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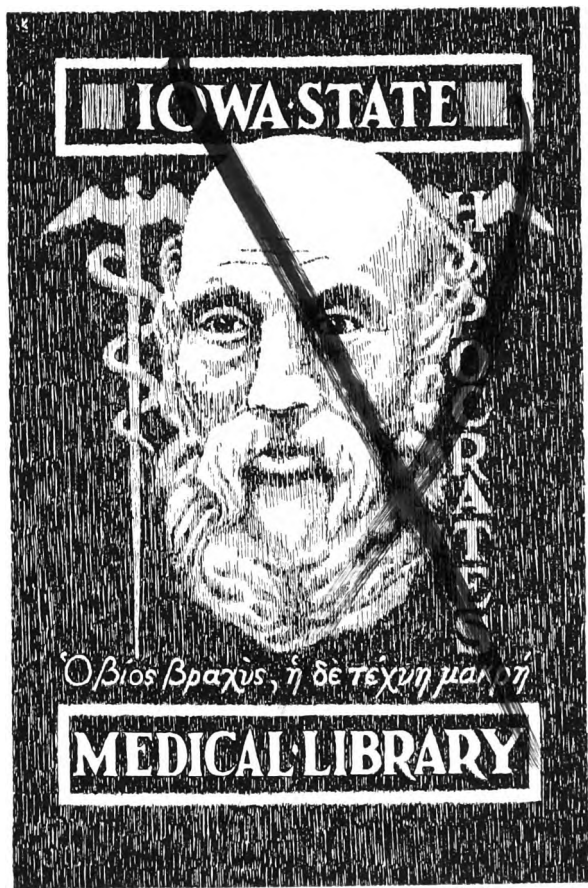
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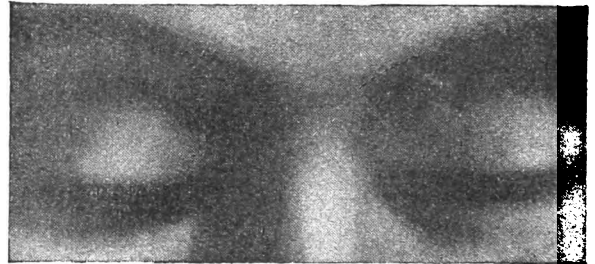
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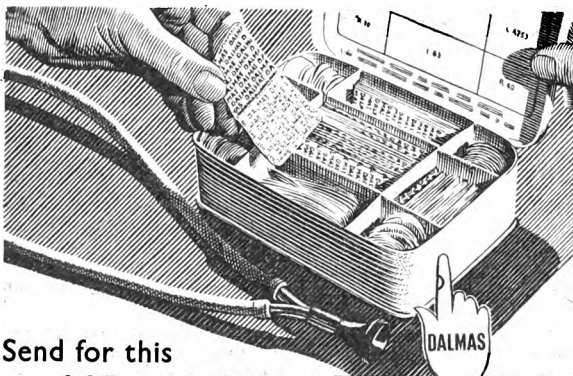
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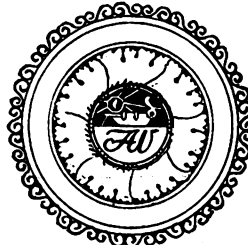
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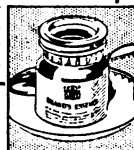
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SIX CASES TREATED SURGICALLY

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D.M. Oxf'd, F.R.C.P.

PHYSICIAN TO THE LONDON
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MARCIA WILKINSON

B.M. Oxf'd, M.R.C.P.

MEDICAL REGISTRAR AT THE MAIDA VALE HOSPITAL FOR
NERVOUS DISEASES

In this paper we describe 6 patients, all middle-aged or elderly women, who suffered from bilateral median neuritis due to compression of the nerves under the transverse carpal ligament at the wrist. They were treated by surgical division of the ligament. This operation appears to have been performed on only three occasions previously (Woltman 1941, Zachary 1945), and in those three patients the compression of the nerves was due to fracture or arthritis. In our 6 patients the compression arose spontaneously, but unaccustomed manual work may have helped to cause it. We have seen 8 other patients in whom the lesion has not yet been verified. Most of these add no fresh features, but allusion will be made to one, in whom the compression was secondary to fracture of the scaphoids and osteo-arthritis. The syndrome presents several points of interest in relation, particularly, to its pathogenesis, to the symptoms of slow compression of a mixed peripheral nerve, and to the diagnosis of partial thenar atrophy.

PREVIOUS OBSERVATIONS

Ramsay Hunt (1909, 1911, 1914) drew attention to syndromes which he described as "the thenar and hypothhenar types of neural atrophy of the hand." The hypothhenar type, which he ascribed to compression of the deep branch of the ulnar nerve, does not concern us further. He reported (1911) three examples of the thenar type. In two the wasting was bilateral, in the third unilateral. The limitation of the wasting to the abductor pollicis brevis, the opponens pollicis, and the outer head of the flexor brevis pollicis, together with the absence of sensory loss, led Hunt to place the lesion, hypothetically, in the thenar branch of the median nerve, which he supposed to be compressed where it passed over the palmar border of the transverse carpal ligament. Later (1914), however, he attributed the paralysis to a lesion of the thenar branch beneath the ligament. Marie and Foix (1912) reported ten examples of "isolated non-progressive atrophy of the small muscles of the hand," with four necropsies; but in only two of their patients was the wasting limited to the thenar eminence, and these were not among those on whom a pathological examination was made. Marie and Foix concluded that the lesion was in the spinal cord and was a localised destruction of anterior-horn cells, mainly of the 8th cervical segment.

A year later, however, Marie and Foix (1913) reported a case in which the lesion was in the median nerve.

Their patient was a woman, aged 80, admitted to hospital with a cerebral vascular lesion and found to have also bilateral wasting of the thenar eminences. Unfortunately, sensory testing was impossible.

Outside the central nervous system there was no lesion except in the median nerves, which showed, immediately above the transverse carpal ligament, a thick and firm nodular swelling or neuroma, while beneath the ligament there was a narrowing due to a "strangulation" which contrasted with the swelling above.

Microscopically the swelling was characterised by great overgrowth of interfascicular and intrafascicular fibrous

tissue, with destruction of myelin sheaths. At the level of the ligament there was still much intrafascicular fibrosis, but it was less marked than above. Weigert-Pal stain showed that the myelin sheaths diminished progressively from the upper limit of the neuroma and disappeared at the level of the ligament.

It was clear that the thenar atrophy in this case was due to an interstitial neuritis at the level of the ligament, causing a strangulation of the nerve beneath the ligament and a neuroma above it.

Brouwer (1920) reported 14 cases. His first 4 patients were tailors; 2 of his female patients did much washing, and 3 had arthritis. Brouwer emphasised the importance of occupation, and considered that the thenar muscles, being of recent phylogenetic development, were especially liable to undergo degeneration as a result of trauma.

Harris (1926) described wasting of the thenar muscles due to neuritis of the median nerve caused by intermittent pressure on the ball of the thumb by an instrument such as a trowel-handle or a scrubbing brush. He also mentioned wasting of the abductor and opponens pollicis as a result of motor neuritis secondary to arthritis of the trapezio-metacarpal joint at the root of the thumb.

Lhermitte and de Massary (1930) reported a case of senile non-progressive thenar atrophy, without sensory loss, associated with an atrophy of the posterolateral group of cells in the anterior horn of the 6th cervical segment of the spinal cord on the affected side.

Dorndorf (1931) reported 16 cases of isolated paralysis of the ball of the thumb. All his patients were women at or near the menopause. He was inclined to attribute the disorder to ischæmia, without reaching a conclusion about the site of the lesion. If it were in the median nerve, he thought the absence of sensory loss must be attributed to a higher resistance of sensory fibres or to a selective damage to the motor fibres.

Wartenberg (1939) reported 7 cases of "partial thenar atrophy." His paper included an anatomical report on the muscular branch of the median nerve to the thenar eminence by Saunders, who has found that this branch arises independently from the volar aspect of the median nerve beneath the middle of the transverse carpal ligament. It then proceeds distally beneath the ligament to its distal border, to pass through a definite canal in the lateral attachment of the ligament to the trapezium. After this it is reflected to pursue a recurrent course to its division to supply the individual muscles. In this part of its course the position of the nerve is variable in its relation to the flexor brevis muscle. Winckler (1930) has reported a case in which the thenar branch actually pierced the anterior carpal ligament. Wartenberg observes that these facts show that the thenar branches of the median nerve may be so unfavourably placed in a normal person as to be subject to trauma by the ordinary use of the hand. Nevertheless he concludes that the evidence that such is the cause of the thenar atrophy is unconvincing. The occurrence in some patients of paræsthesia not necessarily confined to the distribution of the median nerve suggests the presence of some unknown nocuous factor to which Wartenberg supposes the thenar muscles to be specially susceptible owing to their late development in the evolution of man.

Moersch (1938), who reported another case, accepted Hunt's view that the motor branch was injured as it passed over the distal edge of the anterior carpal ligament.

Woltman (1941) reported 2 cases of median neuritis with both motor and sensory symptoms. The first patient had acromegaly, and her hands eventually improved after X-ray treatment of the pituitary. The second patient had unilateral median neuritis, secondary to arthritis of the wrist, with motor, sensory, and trophic symptoms which disappeared after section of the transverse carpal ligament.

Zachary (1945) reported 2 cases similar to the last. His first patient had bilateral motor and sensory symp-

toms corresponding to the distribution of the median nerves in the hand, and X rays showed old fractures of both scaphoids, with osteoarthritis. The left median nerve was operated on by Prof. H. J. Seddon and found to be compressed in the carpal tunnel. An unexplained feature in this case, to which allusion will be made below, was loss of extension of the index and middle fingers. The second patient had an old malunited Colles's fracture and developed symptoms of median neuritis at the wrist more than twenty years later. Again the nerve was found to be compressed in the carpal tunnel, and paræsthesiæ and pain were relieved within two days of operation.

REPORTS OF CASES

A married housewife, aged 49.

History.—Three years ago she started to have a tingling and burning pain in the right hand, involving mainly the thumb and 2nd, 3rd, and 4th fingers. The pain did not extend above the wrist. At the same time her right hand felt numb. The numbness and tingling gradually got worse.

A year ago she noted wasting of the muscles at the base of the right thumb and also developed pins-and-needles and occasional numbness in the left hand. The pain was worse at night and on carrying anything heavy.

Past History.—During the war she had been doing an increased amount of housework.

Examination.—Right hand: wasting and weakness of abductor brevis and opponens pollicis and slight impairment to light touch and to two-point discrimination over the median distribution.

Left hand: slight weakness of abductor pollicis brevis. Slight impairment to pinprick and light touch over the palmar aspect of the 2nd and 3rd fingers, the loss to pinprick being more pronounced. Two-point discrimination: normal. Reflexes present and equal. No tenderness at wrist. No other abnormal signs in the central nervous system.

Radiography.—Cervical spine normal. Wrists, no abnormality detected.

Operation (August 1, 1946).—General anaesthesia. The right median nerve at the wrist was found to be enlarged and flattened above the carpal ligament, and was about three times the size of a normal nerve. A small vessel ran down the anterior side of the nerve, disappearing 1 in. above the carpal ligament. The bundles of nerve-fibres were separated by (? oedema) fluid, and in the carpal tunnel the nerve was thickened and swollen. There was no definite groove corresponding to the upper end of the carpal ligament.

Left nerve: similar in appearance to right nerve, but the changes were less well marked (fig. 1).

Follow-up.—August 17: subjectively there was a considerable improvement. She no longer complained of the burning pain and only occasionally had a tingling feeling. There was still some numbness of the tips of the fingers.

Feb. 3, 1947: no pain; occasional tingling in right hand, none in left. Hands feel stronger but no subjective improvement in sensation. Wasting and weakness of right abductor pollicis brevis less, otherwise no change in voluntary power. Sensation: right hand, no change in anaesthesia or tactile discrimination, analgesia limited to distal two-thirds of digits supplied by median nerve; left hand, slight hypæsthesia over median distribution, hypalgesia over distal half of index and middle fingers only.

II

A married tailoress, aged 37.

History.—Five years ago she noted that her left thumb was becoming weak, and that she could not button up her coat properly. Her thumb felt numb and cold, and she had some numbness of her 2nd and 3rd fingers. When she carried a heavy bag she had a feeling of numbness extending up her forearm to her elbow.

Three and a half years ago she noticed wasting of the muscles at the base of her left thumb. She attended a hospital and was told that she had progressive muscular atrophy.

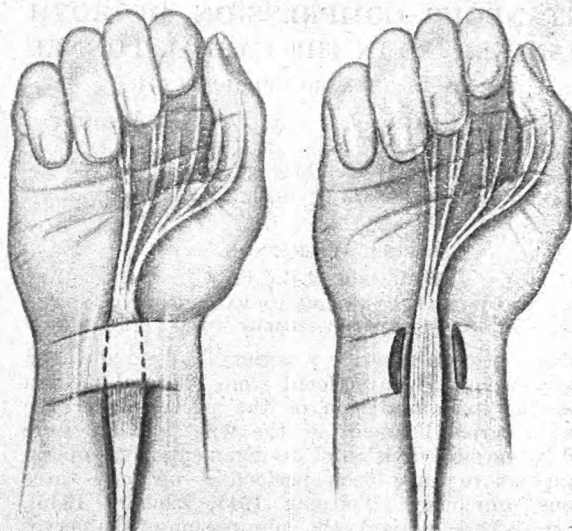


Fig. 1.—Case 1: median nerve flattened and enlarged under carpal ligament.

Three years ago the thumb and 2nd and 3rd fingers of her right hand became numb and the muscles of the right thumb wasted, and she had an itching feeling in her fingers.

For the past three years there has been no progression in her symptoms, but she still has pins-and-needles, numbness, and itching, and cannot sew because of the weakness and clumsiness of her thumb and fingers.

Past History.—On one occasion she was thrown to the ground by a bomb exploding close by, and she fell rather heavily on her outstretched hands.

Examination.—Well-marked weakness and wasting of both abductor pollicis brevis and opponens pollicis muscles. Slight hypalgesia and hypæsthesia over the thumb and 2nd and 3rd fingers of both hands. Two-point discrimination and joint sense normal. No other abnormal signs in the central nervous system.

Radiography.—Wrists and cervical spine: no bony lesion seen.

Operation (Sept. 19, 1946).—The left median nerve was found to be pale and swollen to about twice its normal size. The swelling extended for $\frac{3}{4}$ in. above the carpal ligament. The right nerve was also swollen but was slightly pink under the carpal ligament. In both nerves the nerve bundles could be seen distinctly. The carpal ligament was divided on both sides.

Follow-up (Jan. 23, 1947).—She had lost the feelings of numbness extending up the forearm to the elbow and had no pain or paræsthesiæ in the hand. There was still gross weakness and wasting of the abductor pollicis brevis on both sides, but power in the opponens pollicis on both sides was almost normal. There was slight hypalgesia over both hands of the same distribution as before, and an area of hypalgesia about 3 cm. in diameter on the palmar aspect of the left hand just distal to the end of the scar. Appreciation of light touch and tactile discrimination were normal.

III

A married housewife, aged 67.

History.—Six months ago she began to get a feeling of pins-and-needles in the tips of the 2nd and 3rd fingers of each hand. Later these fingers and the thumb became weak.

Five and a half months ago she was awakened at night with severe pains in the palms of her hands. These pains persisted and were always worse at night.

Five months ago the numb feeling spread from the tips of her fingers to the palms of her hands, and she was unable to hold or pick up small objects, such as needles. When she touched an object she got a pricking feeling in her fingers, although they felt numb. At night she had a burning feeling in her hands, and during the day her hands felt cold.

Three months ago she noticed that her hands were getting thinner.

Past History.—During the war she has had to do an increased amount of housework. No history of trauma.

Examination.—In both hands weakness and wasting of *opponens pollicis* and *abductor pollicis brevis*. No weakness of flexion or extension of the wrist. Hypalgesia, hypæsthesia, and impairment to two-point discrimination over distribution of median nerves. Slight defect of postural sense in the terminal phalanges of 2nd and 3rd fingers of the left hand.

No other abnormal physical signs in the central nervous system.

Radiography.—Wrists and cervical spine: no bony lesion seen.

Operation (June 11, 1946).—Both median nerves were exposed. The left nerve was swollen and pink for $\frac{3}{4}$ in. above the carpal ligament, and there was a depression on it corresponding to the upper level of the carpal ligament. The median nerve on the right side, which was also swollen, had divided into two parts about $1\frac{1}{2}$ in. above the upper end of the ligament.

Follow-up.—Two or three days after the operation pinprick was felt more sharply on the right hand, and there was a slight improvement in two-point discrimination. Subjectively there was considerable improvement, as the severe pain stopped and, though the fingers felt numb, the feeling of pins-and-needles diminished. Her nights were no longer disturbed.

Sept. 5: the feeling of numbness had shrunk to the distal half of the left index and middle fingers only. The wasting was less, and power had improved. Hypalgesia was present on the index and middle fingers and the terminal phalanx of the thumb. Hypæsthesia was present only over the terminal phalanges of the thumb, index and middle fingers, and tactile discrimination over the right index and left index and middle fingers only.

Nov. 6: she wrote that her hands felt much less numb, and that the movements of the thumbs were much stronger.

IV

A married housewife, aged 51.

History.—Twenty-one months ago she started to have a burning uncomfortable feeling in the index and middle fingers of both hands, which lasted for several months. After this she was free of all unpleasant sensation for five or six months.

Nine months ago she began to get a tingling feeling in the thumb and 2nd, 3rd, and 4th fingers of the left hand and the thumb of the right hand. This feeling gradually developed into a burning pain which affected the fingers but not the thumb.

Three or four months ago the same fingers began to feel numb, and the burning pain was brought on by using her hands. The tingling feeling was always worse in the mornings and more recently woke her up at night.

Past History.—In the past she has had several heavy falls on to her hands, but she has not broken any bones. In the last few months she has been doing an increased amount of housework.

Examination.—Wasting and weakness of both *abductor brevis pollicis* muscles. The short flexor of the thumb and the *opponens pollicis* were not affected.

Hypalgesia and hypæsthesia and slight loss of two-point discrimination in the distribution of the median nerve, the loss being more marked on the right than on the left. No other abnormal physical signs in the central nervous system.

Radiography.—Wrists and cervical spine: no bony lesion seen.

Operation (June 28, 1946).—Both median nerves were exposed at the wrist. On the right the nerve was pink and swollen for about $1\frac{1}{2}$ in. above the carpal ligament. The bundles of nerve-fibres could be seen distinctly. Below and more than $1\frac{3}{4}$ in. above the carpal ligament the nerve appeared normal. The left nerve was similar to the right and was even more swollen, being nearly as large as the sciatic.

Follow-up.—Two or three days after the operation there was a considerable subjective improvement. The tingling and burning pain went, but the affected fingers still felt numb.

After operation there was still impairment to pinprick and light

touch, but this was less marked, and two-point discrimination was only very slightly impaired.

Feb. 3, 1947: no pain or paræsthesiæ. Fingers tend to go white in cold weather and puffy and shiny when very hot. Able to do housework, knitting and sewing normally. Just detectable wasting of *abductor pollicis brevis* on both sides: power in these muscles 90% of normal, and power in both *opponens pollicis* normal. No anaesthesia or analgesia; tactile discrimination perfect at 0.5 cm. separation.

V

A married housewife, aged 57.

History.—Two years' history of pain in front of right wrist spreading to thumb, index and middle fingers, like electricity, and associated with numbness in thumb, wasting of outer aspect of thenar eminence, and weakness of thumb. Four weeks' onset of pain and paræsthesiæ in left thumb, index and middle fingers. Left shoulder always higher than right. Occasional pain in neck on extension.

Examination.—Severe wasting and weakness of *abductor brevis* and *opponens pollicis* of right hand, and slight of left. Weakness of extension of right thumb at metacarpophalangeal and interphalangeal joints. Slight impairment of appreciation of light touch and pinprick over distal half of palmar surface of thumb, index and middle fingers, and radial half of ring finger of both hands and corresponding dorsal surfaces of terminal phalanges: no loss of tactile discrimination or postural sense. Sensory loss greater on right hand than left.

Electrical Reactions.—Faradic response lost in right *abductor brevis* and *opponens pollicis*, and sluggish in *abductor longus* and the extensors of the thumb on both sides.

Neck very short; extension somewhat limited; some pain on lateral flexion. Prominence of lower cervical spinous processes. Left scapula higher than right.

Radiography.—Dr. James Bull reports: "There are seven cervical vertebrae of which the atlas alone has a fairly normal appearance. C2 and C3 are fused and lack an intervertebral disk space between their bodies. C4 and C5 are fused and have a rudimentary intervertebral disk space. The same applies to C6 and C7. True intervertebral disk spaces are present between the pairs at C3-C4 and at C5-C6 level. The disk space between C7 and D1 is normal. Osteo-arthritic changes are present between C3-C4 and C5-C6. The body of C6 is rather rudimentary on the right side and causes a scoliosis. Bilateral cervical ribs are present at C7, the right being larger than the left. A very rudimentary cervical rib is present on the right side at C6.

"The right scapula is normal. The left scapula lies very high, the upper border being at the level of C7 (that on the right is at T3 level). The vertebral border of the left scapula, instead of having a normal straight edge, is angulated towards the spinal column in a V shape. At the apex of the V an abnormal bone articulates rather in the manner of the acromioclavicular joint. The abnormal bone has a spatulate appearance. It is triangular, with the apex directed cranially. The apex articulates with the spinous process of C5, the angle at the left base articulates with the left scapula as already mentioned, and the remaining angle of the bone is free. This triangular bone is about 8 cm. long and 7.5 cm. broad. It appears to be about as thick as a scapula and has a spinous process directed backwards at its upper end."

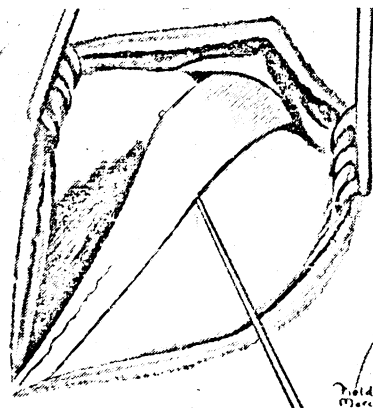


Fig. 2—Median nerve swollen and resembling a tendon.

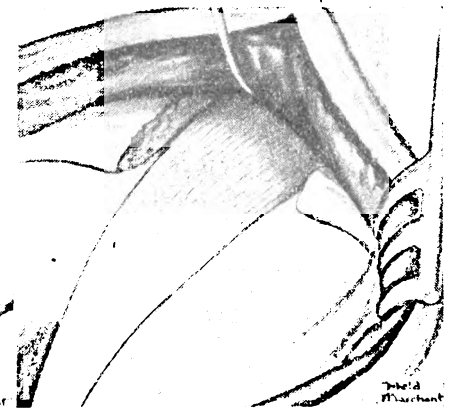


Fig. 3—Carpal ligament cut to expose median nerve.

Operation (Oct. 14, 1946).—The right median nerve was swollen for about $\frac{1}{2}$ in. above the carpal ligament and under the ligament. The carpal ligament was incised. The left median nerve was then exposed. This was also swollen but was pinker than the right. The left nerve divided into two parts about 1 in. above the upper end of the ligament, both parts running together under the ligament. The ligament was incised and the wound sutured.

Follow-up (Feb. 5, 1947).—No pain or paræsthesiæ. Power in thumbs stronger; can now darn for the first time for two years. Slight wasting of right abductor brevis pollicis, in which power is about half of normal. Muscular power otherwise normal in both hands. No substantial change in sensation.

Electrical reactions normal in thenar muscles of both hands except right abductor brevis pollicis which does not respond to faradism but responds normally to interrupted galvanism. Extensors of thumbs normal.

VI

A married housewife, aged 67.

History.—Three months ago while on holiday she did a great deal of unaccustomed heavy work. A few days later she developed a sharp shooting pain in her arms, which went down her hands. Every time she drew a deep breath she got a stabbing pain in the arm. The pain in the hand affected chiefly the 3rd finger and was always worse at night.

Six weeks ago she had some physiotherapy, which seemed to make the pain in her hands worse.

Five or six weeks ago both thumbs became weak and useless, the left being more affected than the right. She has noticed that the thumb and 2nd, 3rd, and half the 4th finger have felt numb, and she has a severe burning pain in her hands.

Right-handed.

Examination.—Hands: wasting and weakness of the opponens pollicis and abductor pollicis brevis, more marked on the left than on the right. Hypæsthesia and hypalgesia over the distribution of the median nerve. Joint sense and vibration sense normal. Two-point discrimination: no gross impairment. Reflexes present and equal. No other abnormal signs in the central nervous system.

Radiography.—Neck and wrists: no bony lesion seen.

Operation (Oct. 29, 1946).

Left hand: the median nerve was swollen and slightly pink. The surrounding tissues seemed more adherent than in a normal nerve. The carpal ligament was cut through.

Right hand: changes were similar to, but less marked than, those on the left. The carpal ligament was divided.

Follow-up (Feb. 5, 1947).—Feels much better. Free from pain except for occasional shoot in the fingers. Fingers still feel numb, but can knit and sew. Wasting of right thenar muscles less, but left unchanged. No change in voluntary power. Hypæsthesia of median distribution on both hands. Hypalgesia now limited to median supply to digits of right hand and on the left hand distal half of digits supplied by median nerve.

The clinical picture which emerges from these patients begins with burning and tingling sensations in the distribution of the median nerve of one hand. The discomfort may be severe and awaken the patient at night. *Pari passu*, weakness of the abductor brevis and opponens pollicis or, as in case IV, abductor brevis alone, develops, and these muscles waste fairly rapidly. Appreciation of pinprick, light touch, and tactile discrimination are impaired over the distal half of the fingers innervated by the median or even over the whole of the palmar aspect of these fingers. At this stage the pain diminishes, but sensory loss interferes with the manipulation of fine objects. Within an interval of weeks, months, or years the other hand is similarly affected. There is no weakness of the muscles innervated by the median nerve in the forearm, nor is the nerve usually tender at the wrist.

In all the patients operated on, the same lesion has been found: a compression of the median nerve where it passes beneath the transverse carpal ligament, and a swelling of the nerve for an inch or so immediately above this. When the history has been short, the swollen nerve has appeared pink; in more chronic cases it has seemed more fibrotic. It seems likely that the final condition in untreated cases is a neuroma, such as that examined histologically by Marie and Foix (1913).

PATHOGENESIS

The carpal tunnel (fig. 1) lies between the tough transverse carpal ligament anteriorly and the bones of the wrist-joint. It is divided into two compartments, the larger of which contains the tendons of the flexors of the digits and the median nerve, and the smaller the tendon of the flexor carpi radialis. Normally there is little spare room in the carpal tunnel, and it is easy to see how the median nerve may be compressed between the bones of the wrist-joint and the transverse carpal ligament when the tunnel is narrowed owing to fractures involving the lower end of the radius or proximal carpal bones, or to osteo-arthritis of the wrist. In our patients, however, no bony lesion was shown radiographically, and the source of the compression must be sought elsewhere. There can be little doubt that occupation is a causal factor. One of our patients, like four of Brouwer's, was employed in tailoring; four of the others said they had done much unaccustomed housework during the war; and in the last the onset occurred at a time when she had to carry buckets of water.

Abbott and Saunders (1933) state that, even in normal persons, acute flexion of the wrist pinches the median nerve between the proximal margin of the transverse carpal ligament and the anterior border of the distal end of the radius. They carried out injection experiments on the cadaver which showed that, if the wrist was in a position of acute flexion with some ulnar deviation, solutions injected proximally into the median nerve were arrested at a point opposite the proximal border of the transverse carpal ligament; whereas, if the wrist was held in moderate flexion or extension, the injections flowed easily into the palm of the hand and even along the terminal branches of the nerve.

Our own observations do not support the view that flexion of the wrist is the important factor. If the tip of the little finger is introduced into the carpal tunnel in the cadaver, it is easy to feel that there is much more room in it during flexion of the wrist than during extension. Moreover, on flexion of the wrist, as might be expected, the median nerve becomes slacker. To measure the pressure changes we constructed a simple tambour consisting of an elongated rubber bulb, which was introduced into the carpal tunnel and was filled with water and connected to a manometer. The pressure was adjusted so as to register 0 when the wrist was straight. Flexion to a right angle raised the pressure to 100 mm. of water, but extension to a right angle raised it to well over 300 mm. of water. Measurement of the volume displaced showed that extension reduced the content of the bulb by 0.7 c.cm. as compared with flexion.

Acute flexion of the wrist is a rare movement, but extension is a common one, and repeated extension occurs in housework. In scrubbing and polishing, the hand holding the brush or the cloth is usually extended at the wrist, and the other hand often rests with the palm upon the flat surface and the wrist also extended. It seems that the rise of pressure in the carpal tunnel caused by repeated extension of the wrist is in some people sufficient to cause compression of the median nerve. Since most patients affected in this way are middle-aged or elderly, and since the pathogenic process in all pressure lesions of nerves appears to be ischæmia, it is probable that vascular degeneration in middle life increases the ischæmic effect of pressures which might be harmless in younger people. Moreover, the reaction of the nerve to pressure is œdema, which increases the pressure still further and so leads to a vicious circle.

The severity of the œdema above the constriction was surprising, but these observations in man confirm what has been found in the experimental animal. Weiss (1943a and b), in the course of experiments which involved the splicing of divided peripheral nerves by a cuff of live artery, noted that, when the splice was too

tight, œdema developed in the nerve on the proximal side of the constriction, and thought that this indicated a centrifugal flow of lymph in the nerve which was obstructed by the constriction. Denny-Brown and Brenner (1944b) have observed a similar œdema after compression of a peripheral nerve with a spring clip. They reject Weiss's explanation on the ground that in his experiments the nerves were divided, and that the resulting interference with the circulation in the peripheral segment explains why the œdema was more severe proximal to the lesion. In their spring-clip experiments œdema was noted both above and below the site of compression. "Continued pressure on a segment of nerve," they write, "not only renders that region ischæmic but induces prolonged vascular stasis in neighbouring regions." After such lesions, as after tourniquet paralysis (Denny-Brown and Brenner 1944a), conduction in motor fibres is selectively damaged, and sensation, if impaired, recovers much more rapidly. The same authors (1944b) attribute this dissociation between motor and sensory function "to a functional property of the disorder of the axoplasm, and not to selective effect related to the size of the fibre."

Denny-Brown and Doherty (1945), in acute experiments on the effects of stretching peripheral nerves, found that after milder lesions a pseudoneuroma formed owing to the presence of fluid in the endoneural spaces, whereas when the lesion was more severe a true neuroma was present.

It is thus possible to give a fairly complete explanation of both the operative and clinical findings in our patients. The primary lesion appears to be a compression of the nerve as it passes through the carpal tunnel. The œdema proximal to the compression is comparable with that found experimentally above ischæmic lesions. This, if not relieved, tends to impair the function of the nerve and ends by becoming a true neuroma. The pathogenesis of this form of median neuritis is thus in some respects similar to that of the pressure neuritis arising in a "slipping" ulnar nerve, though the initial mode of compression is different. Meralgia paræsthetica, due to compression of the external cutaneous nerve beneath Poupert's ligament, is an even closer parallel. Since spontaneous recovery does not seem to occur, operation should be carried out as early as possible.

As Zachary (1945) points out, the selective damage to the motor functions, which led earlier workers to postulate an unverified lesion of the thenar branch of the nerve, is explained by our knowledge of the effects of trauma on a mixed nerve. Thus Stopford (1926) distinguishes three stages in the symptomatology of the compression of a mixed nerve: (1) increasing weakness and neuralgic pain; (2) objective sensory disturbance consisting of dissociated loss of appreciation of pain, heat, and cold before light touch, the neuralgia diminishing and disappearing as full analgesia develops; and (3) tactile anæsthesia within a smaller area than the remainder of the sensory loss. We have met with all three of these stages in our patients. Though weakness and wasting have on the whole been more severe than sensory disturbances, the latter have never been absent. Whereas it is possible that thenar atrophy may occur alone if the thenar branch of the median nerve is damaged in isolation, this hypothetical lesion has apparently never been proved to exist; and, in some cases regarded as examples of this lesion, sensory symptoms have been described by the patient—e.g., cases 1 and 2 of Hunt (1911). The frequent sparing of flexor brevis pollicis is no doubt due, as Zachary (1945) points out, to the fact that it is often innervated entirely by the ulnar nerve. When the palmar cutaneous branch of the median nerve lies superficial to the transverse carpal ligament it escapes; hence there is no sensory loss on the palm.

A feature which is difficult to explain is the presence, in two of our patients and in one of Zachary's, of

weakness of some of the long extensors or flexors of the digits. Our case v showed weakness of extension of the right thumb and diminished response to faradism in the corresponding muscles on both sides. In one of our unverified cases both median nerves were compressed at the wrists as a result of osteo-arthritis secondary to fracture of both scaphoids. The patient had loss of flexion of the terminal phalanx of the left thumb, which he said had come on suddenly. Zachary's first patient had almost complete loss of extension of the left index and middle fingers. In our case v the extensors of the thumb recovered pari passu with the thenar muscles. We draw attention to this curious point so that others may look for it and perhaps discover the explanation.

DIAGNOSIS

When sensory symptoms are slight, the muscular wasting may suggest progressive muscular atrophy. The sharp limitation of the wasting to the outer half of the thenar eminence, and its severity there, in the absence of wasting elsewhere and of fibrillation, are characteristic, and the presence of paræsthesiæ and even slight sensory loss of median distribution exclude motor-neurone disease. Syringomyelia is not likely to lead to difficulty, for the characteristic dissociated sensory loss will usually be present and extend over an area wider than the distribution of the median nerve. Muscular wasting will not be limited to the thenar eminence, and the tendon reflexes will, as a rule, be diminished or lost in the upper limbs.

The diagnosis from the costoclavicular syndromes may be much more difficult; two of our cases had previously been diagnosed as such. Wilson (1913) first drew attention to thenar wasting as a symptom of cervical rib, and in particular to the occurrence of wasting of the abductor brevis and opponens pollicis with sparing of the flexor brevis. To explain this he assumed that "though their peripheral supply is from the same source, their root supply is from two sources, probably the seventh and eighth cervical. . . . It may fairly be concluded that the root supply of the abductor brevis and opponens pollicis is the seventh cervical, and of flexor brevis pollicis the eighth cervical." Wilson offered no proof of this, and there is an alternative and much more probable explanation, both of the wasting of the median muscles and of the sparing of the flexor brevis. Fibres from the C8 and D1 roots run to the median nerve through the inner cord of the plexus and the inner head of the median nerve. Compression of the inner head of the median nerve—e.g., by the third part of the subclavian artery—would involve the nerve-supply to the hand muscles carried by the median; and, as Hight (1943) has shown, in 80% of cases the flexor brevis is supplied by the ulnar nerve. Whatever the explanation, partial thenar wasting may be produced by a lesion of the median nerve in the carpal tunnel, or by a lesion of its thenar branch, or as part of a costoclavicular syndrome. Moreover, X-ray evidence of the presence of a cervical rib does not prove that this is the source of the wasting, since in our case v bilateral cervical ribs together with the Klippel-Feil syndrome and Sprengel shoulder coexisted with pressure neuritis of the median nerves.

Sensory abnormalities are therefore most important in diagnosis. They are relatively uncommon in the costoclavicular syndromes associated with structural abnormalities. In 60% of Sargent's (1921) 65 cases of cervical rib no objective sensory change was found, and in only 4 patients was sensation impaired on the radial side of the hand. The thenar type of wasting was present in 12 out of 32 cases. Thus it is clear that thenar wasting due to cervical rib is unlikely to be associated with sensory loss falling within the cutaneous distribution of the median nerve. When, as commonly happens, cervical rib involves either the C8 or D1 contribution to the

plexus, or the inner cord, or the inner head of the median nerve, the segmental cutaneous area affected will be D1 or C8 or both. Even if the plexus be postfixed so that the C8 root carries sensation to what is normally the C7 cutaneous area, there will be no sensory change on the thumb or index finger. Objective sensory loss on the thumb or the index finger associated with thenar wasting is therefore most unlikely to be part of a costoclavicular syndrome and points to damage to the median nerve. Similarly, sensory impairment of full median distribution affecting the radial half of the ring finger and sparing the ulnar half can be caused only by a median-nerve lesion and not by a lesion involving the brachial plexus.

SURGICAL TREATMENT

The operation is carried out through an incision over the front of the wrist. The vertical incision is 2 in. long and precisely in the middle, and ends at the distal transverse crease, as it was felt that it was preferable not to make an incision over the flexor aspect of the wrist or to leave a scar on the palm. The nerve is practically subcutaneous and very easily found. Delay may be caused because of the altered appearance of the nerve, which resembles a tendon, as it is swollen to two or three times its normal size (fig. 2), resembling the friction neuromata seen in cases of cervical rib or attrition of the ulnar nerve at the elbow. In 2 of the 6 cases the nerve had divided about 2 in. above the carpal tunnel and passed through the tunnel in two thickened parts; this very common abnormality might also cause delay in recognising the nerve. It seems that there is an effort on the part of the perineural and endoneurial connective tissues to protect the delicate nervous elements by thickening. The effect of this thickening is not helpful to the nerve, as it increases the friction and the compression even more so if this is a factor, as in the type of case we are now considering. It was demonstrated at operation that there is a considerable to-and-fro excursion of the median nerve in the carpal tunnel during wrist movements, but the thickening extended over much more of the nerve than the part chafed, the hyperplastic process extending some distance on each side of the irritated portion.

The anterior carpal ligament is cut through in the midline along its entire length (fig. 3) until the thenar muscles originating from its inferior border are seen and partly divided; the finger can then be passed through the tunnel with ease, to make sure that the nerve is free from constriction. The nerve is now lifted from its bed so as to demonstrate certain constant filmy adhesions, which are divided until the nerve is quite free, when it is returned to its bed and the wound sutured after securing hæmostasis following the removal of the tourniquet. No splinting is applied after the operation, and the wrist is only partly immobilised with a firmly bandaged wool dressing for seven days until the stitches are removed.

There is no reason to fear prolapse of the tendons, because all powerful movements of the hand are done with the wrist in extension. The physiotherapy appropriate to a peripheral-nerve lesion should be carried out.

RESULTS OF OPERATION

These patients have been observed for only a short time—from 3 to 7 months—since operation. Relief from pain and tingling was rapid and complete in all cases. No. iv has made an almost complete motor and sensory recovery in 7 months. No. v has made an almost complete motor recovery in 3½ months without objective sensory improvement. The others have all improved to some extent, and improvement may be expected to continue until from 6 months to a year after operation.

SUMMARY

Six cases of bilateral compression of the median nerve in the carpal tunnel are reported. All occurred in middle-

aged or elderly women without X-ray evidence of bony damage in the neighbourhood of the wrist-joints.

The symptoms were pain, paræsthesia, and cutaneous sensory loss within the distribution of the digital branches of the median nerves, and partial thenar atrophy, limited to the abductor brevis and opponens pollicis muscles or even the abductor brevis alone.

All were treated by surgical division of the transverse carpal ligament with immediate relief of pain and tingling, and gradual improvement in power and diminution in sensory loss.

The lesion found at operation was compression of the nerves in the carpal tunnel, and œdema for about 1 in. proximally.

It has been shown that extension of the wrist raises the pressure in the carpal tunnel, and it is suggested that occupations involving this movement may in time lead to compression of the median nerves.

The symptoms and pathology are discussed in the light of recent experimental work.

Diagnosis, especially from costoclavicular syndromes, is considered.

We are indebted to Dr. Douglas McAlpine for allowing us to report case vi, and to Prof. J. D. Boyd, Prof. H. J. Seddon, and Mr. R. B. Zachary for helpful comments.

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PURIFIED PRECIPITATED DIPHTHERIA TOXOID OF CONSTANT COMPOSITION

(P.T.A.P.)

LEWIS B. HOLT
M.Sc. Lond.

From the Inoculation Department, St. Mary's Hospital, London

DESPITE considerable advances extending over a long period, it has not hitherto been possible for the manufacturer to make any accurate prediction of potency, when assayed by in-vivo methods, of batches of diphtheria prophylactic, whether formol toxoid or alum-precipitated toxoid (A.P.T.). This lack of reproducible physiological activity has rendered unsatisfactory the assessment of immunising procedures, such as dosage, time intervals, &c.

The difficulties in the preparation of A.P.T. of uniform antigenicity arise principally from our limited knowledge of its exact composition, of the mechanism of the enhanced activity of the precipitated toxoid when administered as A.P.T., and of the influence of impurities on the induced antibody response. The position has recently been described by Glenn (quoted by Lewis 1941) as follows:

"Any comparison between the efficiency of different prophylactics can only be made if many batches of the same type have been used, owing to the great variation in

the antigenic value between individual batches of the same type. The simplest type of prophylactic, formol toxoid, is subject to great variation. Glenny and Barr (unpublished) have found that the antigenic efficiency of two batches of diphtheria toxoid, of the same flocculating value and time, can vary at least a hundred-fold, as judged by antitoxin production in guineapigs. Large enough groups of animals were used to cut out individual animal variation. Methods of preparing A.P.T. introduce further variation: the type of medium used, the amount of potash alum added, and the subsequent separation and cleansing of the precipitate differ considerably in different laboratories."

This report is a summary of an inquiry into the nature of A.P.T. and of a method of preparing a new diphtheria prophylactic with an immunising activity at least equal to that of high quality A.P.T. and having a constancy of composition previously unattainable.

TECHNICAL.

The first stage of the investigation was the preparation of the medium for the growth of the strain of *C. diphtheria* used. A slight modification of Mueller's (1939) semisynthetic medium was adopted which eliminated the variations inherent in digest media and gave toxins free from undesirable peptones and similar substances.

A study of the mineral composition of different samples of A.P.T. revealed that they were essentially a mixture of aluminium hydroxide and aluminium phosphate approximately in the ratio of bicarbonate to inorganic phosphate present in the formol toxoid.

It has been found, however, that both pure aluminium hydroxide and aluminium phosphate will precipitate the toxoid antigen; but whereas aluminium phosphate precipitates only protein, aluminium hydroxide also precipitates other nitrogenous matter. Finally, it was found that, if purified toxoid was added to a suspension of pure aluminium phosphate, the toxoid was precipitated in useful amounts.

Since this integrated preparation is a potent immunising agent (see below) it was important to be able to prepare the purified toxoid on a large scale. The refined toxoid used in this work was prepared by a method which will later be described in detail. It has a purity of 1200-1500 Lf/mg. nitrogen.

The purified and concentrated toxoid may be freeze-dried and stored for a long period. The dried material redissolves, apparently unaltered, on the simple addition of distilled water or saline.

PRELIMINARY POTENCY TESTS

When it was found that a suspension of pure aluminium phosphate would remove the toxoid from solution, it became clear that this could be the basis of an alternative method of preparing a diphtheria prophylactic without the disadvantages of alum precipitation, provided that the resultant product was a potent immunising agent.

A sample of pure aluminium phosphate was prepared with equimolar amounts of aluminium chloride and trisodium phosphate to give 3 mg./c.cm. of aluminium-phosphate suspension. To this was added sufficient concentrated and purified toxoid to give Lf 50, and the mixture was left standing for twenty-four hours. Examination of the preparation revealed that there was no detectable toxoid in the supernatant fluid, but that it was all in the centrifuged deposit.

A potency test was carried out with this preparation, using ten guineapigs (300 g. in weight) each receiving subcutaneously an injection of 1 Lf of the diluted preparation in 1 c.cm. of saline. The dose was repeated four weeks later, and the animals were bled six weeks after the first injection. A small quantity of blood was taken from each animal at the time of the second injection

to observe the average antitoxin titre four weeks after one injection. The results were:

Titre after four weeks (one dose) .. 0.2 unfit per c.cm. of serum (average value).

Titre after six weeks (two doses) .. 2.25 units per c.cm. of serum (geometric mean).

A duplicate test with another sample of purified and concentrated toxoid gave the following results:

Titre after four weeks (one dose) .. 0.2 unit per c.cm. of serum (average value).

Titre after six weeks (two doses) .. 2.05 units per c.cm. of serum (geometric mean).

Although not exceptionally good, these results were reasonably consistent and sufficiently satisfactory to warrant further investigation.

PROPERTIES OF PURIFIED TOXOID, ALUMINIUM-PHOSPHATE-PRECIPITATED

In the large-scale preparation of this new diphtheria prophylactic, with highly purified toxoid, and aluminium phosphate as precipitant and mineral carrier, several important points have to be borne in mind.

It is easy to add a measured volume of concentrated purified toxoid solution to a definite quantity of aluminium-phosphate suspension, and this operation may be regularly and readily reproduced. It is necessary, however, to ascertain what influence the following factors have on the potency of such preparations:

(1) Any damage inflicted on the toxoid during the processes of toxoiding and purification. For instance, an increase in the time required for flocculation with antitoxin (Kf) may indicate some damage inflicted on the toxoid.

(2) Purity of the toxoid solutions used. It is not yet practicable to produce the pure toxoid commercially. That used in the present method is about 66% pure. (The toxoid present in the initial solutions accounts for about 25% of the total protein or 2% of their total nitrogen contents.)

(3) Any influence of the amount of mineral carrier used per dose. Seal and Johnson (1941) have reported that an increased amount of alum precipitate does give rise to the production of more antitoxin in animals. These experiments were only roughly quantitative, and the observations were not further investigated.

The following information has been obtained on these points:

(1) *Prolonged Kf.*—Though the method of toxoiding used produces a toxoid with a Kf not exceeding three times that of the parent toxin, there is a *reduction* of Kf for the final purified solution compared with the initial formol toxoid.

(2) *Purity of Toxoid Solution.*—This important aspect of the problem in different samples of diphtheria prophylactic is being more closely examined. The new method of preparation makes it possible to investigate this point more accurately, as the amount of both toxoid and mineral carrier may be precisely controlled, leaving the purity of the toxoid preparation as the only variable factor.

(3) *Influence of Amount of Mineral Carrier.*—Briefly, the more aluminium phosphate injected per unit of toxoid, the greater is the antibody response in guineapigs, but there is an optimal amount, considerably in excess of that required merely to precipitate the toxoid, beyond which the response declines (see below).

STABILITY AND REACTIONS

It is also necessary to find out whether the new preparation is stable on storage, and whether it produces

any untoward reactions in human prophylaxis against diphtheria.

Stability.—Samples of Lf 50, purified toxoid, aluminium-phosphate-precipitated, have been stored at room temperature for a year and have lost only 10% in flocculating power. A sample stored in the refrigerator for two years has shown no detectable loss.

In practice the new prophylactic can be made from purified and dried toxoid and freshly prepared aluminium-phosphate suspension as required.

Reactions.—Schick-positive children and adults have been immunised with the new prophylactic, and no untoward reactions were encountered.

Tests were also made on a few persons hypersensitive to diphtheria formol toxoid and to A.P.T. In these experiments a direct comparison was made between crude formol toxoid and purified toxoid, as well as between A.P.T. and purified toxoid, aluminium-phosphate-precipitated. The dose was 1 Lf each, in 0.2 c.cm. volume, injected subcutaneously. These injections were given simultaneously in strictly comparable skin areas. A reduced inflammatory reaction was definitely observed where the purified toxoid was injected, whether in solution or precipitated; therefore it cannot be claimed that no reactions developed at all. The aluminium-phosphate carrier without the toxoid gave rise to no untoward reactions.

POSSIBILITY OF A STANDARD DIPHTHERIA PROPHYLACTIC

For laboratory and statutory purposes it is desirable to have a standard or reference diphtheria prophylactic against which other preparations may be standardised, in much the same way as with some antitoxins, vitamins, and hormones.

The major difficulty in the use of A.P.T. as a standard has been its instability on long storage. Sir Percival Hartley (1945) has reported that freeze-dried A.P.T. has not proved satisfactory in this respect.

Though it cannot be claimed that the completed purified toxoid, aluminium-phosphate-precipitated, preparations remain stable indefinitely, this difficulty may possibly be overcome, as mentioned above, by using the two components separately: (1) the purified and dried toxoid, and (2) a suspension of freshly prepared pure aluminium phosphate. These could be integrated at the time of the potency test. The dried toxoid could be prepared in bulk and issued in bottles containing an exact number of units of toxoid; to this could be added a definite amount of a defined suspension of aluminium phosphate for the test.

Influence of Amount of Mineral Carrier on in-vivo Potency

When a sample of A.P.T. is to be tested for potency, the regulations of the Therapeutic Substances Act require that it be diluted to Lf 1 (one flocculating unit per c.cm.), and that two injections of 1 c.cm. each into normal guineapigs should be made four weeks apart. The guineapigs should be bled not later than three weeks after the second injection, and the sera assayed individually for their antitoxin values; from these the geometric mean is calculated.

The object of the test is to obtain a measure of the antigenicity of the prophylactic, the titre of which must be not less than Lf 50. To inject into guineapigs the same amounts of A.P.T. as are administered to a child would involve using excessive amounts owing to the difference in weight between test animal and child. A recent Government inquiry (see *British Medical Journal*, 1942) revealed that samples of A.P.T. which had been found satisfactory in field trials—giving high Schick-conversion rates in children—when tested in guineapigs as described above produced sera with a geometric

mean value of at least two units of antitoxin per c.cm.

The dilution of the prophylactic reduces not only the toxoid content but also the mineral carrier, though it preserves their original proportions. Thus the amount of mineral carrier used in the test animal is never more than one twenty-fifth of that for human prophylaxis. Hitherto no animal experiments have been recorded on the potency of a diphtheria prophylactic which maintained the same concentration of carrier as in human prophylaxis and with a reasonably small quantity of toxoid.

It was observed that, when guineapigs were injected subcutaneously with 1 Lf doses of diluted A.P.T., nodules never developed, but they invariably appeared when a small dose (0.2 c.cm. or greater) of undiluted A.P.T. was used. Since the depot theory of Glenny et al. (1931), for the enhanced potency of A.P.T. over its parent formol toxoid, postulates a depot, or reservoir, of slowly liberated toxoid in the tissues, it follows that the diluted prophylactic should be antigenically inferior to the concentrated one.

It is therefore of practical importance, in human prophylaxis, to determine the optimal amount of carrier to use for both primary and secondary stimuli. With A.P.T. of varying mineral composition this is very difficult to ascertain. For example, it was found that A.P.T. derived from Mueller's (1939) medium toxins did not pass the animal potency test when prepared in the usual way, but did so easily with 1% sodium phosphate added to the formol toxoid used before the addition of alum. This produced a well-marked increase in the amount of precipitate per Lf.

The fact that a potent diphtheria prophylactic can be prepared simply by mixing purified toxoid with a suspension of aluminium phosphate facilitates the investigation of these important questions. By this means it is possible to determine quantitatively the influence of the amount of mineral carrier on the antitoxin response and to ascertain the optimal amount to be contained in diphtheria prophylactics of this type.

INVESTIGATION

For this investigation concentrated and purified toxoids and suspensions of pure aluminium phosphate were used; these were prepared as described above and were preserved with 1/10,000 sodium ethyl mercuriothiosalicylate. Samples were made in which the ratio of toxoid to aluminium-phosphate carrier was varied. In all cases 1 Lf quantities of toxoid in 1 c.cm. amounts were injected into groups of at least 10 guineapigs. The dose was repeated four weeks later. A small quantity of blood (0.5 c.cm.) was collected from each animal at the end of the twenty-eight-day interval to obtain the average antitoxin titre four weeks after the first dose. Larger bleedings were made two weeks after the second dose, and each serum was individually assayed for its antitoxin content. From these results the geometric mean value was calculated for each group.

Results.—The results obtained are summarised in the table, with their statistical analysis, which reveals that in every case there was a chance of less than 1 in 100 of these being fortuitous. These results show that the amount of mineral carrier (aluminium phosphate) plays an important part in regulating the antigenic potency of such preparations. When a sample of diphtheria prophylactic is diluted to conform to the official method of assaying potency, the indicated efficiency of the prophylactic, measured by the numerical value of the antitoxin produced, is probably below that obtained from the undiluted preparation, owing to the reduction in the amount of mineral carrier used.

This is shown in series A (see table). The material used was composed initially of 3 mg./c.cm. of aluminium

phosphate with a titre of Lf 50 and was diluted to Lf 1 for the test. The same sample of purified toxoid diluted to Lf 1 but mixed with 3 mg. of aluminium phosphate (corresponding to the preparation A as used for children with only its toxoid component reduced) would give (1) about ten times as much antitoxin for a primary stimulus (its value being taken as 2 units per c.cm. after one dose), and (2) about four times as much antitoxin with two doses (its value being taken as 8 units per c.cm. for two doses).

Particular importance should be attached to the very pronounced efficacy of the primary stimulus with preparations in which the amount of mineral carrier

INFLUENCE OF VARYING AMOUNT OF AL PO₄ ON POTENCY
(Antigen employed constant at 1 Lf per dose)

| Series | Al PO ₄ injected per dose (mg.) | Serum antitoxin titres u./ml. | | Gain | Statistical analysis † | | | | | | | | |
|--------|--|-------------------------------|-------|------|------------------------|----|------|-------|-----------------|-----------------|----------------|----|----|
| | | (I)* | (II)† | | Ratio II I | n | d.f. | Mean | Sd ² | Sx ² | s ² | t | |
| A | 0.06 | 0.2 | 2.2 | 11.0 | 20 | 19 | 2.5 | 52.9 | .. | .. | .. | .. | .. |
| B | 0.2 | 0.4 | 4.1 | 10.0 | 10 | 9 | 4.7 | 50.12 | 103.0 | 3.6 | 3.0 | | |
| C | 0.5 | 0.7 | 4.4 | 6.3 | 10 | 9 | 5.1 | 70.9 | 123.9 | 4.4 | 3.2 | | |
| D | 1.0 | 1.0 | 5.4 | 5.4 | 10 | 9 | 6.9 | 222.9 | 275.8 | 9.8 | 3.6 | | |
| E | 2.0 | 1.75 | 7.6 | 4.3 | 12 | 11 | 8.3 | 154.7 | 207.6 | 6.9 | 6.0 | | |
| F | 4.0 | 1.5 | 3.9 | 2.6 | 14 | 13 | 4.35 | 47.18 | 100.1 | 3.1 | 3.0 | | |

* 28 days after 1st dose (mean value).
† 14 days after 2nd dose (geometric mean).
‡ For this analysis the results from the 0.06 mg./ml. sample were compared with those from the others, using the formula:

$$t = \sqrt{\frac{\bar{x}}{s^2 \left(\frac{n_1 + n_2}{n_1 \cdot n_2} \right)}}$$

has been increased. Further, these results indicate that the optimal amount of mineral carrier required for maximal antitoxin production in guineapigs is approximately 2.75 mg. of aluminium phosphate for each injection.

It would be erroneous to assume that, because a child weighs at least thirty times as much as a guineapig, the best dose of mineral carrier to use in the diphtheria prophylactics for children should be thirty times the optimal amount for guineapigs.

For an accurate assessment of a sample of diphtheria prophylactic it would be more reasonable to use the same amount of carrier for both, but considerably less toxoid in the guineapigs. The figures in the table support this view, though the evidence is weakened by the high antitoxin levels which result from the need to conform to the official potency-test regulations, where 1 Lf of toxoid must be used. To obtain in the guineapig the level of circulating antitoxin which in the child is considered adequate for protection against diphtheria—i.e., about 1/50 unit per c.cm.—with the same amount of carrier, it is not unlikely that very much less than 1 unit of toxoid would be required, particularly when two doses are used.

The figures in the table also show that, as the amount of mineral carrier is increased, the "gain" resulting from the second inoculation is decreased. This aspect of the phenomenon of antitoxin production in the guineapig is being investigated and appears to be of considerable complexity.

The shape of the curve obtained when the "gain"—i.e., ratio of the second response to the primary—is plotted against the amount of aluminium phosphate injected suggested that it was a rectangular hyperbola. This was confirmed by the finding that the product of the "gain" and the number of mg. of aluminium

phosphate plus 1 was a constant. The values obtained for each aluminium-phosphate level were:

| Al PO ₄ injected per dose (mg.) | "Gain" | (Al PO ₄ + 1) × "gain" |
|--|--------|-----------------------------------|
| 0.06 | 11.0 | 11.6 |
| 0.2 | 10.0 | 12.0 |
| 0.5 | 6.3 | 9.4 |
| 1.0 | 5.4 | 10.8 |
| 2.0 | 4.3 | 12.9 |
| 4.0 | 2.6 | 13.0 |

Here the constant is about 12.

Field trials with purified toxoid, aluminium-phosphate-precipitated, on several hundreds of children have been carried out by Dr. Guy Bousfield, who reports his findings separately.

DISCUSSION

It has been shown that it is possible to make a potent diphtheria prophylactic by first purifying the diphtheria toxoid and then incorporating it in a suspension of pure aluminium phosphate. Both the titre and the concentration of aluminium phosphate in the final product can be accurately regulated as required.

Though this new method permits of accurate reproduction from a chemical point of view, it does not necessarily follow that a similar degree of accuracy has been achieved in respect of physiological activity.

In some measure, however, this has been attained, as is shown by the fact that one of the most important variables—the amount of mineral carrier—can be controlled. Further, the removal of much foreign protein and other nitrogenous material initially present in the crude toxoid solutions must help to reduce variations.

From a strictly chemical point of view, if absolutely pure toxoid was used with the aluminium-phosphate carrier, there would appear to be no grounds for expecting variations in physiological activity in preparations of the same composition.

Data to hand have shown that the new prophylactic, when prepared as described, does yield products of unusually constant antigenicity; but, before a complete report can be made on this point, more data are needed.

SUMMARY

A method is outlined for the preparation of a new diphtheria prophylactic, consisting of a purified toxoid precipitated by a suspension of a measured amount of pure aluminium phosphate.

The new prophylactic is antigenically potent, has good storage properties, and produces less reactions than does A.P.T. in sensitive persons.

A method is suggested for the production of a reference or standard diphtheria prophylactic.

In guineapigs the antitoxin response from the purified toxoid, aluminium-phosphate-precipitated, with a constant amount of toxoid is largely governed by the amount of mineral carrier it contains. This is particularly the case when the results of primary stimuli are examined.

For maximal antitoxin production in guineapigs the optimal amount of aluminium phosphate per dose is about 2.75 mg.

A simple mathematical equation has been found to express the relationship between the amount of aluminium phosphate injected and the ratio of the antitoxin obtained from two doses as against one of the same preparation.

My thanks are due to Dr. W. J. Martin, of the London School of Hygiene, for his expert advice on the statistical analysis. Important technical help was rendered me by W. C. Evans, PH.D.

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CLINICAL TRIALS OF DIPHTHERIA TOXOID ALUMINIUM-PHOSPHATE-PRECIPITATED

TO DETERMINE OPTIMAL ALUMINIUM-PHOSPHATE CONTENT

GUY BOUSFIELD
M.D. Lond.

At the request of Mr. L. B. Holt I tried to find out if there were any differences in immunity production when persons were inoculated with batches of the same parent diphtheria toxoid made up so that they contained various amounts of aluminium phosphate.

Holt's method of preparing the antigen renders it possible for the pure phosphate to be used, with great advantage, in that the amount of $Al PO_4$ added can be controlled at will. Using only the phosphate in his preparations, Holt had found that they were physiologically active as immunising agents in guineapigs. It thus became necessary to determine whether his findings could be confirmed in man.

It was essential to make observations only on subjects of reasonably comparable body-weight, who were without substantial basal immunity. The investigation was therefore limited to Schick-positive children between their first and second birthdays. A suburban area, where herd immunity was low, was selected for the work.

The possibility of reaching conclusions based on serum-antitoxin titrations was excluded by the age of the children: a study of the Schick-conversion rate was the only available method of comparing various samples of prophylactic. Nevertheless, I have repeatedly observed in the past that the Schick test will yield results which are generally comparable with those obtained by the more precise method of antitoxin titration, provided that the test is intelligently applied. Thus no apology is made for presenting this work based on the Schick standard.

IMMUNITY RESPONSES

As so often happens when unknown territory is being explored, a preliminary experiment had to be staged. It was necessary to determine what Lf dosage should be used so that it should neither be so large as to

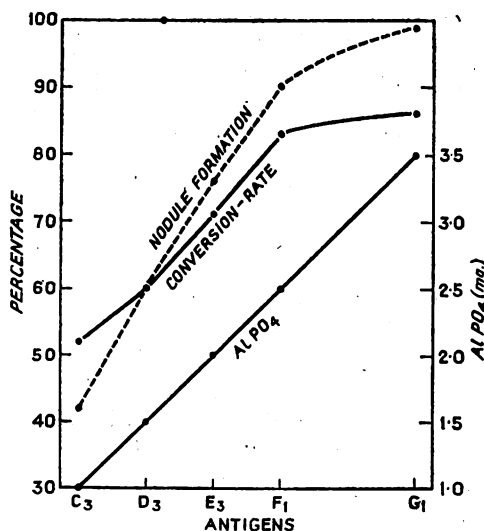


Fig. 1—Relation between amount of $Al PO_4$ injected, nodule formation, and Schick-conversion rate.

the dosage adopted for the preliminary work was 0.3 c.c.m. of a 10 Lf/c.c.m. aluminium-phosphate toxoid, various samples supplied by Mr. Holt containing $Al PO_4$ in concentrations of 0.5, 1.0, 2.0, 3.0, and 4.0 mg. per c.c.m. The actual quantities of $Al PO_4$ injected in the tests were thus three-tenths of the amounts described, as I was using the 0.3 c.c.m. dose. Throughout the work described

in this paper the injections were given subcutaneously, on the outer aspect of the upper arm, so that local reactions could be observed. Successive children were treated in rotation with the various samples of prophylactic, and post-Schick tests were performed twenty-eight days after the single injection of 0.3 c.c.m. The batches yielded striking differences in the immunity response which they evoked; these are shown in table I. At this stage of the work it seemed possible that the findings in group E1 indicated that the optimum $Al PO_4$ dosage had been passed.

These results suggested the adoption of a larger Lf dosage and in consequence a slight corresponding increase in the total $Al PO_4$ injected. The next series thus received 0.5 c.c.m. doses of 10 Lf/c.c.m. preparations containing the same aluminium-phosphate concentrations as were used in the former investigation. The results appear in table II.

When the investigation had gone this far it seemed that there was no reason to suppose that the findings

TABLE I—IMMUNITY RESPONSES IN 251 CHILDREN TO SINGLE INJECTIONS OF 0.3 C.C.M. (3 LF UNITS OF TOXOID)

| Group | Total $Al PO_4$ injected (mg.) | Schick results 28 days after injection | | Conversion-rate (%) |
|-------|--------------------------------|--|----------|---------------------|
| | | Positive | Negative | |
| A1 | 0.15 | 41 | 5 | 11 |
| B1 | 0.3 | 38 | 5 | 12 |
| C1 | 0.6 | 35 | 15 | 30 |
| D1 | 0.9 | 15 | 39 | 72 |
| E1 | 1.2 | 19 | 39 | 67 |

in group E2 indicated that the optimal $Al PO_4$ concentration had yet been reached; so it was decided to extend the scope of the work without delay rather than to accumulate further evidence under the heading of table II. One thing that has to be appreciated in this kind of work is that no experiment can simply be extended to acquire further information. Each series must be complete in itself, so as to allow for minute differences in antigen composition, prevalence of traces of diphtheria infection in varying seasons, &c. These factors may explain the differences in conversion-rates which will be noted in table III, as compared with table II. Such variations render it impossible to present a composite table embodying all results. The trends of the curves are, however, sufficiently clear in the individual tables. For the above reasons I have always found it advisable to provide for an overlap on the last experiment when starting a new series.

Further samples of prophylactic had to be procured from Mr. Holt, and the $Al PO_4$ content of groups C2, D2, and E2 of table II were again used in the next stage of the investigation. The scope of this was extended by the inclusion of two further samples, F1 and G1, these containing 5 and 7 mg. of $Al PO_4$ per c.c.m. respectively, the toxoid being maintained at 10 Lf/c.c.m. These last five samples were prepared from a different parent toxoid. Table III shows the same upward trend in conversion-rates as the $Al PO_4$ dosage is increased.

The flattening of the curve when the 2.5 mg. dosage is reached is best shown in a graph, the rest of the rise being fairly steady. Fig. 1 illustrates the point and suggests that the optimum seems to be approached with the dose used in group G1. Clearly the work could not stop at this point, and a further sample of G1 strength, and two containing more $Al PO_4$, were prepared, H1 containing 10 mg. and I1 containing 15 mg. per c.c.m. Results obtained with these three samples up to the time of publication are shown in table IV, which suggests that the optimal aluminium-phosphate dosage has been reached in sample H1 or thereabouts. At any rate, the

TABLE II—IMMUNITY RESPONSES IN 177 CHILDREN TO SINGLE INJECTIONS OF 0.5 C.C.M. (5 LF UNITS OF TOXOID)

| Group | Total Al PO ₄ injected (mg.) | Schick results 28 days after injection | | Conversion-rate (%) |
|-------|---|--|----------|---------------------|
| | | Positive | Negative | |
| A2 | 0.25 | 31 | 7 | 18 |
| B2 | 0.5 | 26 | 11 | 30 |
| C2 | 1.0 | 13 | 18 | 48 |
| D2 | 1.5 | 10 | 28 | 74 |
| E2 | 2.0 | 4 | 29 | 88 |

amount of the salt which can be added is governed by something more than theoretical considerations. Sample H1 contains about as much Al PO₄ as is convenient from the practical point of view, since prophylactics containing larger amounts leave copious white deposits wherever they fall and may, in vulgar parlance, be described as "messy."

Critics may say that this work is fragmentary. The answer is that one was exploring new territory and had to feel the way carefully so as not to produce unnecessarily severe local reactions as the Al PO₄ content of the prophylactics was increased. With the knowledge gained from the foregoing investigations it will be possible to stage one good experiment, and the next step will be to work out the range between 3 mg. and 15 mg. of Al PO₄ per c.cm. but allowing smaller differences between the various samples as regards their salt content. Thus the true curve and absolute theoretical optimum may be

TABLE III—IMMUNITY RESPONSES IN 285 CHILDREN TO SINGLE INJECTIONS OF 0.5 C.C.M. (5 LF UNITS OF TOXOID)

| Group | Total Al PO ₄ injected (mg.) | Schick results 28 days after injection | | Conversion-rate (%) |
|-------|---|--|----------|---------------------|
| | | Positive | Negative | |
| C3 | 1.0 | 27 | 29 | 52 |
| D3 | 1.5 | 22 | 33 | 60 |
| E3 | 2.0 | 18 | 44 | 71 |
| F1 | 2.5 | 9 | 45 | 83 |
| G1 | 3.5 | 8 | 50 | 86 |

$\chi^2 = 22.7$. $P > 0.01$.

demonstrated in one large series. There is, however, no reason to delay publication of the present findings, which illustrate quite well the paramount importance of controlling carefully the amount of aluminium phosphate which must be added to the prophylactic if an optimal primary stimulus is required.

About half-way through the foregoing investigations the effect of increasing the aluminium salt on the immunity response was so pronounced that it was thought well to perform a small control experiment to meet possible criticism. Ten children therefore received a suspension of the Al PO₄ in 0.5 c.cm. doses of a 7.0 mg. per c.cm. preparation, but no antigen was included. On testing these ten children twenty-eight days later, all were as strongly Schick-positive as they had been originally.

NODULE FORMATION

The next endeavour was to determine to what extent nodule formation in the subcutaneous tissues was related to a satisfactory immunity response, and what bearing the Al PO₄ dosage had on the incidence and character of the nodules. Since all injections were deliberately given subcutaneously, it was easy to palpate for nodules at the time of the post-Schick test, twenty-eight days after the antigen had been administered. The findings are given in table v. They are so arranged that evidence in favour of the depot theory of stimulation appears in

columns marked I and II, while arguments against it might be deduced from columns III and IV.

Taking the findings as a whole, columns I and II, favouring the depot theory, total 363 cases, while presumably contrary evidence in columns III and IV amounts to 144 cases. The evidence that satisfactory primary stimulation is bound up with some degree of local fibrosis and presumed depot action is thus about seven to three in favour of the depot theory.

In fig. 1, based on table III and on a portion of table v, it can readily be seen how striking is the resemblance between the conversion-rate curve and that of nodule formation and Al PO₄ content.

An interesting point arises in considering to what extent a true depot of any real permanency is likely to be established in the body after the injection of A.P.T. or similar prophylactics. It seems probable that the main deposit of antigen can only contribute to such a process for a relatively short time; encapsulation and

TABLE IV—IMMUNITY RESPONSES IN 134 CHILDREN TO SINGLE INJECTIONS OF 0.5 C.C.M. (5 LF UNITS OF TOXOID)

| Group | Total Al PO ₄ injected (mg.) | Schick results 28 days after injection | | Conversion rate (%) |
|-------|---|--|----------|---------------------|
| | | Positive | Negative | |
| G2 | 3.5 | 7 | 35 | 83 |
| H1 | 5.0 | 3 | 42 | 93 |
| I1 | 7.5 | 4 | 43 | 91 |

occlusion from the circulatory or lymphatic systems, must take place fairly rapidly, the enclosed prophylactic presumably serving no further useful purpose. So, if the depot theory is the true explanation of the success of A.P.T. and similar prophylactics, it seems probable that only that portion of precipitate near the periphery of the early inflammatory reaction is utilised, or is concerned with any sort of prolonged local depot action. That amount of A.P.T. must be very small, but I hold the view that the actual Lf dosage necessary to provide a stimulus is probably extremely small. We have to use relatively large doses to create those conditions which render it possible for a small proportion of the injection to be utilised optimally by the body.

Whatever the explanation is, the fact emerges clearly from the foregoing observations that the characteristic of nodule formation is most closely bound up with the use of an antigen with a reasonably high Al PO₄ content; and that the Schick-conversion rate improves with the incidence of a high percentage of nodules obtained as a result of using increasing quantities of aluminium phosphate. Generally speaking, as more Al PO₄ was

TABLE V—NODULE FORMATION WITH HOLT'S ALUMINIUM-PHOSPHATE TOXOID IN NINE DIFFERENT PHOSPHATE CONCENTRATIONS

| Group | Al PO ₄ dosage (mg.) | No. of cases | Devel-oping nodules (%) | I | II | III | IV |
|-------|---------------------------------|--------------|-------------------------|------------------------|----------------------|------------------------|----------------------|
| | | | | With nod. Schick- - | No nod. Schick- + | With nod. Schick- + | No nod. Schick- - |
| A | 0.25 | 34 | 29 | 2 | 20 | 8 | 4 |
| B | 0.5 | 36 | 36 | 6 | 18 | 7 | 5 |
| C | 1.0 | 85 | 42 | 23 | 29 | 13 | 20 |
| D | 1.5 | 89 | 60 | 37 | 13 | 16 | 23 |
| E | 2.0 | 86 | 76 | 58 | 7 | 7 | 14 |
| F | 2.5 | 60 | 90 | 46 | 0 | 8 | 6 |
| G | 3.5 | 37 | 100 | 30 | 0 | 7 | 0 |
| H | 5.0 | 38 | 100 | 35 | 0 | 3 | 0 |
| I | 7.5 | 42 | 100 | 39 | 0 | 3 | 0 |

injected, so the nodules produced became larger and firmer, as well as more frequent, as shown in fig. 1.

It must be emphasised that, in all the work described above, no reactions have been encountered sufficiently severe to suggest that the $Al PO_4$ content of any of the batches used has been pushed beyond the limits of safety or advisability. Complaints of the effects of these subcutaneous injections have been singularly lacking; and, if the intramuscular route is used, there is a total absence of complaint.

These observations on the critical nature of the aluminium content of antigens like A.P.T. may partly explain the variable immunising power of many prophylactics in the past, when it has not been possible to include the same amount of aluminium hydroxide in all samples. Holt's technique will enable the optimal amount of $Al PO_4$ to be used in every batch. This amount remains

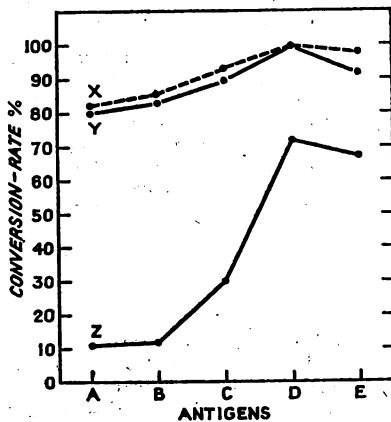


Fig. 2.—Conversion-rates produced by one and by two injections of five batches of antigen containing various amounts of $Al PO_4$: Curve marked X includes as negative to two injections all children who were negative to one injection besides children who only became negative as a result of a second injection; Y, two injections of 9.3 mg. (3 Lf) at 28 days' interval, with Schick tests 3 months later; Z, one injection of 0.3 mg. (3 Lf) with Schick tests 28 days later.

to be determined precisely but, in my opinion, will be found to be about 5 mg. in the 0.5 c.cm. dose. It has yet to be demonstrated whether 5 mg. will be the optimal amount, irrespective of the Lf dosage used with it, but it is suspected that this will prove to be so. One more word may be added in defence of the use of the Schick standard for this work. In immunising the human organism, the essential thing is to show that the highest possible percentage of subjects

have reached a certain minimal degree of education in antitoxin production—i.e., that they have become Schick-negative. This is probably more important than being able to prove in the laboratory that certain methods will produce large quantities of antitoxin in the circulating blood, such amounts probably being totally unnecessary for satisfactory basal immunity. It should be made clear that, though all these findings are based on observation of the effects of primary stimuli, each child received a secondary stimulus also, and all subjects were rendered Schick-negative before discharge from further treatment. In taking the reading of the Schick tests twenty-eight days after the primary stimulus, I was not aware which aluminium-phosphate concentration I had used in any given case until the decision on the test had been made. Prejudice in favour of any batch was thereby excluded.

TESTING A.P.T. OR ALLIED ANTIGENS

For controlling the antigenic activity of diphtheria A.P.T., two injections are given at monthly intervals; under the provisions of the Therapeutic Substances Act these must produce a certain minimal antitoxic response in animals before the antigen can be issued from the laboratory of manufacture.

The first experiment described in this paper (table 1), when extended somewhat, suggested that the response to a single injection would reveal much more clearly any differences between batches of good quality and those which were relatively inferior.

Table 1 shows the response to a single injection of 0.3 c.cm. (3 Lf units) at the end of a month, as revealed by the Schick-conversion rate. When the above-mentioned post-Schick tests were performed twenty-eight days after the primary stimulus a second injection of 3 Lf units, of the same batch of antigen as previously used, was given to each child. Any children who were found, the following week, to be still Schick-positive as a result of the single injection were called for a further Schick test at the end of three months for the effect of the second injection to be observed.

The results were unexpectedly instructive. The conversion-rates of children who were still positive as a result of the first injection and who received the second injection and further three-month Schick tests are plotted in fig. 2, in which the curve obtained as a consequence of only a single injection is also shown. It was, however, considered that a curve based only on the effect of two injections on relatively resistant subjects might present a false picture. It was thus advisable to regard any children who became negative as a result of one injection as certainly being likely to be negative as a result of two, and to add such negative cases to the sum total of those children who were converted as a result of two injections. This curve is also plotted (marked X), and it will be noted that its form does not differ materially from that obtained when only the Schick-positive children who received a second injection were studied.

The five antigens A, B, C, D, and E all showed very different properties when one injection only was used. When two were given the antigens A, B, and C were highly flattered at the expense of D and E.

The conclusion is that the observance, twenty-eight days later, of the effect of a single injection is a more searching test for selecting the best antigens, and that this method therefore yields the most useful information.

Admittedly these results are based on the Schick test alone, but it seems likely that they constitute a pointer to the truth.

SUMMARY

Investigations of the immunising power of various prophylactics prepared from diphtheria toxoid and produced by Holt's new process are described.

Aluminium is used in the form of phosphate, and the effect of using nine different concentrations of the salt in conjunction with a constant number of Lf units of diphtheria toxoid has been studied.

The Schick-conversion rate, in children aged 1 year, is shown to rise steadily as the concentration of $Al PO_4$ in the antigen increases, the Lf unit dosage being constant in all groups compared.

Nodule formation under the skin, after subcutaneous injection of these antigens, was carefully observed; the incidence of nodules rose very nearly in strict proportion to the increase of $Al PO_4$ content.

The findings entirely support results obtained by Holt in guinea-pigs; they are briefly discussed in relation to the depot theory of primary stimulation.

Evidence is put forward to show that the most searching test for the efficiency of prophylactics such as A.P.T. is to observe the effect of a single injection rather than that of two doses. Figures are given which suggest that the two-injection method of testing is liable to flatter poor samples of prophylactic at the expense of better batches.

During the whole of this work there has not been a single complaint of troublesome local or general reactions, even with the highest $Al PO_4$ concentrations.

Thanks are due to Mr. L. B. Holt, M.Sc., for giving me the opportunity to collaborate in this work; and to Dr. A. Anderson, medical officer of health for Heston and Isleworth, for many facilities, for helpful discussion, and for verification of the statistical significance of table III.

ATELECTASIS AFTER PARTIAL GASTRECTOMY

P. STRINGER

M.B. Lond., F.R.C.S.

LATE SURGICAL REGISTRAR, CHARING CROSS HOSPITAL, LONDON

ATELECTASIS, or collapse, has been recognised as probably the commonest postoperative chest complication. Most writers consider that bronchial occlusion, due to inspiration of a mucous plug or resulting from inflammatory oedema of the lining epithelium, is the usual cause; but there is little reference in the literature to the time of onset of postoperative atelectasis.

Thomas (1938) pointed out that, though bronchial occlusion was probably the mechanical factor responsible, collapse did not supervene immediately, citing Brooks's (1938) use of a balloon to produce temporary occlusion of the bronchial lumen as a form of collapse therapy in pulmonary tuberculosis. Collapse did not take place usually until 4-6 hours after inflation of the balloon. Consideration of the time-incidence of occlusion is obviously of importance in the use of bronchial aspiration. Haight (1938) showed the value of such treatment in the early stages of atelectasis to prevent its further development.

It was therefore decided to radiograph the chests of patients who had undergone partial gastrectomy at Charing Cross Hospital and Ashridge E.M.S. Hospital to determine with more accuracy the time of onset of atelectasis. Radiography was done immediately after, four hours after, and twenty-four hours after operation. In certain cases, in which the previous radiological findings and the clinical condition indicated, radiography was done later also. Radiological interpretation was not always easy, and an additional handicap was that the

TABLE I—AGE-INCIDENCE OF ABNORMAL POSTOPERATIVE RADIOLOGICAL SIGNS

| Age-group (years) | Number of cases | | | |
|-------------------|-------------------------|---------|----------------------------|---------|
| | With radiological signs | | Without radiological signs | |
| | Males | Females | Males | Females |
| Under 30 .. | .. | 1 | .. | .. |
| 30-40 .. | 7 | 2 | 11 | 2 |
| 40-50 .. | 8 | .. | 12 | 1 |
| 50-60 .. | 5 | 1 | 3 | .. |
| 60 and over .. | 2 | .. | .. | .. |

first film was taken with the patient supine, the later ones with the patient erect. During the investigation the frequency of atelectasis and certain possible causal factors, such as age and a previous history of chest disease, were also considered.

The preoperative preparation was standard in almost all cases. The patient received sulphathiazole gr. 2 to start and then gr. 1 four-hourly. Breathing exercises, starting on the day before operation, were a routine. The immediate preoperative medication was 'Omnopon' gr. 1/3, scopolamine gr. 1/150, half an hour before operation. The patients numbered 55 (48 males and 7 females), and 26 of them (22 males and 4 females) developed postoperatively abnormal radiological signs including those of various stages of atelectasis and increased hilar striation or vascular markings of a lobe, which may precede atelectasis.

Table I shows that the preponderance of patients operated on fell into the groups 30-40 years and 40-50. Similarly, the highest incidence of those with radiological signs fell into these particular groups. No particular age-group appears especially liable to show

such signs, though a higher incidence is to be noted among the older ones, as would be expected.

Previous respiratory infection has long been recognised as predisposing to postoperative atelectasis. The chronic bronchitic, or the patient with slight bronchiectasis producing a little mucopurulent sputum every morning, is especially liable.

Table II shows that the great majority of the patients gave no history of previous chest disease. Almost the same number of patients with chronic bronchitis and emphysema showed radiological signs after operation as those which did not, although not in all cases was the diagnosis of chronic bronchitis and emphysema confirmed radiologically. From this small series, therefore, it does not appear that previous chest disease necessarily predisposes to postoperative atelectasis.

Anæsthesia.—Much of the recent literature on the subject of postoperative chest complications has considered the influence of forms of anæsthesia on their causation. Such a comparison is hardly possible in the present series, since the anæsthesia in practically all

TABLE II—RELATION OF ABNORMAL POSTOPERATIVE RADIOLOGICAL SIGNS TO HISTORY OF CHEST DISEASE

| Previous condition of chest | Number of cases | |
|----------------------------------|--|--|
| | With radiological signs | Without radiological signs |
| No previous chest disease | 18 | 21 |
| Chronic bronchitis and emphysema | 6 | 5 |
| Previous chest disease | 1 (old pleural effusion) 1 (bronchopneumonia) | 2 (bronchopneumonia) 1 (rheumatic carditis) |

cases was the same. High spinal anæsthesia with light 'Nupercaine' 1 in 1500 or 1 in 1000 by Lake's modification of Howard Jones's method was used almost exclusively. Of the patients who showed radiological evidence of chest complications, 3 received supplementary gas and oxygen; in 4 cases anæsthesia other than spinal was used, 3 of them receiving gas-oxygen and cyclopropane, and the other regional and splanchnic block. Only 3 patients received general anæsthesia alone; all showed abnormal postoperative radiological signs.

Time of Operation.—Brock (1936) has emphasised that in the drier seasons a higher incidence of collapse might be expected owing to greater fluid loss from sweating, with consequent increased viscosity of sputum and possible retention in the terminal bronchioles. The seasonal incidence of radiological complications was therefore noted.

Table III shows that the cases with radiological evidence of pulmonary complication occurred far more frequently in the period March 31-Oct. 1. This suggests that the time of year, possibly for the reasons already suggested,

TABLE III—SEASONAL INCIDENCE OF ABNORMAL POSTOPERATIVE RADIOLOGICAL SIGNS

| Time of year | Number of cases | |
|--------------------|-------------------------|----------------------------|
| | With radiological signs | Without radiological signs |
| Oct. 31-March 1 .. | 8 | 17 |
| March 31-Oct. 1 .. | 18 | 12 |

may contribute to the incidence of postoperative chest complications; but many other factors, such as the temperature on the day of operation and the humidity of operating-theatre and wards, would also have to be considered.

POSTOPERATIVE CHEST COMPLICATIONS

Collapse.—This includes patchy or lobular atelectasis, partial collapse (atelectasis affecting part of a lobe),

and total or massive collapse (collapse of one or more lobes). The first postoperative film was taken on the operating-table immediately after operation, and in all those cases which later showed abnormal radiological signs none were noted in this film (see table IV). The first signs were noted in the film taken four hours after operation. Altogether there were 13 cases of collapse, of which 5 were first manifest in the four-hour film, showing patchy atelectasis.

TABLE IV—TIME OF ONSET OF POSTOPERATIVE ATELECTASIS

| Time of radiography after operation | Number of cases of atelectasis |
|-------------------------------------|--------------------------------|
| Immediate | None |
| 4 hours | 5 |
| 24 hours | 6 |
| Later | 2 |
| Total | 13 |

In the film taken at twenty-four hours 11 cases were confirmed radiologically. The 5 cases noted in the four-hour film all showed development of the original patchy atelectasis, and in some a definite partial collapse of a lobe was evident. The other 6 showed signs of commencing patchy atelectasis. In 2 of the 11 cases observed in the film taken at twenty-four hours atelectasis affected both bases; in 5 it affected the right side alone, and in 4 cases the left side alone. In the 2 other cases in the series radiological evidence of collapse was not manifest until three and five days after operation (see table IV). Usually the lung fields on the affected side began to clear four or five days after operation, although in 4 cases the other side showed signs of atelectasis before this event.

In all cases of collapse there were clinical signs and symptoms, though, as Gius (1940) says, "the physical signs in the early stages are notoriously inconstant and variable. Transient physical signs are found in the chest after nearly all upper abdominal operations, and a diagnosis of atelectasis is normally not warranted on the basis of physical signs alone." The temperature rose to 100–101° F; the pulse-rate correspondingly to 100–120. A patchy distribution of râles and high-pitched rhonchi developed in some cases, and occasionally areas of bronchial breathing with increased vocal resonance and diminished percussion note. Gross mediastinal shift was not observed in any case. Sputum, at first scanty, tenacious, and viscid, became more copious and mucopurulent in a few cases. In the 2 cases occurring rather later than the others the associated rise of temperature and pulse-rate without other obvious cause suggested atelectasis, which was confirmed by radiography.

Appearances Resembling Collapse.—In 10 of the 26 cases increase in the vascular markings either in the lower lobes or hilar regions was noted radiologically. None were noted in the immediate postoperative film, 7 appeared in the four-hour film, and others at twenty-four hours. Some noted in the four-hour film had cleared at twenty-four hours. Mention is made of these because, where atelectasis was first noted radiologically at twenty-four hours, increase in the vascular markings of the affected areas was noted in the four-hour film (see below).

Other Types.—In 3 cases pulmonary complications other than collapse occurred. In 1 of them increased density in the right hilar region was noted radiologically at twenty-four hours. Three days later the patient developed bronchopneumonia. The second case showed the clinical picture of bronchitis, developing nearly a week after operation. Radiography revealed increased markings in the left hilar region. In the third case no abnormal signs were noted in the usual postoperative films, but five days later the patient developed signs and

symptoms of collapse at his right base. The film then taken showed collapse of right lower lobe, with a small pleural effusion.

In another case (not included in the series) the patient developed bronchopneumonia secondary to a subphrenic abscess. Eventually death took place from toxæmia and paralytic ileus. This was the only death from a chest or other complication and was secondary to a subphrenic abscess. No radiological signs were visible until the fifth day, when they consisted of raising of the left diaphragm, with distension of the splenic flexure, and partial collapse. Bronchopneumonic changes supervened later.

TIME OF RADIOLOGICAL APPEARANCE OF ATELECTASIS

Signs of commencing patchy atelectasis were seen in the four-hour film in 5 cases (table IV), none being noted in the immediate postoperative films. Four hours after operation clinical features are of little value in the diagnosis of postoperative atelectasis, as already emphasised. At this stage, therefore, only radiography can establish the diagnosis. In the films taken at this time, however, 7 cases were reported as having increased vascular markings of the hilar region or lower lobes. This appearance is not easy to distinguish from atelectasis. In some cases the signs of patchy atelectasis developed in the film taken at twenty-four hours. In the others at twenty-four hours the radiological signs were similar to those of the four-hour film or had disappeared. In no case in which hyperæmia alone was noted in the film at twenty-four hours did atelectasis develop subsequently. The cases of atelectasis observed in the four-hour film, however, were all more marked at twenty-four hours. At that stage 6 more cases had developed—i.e., by twenty-four hours 11 out of the 13 cases had shown themselves radiologically. Neither of the 2 cases arising subsequent to this time showed signs of hyperæmia or atelectasis in the postoperative film. It was the clinical condition that suggested the development of atelectasis, which was confirmed by radiography.

Thus, in the observation and diagnosis of postoperative atelectasis, it seems that radiography twenty-four hours after operation is most valuable. Collapse previously noted in the four-hour film will be definitely confirmed, and most of the cases of collapse will have appeared by then (11 out of 13 in this series). Further, the changes, interpreted as increased vascular markings of hilar or basal regions, have either regressed or have developed into early patchy atelectasis by this time. Twenty-four hours after operation the clinical signs and symptoms of collapse are slight and often misleading. Radiography alone can establish the diagnosis.

It is therefore suggested that, to show whether or not atelectasis has occurred, a routine film should be taken twenty-four hours after operation. If the hypothesis is accepted that bronchial occlusion by a mucous plug is the chief ætiological factor, and that early bronchial aspiration is the correct treatment, its use at this stage is indicated if a film taken at this time shows atelectasis. Immediate postoperative bronchoscopy, in cases where spinal anaesthesia has been used, necessitates local anaesthesia of the pharynx, larynx, and trachea; but bronchoscopy may be performed under local anaesthesia twenty-four hours after operation, and the difficulties associated with its use immediately after operation would not then arise.

SUMMARY

The incidence of atelectasis after partial gastrectomy has been investigated by radiography of the chest immediately after, four hours after, and twenty-four hours after operation.

Of 55 cases investigated 26 showed abnormal postoperative radiological signs, and out of these 26 cases 13 showed signs of lobular, partial, or total atelectasis.

No signs were noted in the immediate postoperative film; signs first appeared radiologically at four hours in

5 cases, and at twenty-four hours in a further 6 cases. The other 2 cases of atelectasis did not develop until later.

Besides signs of atelectasis there were increased vascular markings in some cases, and 3 other cases showed bronchopneumonia, bronchitis, and collapse with effusion.

The findings suggest that the film taken twenty-four hours after operation is the most valuable in determining whether or not atelectasis has occurred.

If the cause of atelectasis is bronchial occlusion by a mucous plug, bronchoscopy should then be considered.

I should like to thank Mr. Norman Lake, at whose suggestion this investigation was carried out, for his continued advice and encouragement in the preparation of this article.

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PAIN AND THE HEALING OF PEPTIC ULCERS

A. MORTON GILL
 M.D. Lond., F.R.C.P.

ASSISTANT PHYSICIAN, WEST LONDON HOSPITAL

It has been known for many years that at a certain stage peptic ulcers may be present without associated symptoms, of which the chief is pain.

This curious feature is seen in all grades of peptic ulcer, from the acute to the very chronic. Most clinicians can remember patients who suddenly had violent, profuse, and dangerous hæmatemesis, without any prodromal dyspepsia, and in some of whom gastroscopy, performed within a few days of the hæmorrhage, revealed an acute ulcer healing rapidly and spontaneously, without pain at any time. At the other extreme is the callous ulcer, of which the following is an example:

A man, aged 82, had severe epigastric pain, loss of appetite, and rapid emaciation. A barium meal showed a huge ulcer involving most of the lesser curve of the pars media. Its size alone suggested malignancy, yet within forty-eight hours of being put to bed on hourly milk feeds the patient lost his pains. Within a fortnight his appetite had returned, and within a month the ulcer crater had diminished to half its former size. Nevertheless, the crater never disappeared, and at the patient's death, of arteriosclerotic cardiovascular disease two years later, it was still present, though there had never been any recurrence of pain or indigestion.

On the other hand, the ulcer may heal and the pain continue, as it does in a phantom limb.

A woman, aged 42, had a small stubborn gastric ulcer, for which she was fed on milk by continuous intragastric drip for six weeks. At the end of this time, as her pains were no better, it was decided to perform a partial gastrectomy. The surgeon asked that she should be gastroscoped first, and at gastroscopy the ulcer was found to be completely healed, a small depressed epithelised scar being seen. Some students, present at the examination, were shown the puckered folds produced by the healing of the ulcer. The patient, overhearing this demonstration, realised that at last her ulcer had gone, and from that moment she lost her pain.

Not so fortunate was a woman, aged 38, whose duodenal ulcer was treated by continuous milk drip and whose pain remained unrelieved. As a result a partial gastrectomy was advised; but, owing to some mischance, a barium meal was not given before operation. At laparotomy no ulceration was present, a small scar only being found in the duodenum.

It seems therefore clear that one of the main clinical criteria of ulcer activity—i.e., pain—is unreliable, since ulcers can be present for a long time without producing any discomfort; and, on the other hand, though an

ulcer may be healed, the patient may continue to feel the pain usually associated with an active ulcer.

HEALING FACTORS

The factors that cause an ulcer to heal are no easier to understand.

A man, aged 50, was given a long rest in bed, with careful diet, for his gastric ulcer; and, though he soon lost all his pain and felt very well, the ulcer, viewed at intervals through the gastroscope, showed no signs of healing.

The patient accepted the decision to operate, and a week later, the day before that fixed for the operation, a final gastroscopy was performed. The ulcer was healing rapidly, operation was postponed, and in another week no crater could be seen, a white scar marking the site of a hitherto peculiarly intractable lesion.

Of the various measures used to encourage ulcers to heal, some authorities emphasise the value of rest in bed, others forbid tobacco, others pay strict attention to diet, others favour various antacids, acid neutralisers, acid buffers, acid inhibitors. It is perhaps heresy to doubt whether any of these are necessary; yet the following experience is suggestive:

A consecutive series of 20 patients, each with a chronic gastric ulcer, were given a daily hypodermic injection of 1 c.cm. of distilled water. They were ambulant, their diet was unrestricted and even disregarded, they were given no medicines, and those who enjoyed smoking were encouraged to continue.

With one exception all lost their pains as quickly—i.e., within a few days—as a control series treated along orthodox lines. Healing of the ulcers was observed gastroscopically and took place in the usual time—i.e., in 4–8 weeks from the start of treatment.

The exception was a man who was worried about his wife's illness. His pain continued, and his ulcer showed no sign of healing. After his third gastroscopy, some four weeks from the beginning of treatment, he was told that his ulcer had almost healed. Thereupon his pain went, within a fortnight his ulcer really was healing, and within a month it was completely healed.

DISCUSSION

No doubt in a larger series there would have been some failures, and no-one would wish to use distilled-water injections as routine ulcer therapy. Nevertheless, the fact remains that ulcers may heal after a series of injections of a completely inert fluid such as distilled water.

Hubacher¹ records favourable results following the injection of extracts of stomach and small intestine; and Morrison² has obtained equally good results by the oral administration of normal gastric juice.

It is clear that any one of several different treatments, having apparently nothing in common, may be associated with the healing of peptic ulcers. From this it seems fair to argue that the essential factor is the patient's belief that his treatment is going to be successful. Whether he agrees or not with the treatment matters not at all in the case of a man with pernicious anæmia—a few injections of liver extract and he is well. Not so the man with a gastric ulcer—not only must he be satisfied that his treatment is proceeding along the correct lines, but also he must find himself in a sympathetic environment and be protected from protracted anxieties.

Ulcers are not healed by diet alone, nor by injections, nor by medicines, but because the man with the ulcer comes under the care of a physician who is able to transmit some of his own confidence to his patient. Because it is common sense to rest a diseased organ and to give rest to a man suffering from disease, so we continue to treat ulcers by advising rest, a dietetic holiday, and a temporary escape from the worry and strain of the daily round. If the habits of these patients could be altered permanently, they might have no relapses.

1. Hubacher, O. *Lancet*, 1946, ii, 272.

2. Morrison, L. M. *Amer. J. Digest. Dis.* 1945, 12, 323.

Reviews of Books

A GUIDE TO THE TUBERCULOUS (2nd ed., London: William Heinemann Medical Books, pp. 120, 3s. 6d.) is so far the only textbook on tuberculosis written primarily for the patient, and it is hard to see how it could be bettered. Dr. G. S. Erwin, medical superintendent of the Liverpool Sanatorium at Frodsham, answers all the patient's questions in simple terms, dispelling the terrors of the unknown, and reassuring without false optimism. The second edition smooths out many of the roughnesses of the first. Short sections on interdependent psychoneurotic conditions, and the effects of air travel on artificial pneumothorax, have been added, together with some interesting social statistics.

In A PRELUDE TO MODERN SCIENCE (London: Cambridge University Press, 50s.) Prof. Charles Singer and Mr. C. Rabin discuss the history, sources, and circumstances of the *Tabulae Anatomicae Sex* of Vesalius, has just been published by the Wellcome Historical Medical Museum. Students of medical history will welcome this careful study and the beautiful plates and figures which illustrate it.

Sir John Conybear's MEDICINE (Edinburgh: E. & S. Livingstone, pp. 1170, 30s.) has reached its 8th edition. A section on the uses of penicillin has been added, and the articles on malaria, blackwater fever, bacillary dysentery, and typhus have been rewritten. An article on the menopause has been added, and the articles on thyrotoxicosis and diseases of the pituitary have been brought up to date. An appendix on aviation considers physiological problems arising at great altitudes and high speeds. Tables of physiological normals, just inside the cover, will be welcome to all.

T. F. Rhodes's guide to the chemistry of crime detection (FORENSIC CHEMISTRY, London: Chapman and Hall, pp. 164, 15s.) reflects his experience in the laboratories of the Department of Technical Police at Lyons, the famous Locard school. It is hard-paned technical reading, largely the collected writings of contemporary experts in this field, but embellished with a first-class monograph on the chemistry of questioned documents. The rest of the text is a quaint mixture of tradition in forensic chemistry—a fifth of the references are over 40 years old—and of shrewd practical evaluation of technical detail which betrays the laboratory expert. The section on blood and other stains is poor and outdated in comparison with the substance of the book.

THE PROCEEDINGS OF THE CONFERENCE ON DIAGNOSIS IN STERILITY, 1945, are edited by Earl T. Engle, PH.D. (Springfield, Ill.: C. C. Thomas, pp. 237, \$5). The conference was called in New York by the National Committee on Maternal Health, and the report will interest those already possessing some special knowledge of problems of human fertility and infertility. Most of the speakers had original contributions to make and plenty of clinical material to quote from. The most disappointing sections are those on the laboratory examination of seminal specimens and the post-coital examination of cervical mucus. Those on testicular and endometrial biopsy, the accessory glands, basal temperature charts, history-taking, tubal patency, and pelvic congestion throw some fresh light, and Dr. Kenyon's working hypothesis of the mechanism of sterility is a nice piece of speculation on the possibly depressive action of androgens on the seminiferous epithelium.

In a useful little manual (PRINCIPLES OF THE CONTACT LENS, London: H. Kimpton, pp. 88, 10s. 6d.) Mr. H. Treisman, F.R.C.S., describes the development and optical properties of contact lenses, and their advantages over ordinary spectacles. Many of the indications for their use given here have not yet been put to the test, and on the whole the advice is a little over-enthusiastic. Before these lenses can be tolerated there must be a very strong incentive, or the arduous preliminaries will discourage the prospective wearer. Vanity alone is not a sufficient incentive. For patients with keratoconus or mustard-gas keratitis, however, they give visual improvement which can be obtained by no other means, and their manufacture would be amply justified on these grounds alone. The Dallos moulded lens is the chief type described, and little is said of the more recently developed plastic contact lenses, which can be more easily manufactured at a smaller cost. Plastic lenses may in time largely replace the glass variety.

The pages on PENICILLIN IN THE TREATMENT OF INFECTIONS have now been reprinted from the *Oxford Loose-Leaf Medicine* as a conveniently slim book, which may be obtained from the Oxford University Press for 8s. 6d.

The 5th edition of Dr. R. W. Fairbrother's TEXTBOOK OF BACTERIOLOGY (London: Heinemann, pp. 480, 17s. 6d.) has been thoroughly revised, and advances in the subject since the 1937 edition have been added. The medical student will find here all that he needs for examinations, and more.

The 1946 YEAR BOOK OF GENERAL MEDICINE (Chicago: Year Book Publishers, pp. 772: 21s.) carries the usual stimulating quiz on the cover. It contains sections on infectious diseases, diseases of the chest, the blood and blood-forming organs, the heart and blood-vessels, the digestive system, and metabolism. It can be obtained in London from Messrs. H. K. Lewis & Co.

The fifth edition of Prof. Arthur Hale Curtis's TEXTBOOK OF GYNECOLOGY (London: W. B. Saunders, pp. 755, 40s.) has been extensively revised. A quarter of this American book is allotted to anatomy and physiology, and there are ten sensible pages on history-taking and examination. He is both wise and dogmatic in advice, but never hesitates to state and discuss the alternative view to his own.

Prof. Robert Courrier has reviewed and examined published work on the physiology of gestation from ovulation to the puerperium (ENDOCRINOLOGIE DE LA GESTATION, Paris: Masson, pp. 339, fr. 465). His book also describes much French work, notably in comparative physiology, which has hitherto been insufficiently appreciated in this country. His book is well illustrated and is readily comprehensible to the English reader with a smattering of French.

In the 1946 YEAR BOOK OF EYE, EAR, NOSE AND THROAT (Chicago: Year Book Publishers, pp. 543, 21s.) chapters on the eye occupy about half the text, and are preceded by a special article on the medical treatment of glaucoma by Dr. Louis Bothman, who edits this section. The second half of the book is edited by Dr. Samuel J. Crowe, and includes 37 pages on war injuries of the ear, in which the long-term effects of treatment are now beginning to be assessed.

The sixteenth edition of Stedman's PRACTICAL MEDICAL DICTIONARY (London: Baillière, pp. 1291, 42s.) has been well edited and revised by Dr. Norman Burke Taylor, and has acquired a welcome section on medical etymology by Mr. A. E. Taylor, which makes simple the translation of classical terms into familiar ones. Appendices give weights and measures, the meaning of symbols, comparative temperature and barometer scales, a table of elements, and the three forms of anatomical nomenclature which may still come the way of luckless students.

A POCKET SURGERY (2nd ed., London: J. & A. Churchill, pp. 272, 8s. 6d.) by Mr. P. H. Mitchiner, surgeon to St. Thomas's Hospital, and Mr. A. Hedley Whyte, surgeon to the Royal Victoria Infirmary, Newcastle-on-Tyne, is a comprehensive review of general surgery, useful for the Service medical officer who finds himself far from colleagues and libraries; but for the civilian doctor details are somewhat scanty. On specialised subjects the advice given is sometimes questionable—e.g., the recommendation to wrench the adolescent coxa vara into position, and to move sutured tendons on the second or third day. The sections on the broad principles of general surgery and on abdominal surgery are perhaps the best in the book.

PRINCIPLES OF ANATOMY AND PHYSIOLOGY FOR PHYSICAL TRAINING INSTRUCTORS IN THE ROYAL AIR FORCE (H.M. Stationery Office, pp. 180, 7s. 6d.) has been written with the primary object of explaining the basic facts of anatomy and physiology to members of the Royal Air Force interested in maintaining physical fitness, whether in men receiving routine physical training, or patients in hospitals, or at reablement centres. The anonymous authors have dealt with their subjects so clearly, and hold the reader's interest so well, that the general public and the medical student will also enjoy reading the book. The skeletal and muscular systems are of course particularly well covered; the remaining systems are treated under physiology. The pages on the pathology of malposture are very good, and all the illustrations are first-class.

THE LANCET

LONDON: SATURDAY, MARCH 8, 1947

Enough to Eat?

DISCUSSION of the national diet, now a favourite pastime, is often silenced by a reminder that it is determined less by appetite than by world supplies and the requirements of other countries. When famine threatens Eastern Europe, it may seem indecent to grumble about dull food or minor deficiencies. Nevertheless both our allocation of existing supplies and our policy for the future depend partly on knowing how far we are in fact now being properly fed. A single theme runs through the Government's economic white-paper¹—the need for greater production—and elsewhere in this issue Dr. McMENEY argues cogently that for full physical and mental health, and thus for full production, the national diet must be increased and varied.

The nutritionists tell us that the average consumption of the people of this country falls little short of what it was before the war; and that this consumption, though near the borderline, is still above internationally accepted minimal standards.² On the other hand, the margin is so small that inability to draw on the floating 10% of rationed foods at canteens or restaurants undoubtedly causes some to go short, and there is uneven distribution within the family.³ The ration is not large enough to meet personal idiosyncrasies in favour of a particular food, and it takes little account of personal taste. Despite improvements, our fare remains monotonous, and whatever its other virtues it often fails to give the sense of satisfaction and repletion by which we tend to gauge the sufficiency of meals. Has this any adverse effect on personal efficiency? Surveys, we are informed, "suggest that the nutritional state of the nation was not worse at the end than at the beginning of the war, and, as regards children, was somewhat better."⁴ But, as E. P. CATHCART⁵ has put it, a person's state involves something more than physical attributes: "there are also intangible psychic factors which may be summarised in terms like 'alertness,' 'fitness,' 'aliveness,'" and these are not readily measured. The surveys have been few in number and restricted in scope, and wide differences in the conclusions of competent observers studying the same groups show how high personal judgment ranks in the reckoning.⁶ Until a base-line has been found, the nutritionist can give no firm answer to those who ask whether there is particular virtue in good red meat, or to those others who suggest that we are getting a suboptimal diet whose defects are evident only in our daily work.

1. Economic Survey for 1947. Cmd. 7046. H.M. Stationery Office.
2. Food Consumption Levels in the United States, Canada, and the United Kingdom: Third Report of a Special Joint Committee set up by the Combined Food Board. United States Department of Agriculture Production and Marketing Administration. 1946.
3. Schultz, T. *Bull. Oxfor Univ. Inst. Statist.* 1946, 8, 375.
4. On the State of the Public Health During Six Years of War. H.M. Stationery Office. 1946.
5. Cathcart, E. P. *Brit. med. J.* 1937, i, 435.
6. See *Lancet*, 1944, ii, 825.

By all accounts, many of the peoples of Europe, on inferior rations, are showing remarkable vigour in reconstruction: the strength of their incentives seems to overcome the deficiencies of their food. Obviously, then, the nutritionist cannot expect to see the whole picture. To the psychologist many of the features which are physically baffling seem clearer. The prevalent hunger is, he argues, one manifestation of our gradual recovery from post-war inertia: it is related to a larger hunger for a sense of purpose and a sense of security; and the common syndrome of lassitude, irritability, and deficient mental concentration, tentatively ascribed by others to early vitamin-B deficiency, he claims to be at least partly psychogenic. He has satisfied himself of a relationship between food-fussiness and uncertainty or insecurity; and these are uncertain times. He reasons that the worker, particularly in industry, seeks to offset the lack of colour in his daily employment by variety and excitement in his relaxations; the present diet underlines, instead of interrupting, the general monotony. He points to examples in industry where, with low morale and reciprocal hostility between management and workers, the canteen is made a scapegoat. The current irritation could, he believes, be partly overcome by giving people more say in their feeding; he would promote open discussions, and he would ensure that workers were given evidence of attention to their diet and to the pattern and difficulties of their lives, for Service experience showed that a man's opinion of his food varies less with its quality at the table than with the interest known to be taken in its preparation and in his own general welfare. Finally, the psychologist would favour, as a form of mental release, any changes which brought greater variety, satiety, or acknowledgment of pet luxuries. How far advantages of this kind can properly be used as an incentive to enter particular industries, or as a reward for good output, is another matter. It depends perhaps on whether they would be offered at the expense of a satisfactory diet for the rest of the community; for in Lord BEVERIDGE's phrase, nobody should eat cake till everyone has bread, and hitherto it has been an acknowledged principle that in the distribution of food there should be no privileged class.

The control of food is not, of course, the concern simply of the dietitian, the nutritionist, or the psychologist. It concerns also employer and employed, those who grow or buy food, those who process or cook it, and those who distribute it; and each can make his own contribution. Five years ago the *Times* suggested that representatives of these various interests should be brought together in a Nutrition Council; but despite influential support, particularly from leaders of the medical profession, the council was never formed. This time of economic adversity might be the occasion to reverse the decision. One of the council's first tasks would be to undertake the continuous surveys recommended at the Hot Springs Conference, and such surveys might help, among other things, to answer the question whether the diet adequate to prevent any signs of malnutrition or disease is ipso facto adequate for full endeavour. To a country spending £725 million this year on imported food and agricultural equipment, and

urgently needing greater output, this question is highly important; but if nutrition continues to be regarded as a matter for guidance exclusively by nutritionists, and for purely interdepartmental discussion, we shall not be making full use of our opportunities to get the facts.

Part-time Nursing and its Future

DURING the war it was often said that part-time nursing had been tried but had failed. Gloucestershire has made it clear that the failure lay not with the part-time workers but with those seeking to use them. Those who attended the Cheltenham conference (reported elsewhere in this issue) saw hospitals, staffed almost entirely by part-timers, running smoothly and giving to chronic-sick patients a standard of care not exceeded in first-class acute hospitals.

In his full account of an experiment for which he has been largely responsible, Mr. W. A. SHEE could not help revealing how much careful and human deliberation had gone to make it succeed. The essence of the scheme has been that part-time workers, whether State-registered nurses or raw recruits with no previous experience, have been regarded from the beginning as members of the hospital team, and given responsibility appropriate to their sense and experience. The result has been to attract a new type of woman into nursing; or rather to attract good nurses who have been compelled to resign their career, and other able women who can give some but not all of their time to the care of the sick. There seems little doubt that we now have in our hands a complete answer to the staffing difficulties of the infirmaries and institutions for the old and ailing, and the Ministries of Health and Labour are warmly encouraging local authorities to follow Gloucestershire's lead. The many visitors to the conference went back convinced, to carry the principles to their own areas. Medical officers of health were not perhaps as numerous as could have been wished, but possibly the Society of Medical Officers of Health would contemplate inviting Dr. KENNETH COWAN and Mr. SHEE to open a discussion on part-time nursing at one of their meetings. The success of such schemes, experience has shown, depends on overcoming in advance the prejudice of those who will have to work it, and especially the prejudices of matrons; and nobody is better placed for this persuasive task than the medical officer of health. The prejudices of authorities can be diminished by showing the Gloucestershire balance-sheet, where expenditure of £10,000 a year on transport is entirely compensated in other ways.

Londoners will have noticed that a part-time scheme was launched on Feb. 15 for the Greater London area, where the L.C.C. hospitals are in greatest need. The daily press has published lists of hospitals to which volunteers can apply; the Ministry of Labour resettlement advice offices are also taking particulars from volunteers and forwarding them to the nearest hospital wanting part-time workers; and specially difficult cases are being put through the London Appointments Office, at 23, Portman Square, W.1, which is acting as a clearing-house for the whole area. The appeal unfortunately coincided with the fuel crisis, and this no doubt partly explains why the

number of volunteers of all kinds in a fortnight was only 930—a total which must seem meagre to those familiar with the Cockney tradition of lending a friendly hand to neighbours in difficulties. But criticisms at the conference suggest that backwardness in volunteering is also partly attributable to the Rushcliffe rates of pay which have been adopted. On this scale intermediate assistant nurses are paid 1s. 5d. an hour, which is less than the rate recommended by the National Joint Council for ward orderlies doing domestic work; and State-registered staff nurses are offered 2s. 1d., which is less than the average pay of a metropolitan charwoman. There was a strong feeling at the conference that these rates should be reconsidered.

May not the part-time principle have much wider applications than at present appear? Speakers at Cheltenham felt it opened great possibilities for mental hospitals and sanatoria, and perhaps also for special hospitals and acute general hospitals. There were doubts whether it could be applied in training schools, but further experiment may disperse even these: it is possible to conceive of a training hospital in which part-time workers, jointly with full-time trained staff, ensure the staffing of the ward, and thus release the sister for bedside teaching and the students for learning. The long-standing complaint that students bear the double burden of study and hospital service could thus be relieved. We must not be faint-hearted if the implications of the part-time system turn out to be much greater than we originally supposed.

Neonatal Infection

It is probably fair to say that about a fifth of all deaths in the first four weeks of life are the result of infection. Rather more than half of the total infant mortality occurs in this first month, which in England and Wales means some 18,000 deaths; so each year 3000–4000 babies die of infection, much of it preventable, in the first few weeks of life. The report¹ of a subcommittee of the Scottish Scientific Advisory Committee, under the chairmanship of Sir ALEXANDER MACGREGOR, which has been studying the causes, predisposing factors, and control of neonatal infection, shows that the neonatal mortality for Scotland during 1941–43 was 35.91 per thousand live births. The rates for maternity units ranged from 10.1 per thousand in emergency hospitals taking only normal cases to 52.2 per thousand in teaching institutions, which admit a high proportion of abnormal cases and have a premature-birth rate of 12.7% compared with 2.8% in the emergency hospitals. The proportion of these deaths attributed to infection ranged around 10%, but where clinical diagnosis was checked by careful post-mortem examination this proportion was doubled.

The principal form of fatal neonatal infection was pneumonia, of which Dr. AGNES MACGREGOR has described four main varieties. The first is chiefly associated with birth asphyxia, and deaths usually occur in the first three days of life; its prevention lies chiefly with the obstetrician. The second, septic aspiration pneumonia, also most common in the first

1. Neonatal Deaths Due to Infection. Edinburgh: H.M. Stationery Office, 1947. Pp. 43. 9d.

few days of life, is due to inhalation of milk or regurgitated stomach contents; its prevention is dependent on care in the feeding and nursing of the infant. The third, staphylococcal pneumonia, is commoner in the neonatal period than at any other time of life and frequently arises in small outbreaks; while the fourth, bronchopneumonia similar to that in older infants, may be due to organisms, such as *Bact. coli*, which are not usually associated with pneumonic infection. Many of these pneumonias, which are most common in premature infants and are often related to faults in lung function, are undetected clinically because of the absence of cough, fever, and dyspnoea; while cyanosis, when present, may suggest asphyxia or cerebral hæmorrhage. In Scotland, in the three years covered by the report, neonatal diarrhoea was responsible for much fewer deaths than respiratory infections, and outbreaks of neonatal diarrhoea were rare, but the committee cite Prof. CHARLES MCNEIL's figures showing an incidence of diarrhoea ten times higher in premature than in full-time babies. The committee also comment on the much greater resistance to intestinal infection among breast-fed than among artificially fed infants, a point well illustrated by the figures from Cincinnati,² where of 221 infants admitted to hospital for diarrhoea all but 3 had been bottle-fed.

The committee give sound advice on prevention. Emphasis is rightly laid on the adequacy and quality of the nursery nursing staff. They should be sufficient in number for the work to be careful and unhurried; there should be a nucleus of permanent trained staff to ensure continuity of treatment; and a basic nursing technique should be fully understood and practised. The nursery nurse or "auxiliary worker" (who may range in age from 17 to 45 years), being a permanent member of the nursing staff, is more useful than the pupil-midwife who spends only 4-6 weeks in the nursery. The nursery should be under the charge of a pædiatrician skilled in the care of young babies, and records should be kept of the day-to-day progress of each infant so that any minor infection or loss of weight is noted and attended to early. Mothers need more instruction in the care of the infant and in breast-feeding, WALLER's³ studies on lactation being borne in mind; this may mean a larger staff and a longer stay in hospital, and, before the mother leaves hospital, coöperation between the health visitors and the hospital midwives. The committee were divided in their views about keeping infant and mother together or having a separate nursery for the healthy babies. If separate nurseries are provided they should be small, containing only 4-6 cots and allowing 40 sq. ft. per cot; the cots should be properly spaced and not crowded cheek by jowl along one side of the room as they often are. A separate nursery with a number of single rooms should be provided for sick and premature infants and for infected cases requiring isolation. For premature infants the committee favour a ward unit of 4 cots kept at a temperature of 75-80° F and a relative humidity of 70%, and they recommend the nursing technique evolved by Dr. MARY CROSSE in Birmingham.

Prematurity is clearly the most important predisposing factor in fatal infections. Thus in the two

largest Scottish teaching hospitals the death-rates from infection were 5.4 and 5.7 per thousand among mature babies but 79 and 75 per thousand among premature infants. In the four Glasgow corporation hospitals, where the proportion of abnormal cases is much smaller, death-rates from infection among full-time and premature babies were 3.4 and 29 per thousand. Of the neonatal deaths from all causes, 70% were in premature infants. The causes of prematurity require further elucidation, but the studies of BAIRD⁴ and SUTHERLAND⁵ indicate that poverty and poor nutrition of the mother are important factors, and the remarkable reduction in the stillbirth-rate and neonatal mortality during the war years is probably a reflection of better nutrition in the lowest social classes, among whom premature births are most common. A reduction in the prematurity-rate, now around 7%, must be the long-term policy in the control of neonatal mortality. Meanwhile, this report points the way to the preventive measures that should be practised in every maternity unit.

Annotations

DIVORCE

THE great argument against divorce is the bad effect of a broken home on children. In their final report,⁶ the Committee on Procedure in Matrimonial Causes, whose chairman is Mr. Justice Denning, pay special attention to the child, and consider in detail possible means of reconciling the parents. Reconciliation work has so far been mostly done by voluntary bodies, some of them religious. Court missionaries and probation officers have also helped estranged couples to understand each other better, and so have the Family Welfare Association, and the Sailors', Soldiers' and Airmen's Families Association. Since 1937 magistrates have been officially permitted to ask a probation officer or other person to try to reconcile parties seeking separation or divorce. Under the Army and R.A.F. Legal Aid Scheme some 27,000 applicants for divorce (a quarter of all those applying) have been reconciled; and in civilian life the Marriage Guidance Council, founded in 1938 and reconstituted in 1943, has done successful work. At its centres selected people act as "counsellors," interviewing those who apply and often referring them, according to their needs, to a consultant, who may be a doctor or psychologist, an ethical or spiritual adviser, a social worker, or a lawyer.

The Denning Committee find that the prospects of reconciliation are most favourable in the early stages of disharmony, and in families where there are children. For success, one of the couple must seek help of his or her own free will; and each must be sure that nothing told to the adviser will be repeated to the other partner without permission. The personal relationship with the adviser is so important that churches, voluntary societies, and individuals have a much better chance than a State institution would. Unfortunately the law relating to collusion and condonation hampers attempts at reconciliation: fear that the divorce may be quashed makes each partner reluctant to offer or accept advances. Actually, the law about collusion does not forbid discussions with a view to reconciliation, or about the future of the children, the house and furniture, maintenance, or costs. Condonation, on the other hand, presents a more serious bar to reconciliation; because one act of sexual intercourse cancels out an

4. Baird, D. *J. Obstet. Gynecol.* 1945, 52, 339.

5. Sutherland, I. *Lancet*, 1946, ii, 953.

6. Cmd. 7024. H.M. Stationery Office. Pp. 36. 9d.

2. Wethl, C.; Rapoport, S.; Dodd, K. *J. Pediat.* 1947, 30, 45.

3. Waller, H. *Lancet*, 1943, i, 69; *Arch. Dis. Childh.* 1946, 21, 105.

injured husband's grounds for divorce (though it does not affect those of an injured wife unless she has really forgiven and reinstated her husband).

The committee want to see a Marriage Welfare Service, sponsored by the State, established to ensure that enough suitable advisers are available, to encourage people to seek competent advice—engaged couples in preparation for marriage, and married couples as soon as serious conflicts arise—and to attempt reconciliation when necessary. This service would be developed from existing services and societies, which would be grant-aided, and would have opportunities for broadcasting, and for giving information at registrars' offices. Court welfare officers would be appointed to help those applying for divorce, or thinking about it; and solicitors approached about divorce would be asked to recommend the couple to consult a welfare officer or one of the voluntary societies. The welfare officer should have access to every petition, and in suitable cases should write offering his services.

The committee think that the present administration of divorce is poorly fitted to safeguard children.

If no application is made for custody, the court has no opportunity to consider their welfare; if an application for custody is unopposed, the court usually grants it; though the lack of opposition may be due to misunderstanding. Thus a wife who is guilty of adultery may think she has forfeited the children and may reluctantly hand them over to her husband, though this may not be the best thing for them. Where an application is opposed, the subsequent conflict between the parents often becomes so bitter that the welfare of the children fades out of sight.

The report recommends that in every divorce case, whether there is an application for custody of the children or not, the court welfare officer should report on the welfare of the children and should represent their interests before the court. The divorce judge should deal with the future of the children on the same day as he deals with the divorce, but afterwards. The hearing about custody should be in private, and the parents and their advisers would have the chance to be present, and to bring witnesses: their evidence should be given orally on oath, and not by affidavit as at present. The judge would also be able to see the parents and children separately and in private.

The rest of the committee's recommendations deal with alimony and maintenance, and with procedural reforms to meet certain difficult cases. These have no direct bearing on social medicine.

CONTROL OF SCRUB-TYPHUS

In the Far East campaign scrub-typhus was a major medical problem whose dimensions had not been anticipated from the limited peace-time experience. Only when the jungle was invaded by an army was it realised how widespread was the infestation. This mysterious disease had a profound effect on the fighting soldier and it acquired some of the properties of a secret weapon. The overall case-mortality of about 10% was equally impressive to the medical authorities. Owing to the painstaking work of Australian investigators and the U.S. Typhus Commission the disease came ultimately under complete control.

In attacking this problem McCulloch¹ assumed that the disease was mite-borne—a view widely held at the outbreak of war and one which has since been further substantiated. The success of new mosquito repellents such as dimethyl phthalate suggested their use against the trombiculids which carry the rickettsia responsible for scrub-typhus. The field work began with the exposure of volunteers to the mite producing "scrub itch," *Trombicula minor*, a mite which does not carry the rickettsia but produces the same reaction as the

"harvester" mite in England. The protection afforded by dimethyl phthalate was striking, and dibutyl phthalate (D.B.P.)—more readily obtainable in Australia—proved even superior and withstood washing without losing its repellent action. With this initial success the detailed treatment of clothing was worked out on sample pieces of cloth subjected to various forms of impregnation and various types of washing, using mites easily obtained from the jungle. The method eventually adopted by Australian troops was to rub an ounce of D.B.P. into socks, trousers, and shirt once a fortnight, a treatment which was shown to be effective even with unrestricted washing. Rubbing in by hand was much better than spraying.

One of the most important and difficult stages in the introduction of new hygiene measures to a field force is the necessary education of the soldier, who is sceptical and suspicious of innovations. This "sales-resistance" disappears directly a unit encounters scrub-typhus in the field, and unit commanders then become anxious to take advantage of any method of protection. In New Guinea the instruction of troops formed one of the most important elements of success. Anti-mite fluid was first issued to the Australian forces in November, 1943, and by June, 1944, all troops in forward areas—those most exposed to infection—were protected. The scrub-typhus rates fell sharply. For the last year of the war the incidence was about 9% of that for 1943, though this fall cannot wholly be ascribed to the use of the miticide, since distribution of scrub-typhus is essentially patchy and troops may have been fighting in less infested country. However the unmistakable conclusion of the New Guinea campaign was that D.B.P., applied fortnightly, could completely control scrub-typhus and that where failure occurred it was ascribable to lack of supplies.

A NEW DIPHThERIA PROPHYLACTIC

ALUM-PRECIPITATED toxoid (A.P.T.), the diphtheria prophylactic used in this country for mass immunisation, is doing much to prevent this preventable disease, as the Ministry of Health figures and the depleted diphtheria wards in fever hospitals combine to show. Yet though A.P.T. is potent and generally reliable, it has some drawbacks. Thus, as Mr. Holt points out on another page, it is difficult to prepare batches of uniform antigenicity because its exact composition is uncertain, and we still do not know how precipitation enhances the activity of the toxoid, and what influence impurities have on the antibody response. These defects have, in his opinion, made the assessment of dosage and spacing unsatisfactory. He has therefore devised a new prophylactic believed to be antigenically potent and stable and productive of fewer reactions than A.P.T. in sensitive persons. It consists of purified toxoid precipitated by a suspension of a measured amount of purified aluminium phosphate (Al PO₄) and is called P.T.A.P. The great advantage claimed for it is that the antigenicity of each batch can be accurately predicted.

The new product has been submitted to field trials on a pilot scale by Dr. Guy Bousfield, who reports on his results in this issue. The subjects were Schick-positive children between their first and second birthdays, living in a suburban area where herd-immunity was low; thus the children were of reasonably comparable body-weight and without substantial basal immunity. Serum antitoxin titrations were thought to be impracticable in these young children, so Dr. Bousfield assessed the immunity responses to a single subcutaneous injection of the prophylactic by post-Schick tests carried out 28 days later. Breaking new ground, and seeking to avoid undesirable reactions, the trials were made in stages, in an attempt to determine the optimum concentration of Al PO₄ and Lf dosage of toxoid. The highest Schick-conversion rate (93%) was obtained with 5 Lf units of

1. McCulloch, R. N. *Med. J. Aust.* 1946, 1, 717.

toxoid in conjunction with 5 mg. of Al PO₄. Small though the series were, the results seem to demonstrate the favourable effect on the Schick-conversion rate of increasing the amount of Al PO₄ up to this level, and the importance of controlling the amount so as to obtain an optimal primary stimulus. Further tests are to be made to determine more exactly the dosage of Al PO₄ which produces the best results.

When A.P.T. is injected intramuscularly nodules sometimes form at the site of injection, unless it is made deeply. Dr. Bousfield found at the time of the post-Schick tests that nodules could often be felt where P.T.A.P. had been injected subcutaneously, and that their incidence rose almost in strict proportion to the increase of the Al PO₄ content. His findings support the view that satisfactory primary stimulation depends on some degree of local fibrosis and depot-action—that is, the slow release of toxoid into the tissues generally. Thus the nodule which some workers have sought to avoid by a suitable technique of injection may be an important factor in the production of immunity. General reactions after the subcutaneous injections of P.T.A.P. were few; and after a subsequent intramuscular dose to complete the immunising course there were none at all.

Since the choice of a new prophylactic for mass-immunisation is of national concern, these observations will doubtless be repeated by other workers on a bigger scale. In such trials the results—with due respect to Schick's test—should be additionally checked by antitoxin titrations.

JANET

Pierre Janet's great contribution to psychopathology showed two dominant trends, happily fused. On the one hand he was a collector and systematist, in the Linnæan tradition: all his life he went on adding to the fine herbarium which he began in childhood, and the patient amassing of exact data about mental abnormality was only another activity of the born collector-classifier. The other side of him—mystical and philosophical—was equally strong, though less in evidence; to it he attributed his first interest in psychology and especially in clairvoyance and hypnotism, the study of which brought him, when he was 23, to the notice of Charcot and Richet in Paris, and incidentally of Sidgwick and F. W. H. Myers in the Society of Psychical Research in London. His appointment in 1889 to the charge of the psychological laboratory which Charcot established at the Salpêtrière set his feet firmly on the path which he followed for the next half century with endless zest and exactitude.

He used to say that his was a "psychology of the fountain pen" so careful was he to record immediately and with minute fidelity what the patient and he had said, and to abstain from using any recollections that were not precisely in accord with what he had set down in his voluminous notes. His medical training made him reluctant to generalise from particular observations, or to stress dynamic psychological influences at the expense of the hereditary and organic causes of mental illness. Consequently, although he had observed the significance of traumatic experiences and the occurrence of unconscious mental processes earlier than Breuer and Freud, he stopped short at this observation; writing of it much later, he said he could not expand a clinical observation into a metaphysical system. The notions of psychological tension and mental level which he introduced served him well in describing the functional hierarchy and the play of symptoms in the neuroses. In England his concept of dissociation and his descriptions of "psychasthenia" are more widely known than

his far-reaching studies into the psychology of conduct, which have become part of orthodox French psychiatry. The essence of his later work lay in the effort to classify all psychological facts under action and conduct, in accordance with his notions of hierarchical organisation. The economic problems of action, the sources and expenditure of energy, seemed to him the paramount issue in psychology and psychiatry. Whereas the methods and the theories of the other great psychopathologist who was his fellow-student at the Salpêtrière were revolutionary, Janet had a classical preference for precision and order: he subordinated hypothesis to exact observation, and his teachings aroused neither the antagonism nor the productive stir that made Freud the greater force.

TONICS VINDICATED ?

The vegetable "tonics" have long been out of fashion in our medical schools—at most they have achieved passing mention in historical introductions to pharmacology—yet the family doctor has continued to prescribe some of them for their appetising properties or merely as flavouring agents. Now it seems that there may be a rational basis for these traditional remedies. Chaikelis¹ has investigated the thiamine content of 41 genera of herbs and medical plants belonging to 20 distinct and separate botanical families, and has found that this ranges from 125 to 2880 microgrammes per 100 grammes of dried substance. No less than 12 of the dried plants examined contained more than 1000 µg. per 100 g. and only 5 contained less than 300 µg. The list includes buchu (1965 µg. per 100 g.), caraway (722), camomile (1154), dandelion (1577), gentian (477), quassia (1839), thyme (502), and white cinnamon (427). The two richest known sources of thiamine, wheat-germ and yeast, contain 2000 µg. per 100 g., so some of these herbs run them close. It would be interesting to know how much of the thiamine content of herbs is extracted in making infusions. Chaikelis points out that the symptoms of thiamine deficiency include loss of appetite, fatigue, gastro-intestinal disturbances, muscular weakness, and lowering of the blood-pressure, and these are the very symptoms for which tonics are often prescribed.

NEGOTIATIONS BEGIN

ON Friday of last week the Negotiating Committee, representing medical organisations, met the Minister of Health for discussions on the National Health Service Act. The members now are:

British Medical Association.—Nominated by the council: Dr. J. A. Brown, Dr. R. W. Cockshut, Dr. Guy Dain, Dr. W. E. Dorman, Dr. F. Gray, Dr. E. A. Gregg, Mr. R. L. Newell, Dr. S. Wand, and a Scottish member. Elected by the representative body: Mr. A. Lawrence Abel, Dr. J. C. Arthur, Dr. O. C. Carter, Lord Horder, Dr. J. A. L. Vaughan Jones, Dr. J. F. Lambie, Dr. J. B. Miller, Dr. J. A. Pridham, and Dr. S. A. Winstanley.

Royal College of Physicians.—Lord Moran, Dr. H. E. A. Boldero, and Prof. Henry Cohen.

Royal College of Surgeons.—Sir Alfred Webb-Johnson, Mr. Zachary Cope, and Prof. Ernest Finch.

Royal College of Obstetricians and Gynaecologists.—Mr. William Gilliatt and Mr. A. A. Gemmill.

Royal Scottish Medical Corporations.—Prof. Charles McNeil, Mr. Henry Wade, and Dr. J. H. Macdonald.

Society of Medical Officers of Health.—Dr. G. F. Buchan and Dr. R. H. H. Jolly.

Medical Women's Federation.—Dr. Mary Esslemont.

Society of Apothecaries.—Dr. H. Seaward Morley.

The committee has set up six subcommittees dealing severally with general practice, hospital and specialist services, public health, mental-health services, eye services, and superannuation.

Sir WILL SPENS is to preside over a committee to consider the remuneration appropriate for consultants and specialists in a publicly organised service.

1. Chaikelis, A. S. *J. Amer. pharm. Ass.* 1946, 35, 343.



Special Articles

RECRUITMENT OF DOCTORS TO THE FORCES REPORT FROM THE CENTRAL MEDICAL WAR COMMITTEE

THE Central Medical War Committee (C.M.W.C.) has issued an account of the work of its Services Committee during 1946. The report, signed by Mr. H. S. SOUTTAR, chairman of the C.M.W.C., and by Dr. PETER MACDONALD, chairman of the Services Committee, begins by describing the constitution and function of these bodies.

The C.M.W.C. is reappointed annually by the Minister of Health. Its members are nominated by various professional organisations and other bodies. The Services Committee, which is concerned with the recruitment of individual practitioners and acts generally as the executive of the C.M.W.C., is reappointed annually by the parent committee, chiefly from its own membership; it includes four ex-Service doctors, three of them specially appointed as such. The members of both committees give their services voluntarily. Officers of the three Service departments and of the Ministries of Health, Labour, Education, and Pensions attend all meetings as observers and advisers.

The functions which the Services Committee undertakes on behalf of the C.M.W.C. are advisory. The decisions of the committee are recommendations to the Minister of Health, who acts as the agent of the Minister of Labour and National Service so far as the recruitment of doctors is concerned. As a general rule, however, these decisions receive the tacit consent of the Minister's representatives who attend the meetings, and are put into effect without first being submitted formally to Whitehall for approval. In practice, therefore, the committee acts as if it had executive powers; but the last word always rests with the Minister of Health; in matters of general policy the committee can only recommend. The answer to those critics who blame the committee for not raising the limit of age for compulsory recruitment of specialists, or for not calling up men rejected during the war as medically unfit for service, or for not forecasting the release of age-service groups of serving officers for at least six months ahead is that the committee is not in a position to do any of these things. Although the release arrangements depend partly on the success of its efforts to obtain new recruits, the committee does not determine these arrangements and is never able to announce them until they have been promulgated by the Service departments.

RECRUITMENT OF GENERAL-DUTY OFFICERS

During the second half of 1945 the committee had recruited specialists up to the age of 40 and general-duty officers up to the age of 35. Early in 1946 the Government decided to retain the age-limit for specialists at 40 but to reduce that for general-duty officers to 30. Any man born on or after July 1, 1915, was to be regarded as within the latter age-limit. Within the last year the date of birth used in deciding liability for service has twice been advanced by six months for the purpose of maintaining the age-limit at 30. At the present time the date is July 1, 1916, the corresponding date for specialists being July 1, 1906.

During 1946 the committee had no difficulty in supplying the quotas of general-duty medical officers allotted to the three Services on the recommendation of the Medical Personnel (Priority) Committee, now known as the Medical Priority Committee. On the contrary, the number of practitioners, not of specialist status, who became available for recruitment during the year exceeded the estimates on which the quotas were based, with the result that the quotas had to be adjusted to take in the surplus. The total number of medical officers recruited for general duty was 1123. This figure is considerably higher than the corresponding figure (968) for the previous year, and is not much below the figure (1185) for the year 1944, when the limit of age for compulsory recruitment was much higher than in 1946 and when women doctors were still liable to such recruit-

ment and were in fact recruited to the number of 200. The increased yield of recruits in 1946 is to be attributed to the fact that large numbers of ex-Service doctors became available during the year for civilian employment. The result of this was that recently qualified practitioners had greater difficulty in obtaining B2 and B1 hospital posts and thus securing deferment of call-up, and those already holding B1 posts could more easily be released for military service.

The only difficulty encountered by the committee in connexion with recruitment of general-duty officers was in regard to the proportions in which the available recruits should be allotted to the three Services to enable them to release serving officers at approximately the same rate.

At the beginning of the year medical officers in the Royal Air Force were complaining bitterly about the arrangements for their release. Although the Army had announced its intention of releasing in February general-duty medical officers in group 38, and the Navy had already released some medical officers in group 40, the R.A.F. programme provided only for the release of group 28 by the end of March. The committee, although in no way responsible for this state of affairs, was being blamed for having failed to prevent what was alleged to be a departure from the Government's release plan. It was known that no medical recruits had been sent to the R.A.F. during the last four months of 1945, and this was being attributed to lack of foresight on the part of the committee, which had had no alternative but to allocate all the recruits available during these months to the Navy and the Army in accordance with Government instructions.

The Ministry of Health was asked to explain the situation, and replied that the inequality in the rates of release was an inevitable consequence of a decision of the Government, which had been announced in the House of Commons in December, 1945, to reduce the ratio of medical officers to Service personnel to 2 per 1000 in each of the three Services as an emergency measure. It was because the ratio of doctors in the R.A.F. had been relatively low that the numbers to be released from that Service were less than in the other Services. The Ministry added that there was no question of a departure from the white-paper plan, which was elastic enough to permit the release of different groups as between the three Services or indeed as between branches of each Service.

The white-paper had indeed stated that there would be necessary differences in the rates of release; but the committee was not satisfied that this particular case was one of necessity. It thought that equality could be achieved, although not immediately, by an adjustment of the quotas of recruits allocated to the three Services. It had been estimated that 450 recruits would be available during the first half of the year, and the number provisionally allocated to the R.A.F. on the advice of the Medical Priority Committee was only 110. The Services Committee recommended that this allocation should be increased materially, and was later informed that it had been increased to 210. When it became evident that the number of recruits in the first half-year would considerably exceed the estimate, the committee decided to allocate the greater part of the surplus to the R.A.F., which received 298 out of the total of 585.

The figures for the whole year are: Royal Navy, 145; Army, 410; Royal Air Force, 568. The quotas recommended by the Medical Priority Committee for the second half of the year were designed to bring R.A.F. releases into line with those of the Army by the end of the year. This result has been achieved, both Services having released group 53 in December.

RECRUITMENT OF SPECIALISTS

At the end of 1945 the release of specialists had already fallen behind the release of general-duty officers, and the difficulty of finding substitutes for those Service specialists who could not be released without replacement was causing the committee grave concern. The recruitment of specialists and graded specialists continued to be the most difficult problem confronting the committee during 1946. The ways in which it attempted to solve the problem are described briefly as follows:

In the first place, the committee examined a complete list of those specialists who had been granted deferment by the local medical war committees. Holders of B1 posts were excluded from the list as arrangements had been made for

their recruitment to be initiated centrally and not by the local committees. Hygiene specialists, psychiatrists employed in the mental-hospitals service, and pathologists were excluded also, the nomination of recruits in these categories being in the hands of the Ministry of Health, the Board of Control, and the Medical Research Council respectively. Of the 135 specialists included in this list, some had been found medically unfit for military service; others were engaged exclusively in specialties in which recruits were not required; a few were found on further inquiry to have no liability under the National Service Act; and one was registered as a conscientious objector. There remained 80 possible recruits. These were mainly men between the ages of 35 and 40 who were performing highly important work, many of them being on the staffs of teaching hospitals. In rather more than one-half of these cases the committee resolved to initiate recruitment, but there were some cases in which it later decided, after examining the representations received, that it was necessary to grant further deferment; and a few of the men nominated eventually to the Service departments were rejected as medically unfit. The number of fit men whom the committee finally decided to recruit was 33. The scrutiny of these difficult cases entailed much labour, but enabled the committee to satisfy itself completely as to the very formidable problems with which the local medical war committees had been confronted in their efforts to find additional recruits among the few senior specialists of military age who had not already served in the Forces.

Holders of B1 posts have recently formed, and must continue to form, the great bulk of the new recruits of specialist and graded specialist status. In their review the committee re-examined also the position of those senior B1 officers who had previously been granted indefinite deferment because of the extreme difficulty of securing sufficiently experienced substitutes to take over their work. There were 25 such practitioners, of whom the committee decided to recruit 14. The other cases of specialists in B1 posts which were considered during the year—on the completion of twelve months or two years in the posts, or on the expiry of an extended period of deferment previously granted—numbered approximately 110; and in all but 16 of these cases the decision was to recruit the practitioners concerned, either immediately or after a short interval. In a further effort to increase the yield of specialist recruits the committee examined its register of general practitioners below the age of 40 and selected those practitioners who, because they held higher diplomas or for other reasons, possibly might be regarded as eligible for specialist or graded specialist status in the Forces; but in only 10 of these cases did the committee find it possible to initiate recruitment.

STANDARDS OF GRADING

During the past year the committee has modified greatly the standards used in classifying prospective recruits as specialists and graded specialists. Every recruit who has held a B1 post for not less than twelve months is now considered by the subcommittee concerned with grading. A candidate for grading is no longer expected to hold a higher diploma or to have been qualified for a specified number of years; the only question considered is whether he has acquired sufficient experience in a specialty to enable him to hold a responsible post in that specialty, under supervision in the case of a graded specialist. The supply of graded specialists has thus been appreciably increased. As there is now no shortage of general-duty recruits, the present policy of the committee is to allow a B1 officer to retain his post after he has held it for twelve months if he is not then considered eligible for graded specialist status but seems likely to qualify for such status after a further period of deferment.

The committee has repeated its request that the War Office should consider employing specialists of a lower physical standard. The War Office has been furnished with a list of the specialists rejected as medically unfit and has been asked to indicate which of these it is prepared to re-examine. Another recommendation made by the committee was that the Service departments should encourage voluntary recruitment by offering specialists a higher rank, but this proposal has been rejected as impracticable. Towards the end of the year the committee published an appeal to suitably

qualified women doctors to offer their services as gynaecologists, anaesthetists, pathologists, and radiologists. Finally the committee has urged, not for the first time, the importance of scrutinising the use made by the Services of their specialist officers; and the Medical Priority Committee has recently sent investigators to conduct such a scrutiny in the main overseas commands with a view to economies in the employment of specialists.

The total number of specialists and graded specialists supplied to the Services during 1946 was 293, the corresponding figures for 1944 and 1945 being 46 and 80 respectively. Of the 1946 recruits, 17 were nominated by the Scottish Central Medical War Committee and 86 by the Committee of Reference, which initiates the recruitment of specialists in London. Despite all the efforts made to increase the yield of specialist recruits, the release of specialists from the Army was 12 groups behind the release of general-duty officers at the end of the year. Unfortunately, specialists of military age who are medically fit for service and have not already served do not exist in the numbers that would be required to bring the release of Army specialists into line with that of general-duty medical officers.

SHORT-SERVICE EMERGENCY COMMISSIONS

At its first meeting in 1946 the committee was informed that approval had been given to a recommendation of the Medical Priority Committee that specialists should be employed in the Forces on a short-term basis. It had been decided that suitable specialists would be accepted for employment for eighteen months, the commission held being known as a "specialist short-service emergency commission."

It was intended that these commissions should be given to any specialists liable to compulsory recruitment between the ages of 30 and 40, as well as to those above the age of 40 who joined the Forces voluntarily. It was hoped that the offer of employment limited to eighteen months would attract specialists above the age of 40 who might hesitate to volunteer for an indefinite period; and at the time it seemed reasonable to make the short-service commissions available also to specialists recruited compulsorily, if above the limit of age for recruitment of the male population generally, especially as many of these recruits had been retained against their own wishes in E.M.S. and other civilian appointments during the war years and had shared some of the disadvantages of the Service doctors, particularly the disadvantage of being unable to establish themselves in permanent positions.

Before many months had passed, however, the committee began to have doubts about the wisdom of this part of the plan. There was practically no response to the appeal for volunteers, and the continued difficulty experienced by the committee in obtaining sufficient recruits of specialist status made it appear that the men accepted for short-service commissions in 1946 might complete their service at a time when some of the specialists recruited in 1945, although due for release, would have to be retained for a further period.

In July the committee asked the Medical Priority Committee to reconsider the plan; and it was informed in November that it had been decided to suspend forthwith the offer of short-service emergency commissions to specialists liable to compulsory recruitment.

MISCELLANEOUS

In November the committee decided to discontinue, for an experimental period of six months from Jan. 1, 1947, its control of the establishments of resident medical officers in hospitals. This decision was thought unlikely to result in a serious reduction of the number of recruits available for general duty in the Services. As many of the senior hospital posts are now held by ex-Service doctors the committee considered it desirable, in the interests of future recruitment of specialists, that hospitals should be free to create additional posts as circumstances might require. It has asked the hospitals to restrict new B1 posts to men known to be liable and medically fit for military service.

The committee received nearly 1200 applications for release of medical officers out of turn during 1945. As was to be expected, the number greatly diminished in 1946. Among the 120 cases considered during the year there were 47 in which the committee decided

to recommend release in class B. In 38 cases—16 of specialists and 22 of general-duty officers—the recommendations were approved by the Service departments. In view of the serious shortage of specialists in the Services, the committee has continued to exercise great discrimination in regard to release of specialists in class B.

The committee has again asked the Service departments to consider granting leave, whenever possible, to medical officers stationed overseas who have applied for permanent appointments and have been selected for interview. The departments continue to regard this proposal as impracticable. The War Office pointed out to the committee that such a concession could not be restricted to doctors and that, if it were made available generally, a large part of the Army would be continually on the move to and from the United Kingdom.

In the interests of ex-Service practitioners, the committee decided in February, 1946, that it would not in future recommend the issue of entry permits to doctors from Eire, even if satisfied as to the necessity of filling the appointments for which such doctors might be selected, except where the hospital concerned (or the local medical war committee in the case of an assistantship in general practice) was able to assure the committee that every effort had been made without success to secure a candidate normally resident in this country. In July the committee was informed that women entering this country from Eire would no longer be subject to any restriction relating to employment; and in December the information was received that the Home Office was anxious to remove all "conditional landing" controls at the end of the year as it considered that the imposition of landing conditions could no longer be justified in the case of a citizen of Eire. The committee, in view of the reported unemployment among ex-Service doctors, felt bound to resist this proposal, and requested reconsideration of the advisability of retaining for the time being the restrictions on employment in this country of male doctors from Eire who have not served in the Forces.

RELEASES FROM THE ARMY

The committee has received the following statistics relating to releases of medical officers from the Army since June 1, 1945, when the reallocation of man-power scheme came into operation:

| | Total | Percentage of strength (11,876) at June 1, 1945 |
|---|-------|---|
| Releases to Dec. 30, 1946: | | |
| Class A | 8846 | 74.48 |
| Class B | 222 | 1.86 |
| Class C | 42 | 0.35 |
| Relinquishments | 123 | 1.20 |
| Invalidings | 295 | 2.50 |
| | 9528 | 80.39 |
| Intake, June 18, 1945, to Dec. 30, 1946 | 1007 | 8.48 |
| Net release to civil life | 8521 | 71.91 |

MENTAL HEALTH

At the inaugural meeting of the National Association for Mental Health, held in London on Feb. 12, Mr. R. A. Butler, M.P., was elected president, Lord Feversham chairman, Lady Norman vice-chairman, and Sir Otto Niemeyer treasurer. The association has been formed by the amalgamation of the Central Association for Mental Welfare, the Child Guidance Council, and the National Council for Mental Hygiene—as recommended by the Feversham committee on voluntary mental health services.

Dr. Kenneth Soddy, medical director of the association, said he was particularly anxious that the aftercare scheme for ex-Service psychiatric casualties should be continued. The voluntary case-work service would still be valuable as an outsider to official services. Occupation centres for defectives, the care of delinquents, and surveys were among the other tasks now in hand. In child guidance the era of indoctrination had ended; now the problem was to catch up with the opportunities which were offered. There was need for more child-guidance clinics and more workers; and it was hoped that the universities would take their share in the training of these workers. An important international congress, organised at the request of international bodies, was to be held in London next year.

PART-TIME NURSING

CONFERENCE AT CHELTENHAM

By using part-time nurses Gloucestershire has solved the staffing difficulties of its institutions for the old and ailing¹; and on Feb. 18 and 19 a conference, arranged jointly by the county council and the Ministries of Health and Labour, was held at Cheltenham to discuss the scheme and demonstrate it in action.

At the opening session on Feb. 18, with Lieut.-Colonel JOHN GODMAN presiding, Sir ARTHUR RUCKER (Ministry of Health) spoke of the great and growing scarcity of nursing and domestic staff which is likely to endanger the working of the National Health Service. This service is suspected in some quarters of all the dangers of bureaucracy; but part-time nursing should help to counteract this danger by stimulating local interest in the care of the sick and the old. The Ministry of Health have sent to the regions suggestions for part-time schemes, some of which have already been started. A part-time scheme for London was launched on Feb. 15.

Mr. A. F. ROUSE (Ministry of Labour) mentioned over 30,000 nursing vacancies notified to his Ministry, and he thought there might be 15,000 others. The war, he said, could hardly have been won so soon without the help of part-time women workers. The Gloucestershire County Council have handled their people well, with full regard to their family commitments.

VIEWS OF THE ORGANISER

Mr. WILLIAM SHEE (public-assistance officer, Gloucestershire) said that he launched the scheme on Jan. 29, 1946, as a last resource. At that time the county services were about to break down. In less than a year the whole picture had changed; not a ward has had to be closed, and the hospitals for the chronic sick are now fully staffed. The Civil Nursing Reserve, who during the war should have saved the situation for the country at large, were lost to nursing by the dozen, he said, because they were regarded as supernumeraries. Part-time workers must be regarded as "staff," and given full responsibility while they are on duty, even if they only come in for a few hours a week. Part-time nursing staff includes regulars, reserves, and casuals, the last being particularly useful at the weekends, when they are often willing to relieve full-time staff. They are classified, according to their experience, as trained nurses, enrolled assistant nurses, nursing attendants (with some previous nursing experience), and nursing orderlies (with no previous nursing experience). They are all engaged in nursing duties, and do no domestic work.

Pay scales had to be worked out. The National Joint Council has fixed rates for domestic workers at 1s. 4d. an hour for cleaners, 1s. 5d. for housemaids, and 1s. 5½d. for ward orderlies doing domestic work. It seemed common sense, Mr. Shee said, that a woman doing nursing should not be paid less than a cleaner; the rate for nursing orderlies was therefore fixed at 1s. 6d.

Attendants were offered 1s. 9d., and trained nurses 2s. 6d.—an average based on the Rushcliffe rates, which range from 2s. 0½d. to 3s. Enrolled assistant nurses were offered 2s. The latest Rushcliffe scales for part-time nurses offer 2s. 10d. to sisters, only 2s. 1d. to trained staff nurses, 2s. to enrolled assistant nurses, and only 1s. 5d. to "intermediate assistant nurses."

This last figure, in Mr. Shee's opinion, may be right for women who can complete their training and become enrolled; but part-time workers have not this opportunity.

The Gloucestershire workers are collected from approved centres and sent in taxis to their work. Seven of the nine county hospitals for the chronic sick are in isolated country places, and the workers travel 7200 miles a week, at a cost of £10,000 a year, or 5s. per bed per week. They are allowed travelling time from the centre and a meal on duty; if they want it, they can buy another meal at canteen prices when they come off duty. The full-time staff, thanks to the newcomers, now

1. See *Lancet*, 1946, ii, 873.

do a straight 8-hour span of duty daily, instead of a 13-hour span with some hours off; since they, too, are now given their meals in duty time, their weekly hours of work are actually below 48—about 42, in fact. Uniforms of pleasant style are provided and laundered for part-time workers. After six months' service they get holidays with pay; if it happens that a husband's holiday falls due before the six months is up, the worker is allowed to take hers at the same time, but must come back and complete her six months before she receives her holiday pay.

The council has advertised in the press, and by posters and cinema slides, and by addresses to women's organisations; but the best advertisement has come from the women who do the work. A fine type has been attracted from the start; of the 301 engaged, 72 are trained nurses, 32 enrolled assistant nurses, 92 nursing attendants, and 105 nursing orderlies. Only 4 had to be refused as unsuitable, and only 31 left during the first year; 10 of these left during the first month, but between the sixth and the twelfth month only 6 left. Some 86% are married, their husbands' occupations ranging from unskilled or skilled labouring to professional work.

The cost of a 66% part-time service, Mr. Shee reckons, is no greater than the cost of a whole-time nursing service, supposing you could get it; for much must be spent on up-to-date nurses' homes, and large sums go on expensive labour engaged from nurses' cooperative agencies. It seems that a hitherto unused source of labour is being tapped. When a hospital in a neighbouring county lost its entire staff, the Gloucestershire County Council were able to staff it completely at 36 hours' notice, from among their reserve part-time workers. There is no age-limit for candidates, and the average age of those recruited is 38½. Most of them have children, with an average of 1.8 children per worker. The shifts run from 8 A.M. to 12 NOON, NOON to 4 P.M., 4 P.M. to 8 P.M., or (on night duty) from 8 P.M. to 8 A.M. The patients are left to sleep until 7 A.M., and are washed by the day staff.

Some 56% of part-time workers have had previous nursing experience, and the inexperienced are taught at the bedside by the trained staff. Nursing orderlies in due course gain promotion to the grade of nursing attendant. While believing that the State-registered nurse should have a high standard of training, Mr. Shee feels that the aim of such a standard must always be the good of the community, not merely the status of the nurse: training standards should never be allowed to create hardship for the sick. The success of the Gloucestershire scheme has been due, he considers, to the interest and co-operation of the matrons; and it is important to cultivate the right orientation of mind in matrons who are to work such schemes. He holds that no hospital should now close a ward unless everyone concerned is satisfied there is nothing for it but defeat.

EFFECTS OF THE SYSTEM

Dr. H. KENNETH COWAN (M.O.H. for Gloucestershire) finds that patients like the part-time system, not only because it provides enough nurses to look after them properly but because they enjoy news from outside the hospital, and the sight of fresh faces. He suggested that part-time nursing will have a permanent value in the care of the chronic sick, and may well apply in sanatoria, and possibly in acute general and special hospitals, where part-time workers could be used to supplement full-time staff.

Mrs. B. A. BENNETT (Ministry of Labour) told how her critical nurse's eye had been satisfied on a tour of the Gloucestershire infirmaries. She saw there, she said, well-nursed patients, happy nurses, splendid bedside teaching—in fact, the loving care of old people. Mrs. F. W. REYNOLDS (matron of Cheltenham County Infirmary) remarked that she now has a staff waiting-list. The part-time nurses are treated, and work, as part of the team. On public holidays they have volunteered to relieve the full-time staff by making up rotas among themselves.

On Feb. 19 Dr. B. H. HASLETT (consulting physician to the county infirmaries) described the types of patients

nursed. Most of them are over 70, many are senile, some have rheumatic disorders, others need reablement after a stroke, a few are late cancer cases, some are incontinent. It is slightly demoralising work, he said, to change the same incontinent patient several times a day; but a part-time nurse usually has to do this only once in her span of duty, and may therefore suit the patient better than the full-time nurse. It is important to get patients out of bed if they are well enough, and to dress them in their own clothes. This means more work for nurses, and may be neglected where staff is scarce. In 1945 in some of the infirmaries the matron was the only trained nurse on duty, and it was becoming necessary to reduce and simplify treatment, especially surgical treatment, instead of expanding it. Now it has become possible to undertake more surgery in the infirmaries and even to reduce the waiting-list in the general hospitals by using spare infirmary beds for people needing urgent operations. He considers that each large ward should have a full-time sister, if possible, though in emergency part-time workers alone can run a small hospital. The women attracted, being more mature and experienced than most recruits to nursing training, are also more considerate to the old. If acute and chronic patients could share the same hospitals, nurses in training would get experience of both, and some would choose to specialise in the care of the chronic sick. It is true that part-time workers usually have divided loyalties, and may have to give up work for a time to meet demands at home, but this must be accepted and allowed for. They seem to like the work and to want to come back to it; and this is the only system which allows the married trained nurse to carry on with nursing.

In reply to a question, Dr. COWAN said that the council hoped to extend the system into maternity hospitals. Miss D. E. WESTMACOTT asked whether the danger of introducing infection into maternity wards in this way had been considered. Dr. COWAN replied that in wards designed to take 40 they have had as many as 70 patients in labour, while the staff consisted of only 10 midwives instead of the full complement of 18. It is better, he thinks, to have a staff adequately supplemented by picked part-timers than to try to deliver patients with insufficient staff.

OPINIONS AND CONCLUSIONS

Mr. SHEE asked whether the meeting would care to consider a resolution criticising the Rushcliffe scales for part-time nurses, but on the assurance of three members of the Rushcliffe Committee that all that had been said would be reported and considered, he did not press the suggestion.

In further discussions, and during the course of a brains trust held on the evening of Feb. 18, the case of the trained nurse who has been away from nursing for many years was raised. A sister who has returned to part-time work after a 13-year interval remarked competently "I took hold of a swot-book and got the new stuff up." Asked whether she felt that, as matron, she could give a part-time nurse the full responsibility of ward administration, Mrs. REYNOLDS replied: "Of course. I don't look on them as 'part-time workers'; they are my nurses."

This attitude to part-time workers was emphasised by several Gloucestershire speakers; and it is evident, as Mr. Shee claims, that the hospitals regard themselves as being staffed by part-time workers, supplemented by what full-time nurses are available. Mr. C. A. W. ROBERTS (Rushcliffe Committee) pointed out the possible application of part-time nursing to mental hospitals; and Mrs. E. O. JACKSON (matron of University College Hospital) considered that it was the answer to the problems of hospitals for the chronic sick and of small hospitals. She thought it might even be applied in some departments of training schools. At the same time she pointed out that the assistant nurse's qualification was established to regularise the position of untrained women in nursing; since part-time nurses cannot at present train for any qualification, the old situation may to some extent be re-created.

Mr. W. E. LEOPOLD (Ministry of Labour) emphasised the careful way in which the Gloucestershire scheme was launched—the steady build-up, and the care taken to

overcome prejudice before the campaign began. He asked those starting schemes to keep this in mind, yet to remember the urgency of our need; and he begged them to let the Ministry know of their successes and failures. "Where people will not coöperate," he said, "tell us, so that we can back you up."

VISIT TO THE HOSPITALS

A visit to some county infirmaries during the afternoon of Feb. 18 confirmed what had been reported of the scheme. There were ample nurses on duty, doing their work peacefully, at a rate which permitted them to be thorough and careful. All the patients questioned were pleased with their treatment, and those who had been in long enough to see the change-over spoke enthusiastically of the part-time scheme. The standard of comfort was clearly high, and the matrons did not look harassed. The part-time nurses were keen and satisfied, enjoying the rewards of nursing without the fatigues and frustrations sometimes associated with full duty, and bringing to their task freshness and the judgment and initiative which family life fosters. They were on pleasant terms with the full-time staff, who spoke of them appreciatively.

ROYAL COLLEGE OF SURGEONS

HUNTERIAN FESTIVAL

THE Hunterian oration of the Royal College of Surgeons of England was delivered on Feb. 14 by Sir JAMES WALTON, consulting surgeon to the London Hospital, whose subject was Hunterian Ideals Today. It was, he said, by the study of John Hunter's specimens and his series that the importance of his work could be best appreciated. Though his collection had been grievously damaged during the war, much would be gained from the council's decision that, instead of being kept separate as a historical group, the remaining specimens should form a living centre of growth in each section of the museum.

At the Hunterian dinner held in the college that evening, H.R.H. the Duke of GLOUCESTER, himself an honorary fellow, reported that in Australia he had fulfilled the council's commission to bestow the honorary fellowship on Sir Hugh Devine. The PRIME MINISTER, speaking of the National Health Service Act, said that in his experience very few Acts of Parliament came up to the hopes of their authors, but still fewer fulfilled the fears of their opponents. The main object of this Act was to make available to all the benefits formerly confined to a few. The acceptance of this "very great aim" marked a big revolution in ideas—a revolution due not only to politicians but also to doctors. "I am quite sure," added Mr. Attlee, "that as we are united in aim we shall in our British common-sense way find a method by which we can all work together." Sir ALFRED WEBB-JOHNSON, the president, said that the profession was deeply conscious of its responsibility. No health service could be a success without its cordial coöperation, and if flaws were found in the plan he had sufficient confidence in the common sense of the British people and of Parliament to feel sure that those flaws would be removed. Turning to domestic affairs, he mentioned that £144,000 has now been subscribed towards the £250,000 needed for restoration of the college. At present 200 graduates are attending classes, and the London colleges are still foci on which men from other countries concentrate.

Sir HENEAGE OGILVIE's toast of the Guests drew replies from the Lord CHANCELLOR (Viscount Jowitt) and Prof. LOUIS BAZY, past president of the Académie de Chirurgie de Paris, who had just been admitted an honorary fellow. Speaking of the proposed treaty of alliance between France and Britain, Professor Bazy said that it was already signed in the hearts of all Frenchmen. Sir CECIL WAKELEY proposed The Hunterian Orator, and in an eloquent reply Sir JAMES WALTON pleaded for a return of kindness, courtesy, honesty, and charity—between men and between nations.

Those present included the SOVIET AMBASSADOR, the Earl of ATHLONE, Viscount ADDISON, K.G., F.R.C.S., and Mr. ANEURIN BEVAN.

GENERAL MEDICAL COUNCIL

SESSION FOR PENAL CASES, FEB. 25

AT an extra session, held on Feb. 25, Mr. John James Robertson, M.P., introduced by Dr. R. W. Craig, joined the council as a Crown nominee for five years. Three penal cases were considered.

Alexander Lawrie, registered as of 113, Manchester Road, Accrington, Lancs, M.B. Edin. (1932), had been twice convicted in 1944 of being drunk in charge of a motor-car; in February, 1945, the council had postponed judgment for two years. Being satisfied with his conduct in the interval, it now decided not to erase his name.

Christopher Whitehead, registered as of 62, Hockley Hill, Birmingham, L.R.C.P.I. (1926), had been convicted of drunkenness in charge of a motor-car in May, 1944. In February, 1945, judgment was postponed for two years. In April, 1946, he was convicted again of being drunk in an omnibus. He was summoned to appear before the council in November of that year, but was prevented by illness from attending. He now appeared accompanied by Mr. G. E. Evans, of counsel, instructed by Messrs. Donald, Darlington, and Nice. The President (Sir Herbert Eason) reminded him that he had been warned at his last appearance that if he should be convicted again during his period of probation the council might forthwith direct the erasure of his name.

Mr. Evans said that the respondent's conduct had been unblemished before the convictions. He deeply regretted his recent lapse. To relieve an attack of giddiness he had taken three double whiskies at 11 A.M. After his conviction he had entered a hospital and had been discharged on June 1, having responded well to physical and psychological treatment. The medical superintendent reported that his blood-sugar balance was unstable and that he was accordingly highly sensitive to alcohol when fasting. Now that he understood the cause of his trouble he promised to abstain in future. He had arranged to purchase a practice, and to see the vendor on the next day. He produced several testimonials to his professional excellence.

Dr. Whitehead gave evidence on his own behalf and said that he had been practically a total abstainer since his conviction, and had not been on duty at the time he had been drunk. The council postponed judgment again until February, 1949.

Donald Gordon Couitts, registered as of 23, Jordangate, Macclesfield, Cheshire, L.R.C.P.E. (1923), had been sentenced to three years' penal servitude in September, 1946, for the theft of a pound note from a hotel bedroom and of a number of toilet articles the property of a hotel landlord; he had pleaded guilty and admitted 28 other offences. He had previously been cashiered from the Army for cashing several worthless cheques in India and for remaining absent without leave for a month. He did not appear in answer to his notice, but wrote to the council saying that he was in prison and could not afford the expense of the journey. Mr. F. P. Winterbotham said that the Lord Chief Justice, in dismissing his appeal against sentence, had said that he had been a satisfactory doctor but this had given him the less reason for plunging into crime; he had preyed on hotel-keepers for seven or eight months, and it was useless to say that his nerves were wrong. Mr. Winterbotham read a statement from Dr. Couitts, and other evidence, tending to show that he had been treated over several years for severe psychoneurosis. The council found the charges proved and ordered the erasure of his name.

The council considered in private its draft recommendations for the medical curriculum, and the report of a committee which held conferences with the medical defence societies and the British Medical Association on penal procedure under the council's draft Medical Bill.

"... the main differences between the good doctor and the bad are history-taking and planning. Both need time. The good doctor takes a careful history, which is the most important part of his examination. He does not leave the case until he has a plan of action. He may not have made a diagnosis, but he has made a decision. The bad doctor has made neither. Without a decision, reassurance and explanation are impossible."—Prof. ROBERT PLATT, addressing the north-western branch of the Society of Medical Officers of Health (*Publ. Hlth, Lond.*, February, 1947, p. 99).

In England Now

A Running Commentary by Peripatetic Correspondents

A LIGHT flurry of new snowflakes has filled the animals' footmarks, which are now picked out in white on the grey sheet covering our fields. Why snow should go grey down here in the country was a mystery to me till I realised that all this dirt is just a ten days' deposit from the cloud of smoke that always hangs over England.

Much preferring the traditional coal fire to anything that comes out of a wire or a pipe, I've always looked askance at the activities of the National Smoke Abatement Society; but I was shaken last autumn by their Sir George Elliston's remark that 10,000 of our miners spend all their days in producing the smoke that interrupts our sunshine. Almost more disturbing was Mr. E. Minshall in the *Manchester Guardian* of Feb. 17, who showed that burning raw coal is about as wasteful as buying milk and pouring away the cream. It seems that 1,000,000 tons of this stuff, treated scientifically, will yield 390,000,000 cubic yards of coal-gas (which I calculate would grill 97,500,000 underdone fillet steaks), 420,000 gallons of motor fuel, 250 tons of phenol, 1000 tons of cresol, 4000 tons of naphthaline (which would at last drive the carrot-fly right out of our garden), 22,000 tons of pitch, 800,000 gallons of Diesel oil, and 640,000 tons of coke (of which 2 cwt. was, thank goodness, delivered to us last week).

"When it is considered," said Mr. Minshall, "what proportion of coal mined is burnt without any regard to the collection of these raw materials it is at once realised that the people are sacrificing untold wealth in order that they may enjoy the doubtful privilege of a very inefficient mode of heating and that industry should enjoy the obnoxious privilege of dispatching into the atmosphere each year many thousands of tons of soot, tar, acid vapours (sulphur dioxide and hydrochloric acid), and other substances injurious to public health."

Regardless of the public health I shall continue to defend the burning of coal in the domestic grate—as a deliberate luxury. But hasn't the time come when stokers at our power-stations and throughout industry might be denied this atavistic pleasure?

Excuse me while I cut up some wood.

One vivid memory of my schooldays is the joyous abandon with which we at Dulwich welcomed a real good epidemic of German measles in 1895 or thereabouts. I can still recall our delight at feeling the enlarged glands under our ears, and the hectic holiday in the "san." with twenty other high-spirited young devils—three weeks with no more hardship than a dose of purgative; if you were lucky only the gentle and refreshing Eno's. So it comes as a shock to find there is a viper in the bunch of bananas.

Dressed warmly in our ordinary clothes, despite the presence of a Royal Duke, we were all very comfortable at the Hunterian dinner. Surgeons, said the President, are naturally on familiar ground when it comes to making drastic cuts, maintaining gas pressure, avoiding inflation, and keeping open arterial channels and channels of evacuation. Even Mr. Attlee, displaying the detachment expected of our Prime Ministers at moments of peril, seemed less anxious about the industrial crisis than about the possibility that his hosts, if annoyed by the Health Act, might put him in their famous museum. It remained for the Hunterian Orator, replying to what its proposer called the real toast of the evening, to touch at the last moment on the fundamentals of our national situation. It had always seemed to him, he said, that the best means of attaining happiness is to be occupied with work: "Has anyone ever known a really busy man who was unhappy?" People should not, as now, be laying themselves out to obtain more leisure, but should be seeking absorbing occupation, both for their working years and afterwards.

But Sir James Walton would have to admit that, since the Industrial Revolution, the face worn by Honest Labour has often been deplorably dull; and most people can't begin their "absorbing occupation" till they've secured their leisure. Moreover it isn't always

dogs or football: nobody should under-estimate the proportion of its free time which the British public devotes to mildly productive activities such as the upkeep of homes, gardens, and allotments. I have a friend who (it is true) wastes his own weekend in bicycling and thinking: but one of his thoughts is that, if we had another campaign for more home-grown food, any loss to the nation through working a 40-hour week could be largely offset by the value of the vegetables grown in busy hours of idleness at home. Sir James (and anyone fond of vegetables) would like that.

Shivering in the consulting-room for two hours morning and afternoon may be a change from home, where the water main has frozen again, but the prospect doesn't attract other people, and the consequent dearth of patients would be a source of grave anxiety if one's colleagues weren't in the same boat (or on the same ice-floe). "No-one to see me this afternoon," says the E.N.T. man. "Ditto," says the ophthalmologist, while the gynaecologist complains that his patients, having braved the rigours of the Arctic to get to him, resolutely refuse to prepare themselves for his examination, so the visit degenerates into a social call, or an abortive attempt to break the ice.

Meanwhile one listens to the weather reports over the restricted broadcasting service, in the vain hope of a gleam breaking through; one goes home early to fill the coal bucket from the pathetic little dump in the garden, de-snowing it as best one may; one sends for chilblain ointment (samples), sweeps the snow from the garage approach, fails to buy an ounce of paraffin or anti-freeze, swaps burst-pipe yarns (the modern equivalent of blitz stories) with neighbours, wonders what the next Spens committee will produce, sympathises with the builder's labourer who says if he had money he'd follow the sun, and decides tomorrow to stay a little longer at the hospital to cadge a hot bath in the residents' college. Finally, when one's digital circulation has packed up and one is frozen almost into aphasia, one wonders whether that whole-time salaried job would not have cut a little more ice after all.

Notorious money-grubbers, we G.P.s. The other day I went 12 miles, got my car stuck, and walked across three ice-covered fields in an east wind to see an octogenarian (N.H.I.) patient whose sole complaint was that he felt cold.

Leaning back in the comfort of what was once a first-class carriage on our suburban line I opened my *Lancet* of Feb. 8, and idly turning to page 231 seemed to read as follows:

"Learning physiology as a second-year medical student has its tragic side in our college. I have never understood what pH stands for, and having a brain-wave the other day thought it might be a ferment and asked him who is supposed to teach me whether it was. The poor fellow tumbled against the bench, and burst out into a spate of words that told me nothing. However I led him to think he had made it clear to me, and thanked him. Some days later he introduced another of those combinations of letters in connexion with the blood. This time Rh. . . . He asked me if I understood it and I had to say it came next but one to pH, and was going on to ask why the capital letter had been inserted when . . ."

The train stopped with a jerk at our local terminus and I saved my specs, threw my *Lancet* in my case, and ran up the ramp to miss the bus that is timed just not to meet the train. When I had regained my breath I began to have sympathy for this poor boy. Having a form-visual brain and a sound-hearing mind, I have always had great difficulty in grasping the physiologist's airy something without a local habitation. It is not so bad when they have a name—I can at least struggle with a dictionary or a lexicon—but when they are represented by letters that are not even algebraic symbols I am stumped. I believe the Rh factor has something to do with a monkey, though why it should carry a capital "R" while the lion and the lizard keep to a small "l" they do not tell me; but pH is quite meaningless and must remain so till English is no longer English.

Letters to the Editor

THE NATION'S FOOD

SIR,—Mr. Strachey's unsatisfactory answer to Mr. Reid in the House of Commons on Feb. 6 deserves further attention.

"I believe," said Mr. Reid, "that this nation has now to face greater trials, possibly, than it has ever had to face in its history . . . and unless the diet of this country can be improved, and improved quickly, there is the greatest risk that this country will not pull through the trials which face it in the immediate future. . . . Let us not blink the fact that there is a widespread feeling at the moment that this country has not got the food from outside sources of supply which it ought to have got. . . . We have got to get the materials somehow, and if, by reason of ideological considerations, he [the Minister of Food] refrains from returning to ordinary means of buying and thereby loses food for the people of this country, he and his Government are incurring a very heavy liability indeed, and a very heavy responsibility."

In reply, the Minister said that the country as a whole was consuming about 7% less food than before the war. The upper third of the community had found their diet reduced by much more than 7%; the middle third consumed about the same; and the poorest third was consuming far more than before the war.

It is true that there was some improvement in the national dietary during the war: the free issue of meals and milk in the schools has done much to benefit the children's health, and everyone is full of praise for the way in which the food situation was handled in the war years. But can the Minister possibly be right in thinking that the middle third consumes about the same, and the poorest third far more, than before the war? This would mean that the reduction in consumption by the upper third was sufficient not only to offset the increase in consumption of the poorest third but also to reduce the country's total consumption by 7%. Either the Minister is wrong in his analysis, or the "upper classes" must have been engaged before the war in almost continuous assimilation.

As members of the medical profession we are favourably placed for hearing the comments of our patients. Is not the story always the same—workmen complaining that they can't do a morning's work on a breakfast of tea, bread, and margarine; housewives at their wits' (and points') end, and going without themselves, in order to find solid food or even sandwich filling for the men-folk; and school-children raiding the larder and devouring the "mousetrap" ration as a snack? The women's wish is always the same—for meat, bacon, butter, palatable cheese, and eggs. Workers on the land, in the factories, mines, and shipyards all tell of the same dearth.

The Government in defence invariably pin their faith to calories. Would that this unfortunate thermic unit had never been invented, for it takes no account of the hosts of other factors, only some of which are understood, which go towards the satisfying and appetising dietary which is necessary for full physical and mental health.

Our national salvation depends on increased production, which so far is not forthcoming. If, as Mr. Strachey implies, the workmen are now better fed than before the war, then the outlook for industrial recovery is poor; if, however, as some of us feel, the men and their wives are hampered by food-rationing, now more severe and irksome than in the darkest days of the war, then everything is to be gained by improving the food situation. This is not as impossible as the Government suppose, especially if they heed Mr. Reid's suggestions. The importation of food and feeding-stuffs could be considerably increased at the expense of tobacco, films, and cosmetics. Dutch cheese could be imported more to our advantage than Dutch bulbs.

The American loan was largely approved by the Americans, despite mistrust of our post-war Government's policy, because it was felt that our people were in need of food and machinery; but what can the Americans think of a country whose Government do not avail themselves of the opportunity? Admittedly dollar resources must be carefully nursed, and imports must in

part be chosen in relation to exports. Nor are we the only, or by any means the most, ill-nourished nation; but, excepting Germany, we have been engaged longer than any.

The British workman is still a proud craftsman, and if he is properly fed, and can see his wife, children, and parents properly fed, he will not fail to work all out. If well nourished we could again lead and point the way to European recovery; but at present our people have little to work for.

The time has come when the leaders of the profession should, in the nation's interest, review the food situation, and assess the present state of our subnutrition, so offering speedy advice to our harassed and maybe well-meaning but insufficiently experienced Government.

Malvern.

ROBINA McMENEY.

TREATMENT OF TUBERCULOSIS

SIR,—It is regrettable that a report by Dr. Corrigan and myself (Dec. 14) on a small group of patients with pulmonary tuberculosis who were benefited by minimal doses of amphetamine should have evoked from at least one correspondent a denunciation of modern methods of treatment. One cannot attempt seriously to reason with Dr. Brailsford when he suggests (Dec. 28) that the lethal condition of phthisis should remain undiagnosed and untreated because he sometimes sees healed lesions in X-ray films. On the other hand, we do not dispute Dr. Simmonds's contention (Jan. 11) that many patients have a very proper faith in surgical treatment, although some are not as phlegmatic as others. Dr. Clive's axe has, we think, been slightly twisted in his hand. We believe that he did not intend his blow to be struck against the use of collapse therapy, but in defence of the fundamental principles of sanatorium treatment (Jan. 25). Surely both are indispensable; but it has become apparent that the active and passive phases of treatment cannot be happily synchronised.

We thought we had made it clear in our article that we used amphetamine only in exceptional circumstances, in order to alleviate undue mental distress. We suggested, moreover, that the drug might have a value not only in the treatment of difficult cases of phthisis but also in general surgery. It is interesting to recall that a good deal of disapproval was expressed when anaesthetics were introduced for the alleviation of the physical pain of surgical operations.

Harefield County Hospital, Middlesex. L. E. HOUGHTON.

GERMANY

SIR,—As one who has been in contact with German medicine for about a year, I fully endorse the pleas of Flight-Lieutenant Saunders and Flying Officer Levy (Feb. 8). The inadequacy of medical supplies is serious: paper bandages are still being used even in the larger and better-equipped hospitals.

Penicillin became generally available for the first time in Schleswig-Holstein (and, I believe, the British zone) last October, when, through the agency of the British Red Cross and COBSRA, penicillin banks were established. One such bank was at the Save the Children Fund Hospital, Lübeck. Unfortunately the limited supply soon ran low. We have been reluctantly forced to confine the use of the remainder to children until such time as supplies are replenished. So far the situation remains unrelieved.

The employment of penicillin was heartening, and the appreciation of patient and doctor quite inestimable. A group of relief workers in Brunswick, whose salaries are but nominal, sent a relatively considerable sum to London for the purchase of further supplies. It was disheartening and acutely embarrassing to refuse treatment with the excuse that no penicillin was available, while supplies were lying idle, in Military Government stores, waiting for venereal cases.

I would make two suggestions: (1) that the Control Commission should be urged to change the ruling that penicillin be used for cases of v.d. only; and (2) that, in view of the low price of penicillin, immediate financial support be given to such organisations as the British Red Cross and the Save the Children Fund for the purchase of penicillin. In these ways we should be

counteracting the present deterioration in British prestige and implementing the principles about which the Germans have heard so much.

Save the Children Fund Hospital, Lübeck. DAVID MORRIS.

SIR,—I entirely support the appeal of the two R.A.F. medical officers for penicillin for the Germans. It is utterly humiliating to watch a man die for lack of it, as I have done, while knowing that it is being used for face-cream at home and in America. Helpful though the contribution of the Ecumenical Refugee Commission will be it can only touch the fringe of the problem. The solution is:

- (1) To allocate penicillin from British and American production for urgent German needs (which can easily be assessed, if this has not already been done) before allowing it to be used at home for trivial complaints.
- (2) To produce penicillin in Germany.

Nearly two years after the end of the war the huge majority of hospitals in the British zone of Germany have received no penicillin and German doctors have not been trained in its use. I am told that factories in Göttingen and Berlin have been, or will be, started—though I wonder whether two factories will be enough. The resources necessary, unlike those required for other industrial activities, are trifling; the results would be, as they have been in England, tremendous.

This is a matter of public morality, in which we are, therefore, all involved. It is the duty of the profession to insist on the necessary action.

B.A.O.R.

DAVID PYKE.

* * A statement on penicillin by the Minister in charge of the British zone is reported on p. 309.—ED. L.

THYROID AND COLD SENSITIVITY

SIR,—I have observed—it is but a rough clinical impression—that patients taking thyroid gland for a variety of conditions, both rationally and empirically, have not noticed the extreme cold of recent weeks to the same extent as the majority. This is certainly true of patients suffering from thyrotoxicosis, and of course is as well recognised as is the hypersensitivity to cold of hypothyroid patients.

The thyroid gland of rabbits undergoes hyperplasia within half an hour of exposure to cold; and normal mice given thyroid gland stand exposure to cold without loss of temperature to the degree shown by control mice.¹ This is apparently due not only to the raising of metabolism but to induced greater activity. Whether or not this has any large-scale applicability to normally healthy man is debatable, and raises the question of the significance of reported ill effects of large doses over long periods. Nevertheless, it might be worth investigating the effect of controlled moderate dosage over short periods in groups of healthy volunteers. Certainly, inadequately compensated exposure to cold appears to lower resistance to respiratory infection, apart from its more obvious irksomeness. On the other hand, if we raise metabolism and appetite without being able to provide enough food our final state may be worse than the first.

London, W.1.

S. L. SIMPSON.

WHAT CONSTITUTES LIVE BIRTH?

SIR,—May I be permitted to comment on the article under this title in your issue of Jan. 18, in so far as it affects the provisions of the Births and Deaths Registration Acts?

These Acts prescribe that the birth of every child born alive shall be registered; and in the absence of a legal definition of live birth no arbitrary dividing line has been drawn in relation to duration of pregnancy as has been done in the case of stillbirths.

Accordingly successive Registrars-General have taken the view that it is a statutory requirement resting upon birth informants to register as live-born any child which after being completely expelled from its mother breathed, or showed any other signs of life, regardless of the period of pregnancy. The question of viability or non-viability does not affect the requirements of registration. On this interpretation the only births which are not registrable either as a live birth or a stillbirth are the births of

children which issue forth from the mother before the completion of 28 weeks of pregnancy, but which in other respects fall within the statutory definition of "stillbirths."

General Register Office, Somerset House,
London, W.C.2.

J. M. ROSS.

HEALTH CENTRES OF TOMORROW

SIR,—May I offer my whole-hearted congratulations on the series of articles on Health Centres of Tomorrow, concluded in your issue of Feb. 8? You have given us a complete review of the whole problem and have succeeded in resolving many of the points of controversy that at present divide us.

One of your most important proposals is that there should be two main varieties of health centre: (1) an ideal type, to be put up on a limited scale in relation to a teaching school or some research organisation; and (2) a more utilitarian variety which could be universally applied to the whole country without undue delay. Clearly, the first type would be experimental and would give a valuable guide for the future, while the second type, though based upon the plans for the first, would only contain those elements which were immediately practicable.

Within the scope of this definition, the problem of X-ray apparatus at the health centre is immediately soluble. The ideal health centre would naturally have an X-ray plant; its more utilitarian brother could only hope to have one when we have produced "standardised and simplified apparatus which will not be costly." Meanwhile arrangements should be made for practitioners to have their patients X-rayed at a central department from which films would be forwarded.

Dr. Hoffstaedt's suggestion (Jan. 18) that miniature mass-radiography units should be available for X-raying general practitioners' cases deserves further consideration. Many of us who are interested in the problem of pulmonary tuberculosis have been wondering for some time whether it might not be possible to put this apparatus to a better use. Dr. Hoffstaedt's brilliant solution could go a long way towards solving the immediate problem of chest radiology for patients under the care of a general practitioner.

The question of having a clinical laboratory has also proved to be controversial. I cannot agree with Dr. Stark Murray (Jan. 18) when he opposes such an arrangement. The methods of routine clinical observation have gone beyond the stages of palpation and auscultation to include blood-counts, full urine examinations, and radiography of the chest. Any qualified doctor can do the blood and urine examinations himself, so why not let a group of ten doctors share a small laboratory with a centrifuge? We should not let lack of technicians prevent us from having a clinical laboratory in every health centre. It will not be of much value to bring doctors together in a health centre if the old isolated methods of work are to persist. The opportunity for sharing facilities inaccessible to the individual but feasible for the group is the main justification for health centres at the present time.

I believe that your articles may well become the point of departure for plans under the National Health Service Act, and I hope they will be carefully studied. Would it be possible to reprint the series, and the leader of Jan. 4, as a small booklet, and to send a copy to every general practitioner?

Grove Park Hospital, London, S.E.12.

P. W. ROE.

SIR,—The ideal which inspired your excellent articles on the health centre is to secure the best possible service for every patient; and I reply to the letter of Dr. H. B. Porteous (Feb. 1) only because that ideal cannot be reached unless every detail is fully discussed. The difference between us is, however, entirely one of words. My use of the words "central laboratory" appears to have given him the idea of a great institution serving a very large unit of population, and of practitioners waiting days for a result. I agree that such a service would be entirely wrong. What I want to see is a central laboratory that provides every general practitioner within the normal health-centre unit with the most rapid and complete service that can be given.

1. Tanner, M. L. *Endocrinology*, 1946, 38, 263.

May I give an example from my own laboratory? Contrary to the ideas of most people, I spend a large proportion of my time in consultation with general practitioners either in the laboratory or in the homes of their patients. A few days ago—and this is the everyday routine of this laboratory—I was asked to see a patient whom the general practitioner thought might be suffering from agranulocytosis. The patient lived eight miles from the laboratory, which is the extreme limit of the radius we cover; nevertheless he was visited, swabs of the throat were taken, blood-counts were made, and the general practitioner was discussing the result and the best method of treatment in less than three hours.

Dr. Porteous repeats the assertion to which I took exception in your original article—namely, that “if five doctors were working as a group and using regularly the ordinary routine laboratory tests they could fully employ one technician.” What I asked for, and have been seeking for years but have never been able to find, are actual figures to substantiate this assertion. Until they are produced I shall still believe that the best clinical pathological service is one in which *the pathologists are mobile*; the laboratory should serve a unit of population not exceeding 100,000, and should be capable of carrying out the whole of clinical bacteriology, hæmatology, and other associated sciences, at the request of the family doctor and in the closest contact with him and his patients.

Richmond, Surrey.

D. STARK MURRAY.

DOSAGE OF NEPENTHE

SIR,—In your recent report (Jan. 25) of a death following an excessive dose of this drug you say that “nepenthe is a proprietary preparation of opium, containing about gr. 1 in 130 minims.” Surely this should read: “Nepenthe is a proprietary preparation of opium, containing about gr. 1 of anhydrous morphine in 130 minims.”

London, S.W.1

GEORGE E. SPEAR.

* * We are glad to have this error corrected. ‘Nepenthe’ contains 0.84% of anhydrous morphine.—ED. L.

WOMEN DOCTORS AND SERVICE SPECIALIST APPOINTMENTS

SIR,—The Medical Women's Federation has been informed of the extreme difficulty which is being experienced in finding replacements from civilian life for the specialists (men and women) in the Services whose release is behind all other medical personnel—in the Army, for instance, it is 12 groups behind.

There is at present no conscription of women. As many women doctors know, in June, 1945, the Ministry of Labour, by a Cabinet decision, abandoned the call-up of women, and the doctors were included in the general ruling. The Medical Women's Federation wrote a letter at the time to the Ministry of Labour, which was afterwards reported in the medical press, pointing out that this exemption was contrary to the wish of medical women; it deplored the position and said that in professional matters women doctors wished to be treated as doctors, and not to have special privileges as women. Similar representations were made by the Services themselves and by the Central Medical War Committee. The Ministry of Labour, however, was not willing to rescind the order as applying to women doctors, but pointed out that they were at liberty to volunteer.

It must be admitted that recently the Service intake of volunteer women doctors has been very small. This has had the unfortunate consequence of delaying the release of serving specialists, both men and women, and of necessitating the call-up of an unfair proportion of men doctors, many approaching forty, on whom it may inflict serious hardship.

Young women of the graded or full specialist class must realise, furthermore, that their immunity from conscription is certainly not entirely to their advantage. B1 posts and higher hospital appointments are being reserved to a great extent for returning Service doctors or for those who are “recruitable,” in order that, in the latter case, there shall be some specialists trained, in due course, to replace those who are now going into the Services.

The Medical Women's Federation wishes to draw the attention of all young women specialists to this urgent need, recognising however that this is only a short-term measure. Long-term policy involves the consideration of the conscription of women doctors equally with men, but this is bound up with the rectification of certain anomalies in the status of medical women serving with the Army and R.A.F. In spite of this, however, the federation urges eligible women specialists to offer their services *now*, chiefly for the sake of those who are being retained unwillingly or called up; and perhaps also for their own sakes, as on leaving the Services they will be in a strong position in applying for further appointments.

MARY F. LUCAS KEENE

Hayes, Kent.

President, Medical Women's Federation.

NIGHT WORK

SIR,—I wonder whether the advisers of the Government have considered the consequences carefully before recommending night work for millions of people, including a great number of women.

As one who supervised several thousand women during the war years I know that they did magnificent work when their social problems were understood. The single young women were keen on doing night work with its close companionship and the chance of being out in the daytime. They needed little sleep at their age, and food was provided for them. In most cases they also had a certain amount of service because they lived at their parents' homes, or in hostels or lodgings. Incidentally, hospital nurses on night duty fall into this group, and show a very low rate of sick absenteeism; they are also the women on night work who have been observed for the longest period.

The young childless married woman, without a home of her own, and with her husband in the Forces, was in very much the same position except when her husband came on leave. The position of the married woman with obligations was, however, entirely different. Even the childless married woman, whose husband was away had more worries if she had a home of her own and was proud of it. Experience showed that women with young children worked most satisfactorily when they were employed on part-time work only, preferably between 10 A.M. and 5 P.M., provided they had Saturday off to do the week's shopping and the main cleaning.

These problems have increased since the return of the men from the Services. Care of the home and family life are of paramount importance, particularly as both men and women have often had to make a great effort to readjust themselves. Happily, this process of resettlement has usually proved successful, but it must not be endangered again. Physical and mental exhaustion and renewed disturbance of their hard-won married and family life will constitute a real danger. Unless the lessons of the war years are remembered, and married women are exempt from night work and are given sufficient time off to run their homes, the result may be an increase of absences through sickness and a net loss of woman-power.

MEDICUS.

SUPRASPINATUS SYNDROME

SIR,—I read with interest Mr. Armstrong's article (Jan. 18), and I was pleased to note that Mr. Mayer (Feb. 1) advocates deep X-ray therapy as an alternative to surgery.

I cannot entirely agree with Mr. Armstrong's view that surgery alone will cure a third of the cases which do not cure themselves. Mr. Armstrong has dismissed physiotherapy for the supraspinatus lesion with a wave of the hand, as being useless. Whilst agreeing that radiant heat is a waste of time, long-wave diathermy, with one pad applied over the supraspinatus muscle belly and the other over the acromial bursa, will produce great relief from pain. However, a treatment with even more dramatic effects is the production of three Kromayer burns in the line of the tendon, repeated after some weeks if the first application has not cured. This treatment has cured most of my cases of supraspinatus tendinitis. In my experience, operation on the tendon sheath, with scraping or excising of the calcified area, produces intractable stiffness. With arthritis of the acromioclavicular

joint, which I never can cure by any physiotherapy, excision of an inch of the acromion appears a very suitable procedure.

London, W.1.

G. O. TIPPETT.

ACUTE PORPHYRIA

SIR,—In connexion with the observations of Dr. Gray and Professor Rimington (Feb. 1) we would remark that the paper by Watson and Schwartz came into our hands only after we had read the proof of our article. We knew then that certain of our views must be considered wrong. We thought it unnecessary, nevertheless, to send a correction, since the main purpose of the article was to draw the attention to the disease and its connexion with the barbiturates.

We still feel that the benzaldehyde test performed on the urine after extraction with ether is a simple and adequate test for porphobilinogen. If this test is negative after the urine has been made alkaline by giving the patient sodium bicarbonate the diagnosis of acute porphyria is wrong. This method of excluding the diagnosis is simple and can be carried out under primitive conditions.

We may further add that we have recently observed a third case of acute porphyria in which the excretion of porphobilinogen in the urine was provoked by the ingestion of barbiturates.

JORGEN JØRGENSEN
TORBEN K. WITH.

Copenhagen.

ADRENAL APOPLEXY

SIR,—I was interested in the report by Dr. MacMillan (Feb. 1). But his suggestions as to aetiology raise considerable difficulties.

If the hæmorrhage came from a vessel weakened by hyalinisation, it seems an extraordinary coincidence that the bursting-point was reached at the same time in both adrenals. Severe hyalinisation of adrenal arterioles is a fairly common post-mortem finding in deaths from hypertension, whereas adrenal hæmorrhage must be very rare as a termination of this disease. It seems that the hypertension can have played, if any, only a very small part; and some more important factor must surely have been present. It is hard to guess what that factor may have been; but, despite the initial absence of pyrexia, do the clinical and pathological findings totally eliminate an undiagnosed fulminating septicæmia (perhaps meningococcal)? A blood-culture and examination of the cerebrospinal fluid might have been instructive.

Pathological Department, King's College Hospital, London. G. F. M. HALL.

LESSER CIRCULATION OF THE KIDNEY

SIR,—We feel that some comments are necessary on the communication by Trueta and his co-workers which appeared in your issue of August 17 and on the leading article which appeared in the same issue. The techniques of these workers leave no doubt as to the existence of an anastomotic vessel, probably the Isaacs-Ludwig arteriole, which enables the cortical circulation to be short-circuited. We must say that we are far from happy about the experiments in which dye was used as an indicator of the patency of vessels, and we feel that the results would have carried more weight had some of the precise clearance techniques, advanced by Prof. Homer Smith, been used. This point is of particular significance in view of the remark appearing in the communication "the interpretation of renal function tests must be reconsidered." So long as urine is being formed by the kidney, filtration must be occurring at the glomerulus; and its extent is of importance, for unless this is known diuresis may equally well be explained by exclusion of the tubular circulation.

The theory of Cushny, published in 1917, made it apparent that the factor deciding the extent of filtration at the glomerulus was the blood-pressure and not, as Heidenhain had postulated in 1874, the blood-flow. If the blood-flow through the glomerulus is completely cut off then obviously filtration will cease; but it is impossible to draw any further conclusions from this limiting case, since the maintenance of a normal glomerular filtration rate may be associated with a profound reduction of renal plasma flow and urine volume.¹ While it may

be valid to draw conclusions as to the extent of the glomerular filtration from urine flow in the rabbit, the animal presumably used in these experiments, such a correlation has never been demonstrated in other mammals, including man.

In the absence of exact information as to the extent of glomerular filtration and renal blood-flow there appears to be no evidence for the remark in your leader—"during active diuresis, the cortical circulation is fully open, while in anuria the medullary circulation is in action and the cortical circulation is thus bypassed"—if intended to apply to any animal other than the rabbit. From quantitative data,¹ however, it is clear that changes in the cortical circulation are of relatively minor importance in the determination of urine volume in man.

J. A. BARCLAY
W. T. COOKE
R. A. KENNEY.

Birmingham.

PENICILLIN IN LUNG ABSCESS

SIR,—We were glad to see your annotation of Jan. 11; but, in saying that in pulmonary suppuration "the effects of . . . penicillin were uncertain, possibly because of inadequate trial," it misses what we consider the most important point of our paper.¹ It is our opinion that penicillin is a life-saving drug in acute putrid lung abscess, and re-reading of this paper will, we hope, dispel any doubt. Since it was published last July, we have had many more cases of this disease cured completely and saved from unnecessary and difficult surgery by the simultaneous administration of penicillin and sulphadiazine. The cures have now reached over 90%.

B. P. STIVELMAN
J. KAVEE.

New York.

Public Health

Setting the Ball Rolling

ON the passing of the National Health Service Act county and county-borough councils became "local health authorities." Till the appointed day they will have no executive functions, but they will have much to do in preparing for their new rôle. They should begin, the Minister of Health suggests, by setting up a health committee, which should in turn appoint subcommittees to plan the various services. In his circular (22/47) the Minister gives the following as the latest dates for receiving their proposals: June 30, vaccination and immunisation, and ambulance services; August 31, midwifery, health visiting, home nursing, prevention of illness, care and aftercare, domestic help, and duties under Lunacy and Mental Treatment Acts and Mental Deficiency Acts; Sept. 30, care of mothers and young children; Nov. 30, health centres.

The Minister urges that the committee and subcommittees should include an adequate proportion of women, and that co-ordination with related services should be secured by appointing members from, for example, the education committee and the existing maternity and child-welfare committee. Under the Act an authority is free to go outside its own membership in making appointments to the committee, and this power will allow it to obtain the collaboration of doctors and other experts, and of representatives of such bodies as the local hospital management committee.

The Minister does not intend to initiate action to form joint boards, though where authorities themselves wish to combine he will be prepared to consider making an order accordingly. The advantages of arrangements made jointly—as distinct from joint boards—are, he adds, obvious.

The immediate aim of the authorities should be to provide as efficient and comprehensive a service as possible on April 1, 1948. But it would be neither possible nor desirable for their first proposals to be too cut and dried. Before health centres, for example, can be set up much detailed consultation with the medical, dental, and other professions will be needed. The proposals to be submitted by Nov. 30 could, the Minister suggests, suitably deal with such topics as the reservation of sites, especially on housing estates.

1. Barclay, J. A., Cooke, W. T., Kenney, R. A., Nutt, M. E. *Amer. J. Physiol.* (in the press).

1. Stivelman, B. P., Kavee, J. *Ann. intern. Med.* 1946, 25, 66.

Infectious Disease in England and Wales

THREE WEEKS ENDED FEB. 8, 15, AND 22

Notifications

| | Week ended Feb. 8 | Week ended Feb. 15 | Week ended Feb. 22 |
|--------------------------------------|-------------------------|--------------------------|--------------------------|
| Smallpox | — | — | 2 |
| Relapsing fever | — | — | 1 |
| Scarlet fever | 1130 | 1051 | 1081 |
| Whooping-cough | 1842 | 1964 | 2227 |
| Diphtheria | 233 | 211 | 217 |
| Paratyphoid | 3 | 1 | — |
| Typhoid | 7 | 5 | 3 |
| Measles (excluding rubella) | 17,258 | 16,749 | 15,765 |
| Pneumonia (primary or influenzal) | 1583 | 1404 | 1139 |
| Cerebrospinal fever | 94 | 78 | 90 |
| Poliomyelitis | 10 | 8 | 14 |
| Polioencephalitis | 1 | — | 1 |
| Encephalitis lethargica | 1 | 5 | 3 |
| Dysentery | 49 | 41 | 92 |
| Puerperal pyrexia | 115 | 160 | 142 |
| Ophthalmia neonatorum | 59 | 59 | 59 |

No case of cholera, plague, or typhus was notified.

In the 2 cases of smallpox at Grimsby illness began on Feb. 13-14; both patients, who have since died, were unvaccinated. There were 10 further cases up to March 4, with 2 more deaths. Infection, the source of which is unknown, occurred in a lodging-house used by seamen and farm labourers. Of the contacts there 10 cannot be identified, having moved on either by land or sea—most probably on trawlers or coastal vessels.

The case of relapsing fever was notified at Haltemprice, East Yorks.

Deaths in 126 great towns

| | | | |
|--|----------|----------|----------|
| Enteric fever | — | 1 (0) | — |
| Measles | 20 (1) | 15 (2) | 13 (0) |
| Scarlet fever | 1 (0) | 1 (0) | 1 (0) |
| Whooping-cough | 16 (4) | 14 (1) | 9 (2) |
| Diphtheria | 4 (1) | 3 (0) | 2 (1) |
| Influenza | 211 (30) | 163 (19) | 135 (21) |
| Diarrhoea and enteritis under 2 years | 106 (13) | 80 (4) | 69 (5) |

The figures in parentheses are those for London itself.

Stillbirths

| | | | |
|-----------------------------------|-----|-----|-----|
| Total no. notified | 308 | 288 | 260 |
| No. notified in London | 38 | 41 | 33 |
| Rate per thousand total births | 31 | 27 | 25 |

Parliament**ON THE FLOOR OF THE HOUSE**

PARLIAMENT last week grew heated over fuel, heard Mr. Ernest Bevin's reasons for referring the Palestine question to the United Nations, and discussed foreign affairs in the light of the forthcoming conference in Moscow. On the whole, the international prospect lightens. The Anglo-French treaty, now being signed, has an importance not yet fully appreciated. We approach the time when the peace treaties—all of them—will be made, and when nations can disagree about details without feeling that the fabric of international understanding is in jeopardy. The difficulties in Germany are very great indeed; but we are seeing such difficulties more vividly and more clearly now because there begins to be a light in the sky, which more and more of us believe will break into the full sunlight of agreement between the nations. If the United Nations can give the world peace and stability at the centre of its affairs, this peace and stability will be reflected in the individual countries.

British policy must be framed so as to allow for two alternatives: (1) that the United Nations comes into being strong, supported by a great majority of all peoples and armed with an international police force central organisation will be less strong, leaving each capable of making its authority respected; or (2) that the nation to depend on its own navy, army, and air force. Like the U.S.A., the U.S.S.R., and every other country, we are having to budget politically for both of these alternatives. But the world is tired of navies, armies, and air forces, and it is very improbable that it can continue to employ so much scientific research power, so much organising power, and so much plain honest-to-goodness man-power for military purposes, and yet remain solvent and reasonably comfortable—let alone

guarantee to all men freedom and the pursuit of happiness.

As part of this lesser policy of self-defence there will soon be coming before the House a National Service Bill which will define the conditions of service in the Armed Forces which will be laid on all of us in Britain at an early date. This will certainly impose a strain on the medical profession, which by then will be carrying the responsibilities of the National Health Service. How far medical service in the Armed Forces and medical service in the N.H.S. can run together still remains to be worked out in detail. But if we become involved in a future war the civil and the Service sides of the medical profession will certainly have to be more intimately co-ordinated than during the recent one, and perhaps their members will be interchangeable. This would only be carrying the idea of the E.M.S. organisation of the civil medical profession in the late war a stage further.

The medical group in the House of Commons will very soon be considering its policy on these questions, and a statement of the medical viewpoint will be made in Parliament when the Bill comes up for discussion. Meanwhile the Secretary of State for War has told us that the strength of the Army on Dec. 31, 1946, was 896,757 and that its strength on Dec. 31, 1947, is estimated at 660,000. But, he added, the strength "clearly depends on a number of factors." In other words, is the world going on the road to union in the United Nations or to division in strife between the powers? Each nation has to ask itself, where am I going?

MEDICUS, M.P.

FROM THE PRESS GALLERY**Conditions in Germany**

In the House of Commons on Feb. 5 Mr. RICHARD LAW called attention to the appalling gravity of the situation in the British zone in Germany. There 20 to 30 million human beings were rotting to death and we deceived ourselves if we imagined that corruption could go on in Germany and not spread far beyond its confines. If we wanted to save Europe we must call a halt. By our mismanagement and good intentions he believed we were sowing the seeds of a third German war. He had been to the homes of the German people and seen the little children listless and puffy, with no shoes and in a terrible state of health, and from his own experience he knew that the food conditions in Germany had not been exaggerated. Our proper policy now, Mr. Law affirmed, was to abandon all this idea of trying to run the Germans for their good and to revert to the conception of control. We should help the Germans, but leave it to them to organise their industries.

Mr. J. B. HIND, Chancellor of the Duchy of Lancaster, replying for the Government, said that the key criticism of the Government was that they must send more food. They had sent more food and given the Germans more than the 1500 calories ration. This criticism ignored the desperate efforts which the Government had been making for the last eighteen months to get even those quantities of food into Germany. He admitted there had been local breakdowns but overall the ration had been maintained at 80 to 85%, and where it had fallen in one period it had been made up as far as possible later. There was a misunderstanding over the rations. The basic ration for the non-working adults was 1550 calories. But they represented only 36% of the population. The remainder were categorised according to the work they did, and their rations ranged from 2500 to 3966 calories which, in the opinion of the tripartite nutrition committee, was sufficient. In addition, 1,700,000 children in German schools were receiving free meals as well as their ordinary rations. Already the American and British authorities under the fusion agreement had fixed a target of 1800 calories for the normal consumer as a first step. But they recognised that nothing less than 2000 calories could be regarded as approaching a satisfactory condition.

Medical Supplies

On Feb. 6, replying to Mr. A. F. SKEFFINGTON on the question of an increased demand for medical supplies under the National Health Service Act, Mr. C. W. KEY,

then parliamentary secretary to the Ministry of Health, said that through the Emergency Hospitals Scheme substantial quantities of medical supplies and apparatus were issued to the hospitals to enlarge the scope of their work. These were additional to the ordinary supplies maintained by the hospitals themselves for their current needs. Arrangements had also been made to acquire surpluses from our own, the Canadian, and the American Forces for the use of our hospitals. The hospitals would not be asked to pay for such supplies, which would remain Government property. In these ways hospital supplies were being gradually built up. Looking forward to the future the Minister had set up expert working parties, with which were associated representatives of the Ministry of Supply and of the Service departments, to assess the requirements of the new health service, beginning with radiological and laboratory apparatus. The working parties would later consider theatre and ward equipment, dental apparatus and ambulances, and the needs of special departments of hospitals, such as ear, nose and throat, and physiotherapy departments. Care would be taken not to go too far in the way of standardisation.

Control of Penicillin

On the motion for the adjournment on Feb. 25, Sir JOHN MELLOR submitted that Order 731 which made it a criminal offence to supply penicillin except against a medical prescription was no longer necessary. The medical profession did not contend that direct harm could come from the use of penicillin but that the reaction of the body to it tended to diminish with frequent use. But that was true of many drugs and did not mean that their sale was limited by legislation. Even assuming that some control over the distribution of penicillin should be retained, this order was the wrong way of doing it. There was nothing to justify the use of an order made under the Supplies and Services Transitional Powers Act for 1945 to enforce the medical opinion of the Ministry of Health. He agreed that it was wise to hearken to medical opinion. But it was one thing to say medical opinion should be respected and another to enforce it by law. People should be free to follow medical opinion or to disregard it.

Mr. JOHN LEWIS suggested that penicillin should not be used here indiscriminately while it was needed in other parts of the world. Penicillin tablets of 500 units, which could be bought without a doctor's certificate in any chemist's shop, were an utter waste of penicillin, for the tablets had not the slightest effect. Again, penicillin creams were being used indiscriminately in dermatology, though they were not a panacea. Wing-Commander ROLAND ROBINSON feared we were using penicillin as a pawn in the export drive. The Ministry of Supply and the Board of Trade were using it to get hard currency, when it might well be employed at home to improve the health of the people. Dr. S. JEGER pointed out that whenever a new drug achieved a fair proportion of cures the public got the idea that it was a cure-all and wanted it for all sorts of things for which it was no use. Again, when a doctor issued a prescription he did not just order a supply of a drug; he also gave instructions for the method of application.

Mr. W. LEONARD, joint parliamentary secretary to the Ministry of Supply, assured the House that there was now no serious risk of supplies of penicillin being insufficient to meet the medical, dental, and veterinary needs in this country, and during January we had been able to export 85,000 mega units. If control had been removed too early there might have been a sudden expansion of demand and we should have been short of penicillin for important medicinal uses. Indeed, in America it had been found necessary to reimpose control. The position in this country was now so improved that it would no longer be necessary to retain control over distribution on supply grounds. But the Minister of Health had been advised by his medical experts, including Sir Alexander Fleming, that there would be considerable danger in the uncontrolled use of penicillin. There was a real danger to patients and to others of rendering strains of some organisms resistant to penicillin. A draft Bill had been prepared to control the sale and supply of penicillin other than by order.

QUESTION TIME

Penicillin Supplies

Mr. SOMERVILLE HASTINGS asked the Chancellor of the Duchy of Lancaster whether his attention had been called to the fact that, except for the treatment of venereal disease, no penicillin is available for use in children's hospitals in the British zone of Berlin; and what action he had taken, or proposed to take.—Mr. J. HYND replied: Since Dec. 1 five mega units of penicillin have been made available each month to the British sector of Berlin from official sources, for the treatment in hospitals, including children's hospitals, of serious cases of other than venereal disease. In addition 175 mega units have been allocated from very considerable supplies made available for the same purposes by "Save Europe Now" and the British medical profession. The possibility of producing penicillin under licence in Germany is being examined in consultation with the American authorities.—Mr. HASTINGS: Is the Minister aware that letters have appeared in the press pointing out how great the shortage is in our zone of Berlin?—Mr. HYND: There has, of course, been a great shortage of penicillin, and it has been difficult for Germany to get into the queue at all. But supplies received since Dec. 1 have met requirements.

Number of Service M.O.s

Mr. E. M. KING asked the Minister of Defence how many medical officers there are per 1000 men in the Royal Navy, the Army, and the Royal Air Force, respectively; how many non-specialist medical officers hold specialist posts in these Services; and whether the proportions in South-East Asia are similar to those in other commands.—Mr. A. V. ALEXANDER replied: The numbers of medical officers per 1000 personnel in each of the three Services are as follows:

| | World-wide | S.E. Asia |
|----------------------|------------|-----------|
| Royal Navy | 3.25 | 4.4 |
| Army | 2.75 | 2.75 |
| Royal Air Force .. . | 3.03 | 3.9 |

The figures take into consideration members of the women's Services, but not families. The ratio in theatres other than S.E. Asia is dependent on the distribution of personnel and other factors, and varies accordingly. Non-specialist officers are not employed in specialist posts.

Replying to a further question, Mr. J. DUGDALE stated that the ratio of medical officers to total personnel of the Navy at the close of the war in Europe was approximately 3 per 1000.

Mr. PHILIP NOEL-BAKER also stated that at the end of the war in Europe there was 1 medical officer in the R.A.F. to every 437 officers and other ranks. On Dec. 31, 1946, the proportion was 1 to 330.

Refugee Doctors

Dr. S. W. JEGER asked the Minister of Health whether, in view of the fact that a larger number of doctors than is at present available is necessary to implement his new national medical service next year and in view of the fact that the Central Medical War Committee has passed a resolution on this subject, he was now in a position to state his policy on the admission of refugee doctors with foreign qualifications to practise in this country.—Mr. A. BEVAN replied: The views of the Central Medical War Committee on this matter were sought by the Home Office, acting in consultation with my department. I understand that the committee are consulting certain other professional bodies before communicating their views to the Home Office and I am not in a position to make any statement until these have been received and considered.

Medical Certificates for Vacuum Flasks

Sir E. GRAHAM-LITTLE asked the President of the Board of Trade on what grounds his department refused to supply a vacuum flask to a patient on a doctor's certificate until the doctor furnished a description of the exact nature of the illness; and whether this description, when furnished, was referred to a medical advisory committee.—Sir STAFFORD CRIPPS replied: Serious difficulties in obtaining components made it necessary to limit the issue of permits under the distribution scheme which is voluntarily run by Thermos (1925) Ltd. Insufficient flasks were available to allow the issue of permits against all medical certificates presented and it was decided that the only way to ensure that at least the most pressing cases were promptly met was to ask doctors to explain why in particular cases flasks were thought to be essential. The arrival of components from abroad has now

somewhat eased the position and recently permits have been issued to all applicants furnishing medical certificates. The answer to the latter part of the question is "No."

Mr. L. J. EDWARDS, M.P. for Blackburn, has been appointed parliamentary secretary to the Ministry of Health in succession to Mr. Charles Key. Mr Edwards, who has been parliamentary private secretary to Sir Stafford Cripps, is secretary of the Post Office Engineering Union.

Obituary

THOMAS WILLIAM SHORE

O.B.E., M.D. LOND.

Dr. T. W. Shore, emeritus lecturer on biology at St. Bartholomew's Hospital medical college, who died at Oldham on Feb. 19 at the age of 85, came of a family of scientists, for his father, T. W. Shore, was well known as an archaeologist and his brother Lewis Shore, who died in 1944, was a distinguished physiologist. Thomas William Shore was educated at Burnley Grammar School and at Hartley College, Southampton, where his father was principal. In 1879 he entered Barts with an entrance science scholarship, and a year later he took his B.Sc., with first-class honours in zoology and botany. A student who fulfilled his promise, he carried off the Brackenbury and Lawrence scholarships, and after qualifying in 1883 he held a house-appointment till in 1884 he was appointed assistant demonstrator and later demonstrator in physiology. In 1886 he became lecturer in comparative anatomy and for some years he held this post along with the lectureship in biology to which he was appointed in 1892. As a teacher he was an outstanding success, for he had the power of making his subject seem very simple and of making unwilling students industrious.

As warden of the residential college (1891-98) and as dean of the hospital (1906-30) his organising ability found scope. With Sir Anthony Bowlby, Sir Wilmot Herringham, and Sir Holburt Waring he was responsible for joining the college ever more closely with London University, till in 1919 university professors of medicine and surgery were appointed and grants made from the University Grants Committee. Shore was also closely associated with the separation of the college from the hospital and gave able assistance in preparing the charter of incorporation which was granted in 1921. During the 1914-18 war he did good work as a member of the Central War Emergency Committee, and he was appointed O.B.E. in 1919. His juniors did not find it easy to get to know him, for he only appeared on official occasions and on the committees, which he managed with consummate skill.

GORDON ORMSBY LAMBERT

M.D. CAMB., F.R.C.P.

Dr. Lambert, consulting physician to the Royal Berkshire Hospital, Reading, died on Jan. 26, at the age of 69.

Educated in British Guiana and at Bedford School, Lambert studied medicine at Cambridge and at Charing Cross Hospital, to which he won a university exhibition. After qualifying in 1901 he held resident posts at Charing Cross Hospital and at the Victoria Hospital for Children, Chelsea, before appointment as resident medical officer at the Gravesend General Hospital. He graduated M.D. in 1906.

In 1913 he went to Reading as medical registrar at the Royal Berkshire Hospital. The next year he was appointed assistant physician, and in the years that followed became successively physician, senior physician, and, on his retirement from the staff in 1942, consulting physician and cardiologist. He was also consulting physician to Henley-on-Thames War Memorial Hospital and cardiologist for the Reading area to the Ministry of Pensions. In 1933 he was elected M.R.C.P. Lond. for published work, and in 1942 he became a fellow. From 1935 onwards he was a governor of Reading School, and for several years was chairman of the health committee of Reading town council.

His numerous publications on diseases of the heart included a monograph, *Cardiovascular Pain as a Bio-chemical Problem*, published in 1933. In his *Happiness in a Modern World*, which appeared in 1943, he set out his recipe for contentment in a restless age.

A colleague writes: "Lambert was a most careful physician. He was very keen on the hospital, where most of his time was spent; there was hardly a day in the year when he did not visit it. He played an important part in the Reading Pathological Society, of which he was twice president. His chief clinical interest was 'hearts'; and he was the first physician at the hospital to be appointed to take charge of the electrocardiographic department. He took everything very seriously, but had a sense of humour and could tell a good story when the spirit moved him. His outstanding characteristic was conscientious devotion to his work."

ROBERT VACHELL DE ACTON REDWOOD

F.R.C.S.E.

A FAMILY record of 145 years' association with the Rhymney Cottage Hospital was broken on Jan. 3 by the death of Dr. Redwood, who 44 years ago succeeded his father and grandfather as surgeon at the hospital. He died at his country home at Crickhowell, where he had lived for 15 years, in his 68th year. In 1903 he qualified at St. Mary's Hospital and in 1919 he obtained the Edinburgh fellowship. At Rhymney he held many public appointments, being M.O.H., certifying surgeon, vaccination officer, and infant and child-welfare, poor-law, workmen's compensation, and A.R.P. doctor for the district. A freemason, he was divisional surgeon for Monmouthshire for the Order of St. John of Jerusalem, and a serving brother of the Order. During the war, under the Emergency Medical Service, he was part-time surgeon for the county. An all-round sportsman, he played football for St. Mary's Hospital in 1900-01, when they won the international football challenge cup.

Dr. Redwood is survived by his wife.

ANDREW PATERSON

M.A., M.D. EDIN., DIPL. PSYCH.

Dr. Paterson's untimely death is a loss to psychiatry and neurology, which his researches had done much to illuminate. His early training was in philosophy. Having taken a distinguished degree at Edinburgh in philosophy and psychology in 1930, he pursued further studies at Munich. After graduating in medicine in 1935 and holding the post of house-physician at the Royal Infirmary, he worked with Prof. D. K. Henderson as assistant physician at the Royal Edinburgh Hospital for Nervous and Mental Disorders. In 1938 he moved to Cambridge as research assistant in psychiatry to the regius professor—at that time Professor Ryle—and at Addenbrooke's Hospital and in the Cambridge Psychological Laboratory he studied the psychology of abnormal behaviour in human beings and in animals. The war created an opportunity which gave full scope to Paterson's abilities and training: he took the post of psychiatrist in the Brain Injuries Unit, at Bangour, where the Rockefeller Foundation provided the means for thorough research into the effects of brain damage. In this Paterson was associated with a psychologist, Oliver Zangwill, and their collaboration was most fruitful. A number of solid papers, illuminating the psychological changes associated with cerebral lesions, appeared chiefly in *Brain*; they bore witness to a thorough use of clinical and psychological methods of investigation, and showed also the capacity for broad yet critical generalisation in which Paterson excelled. It was clear that he had much to contribute to the training of neuropsychiatrists, and in 1946 he was appointed physician to the Maudsley Hospital. During his short tenure of this post his scientific approach to psychiatric problems and his capacity for bringing together psychological and clinical data, especially in the field of perception, revealed him as a stimulating teacher for advanced students, who appreciated greatly, as did his colleagues, his engaging personality and sympathetic yet shrewd understanding of human nature. Just before his fatal illness he was planning research into depersonalisation which gave promise of valuable results.

He died on Feb. 11, aged 40.

EDGAR THOMAS INKSON

V.C., D.S.O., M.R.C.S.

Colonel E. T. Inkson, who died on Feb. 19 at the age of 74, won his Victoria Cross in the South African War in 1901, when he carried a severely wounded officer to safety under heavy fire over exposed ground.

Born at Naini Tal, in India, the son of Surgeon-General J. Inkson, of the Army Medical Services, he was educated at Edinburgh Collegiate School and took the Conjoint qualification from University College Hospital, London, in 1898. He early chose the Army as his career and became a surgeon on probation in April, 1899. Ten weeks before the beginning of the South African War he received his commission and he was sent as a medical officer to the Royal Field Artillery. For his services he received, besides his Victoria Cross, three mentions in despatches. During the 1914-18 war Inkson enhanced his fine record by winning the D.S.O., and he was twice mentioned. During these years he was in command of a field ambulance and later of a general hospital. He retired in 1926. He leaves his wife, formerly Miss Ethel Bromley, with a son and daughter.

CHARLES EDWIN WHEELER

M.D. LOND.

Dr. Charles Wheeler, consulting physician to the London Homœopathic Hospital, died on Feb. 2 at the age of 78. Born in Adelaide, where his father, Dr. Henry Wheeler, was then in practice, he graduated B.Sc. Lond. in 1889. After studying medicine at Leipzig and St. Bartholomew's Hospital he took his M.B. Lond. with first-class honours in 1892. A short spell of general practice in Kingston followed, after which he became resident medical officer in the Nordrach Sanatorium. Going to the London Homœopathic Hospital in 1904, he joined the honorary staff two years later and retired in 1928.

Wheeler's chief interest was homœopathy—he was for many years editor of the *Homœopathic World*, and was a past president of the British Homœopathic Society, the International Homœopathic League, and the Faculty of Homœopathy—but his knowledge was wide and he never ceased to plead that homœopathy should keep in the main stream of medicine. This view, he believed, was supported by many rediscoveries of modern medicine. An excellent speaker, he was an acceptable lecturer on his own specialty to many orthodox societies.

Medicine to him was one of the arts, and his versatility ensured his interest in the others—notably drama, music, poetry, and painting—his friends including E. V. Lucas, Henry James, John Masefield, Gilbert Murray, and Bernard Shaw. A founder of the Stage Society, he was also associated with Granville Barker at the Court Theatre, where his wife, Miss Ethel Arundel, whom he married in 1895, used to act. He was an omnivorous reader, from shockers to Arnold Toynbee, and his remarkable memory enabled him to cap almost any quotation. Apart from his original writings he produced translations of Dante's *Divine Comedy*, Hahnemann's *Organon*, and Ibsen's plays. A charming companion, the soul of kindness and graciousness, he was charitable in the best sense of the word, even to examinees.

W. L. T.

WILLIAM DYSON

O.B.E., M.D. VICT.

Dr. William Dyson, who died at his home at Fallowfield on Feb. 5, was Manchester born and bred, and he served his native city as one of her leading dermatologists for 40 years. Born in 1871, the son of John Dyson, he was educated at Rossall School and Owens College. After taking his M.B. at the Victoria University in 1896 he held a house-appointment at the Royal Infirmary, and spent some nine years in general practice at Broseley in Salop before he turned to dermatology. In 1907 he worked in Vienna under Professor Riehl and Professor Finger, and on his return to Manchester the following year he was appointed to the Manchester and Salford Skin Hospital as assistant medical officer, in 1913 becoming assistant physician and in 1919 full physician. His great interest was in pigmentation, and for his M.D. thesis on Cutaneous Pigmentation in Normal and Pathological Conditions he was awarded the gold medal

of the Victoria University in 1910. A keen Territorial medical officer, in the 1914-18 war he served overseas in Gallipoli, Egypt, and Palestine, earning an O.B.E. and mention in despatches. In 1920 he was appointed dermatologist to the Manchester Royal Infirmary and he also lectured on the pathology of skin diseases at the university.

Dr. Dyson leaves a widow, the daughter of Dr. Speirs, of Cleator, and three daughters. His only son, William Speirs Dyson, a promising surgeon and a good sportsman, was lost in 1934 on the Lake Rudolph expedition in the Rift Valley of Central Africa.

DR. WHITFIELD

Sir Ernest Graham-Little writes: Arthur Whitfield gave single-minded devotion to dermatology, and was in the line of succession to the outstanding teachers who have adorned that branch of medicine in the past fifty years. Of those I have known he ranks in my mind with Desnier, Brocq, and Darier in France, and in this country with Crocker and Colcott-Fox, to whom he dedicated his textbook. The salient characteristic of all these men, as also of Whitfield, was the reliance on personal individualist experience, upon which sure foundation their writing was based. I remember well that during a visit to the United States in 1919 I was assured by more than one authority that Crocker was still regarded in America as having written the most original and the greatest dermatological textbook in the English language. Whitfield's own handbook, *Skin Diseases and their Treatment*, published some thirty years ago, reveals in every one of its 300 pages



Elliott & Fry

the same originality and the same basis of knowledge. It was exhilarating to see him making a diagnosis. With a watchmaker's lens firmly fixed in his right orbit, he would carry out a detailed inspection of the case, using the technique of a Sherlock Holmes; and he would often solve the problem by observing a single lesion which would have escaped the scrutiny of less intent observers. It was his attention to detail, combined with a most extensive experience, that made him so exceptional and acceptable a teacher. The great college of London University, which he served so faithfully and indeed affectionately for so many years, mourns one of its most distinguished sons.

HOWARD EVERSON CHASTENEY

Mr. H. E. Chasteney, who succeeded Sir Wilfrid Garrett at the end of 1945 as Chief Inspector of Factories, died on Feb. 18 from injuries sustained in a street accident. As head of the Factory Department he was intimately concerned with measures designed to improve the health as well as the safety of factory workers. Only a few weeks ago, in reviewing his first annual report, we were describing it as "a document on a subject without intrinsic appeal to many readers, which nevertheless grips the attention by its warm, sometimes anecdotal style." It is tragic that so valuable a career of public service, devoted largely to accident prevention, should have ended thus abruptly.

Chasteney was born in 1888 and educated at Nottingham High School and at Cambridge University where he distinguished himself in mathematics and natural sciences. He entered the Factory Department of the Home Office in 1913, but served in the Royal Engineers during the 1914-18 war. On returning to his job as inspector of factories, he worked in various parts of the country and gained a wide knowledge of industry and the people in it. Promotion came rapidly and he was appointed deputy chief inspector in 1938. During the late war he gave much attention to civil defence, but a notable contribution to industrial health was his chairmanship of a joint committee on the prevention of

dust in steel foundries. The first report was published in 1944 and it bears witness to his thoroughness and sound judgment. He was also chairman of a companion committee which later dealt with iron foundries, and at a recent meeting he signed its final report. His engagingly modest and friendly personality, which did much to soften the asperities of official life, will be missed by all who knew him.

Births, Marriages, and Deaths

BIRTHS

ELLIOT.—On Feb. 9, at Edinburgh, the wife of Dr. T. E. Elliot—a son.
 GAVEY.—On Feb. 17, in London, the wife of Dr. C. J. Gavey—a daughter.
 GORDON.—On Feb. 8, in London, the wife of Dr. John Gordon—a son.
 JOHNSTON.—On Feb. 1, at Glasgow, the wife of Dr. George Johnston—a son.
 MERRY.—On Feb. 16, in Leeds, the wife of Dr. Christopher Merry, Colonial Medical Service, Trinidad—a son.
 MILLS.—On Feb. 7, at Cambridge, the wife of Dr. J. N. Mills—a son.
 NELSON-JONES.—On Feb. 11, at North Cheam, Surrey, the wife of Dr. A. Nelson-Jones—a son.
 WARREN.—On Feb. 7, the wife of Dr. M. D. Warren—a son.
 WYSE.—On Feb. 6, the wife of Major R. W. Wyse, R.A.M.C.—a son.

MARRIAGES

ALLEN—COLLINS.—On Feb. 1, in London, Richard Alfred Allen, M.B., to Joyce Gwendolen Collins, C.S.P.
 EDWARDS—COLES.—On Jan. 30, at Kingsteignton, Devon, Joseph Rowland Goodman Edwards, M.B., to Betty Cecelia Coles.
 LOVELL—WARREN.—On Feb. 8, at Sarisbury, Richard Robert Haynes Lovell, M.R.C.S., to Diana Warren.
 POLLARD—BARKER.—On Nov. 11, at Brompton, Basil Ranson Pollard, M.R.C.S., lieutenant R.A.M.C., to Doreen Barker.

DEATHS

AMBROSE.—On Feb. 28, at Barnet Green, Worcs, William Cole Ambrose, B.A. Camb., M.R.C.S., aged 76.
 AYDON.—On Feb. 23, at Stillorgan, Dublin, John Aydon, M.A. Camb., M.R.C.S., of Angmering, Sussex.
 BREWER.—On Feb. 9, Henry Jeaffreson Brewer, M.R.C.S., aged 67.
 COLYER.—On Feb. 10, Arthur Reginald Colyer, M.R.C.S.
 CUMMINS.—On Feb. 8, at Smyrna Beach, Florida, Arthur Gordon Cummins, M.C., M.B. R.U.I., late R.A.M.C.
 DARBYSHIRE.—On Feb. 16, at Exmouth, Harold Stewart Cassan Darbyshire, M.R.C.S.
 DICKSON.—On Feb. 19, at Hythe, Kent, Robinson Simpson Dickson, O.B.E., M.D. Glasg., aged 78.
 DUGAN.—On Feb. 24, at Oxford, William Dugan, M.B. Camb.
 DUNN.—On Feb. 2, William Dunn, M.B. Aberd.
 DYSON.—On Feb. 5, William Dyson, O.B.E., M.D. Vict.
 EAGER.—On Feb. 2, Richard Eager, O.B.E., M.D. Aberd., aged 65.
 FAIRBANK.—On Feb. 23, at Canford Cliffs, Christian Beverley Fairbank, M.R.C.S., surgeon commander R.N. ret'd.
 FEGAN.—On Feb. 27, at Leamington Spa, Richard Ardra Fegan, M.R.C.S., aged 77.
 GENGE.—On Feb. 19, at Croydon, George Gilbert Genge, M.D., Lond., D.P.H.
 GIBSON.—On Feb. 13, in London, John Basil Aylwin Gibson, M.A. Camb., M.R.C.S., aged 29.
 GLADSTONE.—On Feb. 12, Reginald John Gladstone, M.D. Aberd., F.R.C.S., D.P.H., F.R.S.E.
 GRAY.—On Jan. 21, at Totana, Murcia, Spain, Albert Germain Gray, M.B. Aberd., aged 70.
 HALL.—On Feb. 4, Joseph Percy Hall, M.B. Lond., aged 75.
 HENDERSON.—On Feb. 28, Fergus Leslie Henderson, M.B. Glasg.
 ILES.—On Feb. 21, Mary Muriel Griffin Iles, M.D. Lond., D.P.H.
 INKSON.—On Feb. 19, Edgar Thomas Inkson, V.C., D.S.O., M.R.C.S., colonel, late R.A.M.C., of Chichester.
 JAMESON.—On Feb. 18, at Croydon, George Bernard Jameson, M.D. Edin.
 JAYS.—On Feb. 2, Tom Jays, M.R.C.S., aged 78.
 LANGRISHE.—On Feb. 28, at Edinburgh, John du Plessis Langrishe, D.S.O., M.B., D.P.H., lieutenant-colonel R.A.M.C. ret'd., aged 64.
 LEDGER.—On Feb. 7, at Torquay, Alfred Vernon Ledger, M.D. Brux.
 MCARTHUR.—On Feb. 24, in London, Neil Murray McArthur, M.D. West Ont., surgeon lieutenant-commander R.N.
 MACAULEY.—On Feb. 26, at Ealing, Constantine Macauley, L.R.C.P.I.
 MACDONALD.—On Feb. 16, at Oban, Duncan Macdonald, M.D. Glasg., aged 74.
 MCDONALL.—On Feb. 3, at Wahroonga, New South Wales, Herbert Crichton McDouall, M.R.C.S., D.P.H., aged 87.
 MCGRATH.—On Jan. 28, Liam Henry McGrath, M.B. Belf., wing-commander R.A.F.
 MCNEILL.—On Feb. 3, in London, Arthur Norman Roy McNeill, D.S.O., M.B. Glasg., D.P.H., colonel, late R.A.M.C.
 MACKENZIE.—On Feb. 25, in London, Harry Malcolm Mackenzie, C.I.E., colonel I.M.S. ret'd.
 MACMILLAN.—On Feb. 26, John McCallum Anderson Macmillan, M.D. Edin., F.R.C.S., lieutenant-colonel I.M.S.
 PARRY.—On Feb. 24, at Bradninch, Devon, James Hales Parry, M.R.C.S.
 PATERSON.—On Feb. 11, Andrew Paterson, M.D. Edin., aged 40.
 ROBBS.—On Feb. 7, at Grantham, Charles Haldane Denny Robbs, M.B. Lond., aged 72.
 SELBY.—On Feb. 26, Frideaux George Selby, O.B.E., M.R.C.S., of Lynstead, Kent, aged 81.
 SHORE.—On Feb. 19, at Oldham, Thomas William Shore, O.B.E., B.Sc., M.D. Lond., F.R.C.S., aged 85.
 SISAM.—On Jan. 27, William Sisam, M.D. Birn., D.P.H., aged 71.
 WHEELER.—On Feb. 2, Charles Edwin Wheeler, B.Sc., M.D. Lond., aged 78.
 WIMBLE.—On Feb. 28, at Bushey, Herts, Herbert Charles Wimble, M.R.C.S., aged 80.

Notes and News

RHEUMATISM RESEARCH

At the annual meeting of the Empire Rheumatism Council last December, Lord Horder, its president, announced that the council was undertaking a careful survey of some hundreds of cases of rheumatoid arthritis, with the aim of finding lines for specific research. Studies of this and of other rheumatic conditions, if they are to be effective, must be nationwide and large funds are needed. The council now appeals for £100,000 to enable the work to be carried through.

Manchester University, which produced a scheme some months ago (*Lancet*, 1946, ii, 609), is to appoint a clinical director of its research centre, at a salary of £1500-£2000 a year.

DIAGNOSIS OF VIRUS INFECTIONS

In a Chadwick lecture on Feb. 18 Prof. S. P. Bedson, F.R.S., said that in virus work insufficient use is made of new diagnostic procedures. It is still widely believed that all viruses are too small to be seen with the microscope, yet in quite a number of diseases microscopical demonstration of the causal virus is of diagnostic value. This is true of trachoma and of those conditions caused by the related virus of inclusion conjunctivitis; the virus of lymphogranuloma venereum can at times be demonstrated in smears made from inguinal buboes; and recent work has shown the usefulness of examining smears from the skin lesions of smallpox. Even where the virus cannot be seen, histological changes such as inclusion bodies can be looked for; their occurrence is always suggestive of virus infection, and sometimes, as with the Negri body in rabies, it is diagnostic.

It is still not generally appreciated, said Professor Bedson, that the serological reactions employed in bacteriology are equally applicable to the identification of viruses or the diagnosis of virus disease. Of these reactions the complement-fixation test is probably the most valuable; it can be used either to demonstrate the presence of the causal virus, as in smallpox, or for the detection of antibody, as in influenza, psittacosis, lymphocytic choriomeningitis, lymphogranuloma venereum, and mumps.

REABLEMENT FILM

A COLOURED documentary film dealing with the work at Roffey Park Rehabilitation Centre was given its first public showing at the London School of Hygiene on Feb. 27. Queen Mary was present, and this is said to be the first time that a scientific film has been accorded a Royal première. The film, which was made for the National Council for the Rehabilitation of Industrial Workers by Messrs. Kodak Ltd. and Associated British Pictures Corporation, is meant primarily for the industrial organisations which have used or are otherwise interested in this centre. It is therefore addressed to laymen, but it will have a wide appeal to doctors, for it shows the inter-relation of purely medical treatment with all the other facets of the work. This it does by following the passage through the centre of a man and woman who have broken down in industry, up to their return to work. The film is perhaps a little too idyllic, but nevertheless deserves an extensive showing as illustrating the short-term approach to problems of industrial maladjustment.

University of Cambridge

On Jan. 31 the following degrees were conferred:

M.D.—J. R. Bolton, R. F. Tredgold, B. J. O. Winfield, A. R. Kelsall, W. H. Tattersall.
 M.B., B.Chir.—A. V. Adams, *E. M. M. Besterman, *Gerald Rapoport, *James Fiddess, *Desmond Seymour, *E. B. Davies, *P. A. Emerson, *A. D. R. MacAuslan, *James McMillan, *J. J. Morland, *J. C. Ward, J. A. Elliott, *D. C. Bradford, *R. J. Alcock, *P. W. S. Coghill, *C. S. Kirkham, *E. D. Marsh, *J. P. Paul, *J. P. Stephens, *A. D. Thomson, W. J. B. Rogers, E. S. O. Smith, *C. P. Bennett, *A. O. Chase, *W. M. B. Strangeways, *D. A. L. Bowen, *T. W. Backhouse, *J. P. Bull, *P. W. Rowsell, R. H. C. Robins, *J. H. Steeds, *D. W. Burnford, *K. G. Irving, *J. F. F. Rooney, *J. E. H. Stretton, *John Crossley, *G. R. Freedman, *I. S. M. Jones, *K. S. Murray, D. G. Miller, I. R. D. Proctor, *L. C. Lancaster, *H. E. S. Marshall, *Kenneth Till, *M. F. Smith.
 *By proxy.

The titles of the degrees of M.B., B.Chir. have been conferred on Mrs. S. M. Godfrey.

University of Manchester

Mr. D. G. Evans, PH.D., has been appointed reader in chemical bacteriology, and Dr. R. A. Bailey and Miss Eugenie Willis, F.R.C.S., clinical demonstrators in anatomy.

University of Sheffield

Dr. Llywelyn Roberts has been appointed honorary lecturer in public health, Dr. J. Wilkie honorary lecturer in radiological anatomy, and Dr. Leslie Cook honorary lecturer in bacteriology.

Royal College of Surgeons of England

At a meeting of the council of the college, held on Feb. 13, with Sir Alfred Webb-Johnson, the president, in the chair, Prof. Louis Bazy, of Paris, was enrolled as an honorary fellow.

Mr. Neil Sinclair (West London), Mr. T. Twistington Higgins (Great Ormond Street), and Sir Stanford Cade (Westminster) were re-elected members of the court of examiners, and Mr. W. Kelsey Fry a member of the board of examiners in dental surgery. Prof. F. Wood Jones, F.R.S., was appointed Arris and Gale lecturer, and Dr. R. J. Last and Mr. H. F. Lunn, Arnott demonstrators. Sir Cecil Wakeley was appointed chairman of the editorial committee of the forthcoming *Annals of the Royal College of Surgeons of England*.

The Hallett prize for anatomy, applied physiology, and pathology was awarded to H. J. Richards (University of Sydney). Diplomas of membership, in public health, and in laryngology and otology, were granted to those named at the comitia of the Royal College of Physicians (*Lancet*, Feb. 8, p. 239). The diploma of M.B.C.S. was also granted to P. J. Horsey and F. S. Huxley, and the D.L.O. to R. T. Raymond-Jones.

Royal College of Physicians of Edinburgh

At a meeting of the college on Feb. 4, with Dr. D. M. Lyon, the president, in the chair, Dr. H. J. Parish (Petts Wood, Kent), Dr. R. C. Wood (Edinburgh), and Dr. J. A. Malloch (Edinburgh) were admitted as fellows, and Dr. W. A. Liston (Edinburgh) was elected to the fellowship. The following were elected to the membership:

J. M. Henderson, Nawab Ali, Sujata Chaudhuri, Isidore Schrire, J. P. Baird, Charles Groves, William Hunter, Jacob Du Toit, R. L. Tobias, A. C. Watt, H. M. Khan, R. W. Riddell, Vera S. Emanuel, Cecil Harris, H. C. Hastings, A. R. Currie.

Psychiatric Conference at Amsterdam

The Dutch Society of Psychiatry and Neurology are holding an international meeting in Amsterdam from June 13 to 15, to celebrate their 75th anniversary. English psychiatrists and neurologists who wish to attend should get in touch with the secretary of the Royal Medico-Psychological Association, 11, Chandos Street, London, W.1, before April 15.

Hunterian Society

The society's annual dinner, marking this year the 219th birthday of John Hunter, was held in London on Feb. 13. Among the guests were the Lord Mayor and Lady Mayoress, and the presidents of the three Royal Colleges. Replying, as president, to the toast of The Society, Dr. J. B. Cook recalled that whereas John Hunter's birthday is commemorated by the society on Feb. 13 each year, the Royal College of Surgeons celebrate the anniversary on the 14th. Hunter himself gave his birthday as the 14th; but a copy of the birth-certificate obtained by Dr. Cook from the Registrar-General in Edinburgh establishes that the correct date is the 13th. Mr. A. Dickson Wright, in proposing The Lord Mayor and the Corporation of the City of London, suggested that at the next annual dinner all fellows would be in uniform.

Postgraduate Teaching Hospitals

At a meeting of representatives of special hospitals organised for postgraduate teaching, held at the Hospital for Sick Children, Great Ormond Street, London, on Feb. 11, with Sir Ernest Gowers in the chair, it was unanimously decided to set up a representative body, to be known as the Association of Postgraduate Teaching Hospitals of Great Britain. Membership of the association is limited to hospitals or groups of hospitals having directly attached to them institutes federated or about to be federated to the British Postgraduate Medical Federation (University of London) or to provincial hospitals with institutes recognised and financially supported by a university as postgraduate teaching centres. The objects of the new association are "to keep under review all matters peculiarly affecting the interests of the member hospitals, and to act as a negotiating body directly with the Ministry of Health, universities, local authorities and other bodies on behalf of those hospitals on such matters as may peculiarly affect them." The acting hon. secretary is Mr. John Young, Royal National Throat, Nose, and Ear Hospital, Gray's Inn Road, W.C.1.

Polish Medical School

This school, which has been at the Paderewski Hospital, Edinburgh, since 1941, will shortly be moved to Poland, where it is proposed to provide a hospital of 2000 to 3000 beds.

Institute of Hospital Almoners

The annual general meeting of the institute will be held at Friends House, Euston Road, London, N.W.1, on Friday, March 14, at 6 P.M., when Dr. J. A. Charles, deputy chief medical officer of the Ministry of Health, will speak.

Course in Industrial Medicine

A course in industrial medicine will be held at the University of Leeds on Saturday and Sunday, May 3 and 4. The speakers will include Dr. A. J. Amor, Prof. G. P. Crowden, Dr. G. R. Hargreaves, Dr. F. F. Hellier, Dr. J. Vaughan Jones, and Dr. C. Sutherland. Further particulars will be found in our advertisement columns.

Arthur Davies Research Fund

This fund, which was founded to further research for the benefit of officers and men of the Mercantile Marine, has appointed Dr. Geoffrey Allen as a part-time worker at the Devonport pathological laboratories of the Dreadnought Seamen's Hospital, Greenwich. Dr. Allen has chosen fungal skin disease as the subject of his research.

Reunion of Army Physicians

A reunion dinner for former C.M.F. and M.E.F. physicians (including neurologists, dermatologists, psychiatrists, and radiologists) will be held at Grosvenor House, Park Lane, London, W.1, on Saturday, April 26, at 7.30 P.M. Applications should be sent not later than March 31 to Dr. W. MacLeod, 3, Drumsheugh Gardens, Edinburgh, or to Dr. A. Willcox, 66, Harley Street, W.1.

World Health Organisation

The organisation has inherited a fund of 1½ million dollars which is to be used in partial continuation of UNRRA's activities. Provisional allocations have now been made from this fund to continue the teaching programme in China and the basic health training in Ethiopia; for fellowships in eight countries; for supplying lecturers and medical literature; and for contributions to the salaries of specialists at the New York and Geneva offices of the interim commission of the organisation.

Honorary Consultants

In recognition of their service as consultants to G.H.Q., India, during the war, the following to be honorary consultants to the India and Burma Offices:—

Brigadier S. M. Hepworth (radiologist); Brigadier G. W. Bamber (dermatologist); Brigadier E. E. Prebble (venereologist); Brigadier D. McAlpine (neurologist); Brigadier E. A. Bennet (psychiatrist); Brigadier H. K. Ashworth (anaesthetist); Brigadier G. F. O. Bridgeman, M.C. (ophthalmologist); Brigadier Grant Massie, C.B.E. (surgeon); Brigadier J. D. S. Cameron, C.B.E. (physician).

Society of Chiropodists

The first convention of the society will be held at Friends House, Euston Road, London, N.W.1, from March 20 to 22. Sir Hugh Lett will open the meeting on Thursday, the 20th, at 2.30 P.M., and other medical speakers will include Prof. A. B. Appleton, whose subject will be 'Posture, Mr. Philip Wiles (Pain and Deformity of the Metatarsals and Toes), Mr. Denis Browne (Deformities of the Feet in Children), Prof. A. J. E. Cave (the Foot as a Sensory Organ), and Dr. Allan Yorke (Hyperkeratosis of the Sole of the Foot). Further information may be had from the secretary of the society, 21, Cavendish Square, London, W.1.

Canadian Appointment

Dr. A. B. Stokes is resigning his post as medical superintendent of the Maudsley Hospital on his appointment as professor of psychiatry and physician-in-chief of the Toronto Psychiatric Hospital.

Dr. Stokes, who took the Conjoint qualification at King's College Hospital in 1931 and his B.M. Oxrd three years later, joined the staff of the Maudsley Hospital in 1935. On the outbreak of war he was appointed deputy medical superintendent of Mill Hill Emergency Hospital, later becoming medical superintendent, and in 1945, when the Maudsley Hospital was reopened, he was appointed to his present post. His published work includes papers on the treatment of myasthenia gravis and on mental disorder in Cushing's syndrome.

Biochemical Society

A meeting of the society will be held at Guy's Hospital medical school on Saturday, March 15, at 2.30 P.M.

Research Scholarships

The council of the British Medical Association is prepared to receive applications for the following scholarships: an Ernest Hart scholarship (value of £200), a Walter Dixon scholarship (£200), and four research scholarships (each £150). Scholars should be qualified to undertake research in any subject (including State medicine) relating to the causation, prevention, or treatment of disease, and preference will be given to doctors. Each scholarship is tenable for one year, beginning on Oct. 1, 1947. A scholar may be reappointed for not more than two additional terms, and he may also hold a junior appointment at a university, medical school, or hospital, provided the duties do not interfere with his work as a scholar. Application must be made by May 31, on a prescribed form which may be had from the secretary of the association, B.M.A. House, Tavistock Square, London, W.C.1.

Return to Practice

The Central Medical War Committee announces that the following have resumed civilian practice:

Dr. T. R. LLOYD JONES, 17, Queen Anne Street, London, W.1 (Langham 2576).

Dr. R. LOUIS ROSE, 118, Newmarket Road, Norwich.

Lieutenant-General Sir Alexander Hood, F.R.C.P., has been elected chairman of governors of the Star and Garter Home for Disabled Sailors, Soldiers, and Airmen, Richmond, in place of Sir Arthur Stanley, who has resigned.

Dr. H. P. Chu, dean of the National Medical College, Shanghai, and formerly secretary of the Chinese Medical Association, has arrived on a three months' visit to this country arranged by the British Council. He is studying medical education and the training of nurses.

The firm of Ciba Limited has changed its name to Ciba Laboratories Limited.

Diary of the Week

MARCH 9 TO 15

Monday, 10th

ROYAL COLLEGE OF SURGEONS, Lincoln's Inn Fields, W.C.2
3.45 P.M. Dr. L. E. Glynn: Aneurysms and Aneurysm Formation.

5 P.M. Prof. Frank Goldby: Intracranial Anatomy of the Trigeminal Nerve.

MEDICAL SOCIETY OF LONDON, 11, Chandos Street, W.1
8.30 P.M. Dr. Horace Evans, Mr. Geoffrey Keynes: Thyrotoxicosis.

Tuesday, 11th

ROYAL COLLEGE OF SURGEONS
3.45 P.M. Dr. P. R. Peacock: *Ætiology of Gastric Cancer.*
5 P.M. Professor Goldby: *Anatomy of the Optic Pathways.*

ROYAL SOCIETY OF MEDICINE, 1, Wimpole Street, W.1
5 P.M. *Experimental Medicine and Therapeutics.* Brigadier J. S. K. Boyd, Prof. N. Hamilton Fairley, F.R.S.: *New Antimalarials and Malarial Control.*

5.30 P.M. *Psychiatry.* Dr. Russell Davis: *Disorders of Skill.*

LONDON SCHOOL OF DERMATOLOGY, 5, Lisie Street, W.C.2

5 P.M. Dr. F. R. Bettley: *Eczema.*
EDINBURGH POSTGRADUATE BOARD FOR MEDICINE
5 P.M. (Royal Infirmary.) Prof. J. H. Gaddum, F.R.S.: *The Introduction of New Remedies.*

Wednesday, 12th

ROYAL COLLEGE OF SURGEONS
3.45 P.M. Prof. Alexander Haddow: *Carcinogenesis by Chemical Agents.*

5 P.M. Prof. C. M. West: *Reproductive System.*

ROYAL SOCIETY OF MEDICINE
4.30 P.M. Mr. H. E. Griffiths: *Analysis of Function.*

Thursday, 13th

ROYAL COLLEGE OF SURGEONS
3.45 P.M. Professor Haddow: *Nature and Role of Tumour-producing Viruses.*

5 P.M. Professor West: *Reproductive System.*

ROYAL SOCIETY OF MEDICINE
5 P.M. *Ophthalmology.* Mr. O. Gayer Morgan, Dr. C. J. C. Britton, Dr. J. T. Ingram: *Allergy in Ophthalmology.*

LONDON SCHOOL OF DERMATOLOGY
5 P.M.: Dr. J. L. Franklin: *Occupational Diseases of the Skin.*

Friday, 14th

ROYAL COLLEGE OF SURGEONS
3.45 P.M. Mr. J. R. M. Innes, D.Sc.: *Animal Pathology.*
5 P.M. Dr. T. E. Barlow: *Bronchial Tree.*

Appointments

ELLIOT, T. E., M.B. Edin., F.R.C.S.E.: asst. gynaecologist, Leicester Royal Infirmary.

GORDON, G. A. D., M.B. Edin., D.M.R.: radiologist, Bolingbroke Hospital, London.

HYMAN, GEOFFREY, M.B. Leeds, F.R.C.S.: visiting orthopaedic surgeon, Royal Halifax Infirmary.

LE VAY, MARJORIE K., M.B. Camb.: pathologist, South London Hospital for Women.

MCLARDY, TURNER, M.B.E., M.B. Glasg.: asst. pathologist for neuropathology at the teaching and research laboratory, Maudsley Hospital medical school.

MOORE, H. E., O.B.E., M.B. Manc.: M.O. and acting chief M.O. London, Midland, and Scottish Railway, Crewe.

NEWHAM, C. T., M.R.C.S.: asst. to chief M.O., Great Western Railway.

ROWNTREE, J. K., M.R.C.S.: asst. M.O., Great Western Railway, Swindon.

RUBIN, E. L., M.D. Lpool, D.M.R.E., F.F.R.: radiologist, Royal Liverpool United Hospital.

THOMAS, D. T., M.R.C.S., D.P.H.: M.O.H., Penarth.

WILLIAMS, B. W., B.M. Oxf'd, F.R.C.S.: asst. surgeon, Royal Portsmouth Hospital.

London County Council:

DUKE, J. H., M.B. Belf.: medical superintendent, group IV, St. George-in-the-East Hospital, Wapping.

KEY, L. A., M.R.C.S.: medical superintendent, group IV, Heatherwood Hospital, Ascot.

PECKAR, V. G., M.B. Lond., D.M.R.D.: radiodiagnostician, Lambeth Hospital and St. Charles' Hospital, Kensington.

PIERCY, J. E., F.R.C.S.: medical superintendent, group IV, New End Hospital, Hampstead.

ROSS, G. M., M.B. Edin., D.M.R.: asst. radiodiagnostician, Hammersmith Hospital.

WHEATNALL, AILEEN E. M., M.S. Lond., F.R.C.S.: consultant aural surgeon, public health department.

WIMBUSH, H. G., M.R.C.S.: medical superintendent, group III, Hammersmith Hospital.

Connaught Hospital, London:

BENTLEY, J. P., M.B. Lond., F.R.C.S.: surgeon.

FATHI, J. T., M.S. Lond., F.R.C.S.: surgeon.

RIGBY-JONES, GUY, M.C., M.B. Camb., F.R.C.S.E.: asst. orthopaedic surgeon.

WILKINSON, L. H., M.A. Oxf'd, M.B. Edin.: physician i/c electro-therapeutic department.

Hospital for Consumption and Diseases of the Chest, Brompton:

BROOK, R. C., M.S. Lond., F.R.C.S.: surgeon.

THOMAS, C. P., F.R.C.S.: surgeon.

King Edward Memorial Hospital, Ealing:

KING, R. A., M.B. Lond., F.R.C.S.: surgeon.

WEBB, JOHN: physician to children.

Royal Northern Hospital, London:

OWEN, J. R., M.R.C.P.: physician for diseases of the skin.

WILLIAMSON, BRUCE, M.D. Edin., F.R.C.P.: physician to children's department.

Croydon General Hospital:

AYOUB, J. E. M., B.M. Oxf'd, F.R.C.S.: asst. ophthalmic surgeon.

HAMILTON, J. G., M.D. Lond., D.P.M.: psychiatrist.

HINDENACH, J. C. R., M.D. N.Z., F.R.C.S.: orthopaedic surgeon.

IVES, JOHN, M.B. Lond., D.A.: anaesthetist.

OWEN, M. W. L., M.B. Camb., D.A.: anaesthetist.

PIERSE, D. J., M.Ch. N.U.I., D.O.M.S.: asst. ophthalmic surgeon.

ROBERTSON, IVOR, M.B. Lond., F.R.C.S.E., D.L.O.: asst. orthopaedic surgeon.

TAYLOR, J. H., M.R.C.S., D.A.: anaesthetist.

TURNER, J. W. A., D.M. Oxf'd, M.R.C.P.: neurologist.

Surrey County Council:

GRIGG, D. S., M.D. St. And., M.R.C.O.G.: obstetrician and gynaecologist, St. Helier County Hospital.

LAVELLE, JOHN, M.B. Glasg., D.M.R.E.: radiologist, St. Helier County Hospital.

O'REILLY, J. N., D.M. Oxf'd, M.R.C.P.: paediatrician, St. Helier County Hospital.

PETCH, C. P., M.B. Camb., M.R.C.P.: asst. physician to out-patients, St. Helier County Hospital.

ROUSSEL, O. N., M.D. Camb., D.A.: senior anaesthetist, Epsom County Hospital.

STEWART, J. D., M.B. Edin., D.P.H., D.PHYS.MED.: director, department of physical medicine, St. Helier County Hospital.

Children's Hospital, Birmingham:

CROSSKEY, J. H., M.B. Birm., D.P.H.: anaesthetist.

D'ABREU, A. L., O.B.E., Ch.M. Birm., F.R.C.S.: surgeon to out-patients.

Cardiff City Mental Hospital:

REES, W. L. L., B.Sc., M.D. Wales, M.R.C.P., D.P.M.: deputy physician superintendent.

RICHTER, DEREK, B.Sc., M.A. Oxf'd, M.R.C.S.: director of neuropsychiatric research.

Examining Factory Surgeons:

BEVAN-JONES, D. H. B., M.R.C.S.: Llanaelhaearn.

JONES, E.: Crewe.

LETHEM, EDWARD, M.R.C.S.: Derby.

ROBINSON, WILLIAM, M.B. Glasg.: Costock, Notts.

TAYLOR, GORDON, M.R.C.S.: Yealmpton, Devon.

Colonial Service:

CHERRY, J. K. T., M.B. Glasg.: M.O., Uganda.

TALLACK, R. J. K., M.B. Brist.: M.O., Zanzibar.

YOUNG, K. D., M.R.C.S.: M.O., Zanzibar.

ATOMIC ENERGY*

Sir JAMES CHADWICK

M.Sc. Vict., Ph.D. Camb., F.R.S.

LYON JONES PROFESSOR OF PHYSICS, UNIVERSITY OF LIVERPOOL

THE designations "atomic energy," "atomic bomb," &c., which are now in common use are somewhat lacking in precision. In the strict meaning of the term the energy which is derived from fuel of any kind is atomic energy. The energy obtained from the combustion of coal or oil is latent in the atoms of carbon and oxygen. These atoms, like all atoms, are built up on a common plan. Every atom, whatever its kind, consists of a cluster or cloud of electrons held together by the attraction of a positively charged nucleus, which, although it contains nearly the whole mass of the atom, is extremely small compared with the dimensions of the electron cloud. The atoms of one element differ from those of another in the magnitude of the electric charge on the nucleus and therefore also in the number of electrons in the cluster. The charge on the nucleus increases from 1 unit in the case of hydrogen to 2 for helium, and so on up to 92 in the case of uranium. The nucleus itself, although so minute, is a complicated structure, built up from protons and neutrons. It is thus possible to build two or more nuclei which have the same charge, and therefore belong to the same element, but which have different masses; in this way the occurrence of isotopes receives a simple explanation.

All the ordinary properties of matter, such as hardness, electrical conductivity, chemical affinity, &c., are determined by the configuration of the electron cluster and are practically independent of the structure of the atomic nucleus. Thus all the chemical and physical processes involved in normal scientific and industrial developments are concerned with the electron clusters alone.

This is because the usual physical and chemical agencies produce no change whatever in the properties of the nucleus and affect only the electron cloud. But what we are now accustomed to call "atomic energy" has its origin in the atomic nucleus. Processes have been found which can cause a disruption of the nucleus and a rearrangement of the particles which constitute it; and this rearrangement results in the release of a large amount of energy.

HIDDEN RESERVES OF ENERGY

The story of the development which led to our present knowledge of the nucleus and its properties goes back fifty years, to the discovery of radioactivity by Becquerel in 1896.

This discovery opened a new epoch of science, for, as Rutherford and Soddy showed, the phenomena of radioactivity could only be explained by the assumption that the atoms of uranium, radium, &c., were unstable and were continuously breaking up and changing into other elements.

One of the most striking facts in these phenomena is the amount of energy released in the form of radiation, an amount which, atom for atom, is enormously greater than that connected with any chemical reaction. This energy released had, however, no practical value, for the rate of release is very slow and it proved to be impossible to influence it in any way. For example, in the decay of 1 g. of uranium, energy is emitted at the rate of rather less than 1 calorie per year, so that it would take more than 100 years to raise 1 c.cm. of water to the boiling point. On the other hand, the lifetime of uranium is so long that the total amount of energy liberated during the transformation of 1 g. of uranium to lead would be

5,000,000,000 calories. We can compare this with the complete combustion of 1 g. of coal, which gives 8000 calories.

It became clear that there is a reservoir of energy in the interior of the atoms of matter which is enormously greater than that available from any known chemical process. But all attempts to influence the rate of transformation of a radioactive element proved futile and the prospect of any practical application seemed exceedingly remote.

The first successful attempt to affect the atomic nucleus was made by Rutherford in 1918, when he showed that when nitrogen was bombarded by the α -particles from radium C the nucleus in rare instances broke up, forming two other nuclei—hydrogen and oxygen.

After this discovery several other elements were transmuted by similar means, and later it was found that protons and deuterons, accelerated to high speeds in strong electric fields, also produced transmutations in many common elements. The neutron proved to be almost an ideal projectile for carrying out nuclear transformations, and, with it, nearly all the elements have been transmuted. In some cases, especially with slow neutrons, the reactions were very efficient.

Many interesting and even remarkable results in their scientific aspect were obtained in these experiments. But their practical value, as a means of making available the energy stored in the nuclei of atoms, was completely negligible.

The reason was simple. These nuclear transmutations are not only very rare events but they are not self-propagating. This is quite different from the chemical reactions with which we are familiar in our daily life, such as the burning of wood, coal, or oil. Once started, these reactions propagate themselves and they develop and spread, finally involving the whole bulk of material; thus the lighting of a fire releases enough heat to ignite the neighbouring fuel, and so on.

This was not the case for the nuclear reactions. It is clear that to tap the hidden reserves of energy in atomic nuclei and put them to practical use we must find a reaction which can propagate itself—for example, a reaction in which particles are emitted of the same kind that initiated it and in sufficient numbers to affect neighbouring nuclei, so that these in their turn may emit new particles to react with other nuclei, and so on, thus beginning a chain reaction which spreads through the whole mass.

NUCLEAR FISSION

The reaction which opened up this possibility was discovered early in 1939, when Hahn and Strassmann showed that the transformation of uranium produced by neutron bombardment was a very different process from what had hitherto been supposed, and that the uranium nucleus actually splits into two fragments of roughly equal mass.

This process is known as fission. A neutron is captured by a nucleus of uranium 235, forming a nucleus of uranium 236 in a highly excited state. This immediately divides into two nuclei of roughly equal mass and at the same time some 1 to 3 neutrons are emitted and some γ -radiation. The fragments fly apart with great speed, and, in their passage through matter, this energy of motion is transformed into heat. These fragments are unstable and may pass through a series of transformations emitting β -particles and γ -radiations, before they at last reach a stable configuration.

There are two important aspects of the fission process. First, a great amount of energy is released; secondly, more than one neutron is emitted in the fission. This second point is of crucial significance, for it is this which opens up the possibility that the reaction can be propa-

* Lloyd Roberts lecture delivered to the Medical Society of London on Dec. 16, 1946.

gated from atom to atom, developing a whole chain of fissions from one single event. Such a chain process developing in a mass of uranium might take place at an ever-increasing rate and might involve so many atoms that there would be an appreciable, and possibly an overwhelming, liberation of energy. In this way we might get a new type of combustion of matter which would give an energy yield a million times greater than we get from the combustion of the same weight of coal.

Investigation showed that natural uranium is unable by itself to sustain a chain reaction. The reason for this is that the common isotope 238, which forms more than 99% of natural uranium, undergoes fission only when the bombarding neutrons have a high energy; it is the isotope 235 which is particularly susceptible to fission, and this is present in natural uranium only to the extent of 0.7%.

In order to make a small and efficient system which would sustain a chain reaction it was therefore necessary to separate uranium 235 from ordinary uranium. This separation is a very difficult operation since the two isotopes are almost identical in every property but that of mass, and even in mass they differ by little more than 1%. Nevertheless the separation has been accomplished in two different ways, by an electromagnetic method and by a gaseous diffusion process, and both processes have provided adequate amounts of uranium 235.

This uranium 235 can be used to make an atomic bomb, in which the energy is released so rapidly that a violent explosion occurs, or it can be used in such a way as to release the energy gradually.

For many purposes, and especially for those purposes which are of interest in biology and medicine, it is of little importance to have a system of small size. If this limitation is removed, it is possible, by a special device, to build an atomic reactor which uses natural uranium and so to avoid the need for the very difficult and very costly separation of the isotopes. Before describing how this is done, I must make some general observations on the chain reaction and the conditions for its realisation.

MAINTENANCE OF CHAIN REACTION

Suppose we have a large block of fissile material and that a neutron enters and causes one of the nuclei to undergo fission. Energy will be released and two neutrons will be produced. These two neutrons will move through the block until each eventually hits another nucleus. We now have two fissions, liberating more energy, and four neutrons. These in turn produce fissions, so that we have a series of successive generations of energy and neutrons. The number of neutrons, and therefore also of fissions, is doubled in each generation, so that in quite a small number of generations, between 50 and 100, an appreciable fraction of the atoms of the block will undergo fission and a large amount of energy will be set free.

The multiplication of the effect in successive generations clearly depends on the conservation of the neutrons produced in the fissions. If too large a fraction of these neutrons is unable to carry on the chain of fissions the reaction will die out quickly and the amount of energy released will be negligible. Neutrons can be lost in two ways. First, the block of fissile material, or the reacting system as a whole, may be too small or its shape may be unsuitable; in this case too many neutrons will be able to escape out of the block before they are able to produce further fissions. The proportion which escape can be reduced by increasing the size of the block, and there will be a certain size, called the critical size, which will just permit the reaction to develop. There is thus a striking difference in behaviour between an atomic explosive and ordinary explosive. A small amount of

T.N.T. produces a small explosion and a large amount produces a large explosion. But a small piece of fissile material produces no effect whatever; an explosion will only occur when the amount is greater than the critical size.

Secondly, the system must not contain more than a limited amount of material which absorbs neutrons without undergoing fission, for in this way again the neutrons will be wasted and useless for continuing the chain reaction.

These two conditions must be satisfied before a chain reaction can develop.

If atomic energy is to be used as an explosive, the more rapidly the reaction can proceed the greater will be the amount of energy set free and therefore the greater the explosive effect. It is thus an advantage to use pure or nearly pure uranium 235 (or plutonium, another fissile material). The fission neutrons have speeds of the order of 10^9 cm. per sec., and, since they do not have to travel many centimetres in pure uranium 235 before they produce new fissions, the time between successive generations is of the order of 10^{-8} second. Thus in less than a millionth of a second a considerable fraction of the mass of 235 will have undergone fission. A large amount of energy is thus suddenly liberated, raising the temperature of the mass of material to many millions of degrees and the pressure to many millions of atmospheres. The sudden expansion of the hot gases produces a very violent explosion.

For the purposes of the peaceful applications of atomic energy it is obviously necessary to control the chain reaction so that the energy can be released continuously and at a predetermined rate. It would seem at first sight that the control of a reaction which can develop so rapidly and in doing so liberates such enormous amounts of energy must be exceedingly difficult. This is fortunately not the case, and in practice control is a relatively simple matter.

Control depends on the regulation of the flux of neutrons in the reacting system so that at a predetermined level the flux remains constant, only exactly as many neutrons causing fission in one generation as in the previous generation. The surplus neutrons which are produced in the fissions are removed and made unavailable for carrying on the reaction. The reaction will then proceed at a constant rate. This balance of the neutron flux can be achieved either by allowing the excess neutrons to escape or by capturing them in some absorbing material.

If the description I have given of the fission process were quite accurate, this balance of the neutron flux would be exceedingly delicate and control of the reaction would be very difficult. Briefly, the reason for this is that the neutrons have such high speeds—even those we call slow neutrons—that the time between successive generations cannot be made longer than a very small fraction of a second, while any control mechanisms will take a time of the order of a second to act. Thus, if a balanced reaction could be achieved, a slight temperature change or mechanical disturbance might affect the balance and cause the neutron intensity to rise at an uncontrollable rate, resulting in a violent explosion.

The fact is, however, that not quite all the neutrons which are liberated in the fission process are emitted instantaneously. Some of the fission products transform after a time with the emission of a β -particle into nuclei which are so unstable that they emit neutrons. Thus the total neutron emission consists of the "prompt" neutrons emitted in the fission process itself and the "delayed" neutrons from some of the fission products, liberated on the average a few seconds after the fission.

Although these delayed neutrons form only a very small fraction of the total neutron emission they have a profound effect on the problem of control, for they can

be used to reduce the rate at which the chain reaction develops. This is done in the following way: The assembly of fissile material is arranged to be only a very small degree above the critical size, so that the prompt neutrons alone cannot maintain the reaction but need the help of the delayed neutrons. Thus each generation of neutrons has to wait for the delayed neutron emission before a sufficient increase in intensity can occur to keep the reaction going. The rate at which the neutron level can rise is limited by the delay, on the average a few seconds, and is therefore quite slow. The control devices are thus given time in which to act and to take charge, and to hold the neutron intensity and the level of the reaction at any desired value.

THE GRAPHITE PILE

Earlier in this lecture I said that natural uranium is unable by itself to sustain a chain reaction, no matter how large the block of metal is made. This is because the abundant isotope 238 can capture neutrons without undergoing fission and because it undergoes fission only by very fast neutrons. It thus removes neutrons without contributing enough to replace them, and, since this isotope is 140 times more abundant than the 235 isotope, the effect is to prohibit the reaction.

This difficulty could be overcome by reducing the proportion of the 238 isotope—that is, by a process of isotope separation. Although no large reduction would be required the process would be very difficult and very costly.

A simpler and more economical way is to make use of the fact that slow neutrons are much more effective in producing fission in 235 than are fast neutrons. Slow neutrons are also more easily captured by the 238, and so there is still a strong competition between the 235 and 238, but, provided the neutrons can be made to move slowly enough, the chain reaction becomes possible with ordinary uranium.

The neutrons are emitted in the fission process with speeds of the order of 10^9 cm. per sec. They can be slowed down by causing them to make collisions with light atoms, such as hydrogen, deuterium, helium, carbon, &c. In each collision some of the energy of motion of the neutron is transferred to the atom with which it has collided. The neutron is slowed down in a series of steps. The slowing-down process, or moderation as it is called, cannot continue indefinitely since the atoms of the material in which the collisions take place, the moderator, are themselves in motion by reason of their thermal agitation. The process of slowing down can only proceed as far as the stage when the energy of the neutrons is on the average equal to the energy of thermal agitation of the atoms of the moderator. At normal temperature the average speed of the neutrons will then be about 2 km. per sec. This stage will be reached more quickly the lighter the atom of the moderator, so that hydrogen will be the most effective material, with deuterium next, and so on.

There is, of course, the possibility that the moderator itself may capture neutrons, and this limits the choice of moderator; also very considerable amounts of moderator are required.

Only two materials have so far been successfully used—deuterium in the form of heavy water, and carbon in the form of graphite. Heavy water has some advantages, but it is very expensive, whereas graphite is relatively cheap and abundant. Graphite is therefore the most convenient material to use as the moderator.

Owing to the inevitable, though small, loss of neutrons by absorption in the graphite the working margin is small; the competition of the uranium 238 is so severe that there are few neutrons to spare. It is therefore necessary to keep down the loss of neutrons by leakage, which implies a rather large critical size of the reacting

system, so that some tons of uranium and of graphite are required.

For reasons depending on the nuclear properties of uranium, the most effective arrangement of the uranium and the graphite is one in which lumps of metallic uranium are disposed at regular intervals throughout a large block of graphite. The best size of the uranium lumps and of the spacing can be calculated from the nuclear constants of the materials.

In practice it is necessary to arrange for a coolant to be circulated around the uranium lumps in order to remove the heat generated by fission, and it may on occasion be necessary to replace the uranium without disturbing the assembly of the pile. For these reasons the arrangement used is a rod lattice of cylindrical symmetry, in which short rods or slugs of uranium are loaded in horizontal cylindrical channels in the graphite block.

If a uranium 235 nucleus in one of the uranium rods undergoes fission the neutrons liberated in the fission will in general fly out of the rod into the graphite, where they are gradually slowed down, wander around, and finally enter another rod of uranium. There they will either produce fission in an atom of uranium 235 or be captured by a uranium 238 nucleus, with the former process slightly predominating. The energy of the fission fragments will be converted into heat in the uranium metal rods and there will be a flux of neutrons and γ -radiation throughout the pile, with an intensity proportional to the rate of the chain reaction or the power level at which the pile is operating.

The essence of control is to make the assembly of uranium and graphite only a very small degree above the critical size. The chain reaction can then only be maintained by the contribution of the delayed neutrons, and the rate at which the neutron level can change is very slow.

The reaction can then be controlled by pushing into or pulling out of the pile control rods made of cadmium or boron. These substances absorb slow neutrons very strongly, so that a small movement of the control rod by means of a simple mechanical device will suffice to regulate the reaction. These controls can be connected with instruments which measure the neutron density in the pile and thus the power level, and in this way the pile can be kept automatically at a predetermined level.

The power level of a pile is limited only by the rate at which the heat can be removed and by the physical and chemical properties of the materials. As the power increases the temperature of the uranium rods rises and the safe limit of this temperature fixes the maximum power at which the pile can be run. Since uranium oxidises rather easily the rods must be clad with a protecting jacket of aluminium if more than a very small power is required. Even then high temperatures cannot be reached, on account of corrosion of the aluminium. If very high powers are desired, as in the piles for the production of plutonium, the cooling must be very effective, and in these piles a very large circulation of water is used to remove the heat rapidly. For piles of moderate power, however, sufficient cooling can be obtained by pulling or blowing air through the channels in which the uranium rods are placed. In this way a power of a few thousand kilowatts can be achieved and this is enough for most research purposes, including the applications to biology and medicine which I shall shortly describe.

The neutron and γ -radiation intensities inside a pile operating at a few thousand kw. are very high. The γ -radiation alone is equivalent to the radiation from a few tons of radium. Most of this radiation will be absorbed in the pile itself, but the fraction which escapes would still be very dangerous to human life. It is therefore necessary to enclose the pile within thick concrete walls.

MEDICAL APPLICATIONS OF THE PILE

The chief purpose for which the graphite pile has been used so far has been the manufacture of plutonium. When uranium 238 captures a neutron an unstable isotope of mass 239 is formed which passes through two successive β -transformations and turns into plutonium. This is an easily fissile material which can be used to make atomic energy reactors, either bombs or controlled reactors.

The plutonium has to be separated chemically from the uranium, a troublesome operation owing to the intensity of the radiations emitted by the fission products and on account of the large amounts of material which have to be handled.

To produce the quantities of plutonium which are needed to make reactors, a large graphite pile dissipating some hundreds of thousands of kilowatts is required. Owing to the difficulties in removing such a large amount of heat from a system of this kind the construction of these large piles is a formidable operation.

A much smaller pile, say of a few thousand kilowatts, of the air-cooled type, is sufficient for all general scientific purposes, including the applications to medicine and biology. Such a pile can make only a gramme or two of plutonium a day, a quantity of no military significance. It is thus possible to pursue some of the peaceful applications of atomic energy without at the same time setting up a plant to produce weapons of destruction. The medical applications in particular belong to the category of what we may call the "safe" developments of atomic energy.

There are various ways in which the graphite pile can be used in medicine and biology, not all of equal importance.

(1) The pile as a source of neutrons and gamma-radiation. By making a channel in the concrete wall enclosing the pile, a beam of neutrons and γ -rays can be allowed to escape. This beam can be used for experimental purposes, both physical and medical, but it has probably very little therapeutic value. The neutrons in the beam are mostly of low energy; and such experience as we have on the relative efficiencies of neutrons and X rays in the treatment of malignant tumours has not indicated that neutron therapy has any advantages.

(2) The pile can be used for the production of radioactive substances. These are produced in two ways.

First, the two fragments into which the uranium nucleus divides are radioactive and undergo transformation into further active elements, sometimes a whole series of transformations taking place. The fission itself occurs in a variety of ways, so that as a result of a large number of fission processes a wide variety of radioactive isotopes is produced, from zinc to the heavier rare earth, with the majority in the region of barium and strontium. The amounts of material, measured by their radioactivity, which can be produced in this way are very large indeed, so large that it may not be practicable to deal with the main bulk.

Secondly, radioactive isotopes can be produced in the pile because it is a copious source of neutrons. The pile is so constructed that there will be more neutrons than are required to maintain the chain reaction, the surplus neutrons being removed by the control rods. Part of the function of the control rods can be assumed by substances inserted in the pile, which, by absorbing some of the surplus neutrons, form radioactive substances. In this way radioactive isotopes of nearly all the elements can be made. (The number known at present is about 450.) The amounts of the substances produced in this way depend on the number of surplus neutrons available, the power level of the pile, the amount of the bombarded material which is inserted, and its reactivity to neutrons.

This second method of producing radioactive substances is similar to the use of a cyclotron for the same

purpose. It is, however, more restricted, for the cyclotron can provide a greater diversity of bombarding particles—protons, deuterons, and α -particles as well as neutrons—while the pile is a source of neutrons only. Even these are mostly of low energy, so that large yields can be obtained only in cases where the substances are made by means of a neutron capture process, the (n, p) and (n, γ) processes. On the other hand, the flux of neutrons is so intense that the yields are, on the average, at least a thousand times greater than with the largest cyclotron.

USES IN RADIOTHERAPY

These radioactive substances can be used as sources of radiation in radiotherapy, as an alternative to radium and radon both in beam therapy and in interstitial and intracavitary therapy.

The pile can produce some hundreds of curies per day of mixed fission products. If these were separated from the uranium metal in which they are formed, highly concentrated sources of radiation could be prepared which would be very suitable to replace radium in teleradium therapy. Alternatively, small blocks of uranium metal could be irradiated in the pile and used without separation; in this case the preparation is easy, and the dangerous and costly separation process is avoided, but the source will not be so concentrated.

At least two other materials which can be prepared in sufficient quantity—cobalt 60 and tantalum 182—would be suitable as sources of γ -radiation and substitutes for radium in beam therapy. For interstitial and intracavitary therapy, several other radio-elements would be satisfactory substitutes for radium or radon.

A single pile of a few thousand kilowatts should be able to produce sufficient material to treat at least 10,000 cases a year and in addition to maintain several large beam units for teleradium therapy. It should thus provide all requirements for radium therapy in this country.

SELECTIVE IRRADIATION

Next, the radioactive substances can be used for selective irradiation of cells and tissues, depending on the selective absorption of suitable radioactive isotopes in specific cells and tissues. In such cases the chemical and physiological properties of the substance are of first importance, since these determine the selective absorption in the tissues which it is desired to irradiate. Further, a radioactive isotope which emits β -rays of low energy will in general be desirable, in order to limit the action to those specific tissues or cells.

So far only two radioactive isotopes have been proved to be useful therapeutically—phosphorus and iodine.

Radiophosphorus has proved very effective in the treatment of polycythaemia and useful in the treatment of myelogenous leukaemia.

In polycythaemia doses of 2–4 mc. of radiophosphorus have caused the disappearance of the symptoms. The patient is enormously relieved and the remission may last for two years without further treatment.

In the case of myelogenous leukaemia, among some 150 patients treated with radiophosphorus the results were fairly good. The growth of the cancer cells is restrained to some extent and the symptoms are lessened, but life is prolonged by no more than a few months at most. The use of radiophosphorus has one advantage over the conventional X-ray treatment in that there is less radiation sickness involved; on the other hand there is some difficulty in arriving at the correct dose, with an indefinite hazard from the effects of the radiations.

In lymphatic leukaemia there seems to be no advantage whatever in the use of radiophosphorus.

Radio-iodine has been shown to be effective in the treatment of overactivity of the thyroid and of a particular but rather unusual form of thyroid cancer.

Because of the great avidity of the thyroid for iodine, especially when overactive, it is possible to place the radiation directly inside the cells which it is desired to irradiate. About 50 cases of hyperthyroidism have been treated with radio-iodine and in 40 of these the disorder was controlled. Some patients who had not responded to other forms of treatment responded well to radio-iodine. The duration of the remission has not yet been established and it is not certain that there may not be untoward after-effects from the radiation. It seems possible, however, that treatment with radio-iodine may possess some advantages over other forms of treatment, and it is worthy of extended experiment.

Some attempts have been made to treat cases of thyroid cancer with radio-iodine, and in one or two cases of an unusual form of cancer a pronounced effect was obtained. In the more malignant forms, however, there was no evidence of any benefit. In fact only a small fraction of thyroid cancers pick up iodine preferentially and the more malignant the tumour the less is the possibility of affecting it by means of radio-iodine.

On the whole the results of this new method of selective irradiation may appear somewhat disappointing. Such success as has so far been achieved is mainly with relatively benign diseases which respond to the normal methods of treatment. We must remember, however, that this new method is in its infancy and that its development and scope have been limited. Progress is likely to be slow and it would not be reasonable to expect immediate success.

TRACERS

The most promising medical application of these radioactive substances lies in the investigation of the fundamental chemical processes of the body through their use as "tracers."

Nearly all the ordinary chemical elements can now be obtained in radioactive modifications. These have exactly the same chemical properties as the usual forms, so that if a radio-isotope is mixed with a sample of the same element it will accompany the stable form through any series of chemical processes, however complicated these may be, and it can always be recognised by its radioactivity. The radioactivity acts as a label enabling us to detect the presence of a particular group of atoms and to follow this group throughout the chemical processes. Thus if we wish to study the distribution of a certain element in a series of biological processes we can mix with it a radio-isotope and we can then follow the distribution by means of the radioactivity.

The use of radio-isotopes also largely increases the sensitivity of the methods of detection and estimation. This may be an important advantage in such cases as the metabolism of very toxic metals or drugs, where an amount of the material sufficient to permit detection by chemical means in specific tissues may cause alterations in physiology or even death.

The radioactivity also permits us to detect the element at a distance so that the samples need not be specially purified and in some cases need not be removed from the experimental animal. It may also in some circumstances permit a continuous examination of the accumulation of material in an organ without interfering in any way with its normal functioning.

In short, the use of radioactive tracers does not merely supplement the direct chemical approach to the problems of metabolism but it opens up new possibilities in clarifying and analysing their most intimate details.

The first attempt to apply these methods was made by Hevesy in 1923, when he used a radioactive isotope of lead to investigate the metabolism of that element in plants. At that time, however, only the naturally occurring radio-elements were obtainable, none of which are normal constituents of biological systems.

The technique was therefore very limited in its application. It was not until the discovery of artificial radioactivity in 1933 and the development of the cyclotron that radio-isotopes of the common elements became available, providing this new and powerful method of research for the biologist. The first to use it were Chiewitz and Hevesy in 1935, who investigated the metabolism of phosphorus in rats, using radiophosphorus as a tracer. Since that time the method has been applied in nearly all the biological sciences and much new and significant information has been secured, some of which could have been acquired by none of the former methods.

There are three general ways in which the tracer technique has been applied.

(1) *By Examining Samples.*—The technique most widely used, and one which is applicable to all radio-elements, is to follow the distribution in the tissue by quantitative measurement of the radioactivity in samples of the tissues after removal from the body. Thus radiophosphorus may be mixed with inactive phosphorus and converted into sodium phosphate, which is then administered, mixed with the food or as a subcutaneous injection, to a rat. After the lapse of an appropriate time the rat is killed and the various organs and tissues removed. The amount of the administered phosphorus which has reached the various tissues can now be found by a simple measurement of the radioactivity.

Further, the conversion of the administered phosphorus into various complex organic compounds by the physiological processes of the body may be observed. Here the compound must be isolated from the tissues and its radioactivity measured. In this way the rôle of phosphorus in metabolism has been studied in considerable detail. It has been possible to estimate how much finds its way to the different parts of the body, such as the bones, teeth, liver, kidneys, &c., how long it takes to arrive there and by what path, how long it stays, and so on.

The rate of conversion to cephalin and lecithin, the formation of phosphatides in livers, the origin of milk phosphorus, the synthesis of haemoglobin from iron, of thyroxine and diiodotyrosine from iodine, and many similar questions have been studied by this means.

The method is, of course, not restricted to the administration of simple inorganic compounds. Complex organic compounds can be labelled by including radio-elements in their molecules. Thus thiamine (vitamin B₁) has been labelled by synthesising it from radiosulphur, and its fate in the body has been followed by measuring the distribution of the radiosulphur in the various tissues.

(2) *By Direct Measurement of Radioactivity.*—If the radio-isotope emits penetrating γ -rays its presence can be detected through several centimetres of tissue. The presence in a particular organ can then be detected by placing a Geiger-Müller counter over the organ and measuring the intensity of the γ -radiation. This technique has been used to observe the selective absorption of iodine by the thyroid and the circulation of the blood, using radiosodium as a tracer.

An extensive study of the iodine metabolism of the thyroid gland in both normal and goitrous human beings has been made by this method. The deposition of the administered iodine in the thyroid is measured with a Geiger-Müller counter placed against the subject's neck. In this way the patient is not disturbed by any surgical treatment and the changes in the amount of radio-iodine in the thyroid can be followed over a considerable period.

Experiments by Hamilton and Soley, by Hertz, and others showed that thyroids of patients with thyrotoxicosis accumulate and retain a large proportion of the administered radio-iodine, that the thyroid tissue can be destroyed selectively by the irradiation of the radio-

iodine without apparent damage to the other tissues of the body, and that the iodine is deposited preferentially in the regions of the thyroid tissue which are the most hyperplastic.

(3) *By Photography.*—A third method of observation makes use of the photographic action of the radiations from the radio-isotope. Thin sections of the tissue under investigation are placed against photographic films. After an adequate interval the films are developed and will show areas of darkening corresponding to the regions of the tissue in which the radio-isotope has been deposited. The sections are stained and each section is compared under the microscope with its corresponding film. In this way a correlation can be established between the histological structure of the tissue and the deposition of the labelled element. This method of observation is more qualitative than the others, but it has certain advantages in addition to its simplicity.

ILLUSTRATIVE USES OF RADIO-ISOTOPES

I wish now to give some examples of the use of radio-isotopes in the solution of certain problems.

(1) *Permeability of Membrane of Red Cell.*—In human beings the concentration of sodium ions in the blood plasma is about twenty times that inside the red cell, while the potassium concentration inside the cell is about twenty times that in the plasma. Although potassium and sodium ions behave in much the same way chemically, and although there are well-marked changes in the concentrations of chloride and bicarbonate ions during the cycle of respiration, so that the membrane of the cell is clearly permeable to these, this peculiar difference is maintained. To explain this behaviour it has generally been supposed that the membrane of the red cell possesses a selective impermeability to the positively charged basic kations, so that once a cell was born with its peculiar sodium and potassium concentrations it could maintain these concentrations against the very different concentrations in the blood plasma by not exchanging across the surface of the membrane.

This problem was attacked by Cohn by means of the tracer technique. A small amount of labelled sodium chloride, too small to raise the sodium concentration appreciably, was injected and in some minutes it was distributed uniformly throughout the blood. Samples of blood were then drawn from time to time so that any penetration of radiosodium into the red cells could be measured. It was found that penetration did in fact take place and that eventually the concentration of radiosodium in the red cells and in the plasma assumed the normal ratio. Similar results were obtained with radiopotassium. This proved conclusively that there is a continuous exchange of kations through the membrane of the red cell, and that some mechanism other than impermeability must be present in order to preserve the difference in concentrations.

(2) *Effect of X Rays on Cellular Division.*—The preliminary stages of mitosis involve the transfer of nucleotides from the cytoplasm to the chromosomes, their conversion from ribose into desoxyribose nucleotides, and their polymerisation into long chains. At the end of each mitosis the nucleotides are surrendered by the chromosomes. Thus there is a cyclical chemical process.

It is well known that radiation by X rays inhibits cell division in growing tissues and therefore influences their chemical changes at some stage. In remarkable contrast, full-grown tissue is hardly affected by moderate doses of X radiation. Hevesy has studied this question by determining the rate of formation of the desoxyribose nucleic acid before and after irradiation by X rays, using radiophosphorus as an indicator. He found that X rays inhibited the formation of desoxyribose nucleic acid not only in growing tissues but also in full-grown tissues, and to about the same extent in each. The

greater part of the inhibiting action disappears in a few hours after the irradiation.

Hevesy's results explained the difference in the action of X rays on growing and full-grown tissue (the full-grown tissue has time to recover) and suggested some important clues to the sensitivity of tissue to X rays and to some difficulties in the treatment of cancer by radiation.

(3) *Blood-transfusion.*—Some interesting examples of the tracer technique are afforded by work carried out in the United States during the war in studies of surgical shock and in the development of methods for the preservation of whole blood for transfusion.

In this work the radio-element used was radio-iron, since iron is a constituent of hæmoglobin. Two radio-isotopes of iron are known—Fe⁵⁵ which has a half-life of 4 years, and Fe⁵⁹ which has a half-life of 44 days. Because of the difference in the rates at which they lose their radioactivity it is easy to distinguish one of these types from the other.

In the experiments on blood-transfusion one of these radio-isotopes of iron was injected into the recipient of the blood-transfusion, thus labelling his red corpuscles, and the other type of radio-iron was injected into the blood-donor, so as to label the red corpuscles of the blood used for transfusion. This device enabled several important investigations to be carried out concerning the interaction of blood types, which have clarified some points in blood-transfusion and have applications in obstetrics as well as in surgery.

A very important contribution of this technique was the determination of the best methods for the preservation of whole blood and for setting up the technical standards for the blood-donor programme in the U.S.A. By this device of labelling the red corpuscles of the donor's blood direct evidence was obtained on the potency of this blood after various durations of storage when admixed with various suggested preservatives. At the end of any given storage period the blood was transfused into a recipient and shortly afterwards the amount of the donor's blood which still remained active in the recipient's blood-stream was determined by measurement of the radio-iron. It was by this method that the U.S.A. standards for blood storage were established.

CONCLUSION

These few examples of the applications to medicine and biology of this new technique of investigation will perhaps suffice to show its extraordinary delicacy and power and its ability to attack problems which have hitherto been inaccessible to direct experiment. It can hardly be questioned that the development and wider use of this technique will bring rapid and remarkable progress in our knowledge of the fundamental chemical processes in the body and in our knowledge of health and disease.

To derive the full benefit from this new method we must have ample supplies of these radioactive materials. Many of them, and all those which are isotopes of the chemical elements directly concerned in body metabolism, can be made by means of a cyclotron. But the quantities which can be made in this way are relatively small. An atomic pile, because of its more copious supply of neutrons, will in general make far larger quantities—of the order of a thousand times more than can be made by a large cyclotron. Thus a single pile of moderate power would be able to supply all the tracer elements needed in this country. Such a pile has no direct military application, it has no significance for the production of atomic bombs, for its rate of manufacture of plutonium is too small. It is essentially a "safe" development of atomic energy and one which, by enabling us to discover more, and more quickly, about the human body, may bring untold benefits in its train.

ADDED INFECTIONS IN BURNS

A STUDY OF 233 CASES

LEONARD COLEBROOK

F.R.C.O.G., F.R.S.

MEMBER OF SCIENTIFIC STAFF, MEDICAL RESEARCH
COUNCILJOHN M. DUNCAN * W. J. H. BUTTERFIELD
M.B. Birm. B.M. Oxfd

From the Birmingham Accident Hospital

Bourdillon and Colebrook (1946) described a first attempt to keep burns uninfected by dressing them in a dust-free atmosphere, along with other precautions. They analysed the few added infections that took place during the first twelve months of this régime, and concluded that, in more than 1400 dressings, neither hæmolytic streptococcus nor *Ps. pyocyanea* was transmitted in the course of dressing from any patient to another.

A few added infections with these organisms and with *B. proteus* did take place, but the evidence seemed to point clearly to transmission at some other time than during the dressing. It was suggested that such transmission might easily happen in the wards if the covering of the burns became imperfect at any time; or if the patient interfered with it.

In some situations—e.g., the face, and the buttocks near the perineum—it is manifestly impossible to secure and maintain complete covering. In children the neck, chin, and shoulders, which are often accidentally scalded, are notoriously difficult to seal off effectively with dressings, especially after the children have recovered from the early shock and cannot be kept still.

We report here a further study of infection acquired apart from dressing the wound. The investigation overlaps that reported by Bourdillon and Colebrook (1946) and deals with the twelve months August 1, 1945–August 1, 1946, during which we always recorded, when we started a dressing, whether the wound still had perfect or imperfect cover, or had been exposed at any time since the last dressing. The records, illustrating the importance of cover in relation to site of burn, were as follows:

| Site | Perfect cover | Imperfect cover | Total |
|------------------|---------------|-----------------|-------|
| Limbs | 770 .. | 96 (11%) .. | 866 |
| Trunk | 123 .. | 80 (40%) .. | 203 |
| Buttocks .. | 29 .. | 77 (72%) .. | 106 |
| Face and neck .. | 69 .. | 54 (44%) .. | 123 |

Our daily records also show the order in which patients are dressed and the clinical condition and bacteriological flora of each burnt area at the time of its dressing. All these data taken together enable us to decide, with a considerable degree of probability, whether any particular lesion acquired its added infection at the time of dressing, or between one dressing and the next—i.e., in the ward.

The organisms we have used as indicators of added infection are hæmolytic streptococci, *Ps. pyocyanea*, and *B. proteus*, partly because they are easily recognised in culture and, in the case of hæmolytic streptococci at least, because strains can often be identified by their serological reactions. They were chosen as indicators also because of the strong impression (in the case of hæmolytic streptococci it may be said to be a certainty) that these three organisms are more often associated with delayed healing and with unsuccessful grafting operations than are most of the other organisms commonly found on granulating surfaces.

Added infections (or contaminations) with other organisms, especially *Staph. aureus*, have taken place during this period—indeed they have been very common

—but up to now we have made no serious attempt to trace the source from which they are transmitted to the burns. Such a task is likely to be very difficult.

METHODS

Bacteriological Examinations.—Swabs from the wounds have been planted, usually within two or three hours, on plates of 5% horse blood-agar, and on plates of 1% 'Cetavlon' agar (Harper and Cawston 1945). These plates were incubated only aerobically, owing to difficulties of supply and labour. When *B. proteus* was known to be present or was suspected, swabs were planted by Cawston's modification of the Fry method (Colebrook et al. 1945) and by the more recent method of Pearce (1946).

Dressings have been carried out as described by Bourdillon and Colebrook (1946). In most cases, except when it was almost healed, the burn was covered with tulle gras (with or without penicillin cream under it), then dry sterile gauze, then absorbent wool, extending well beyond the gauze, and finally crêpe bandages. The bandages have been held in place whenever necessary with strips of strapping or, in many cases, if there was any likelihood of interference with the dressing by the patient's fingers, with a light shell of plaster-of-paris. Burns of the face, if not severe, were sometimes left without dressings, being only smeared with penicillin cream from time to time.

ADDED INFECTIONS AND THEIR PROBABLE SOURCES

The term "added infection" is used to denote the growth of one of the three indicator organisms from a burnt area of a patient who had been free from such infection on admission, such organisms being obtained at any time during the patient's stay in hospital.

Bourdillon and Colebrook (1946) described the principles which guided them in deciding whether each added infection was or was not probably acquired in the dressing-station. The same considerations apply to the data given below, but our evidence is somewhat more complete, our records showing whether the burnt areas were imperfectly covered, and therefore liable to infection from without, when their added infections were first detected.

Between August 1, 1945, and August 1, 1946, 233 cases were admitted, almost half of them children. The burns of 13 cases were already infected on admission with one or other of the three indicator organisms—9 of them with hæmolytic streptococcus. During this period no dressings have been carried out in the open wards. All first dressings (of fresh burns) were done either in the plenary treatment room or in the shock room, neither of which is supplied with dust-free air. All the subsequent 1419 dressings were done in the dust-free atmosphere of the dressing-station, except 107 in the saline bathroom, which is not air-conditioned.

Streptococcus hæmolyticus has been responsible for added infection in 12 patients (5%) after admission. Only 2 of the 12 had extensive burns; 1 of them acquired her streptococcus after eight weeks, and it had no clinical ill effects. The other patient acquired her streptococcus during the eleventh week of her recovery and lost it within three days. This took place during a phase of breakdown of her grafted areas, which seemed to be due to an acquired sensitivity to tulle gras. In none of the remaining 10 patients was the arrival of hæmolytic streptococcus on the burns associated with any signs of acute sepsis, and in none did the organism persist more than a few days. It may be said, therefore, that, among the whole 224 patients admitted without streptococcal infection during the period, the clinical effects of added infection with that organism have been practically nil. Of the 12 patients with such added infections, 3 had never been in the dressing-station and 9 had not followed a streptococcus-infected case in the dressing-station at the last dressing. One patient did follow a streptococcus-infected patient in the dressing-station, but the infected lesion (a finger) had been

* Receiving a part-time grant from the Medical Research Council.

exposed in the ward, where there was another streptococcus-infected patient; hence it is doubtful where the infection took place. We conclude that 11 of the 12 certainly, or very probably, acquired their streptococci outside the dressing-station. The burnt areas of 8 of these are known to have had imperfect cover immediately before their added infection was detected; 6 were anatomically difficult to keep perfectly covered, being burns of neck, chest, buttocks, or thighs.

Ps. pyocyanea was responsible for added infection in 9 patients (4%). In most of them the infection persisted for days or weeks, and we were unsuccessful in eliminating it by any local applications, including proflavine and 'Phenoxetol.' Apart from some possible delay in healing, the infections appeared to produce little clinical effect. None of the 9 patients had followed a pyocyanus-infected patient in the dressing-station at the last dressing. It is therefore certain, or very probable, that all acquired their infection outside the dressing-station. The burnt areas of 5 of the 9 patients were imperfectly covered immediately before their added infection was detected. One other patient was ambulant and had visited a patient admitted with pyocyanus.

B. proteus was responsible for added infection in 14 patients (6%). Of these 14 patients, 4 had never been in the dressing-station and the remaining 10 had not followed a proteus-infected patient in the dressing-station at the last dressing. All of them, therefore, had certainly, or very probably, acquired their infection outside the dressing-station. The burnt areas of all of the patients were imperfectly covered immediately before their infection was detected, and 11 were so situated as to be difficult to cover adequately (buttocks, chin, neck, &c.).

Summing up these data, of the 220 patients whose burns were free from all the three indicator organisms on admission, 29 (13.2%) acquired one or more of them at some time during their stay in hospital. Of these 29 patients, 14 were children under 5 years of age and 4 were older children. (Of the 29 patients, 5 acquired more than one of the three indicator organisms.) In only one instance was there reason to suspect that the infection may have been transmitted at the time of dressing in the dressing-station. In all the other cases it probably took place in the ward in the interval between dressings.

It is evident, too, that the risk of added infection has been closely related to success or failure in keeping burnt areas adequately covered with dressings. Further evidence on this point is provided by the fact that, out of 1104 dressings of areas recorded as having perfect cover when they arrived in the dressing-station, only 9 (0.8%) acquired an added infection with one of the three indicator organisms; whereas among 315 dressings of areas recorded as having imperfect cover, 27 (8.6%) acquired an added infection.

The exact source of all these added infections is not evident. It is conceivable that a few of them may have been due to transfer of the organism from the patient's skin or from some other part of the patient's body—e.g., the respiratory, alimentary, and urinary tracts. It is unlikely that such transmission was common, in view of the following facts. Haemolytic streptococci were not isolated from throat swabs of 7 of the patients who acquired an infection of their burns with that organism (only 2 patients had a positive swab, and 3 were not swabbed). And these streptococci are rarely found on the skin or in the faeces of normal persons (Colebrook et al. 1935, Hare and Maxted 1935). Pyocyanus and proteus are still more rare in the throat and on the skin. Both may be found in pathological conditions in the bowel or in the urinary tract, but they are rarely found in normal persons. It seems very probable, therefore, that most of the added infections in our patients have arisen by transfer of infective material in some way from a source outside the patient.

We know that clouds of organisms, often including potential pathogens, are liberated whenever bedding is shaken, and therefore also during the routine process of bed-making (Bourdillon and Colebrook 1946, Willits and Hare 1941). In this connexion it should be

remembered that most hospital laundries do not attempt to sterilise blankets (Colebrook et al. 1945). A similar and often larger scatter of organisms into the air takes place whenever dressings are applied (Bourdillon and Colebrook 1946). Pathogens must also be introduced sometimes on the clothing of doctors, nurses, and visitors, especially when these are throat- or nose-carriers of streptococci (Willits and Hare 1941); and they are also carried by flies (Shooter and Waterworth 1944) and by drinking-utensils, bedpans, and thermometers, if these are not sterilised. The interchange of fluffy toys, or materials used for occupational therapy, constitutes another possible pathway for infection which is sometimes overlooked.

PREVENTION OF ADDED INFECTIONS IN THE WARDS

No single remedy is likely to secure a high degree of immunity from these infections. The following procedures have seemed to us of chief importance:

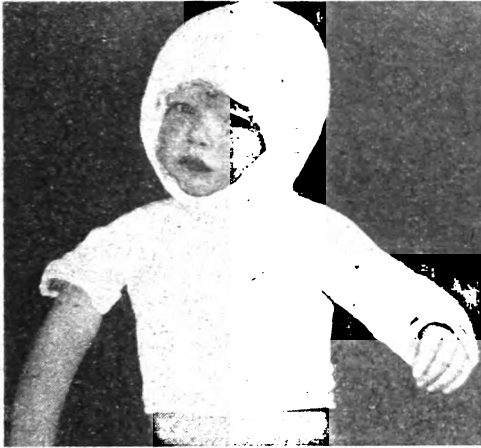
- (1) Maintenance of perfect cover.
- (2) Restraint of bacterial growth on the burnt surfaces, and rapid elimination of reservoirs of infection.
- (3) Rapid restoration of the epithelial covering by early and repeated grafting.
- (4) Anti-dust measures and elimination of flies.
- (5) Segregation of infected cases in cubicles.
- (6) Routine purification of the air of the wards.

(1) *Maintenance of Perfect Cover.*—The close connexion which has been shown between the incidence of added infection and the adequate covering of the burns makes it obvious that continuous attention to this detail is all important. Our practice has been to cover the whole of the burnt area with sterile gauze extending beyond the limit of the lesion and, over this in turn, to apply wool about $\frac{3}{4}$ –1 in. thick, extending well beyond the gauze, to avoid infection from without, like the wool plug of the bacteriologist's test-tube. The whole dressing is then secured with crêpe bandages, which again extend well beyond the wool. We emphasise the necessity for these bandages in dealing with burns dressed at infrequent intervals (5–10 days). Admittedly they are expensive, but not unduly so if they are washed and repeatedly resterilised. Economy in bandages can be easily offset by a longer stay in hospital.

Finally, to defeat the patient who is likely to jump about in bed and cause his bandages to work loose, we often fix the bandages with long strips of strapping carried on to the unburnt skin or, still more effectively, with a thin shell of plaster-of-paris over the crêpe bandages. This last procedure is, in our experience, the only answer to the exploring fingers possessed by so many children.

Some simple rules may be recommended for burns of particular situations:

- (a) For burns of the neck and shoulders (very common in young children and difficult to keep covered) the dressing should extend on to the head and over the chest. For children a plaster-of-paris shell is almost essential (see figure).
- (b) For burns of the arm, forearm, or leg, bandage from the phalanges to above the elbow or knee joint (with the joints in the correct position for function).
- (c) For burns of the trunk, bandage the whole trunk and both shoulders. If the burn extends down past the iliac crest, include the appropriate hip. A plaster-of-paris shell is often advisable.
- (d) For burns of the face, to avoid infection during the first few days before repair has started, and to prevent excessive exudation into the loose tissues, the dressing should cover the whole face except for small apertures giving access to the mouth and nostrils; and firm pressure should be applied over plenty of wool, particularly over the eyes and forehead. After two or three days the eyes may usually be uncovered. This applies only to severe burns of the face. Superficial flash burns can often be treated without dressings if a bacteriostatic cream is applied.



Thin plaster-of-paris shell over crêpe bandages to maintain perfect cover of burns of neck and shoulders in a child.

- (e) For burns of the buttocks (common in young children) it has been found helpful to elevate the legs with strapping extension on a gallows frame.

A complete antibacterial barrier having been obtained by these devices, daily careful examination of the bandages during the ward round is essential. Never was the proverb "A stitch in time saves nine" more apposite.

(2) *Restraint of Bacterial Growth on the Burn and Elimination of Reservoirs of Infection.*—Since it has been clearly demonstrated that sensitive organisms—e.g., hæmolytic streptococci—can be rapidly eliminated from superficial lesions, such as burns, with penicillin (Clark et al. 1943) and sulphanilamide (Colebrook and Francis 1941), there can be little doubt that these agents will also check the free outgrowth of many organisms which are somewhat less sensitive—e.g., staphylococci, diphtheroids, coliforms, and non-hæmolytic streptococci. We have therefore used as our routine dressing for the past three years a cream containing penicillin and sulphathiazole in a bland base (Clark et al. 1943); and results have been so satisfactory that we have seen no reason to change it. (The only reservation we make is that an occasional patient becomes hypersensitive to some ingredient in the cream, and for that reason it is undesirable to continue it for more than three or four weeks as a rule.)

After the first application of this routine cream the dressings are left undisturbed for 7–12 days; after subsequent dressings usually for 5–7 days. If on admission or at any subsequent dressing a wound is found to have acquired hæmolytic streptococci, a course of four or five applications of penicillin cream at two-day intervals is instituted. We attach great importance to this practice, since it eliminates reservoirs of hæmolytic streptococci. As the range of our chemotherapeutic attack is expanded to include organisms such as pyocyanous, proteus, and the coliform bacilli, it will no doubt become possible to reduce considerably the number of added infections.

(3) *Rapid Repair of Epithelial Skin Covering.*—It will always be difficult to keep large granulating surfaces free from added infections for many weeks, and the longer they are not covered with epithelium the more fibrous tissue will be formed beneath them, leading often to serious loss of function. For all these reasons grafting should be carried out as early as possible—sometimes during the first week. And if, as often happens, it does not succeed in completely covering the burnt area it should be repeated without delay. The practice of taking rather more skin than is required at the first grafting operation and storing the unused part in the refrigerator (Mathews 1945) for subsequent use is of the

greatest value. Repeated regrafting of unhealed areas with stored skin, or with small grafts obtained under local anæsthesia, should be a routine dressing procedure, not an operation requiring the use of an operating-theatre and an anæsthetist.

(4) *Anti-dust Measures and Elimination of Flies.*—Bed-making is responsible for a large part of the dust in the ward, and the sweeping of floors, if these are not oiled, for its repeated dissemination through the air. By the oiling of blankets after they are laundered (Harwood et al. 1944) and of floors (Andrewes et al. 1940) both these sources of air-borne contamination can be very much reduced. The ward floors in the burns unit have been oiled once in three weeks and, apart from their being a little slippery for a few hours, no inconvenience has been caused by it. The oiling of blankets has not proved difficult, except inasmuch as it involves one additional process for the laundry staff; nor has it required any new apparatus. The oil cannot be detected by touch or smell. No ill effects of its use have been detected, except perhaps some shrinkage of the blankets.

Even in temperate climates flies can be a nuisance in a burns ward during hot weather. There is bound to be a slight odour from the extensively burnt patient, who is only dressed once in 5–10 days, even if the burn remains uninfected. Occasional spraying with 5% D.D.T. in white spirit has been helpful but will not keep the ward entirely free from flies if their breeding-places—e.g., refuse bins—are not sought and systematically dealt with. A muslin canopy should be used over the whole bed of every extensively burnt patient during hot weather, for a single fly can carry infection to or from such a patient. The complete fly-proofing of wards by fitting fine-mesh gauze to windows and doors is hardly necessary in temperate climates, though one single-bed ward might well be so protected for the exceptionally severe burn which is bound to be somewhat smelly while sloughing.

(5) *Segregation of Infected Cases in Cubicles.*—Single-bed wards have not been available to us hitherto, but there is no doubt that they would reduce the risk of transfer of infection by dust. The ideal burns unit would have perhaps half its bed accommodation in single-bed wards—the rest in wards of 2–4 beds. The windows, doors, and fireplaces of cubicles should be so designed as to allow of being easily sealed off for sterilisation with formalin or other vapour.

(6) *Routine Purification of Air of Wards.*—The great scatter of microbe-carrying particles from bed-clothes and dressings (Bourdillon and Colebrook 1946, Hamburger et al. 1944, Willits and Hare 1941) is a fact which cannot be ignored in any attempt to control cross-infection in hospital wards. The peak load of bacteria in the air which accompanies bed-making or surgical dressings can certainly be reduced by dilution with outside air. Even in a large city the bacterial density of the outside air is much less than that of hospital wards (Colebrook 1946). But ventilation by windows is somewhat capricious and may lead to dissemination of dust besides dilution. Much more controlled and potentially effective ventilation is provided by a plenum system such as has been in use for forty years in the wards of the Royal Victoria Hospital, Belfast (Henman and Lea 1903).

Other procedures worthy of serious consideration in this connexion are the introduction of bactericidal mists—e.g., of triethylene glycol—and of lactic acid (Loveloek et al. 1944) after bed-making; or indirect ultraviolet radiation combined with convection currents, as used by Wells et al. (1942) and Wells (1943) in schools in America. The evidence of Puck et al. (1945) showed that, by combination of anti-dust measures with vaporisation of triethylene glycol, the concentration of streptococci in the air of wards housing patients with pharyngitis was greatly reduced. Further experience is required

regarding possible harmful effects of such bactericidal vapours on patients exposed to them at intervals over long periods.

Whatever methods are used, the frequent cleaning of the air of wards housing burnt patients must be regarded as a desirable goal. Sanatorium conditions would probably be ideal, both for avoiding infection and for healing.

COMMENT

The problem of controlling added infections of burns with *Staph. aureus* remains untouched. These infections, which are very numerous, may well play a prominent part in the slow healing of burns during the later stages of recovery, and also in the aetiology of the dermatitis which is apt to complicate these later stages. The elimination of added infections of this class is likely to present great difficulties in view of the prevalence of *Staph. aureus* in the air of hospital wards besides on the skin and in the nose of so many normal persons.

SUMMARY AND CONCLUSIONS

During a twelve months' period—involving more than 1400 dressings—cross-infection by hæmolytic streptococci, *Ps. pyocyanea*, and *B. proteus* introduced while dressing burns has been almost entirely eliminated by doing the dressings in a dust-free atmosphere, using a strict aseptic technique and adopting a penicillin-sulphathiazole cream as a routine application.

During the same period a few added infections by these three indicator organisms have occurred (33 in all), but the circumstances in all but one instance make it highly probable that the infections were acquired apart from the act of dressing the burn. Most of these added infections occurred in patients whose burns had been imperfectly covered for a period before they were re-dressed, and it seems likely that dust was the infecting agent in most cases.

The incidence of added infection in burns which were found to be imperfectly covered when they arrived for re-dressing was 10 times as high (8.6%) as that of the burns which had perfect cover throughout the period between dressings (0.8%).

Among the 224 patients admitted without streptococcal infection only 12 (5%) acquired this infection at any time during their stay in hospital; and the clinical effect of these few added infections was practically nil.

This investigation takes no account of added infections with *Staph. aureus*, which are numerous and possibly important in relation to slow healing.

Our thanks are due to Sister A. Magee, and the nurses who have worked with her, for their loyal coöperation; W. Cawston and A. Hood for most of the laborious bacteriological work; and Drs. S. D. Elliott and V. D. Allison, of the Central Public Health Laboratory, for invaluable help in typing streptococci.

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HYPERTENSIVE HEADACHE TREATED WITH POTASSIUM THIOCYANATE

P. J. W. MILLS
M.R.C.P.

PHYSICIAN, E.M.S. LISTER EMERGENCY HOSPITAL, HITCHIN

MANY drugs have been used in hypertensive disease, and nearly all have been abandoned as of little value in controlling either the course or the symptoms. Among them was potassium thiocyanate, which was first used in 1903 by Pauli, but, owing to its toxic effects, was abandoned without a careful study being made of its therapeutic and toxic doses, there being then no known method of estimating it quantitatively in the blood.

Potassium thiocyanate was again tried in America by Barker and others in 1936, and more recently by a few clinical observers in Great Britain. A simple method of estimating the level in the blood-stream has now been devised, so that toxic doses can more easily be avoided. When the blood-levels of the drug are carefully controlled it has been found to be a comparatively safe and valuable remedy for some of the symptoms of benign hypertension.

The mode of action and full range of usefulness of potassium thiocyanate have not yet been fully investigated. It is known to be a normal physiological constituent of the blood and saliva, and therefore one view is that it acts by replacement, the salivary thiocyanate being low in many cases of malignant hypertension. It seems most unlikely, however, that the aetiology of hypertension is so simple as this. Thiocyanate is also a vasodilator, but the symptomatic relief it gives does not correspond to any lowering of the blood-pressure that may occur.

The symptoms which respond most readily to this drug are headache and dizziness. In 27 cases of benign hypertension in which these symptoms were prominent, all the patients experienced striking relief within two weeks of the institution of treatment. The cases were selected with care, and as far as possible those in which there was an overlying functional element were not included, so that symptomatic relief could be more accurately assessed. In cases where different symptoms, such as noises in the head, insomnia, and mental changes, were more prominent the drug was not found to be of any great value beyond what might possibly be attributed to a functional response. In 8 such cases treatment did not bring any benefit. Other observers, however, have thought that some benefit was derived from this drug in all cases (D'Silva and Evans 1944).

The effect on the blood-pressure varied widely. The drug usually caused some lowering of both systolic and diastolic readings after one or two weeks' treatment, but this lowering of the pressure was not maintained, although symptoms continued to be relieved. There seems to be no definite relationship between the lowering of the pressure and the relief of symptoms (see accompanying table).

ILLUSTRATIVE CASE-RECORDS

CASE 1.—A housewife, aged 53, had severe headaches and giddiness daily for seven years, causing severe incapacity. She was sensible and coöperative, and there was no suggestion of a functional element. Blood-pressure (B.P.) was 230/110 mm. Hg, and there was considerable enlargement of the left ventricle. She had been treated for some years with regular doses of phenobarbitone without effect. Examination was otherwise normal. There was no evidence of malignant hypertension.

Since she had an invalid husband to look after it was impracticable for her to be admitted to hospital for a preliminary rest, and therefore she was given potassium thiocyanate as an outpatient and attended regularly for blood estimations. The blood-thiocyanate level was kept at 4-8 mg. per 100 c.cm. After two weeks her headaches were

greatly improved and the B.P. reduced to 218/102 mm. After a month's therapy her B.P. was 210/110 mm., but a month later it rose again, and two months later it was 240/110 mm. In spite of the return of the B.P. to slightly higher than its previous level, she was emphatic that her headaches were better than they had been for some years. Up to date, nine months since the beginning of treatment, the B.P. varies between 210/100 and 240/110 mm., but her symptomatic relief continues, and she still gets occasional but much less severe headaches. She also remarked that her feet, which had previously been very cold, were much warmer since therapy; no doubt this was due to the vasodilator action of the drug.

CASE 2.—A male caretaker, aged 52, had led an extremely sedentary existence for twenty years because of varicose veins and varicose ulcers. For the last ten years he had had severe headaches and dizziness, and before admission he had

EFFECTS OF POTASSIUM THIOCYANATE ON HYPERTENSIVE DISEASE

| Predominant symptoms | Cases | Effect on symptoms | | | | Effect on blood-pressure | | |
|--|-------|--------------------|-------------|----------------|-----------|--------------------------|---------------------|-----------|
| | | Complete relief | Much relief | Partial relief | No effect | Permanently reduced | Temporarily reduced | No effect |
| Headache and giddiness | 27 | 1 | 21 | 5 | 0 | 0 | 18 | 9 |
| Other symptoms—e.g., insomnia and tinnitus | 8 | 0 | 0 | 0 | 8 | 0 | 5 | 3 |

been at rest in bed at another hospital for over a month; but this had not relieved the headaches, and he was so giddy when he got up that he could only sit about the ward.

On examination he had benign hypertension, with a B.P. of 265/150 mm. Hg. He had considerable enlargement of the heart but no evidence of cardiac failure and no evidence of malignant hypertension.

After treatment with potassium thiocyanate to keep the blood-thiocyanate level at 6–8 mg. per 100 c.cm. there was great relief in the attacks of giddiness and in the headaches. This was striking to all observers, for the patient would now help in ward duties and could walk about without giddiness. After a month's treatment the B.P. was reduced to 198/134 mm. A month later, however, it had risen to 210/140 mm., but there was still considerable symptomatic relief. The patient has continued to obtain relief from symptoms over the past six months, although the B.P. has now risen to 230/140 mm.

COMMENTS

These 2 cases are exceptionally good examples of the value of potassium thiocyanate therapy, because in case 1 no period of rest accompanied or preceded the administration of the drug, and in case 2 the previous period of rest had been so extensive and without benefit that there seemed to be little doubt that the relief in symptoms was due to the thiocyanate. In the 25 other cases symptomatic relief continued so long as the optimal blood-level was maintained, but in all cases the fall in B.P. was only temporary.

The dosage was adjusted to keep the blood-thiocyanate level at 5–8 mg. per 100 c.cm. Rather higher levels, up to 15 mg. per 100 c.cm., have been used by other clinicians, but low levels are equally efficacious and safer. The optimal level varies enormously from patient to patient and can be found only by trial and error. The usual procedure was to give 0.2 g. in chloroform water thrice daily for three days, followed by once daily for the remainder of the week; at the end of the week the blood-thiocyanate level was estimated and the dose raised or lowered as seemed necessary. Some patients maintain a satisfactory blood-thiocyanate level on as small a dose as 0.2 g. thrice weekly. This plan has been found to be safer than starting with larger doses and being prepared to reduce them. Weekly estimations of the blood-thiocyanate levels are done for the first month. After this the dose necessary to keep the level correct

remains fairly constant, and less frequent blood estimations become necessary, provided there is no indication of any renal disease which may impair excretion.

No toxic symptoms of any sort were encountered in this series, beyond nausea and loss of appetite in one patient in whom the blood-thiocyanate level had risen to 16 mg. per 100 c.cm. and whose symptoms rapidly disappeared after reduction of the dosage. Serious toxic symptoms have, however, been reported (Wald et al. 1939, del Solar et al. 1945), including extreme lassitude, nausea, vomiting, muscular weakness, rashes, thyroid gland enlargement, coma, and death. In all these cases the blood-thiocyanate level had been high. For this reason it is not justifiable to use potassium thiocyanate unless safer measures have failed.

An objection to this form of therapy is that frequent blood examinations are necessary to ensure safety; but this also applies to many other drugs, such as thiouracil, which nevertheless have a place in therapeutics. The technique of blood-thiocyanate estimation is simple and once learnt can be carried out with ease and speed in any small laboratory. The principle is that of colour comparison with a standard of known concentration.

The technique (Ravin 1940) is as follows:

Reagents:

- (1) 20% aqueous trichloroacetic acid.
- (2) Acid ferric nitrate (5% ferric nitrate in 2.5% v/v nitric acid).

Colour Standards:

0.567 g. of potassium dichromate with 38.3 g. of cobaltous chloride hexahydrate is dissolved in 500 ml. of distilled water. This is stock, and corresponds to 20 mg. CNS ion per 100 ml. serum. Prepare standards by dilution from the stock, corresponding to 1 to 20 mg. CNS ion per 100 ml., and seal in comparator tubes.

Technique:

In a tube place 2 ml. of distilled water, 1 ml. of serum, and 1 ml. of trichloroacetic acid solution. Mix well, stand 10–15 min. and centrifuge or filter until clear. Place 2 ml. of the clear supernatant fluid in a comparator tube and add 0.4 ml. of acid ferric nitrate reagent. Mix well and compare with standards. If very high values are encountered, repeat with 0.5 or 0.25 ml. of serum.

The most exacting part is the preparation of the standard, but Lovibonds have now made a disk for their comparator, and this simplifies the technique and avoids error which might arise from the standard losing its colour.

In cases of malignant hypertension some relief has also been obtained where headache was a troublesome symptom before there was a rise in the blood-urea, but after this stage no benefit was derived from the drug. In one case with papilloedema, however, where the patient was nearly blind (to the extent of being unable to count fingers), there was considerable improvement of vision after thiocyanate treatment was started, but whether this was due to the drug is difficult to decide. The usual course of malignant hypertension, with terminal uræmia or cardiac failure, did not seem to be influenced in any way, but only 10 cases were treated.

CONCLUSION

It was with a somewhat sceptical attitude and some reluctance that I began to use potassium thiocyanate, owing to the many claims in the past for various drugs in the treatment of hypertension. An attempt has been made to define the true value of this drug, chiefly as regards its value in the relief of headache, and 27 cases of benign hypertension were treated in which headache and giddiness were prominent symptoms. Besides these, 8 cases of benign hypertension, presenting with symptoms other than headache and giddiness, and 10 cases of malignant hypertension were treated. The benign cases were selected and restricted to long-standing cases of hypertension with a history of symptoms for some years. Those in which a functional element was suspected were not chosen for treatment.

The conclusion reached is that this drug has a definite but very limited place in the treatment of hypertension and should be restricted to cases in which hypertensive

headache is a predominating and troublesome symptom and does not respond to simpler forms of therapy. In many such cases, however, the effects of potassium thiocyanate were very striking and gave great relief, and therefore the drug should not be withheld if its administration is practicable.

This drug does not affect the course of the disease; nor does it permanently lower the blood-pressure, even in cases in which there is much symptomatic improvement. Potassium thiocyanate should be regarded purely as a palliative, so it has a limited though definite place in therapeutics.

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STEVENS-JOHNSON SYNDROME

REPORT OF A CASE

MAURICE NELLEN

M.B. Cape Town, M.R.C.P., M.R.C.P.E.

JUNIOR LECTURER IN MEDICINE, BRITISH POSTGRADUATE MEDICAL SCHOOL, LONDON

In 1922 Stevens and Johnson in the U.S.A. called attention to a syndrome characterised by fever, a bullous skin rash, stomatitis, and ophthalmia. According to Rosenberg and Rosenberg (1940) the first cases were described in France by Alibert and Bazin in 1822. Other examples have been reported under the names "erythema exudativum multiforme bullosum with conjunctivitis and stomatitis," "erythema exudativum multiforme pluriorificialis," or "Stevens-Johnson syndrome," but the condition is so rare that few clinicians are familiar with it.

The following case was seen at the British Postgraduate Medical School in 1945.

A man, aged 20, was admitted on May 13, 1945, with severe malaise, sore throat, and vomiting. Four days before admission he had developed a productive cough and felt generally unwell. A day later he had started vomiting after food and lost his appetite. Two days before admission his eyes had felt gritty, especially in the morning, and he had been unable to open them owing to pain and discharge. The day before admission he had had pain on micturition. There was no previous history of any important illness.

His temperature was 103° F, pulse-rate 100/min., respirations 30/min. There was bilateral conjunctivitis, numerous small vessels running inwards from either canthus towards, but not reaching, the limbus. There were also some vesicles on the conjunctiva. The discharge from the conjunctiva was mucopurulent. The nares were ulcerated, and the upper lip was covered with pustules. On the inside of both cheeks there



Fig. 1.—Ten days after admission, showing crusted vesicles on an erythematous base.

were numerous discrete white patches, up to $\frac{1}{4}$ inch across, which could not be scraped off. There were also patches of white exudate on the tonsils. There was no urethral discharge. There were numerous rhonchi over both lungs. The liver was not enlarged and the spleen was not palpable.

Report on throat swab next day: "No hæmolytic streptococci, no *C. diphtheria*, no Vincent's organisms." The sputum culture grew *H. influenza*, *Strep. pneumoniae*, and neisseriæ. The blood-count showed red cells 4,500,000 per c.mm., Hb 94%, leucocytes 8000 per c.mm. (polymorphs 75%, lymphocytes 20%, monocytes 5%). Wassermann and Kahn reactions were negative.

Progress.—On May 15 a purulent urethral discharge developed. This grew no predominant organism on culture. Vesicles on an erythematous base were now appearing on the skin of both arms. The vesicles contained a pale fluid which was sterile on culture and free from cells. The vesicles were mostly on the dorsum of the arms (fig. 1).

On May 17 the same type of vesicle appeared on the thighs and legs, more on the extensor than on the flexor surfaces (fig. 2), and on the lower chest and abdomen. The vesicles varied in size and tended to crust early, the skin over them being dark.

The patient by now presented a florid picture; pus was pouring from the eyes and mouth (fig. 3) and from the urethra; the sputum was copious and purulent; the temperature ranged from 102° to 104° F, not responding to 'Sulphamezathine.' Pulse-rate 110/min., respirations 30/min.

On the 19th penicillin therapy was begun, 15,000 units being injected intramuscularly every three hours. The general condition improved, as judged by the temperature and the patient's subjective symptoms, but the lesions remained the same. The temperature now varied between 99° and 101° F.

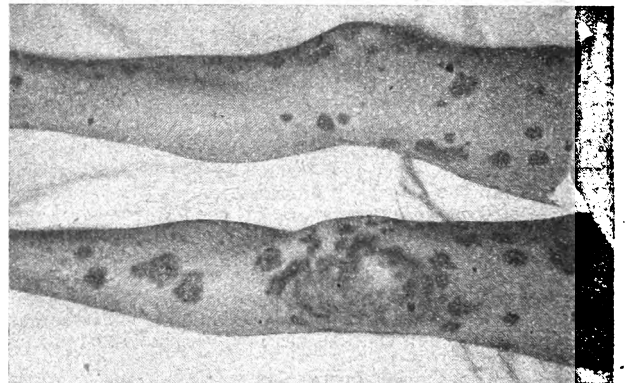


Fig. 2.—Ten days after admission, showing skin lesions on legs.

The eyes (figs. 4 and 5) were seen by Dr. P. M. Moffatt, who reported on the 24th that the skin of the upper lids presented scabs of subsiding vesicles; in the conjunctivæ were elongated greyish swellings (fig. 5) which appeared to contain turbid fluid; and there were some granular swellings in the upper quadrants of the bulbar conjunctivæ, possibly the remains of vesicles which had subsided. Subconjunctival ecchymoses surrounded the limbus of each eye. The palpebral conjunctivæ showed nothing more than congestion. There was some mucopus in the lower fornices. The corneæ were clear and the fundi normal. The patient had a feeling of soreness and grittiness in the eyes and discharge. He resented exposure to bright light during examination. Irrigations with boric acid lotion and eye-drops of 'Alucid' 10% every two hours were prescribed.

These swellings disappeared from the conjunctivæ by June 1, but there was still some congestion of the conjunctival blood-vessels, and traces of the ecchymoses could be seen. The watering and discharge were much less. The condition cleared by June 15, except for some slight injection of the conjunctival blood-vessels.

On May 28 the patient developed slight consolidation at the base of the right lung, with a pleuritic rub. There was a severe cough, with much watery and viscid sputum, which clung to the gums and teeth.

The throat swab at this time grew a heavy growth of *Staph. aureus*. A biopsy specimen of one of the vesicular lesions on the arm showed "slight vascular engorgement of the corium and a little œdema of the malpighian cells."



Fig. 3—Lesion on eyes, nares, and mouth.

Blood-culture was sterile.

The temperature came down to normal on June 1 and remained normal (fig. 6). The eyes were now clear, but the mucosa of the mouth was still inflamed and purulent, and the patient salivated excessively. The urethritis was still severe but improving. The skin of the penis and part of the scrotum were excoriated.

The patient's general condition was now rapidly improving, and the lesions were gradually receding. By June 3 the skin lesions were only brown

discoloured patches. There was no scarring. The lung signs had lasted only two days. The patient was now eating voraciously.

On the 13th the mouth was clear, and the urethral discharge had disappeared. The prepuce, however, was densely adherent to the glans penis and could not be retracted; circumcision was therefore performed. On the 21st the patient was allowed up, and two weeks later he was discharged well.

DISCUSSION

Very few cases of this syndrome occur in females. The age-incidence seems to be between 22 months and 19 years. Of 9 reported cases collected by Ageloff (1940) only 2 escaped total blindness, and these remained partially blind. The ocular lesions include corneal ulceration with scar formation; bilateral suppurative keratitis with perforation, leading to phthisis bulbi and total blindness; chemosis, subconjunctival hæmorrhage, iridocyclitis, and hazy corneas, with vision limited to partial perception of light; and pseudo-

membranous conjunctivitis, with corneal involvement and symblepharon.

The condition in the mouth varies from simple stomatitis and gingivitis to a severe pseudomembranous inflammatory process, with great swelling of the mucosa, tongue, lips, palate, and cheek, causing much pain in swallowing. Healing is usually complete.

The cutaneous lesions have been described as maculopapular, occasionally vesicular and bullous. These resolve as a rule with crusting and scaling, occasionally leaving brown and pigmented areas which finally disappear. The average time for resolution of the skin lesions appears to be 18-21 days.

The ætiology must be regarded as unknown. Chick and Witzberger (1938) described a case accompanied by Vincent's infection of the mouth and suggested Vincent's organisms as an ætiological agent, but this view has not been substantiated by other workers. Sutton and Sutton (1939) believe that the most likely explanation of the condition is allergic sensitisation. Biopsy in our cases and in others (Ageloff 1940, Edgar and Syverton 1938) have revealed only a non-specific inflammation of the skin. Erythema exudativum multiforme, as first described by Hebra (1866), is characterised by a maculopapular

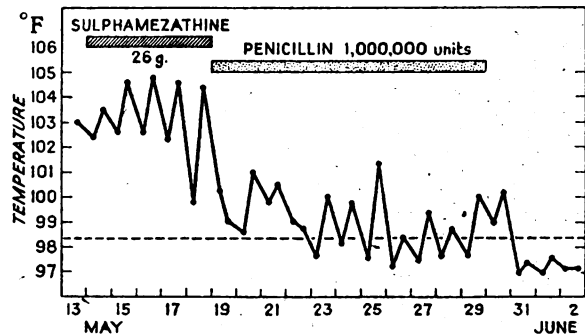


Fig. 6—Temperature chart.

or vesicular eruption on the face, neck, and extensor surfaces of the hands, forearms, and legs. Hebra, however, emphasised the absence of constitutional symptoms and the presence of only mild, if any, oral or ocular involvement. Nevertheless Stevens-Johnson disease may be a severe or atypical form of this condition.

The present case is very similar in many features to the disease seen in two men, aged 19, by Kove (1945). One of his cases was treated with sulphadiazine, with complete recovery. The second was desperately ill and had both sulphadiazine and penicillin. After three months' stay in hospital complete recovery resulted, except for mild chronic conjunctivitis and bilateral ocular synechiæ. In neither of his cases were the lungs affected. In our case there was undoubtedly a transitory pulmonary consolidation, confirmed radiologically, though the sputum did not become more profuse with the onset of the pneumonic lesion, and the flora did not change.

SUMMARY

A case of fever, associated with severe constitutional symptoms and eruptions affecting the skin and mucosa (stomatitis, conjunctivitis, and urethritis), is described.

I wish to thank Mr. E. V. Willmott, A.R.P.S., for the photographs.

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5

Figs. 4 and 5—Eye lesion twelve days after admission.

STEVENS-JOHNSON SYNDROME

REPORT OF TWO CASES

J. O. MURRAY

M.D. Edin., D.P.H.

MEDICAL OFFICER OF HEALTH, CITY OF ROCHESTER

EARLY in 1945 a patient was admitted to St. William's Infectious Diseases Hospital, Rochester, with an unusual eruption which was not typical of any common exanthem or any well-known skin disease. Just over a year later another patient with a similar skin condition was admitted to the same hospital. There was no connexion between these two patients, and on neither occasion were any further cases observed among contacts or persons residing near them.

CASE 1.—A boy, aged 16 years, a clerk, with a previous history of measles, whooping-cough, mumps, and chickenpox in early childhood, had been playing rugby football on Feb. 10, 1945, when he received a kick which split his lower lip and adjoining skin; no sutures were inserted. The injury caused him some local discomfort, but he felt well enough to continue work until the 23rd, when he became feverish, with headache, sore eyes and mouth, and diffuse pains in the limbs. He went to bed and later in the day noted spots on his thighs and arms. During the next two days similar spots appeared on the lower abdomen and shoulders. He was admitted to hospital on the 26th, up to which time he had not taken any drugs.

On admission: He was well nourished, mentally alert, and complained of discomfort in mouth and eyes only. No abnormalities were found in his cardiovascular, respiratory, nervous, lymphatic, or genito-urinary systems; temperature 97° F, pulse-rate 84, respirations 20 per min.

Mouth: There was a black scab at and adjoining the site of his lip injury. The pharynx was slightly inflamed. Lips were fissured and encrusted with blood and bled easily. There were irregular patches of greyish membrane on the buccal mucosa, tongue, and gums. Some patches were black from extravasated blood, and where the membrane was sloughing there were superficial red ulcerated areas on the tongue. The membrane was about 2 mm. thick. He could eat only with great discomfort but took fluids freely.

Eyes: The eyelids were slightly swollen, and the palpebral and bulbar conjunctivæ were injected; there was a slight purulent discharge from both palpebral fissures.

Skin: The rash was centrifugal in distribution and mainly symmetrical but did not favour extensor surfaces; it was profuse on hands, feet, legs, and forearms, and was well marked on thighs and buttocks. Except near the symphysis pubis, the trunk was free, as were the face and scalp. The skin lesions were painless and free from irritation.

The eruption consisted of macules and papules, most being about 0.5 cm. in diameter, though a few were over 1 cm. in diameter. They were oval or circular and superficial. The intervening skin was unaffected. The papules were slightly raised and surrounded by small irregular erythematous areolæ. There was no vesiculation or pustulation. The papules were matt red, some having a purplish or violet tinge.

Temperature, pulse-rate, and respiration were normal throughout his stay in hospital, and there were no toxic manifestations. Mouth discomfort was the worst feature. There was no diarrhoea or vomiting.

Treatment consisted of eye douches of boric-acid solution, frequent alkaline antiseptic mouth-washes, and swabbing: sulphapyridine was given for four days after admission.

Progress: The eye lesions had cleared by three days after admission (7th day of illness), and there was evidence of improvement in the stomatitis after four days' treatment, the mouth becoming free from membrane by the 16th day of illness, by which time epithelisation was well established, though there was some residual cheilosis.

The macules noted on admission chiefly on forearms and hands had become papular within a few days. There was no vesiculation at any time, though some papules eventually showed a whitish dry desquamative centre. By the end of a week (11th day of illness) all the papules were receding, becoming flat and hard before dropping off. They had disappeared completely by the 21st day of illness, the last to disappear being on the palms. Irregular circular pigmented

areas, reddish-brown or faintly violet in tinge, remained to mark the sites of the lesions. On the palms this staining persisted for 8 weeks from the onset of illness.

CASE 2.—A cabin boy, aged 15 years, was admitted to hospital for observation as a smallpox suspect on March 11, 1946. He had had coryza, with some circumoral herpes, for several days but was not off work and did not feel ill.

On the 6th his mouth and tongue had become sore, and next day he had had headache, giddiness, shivering, and diffuse pains in the limbs (but no backache), and his eyes had begun to smart and water. He took to his bed, and on the 9th spots appeared, first noted round both ankles. Later in the day they were seen on the legs, but the rash did not appear on the arms until the evening.

He noted fresh spots on the legs, forearms, hands, and scrotum on the 10th. After this date no other spots appeared.

His only previous illness was diphtheria in 1940. There was no evidence of successful vaccination.

On admission: A thin youth with delayed development of the secondary sex characteristics. Though below average intelligence, he was alert and coöperative during examination. There was no toxæmia. Temperature 98.4° F; pulse-rate

84; respirations 22 per min. No abnormalities were found apart from mouth, eye, and skin lesions.

Mouth: The lining mucosa of his lips and mouth were swollen. Lips and gums were bleeding slightly; black blood was encrusted on the fissured lips (fig. 1). On the gums, buccal mucosa, and tongue were large patches of greyish membrane 2-3 mm. thick; one vesicle containing clear fluid was noted on the palate. In some areas the membrane was sloughing, leaving raw superficial bleeding areas. The swelling of the mouth and tongue, and the discomfort of the patient, prevented a clear view of the fauces, which, so far as could be seen, were not involved. Breath was very offensive, the odour resembling that of diphtheria.

Eyes: The eyelids were swollen and the conjunctivæ cedematous and injected. There was a profuse purulent discharge from both eyes. Culture of pus gave a growth of *Staph. pyogenes*. There was no corneal involvement.

Skin: A profuse papular and vesicular rash involved all areas except the face, scalp, and trunk, which were quite free (figs. 1 and 2). Two papules were present on the scrotum. The rash was most profuse on the hands. There was no preference for extensor surfaces.

In appearance the rash at first was similar to that in case 1 but later differed in that many, but not all, of the papules became vesicular, without, however, showing either loculation or umbilication. The vesicular fluid was faintly turbid. The papules ruptured from one to three days after their appearance.

The fluid from a vesicle was examined by Prof. A. W. Downie, of Liverpool, for variola-vaccinia antigen and proved negative. A differential blood-count on the 20th showed polymorphonuclear neutrophils 47%, eosinophils 2%, basophils 1%, monocytes 6%, lymphocytes 44%. No abnormal cells were seen.

Treatment: The eyes were frequently douched with boric-acid solution, and 'Collosol argentum' was instilled thrice daily. The mouth was treated with antiseptic mouth-washes and swabbing. Penicillin cream was applied to the mouth and skin lesions. No internal treatment was given.

Progress: On the 3rd day after admission (9th day of illness) the papules were beginning to shrink, vesicles had ruptured and some were beginning to dry, but at this stage the mouth showed little improvement. The eyes were free from swelling, injection, and discharge by the 11th day of illness. By this time there was a definite improvement in the stomatitis, and improvement continued uninterrupted

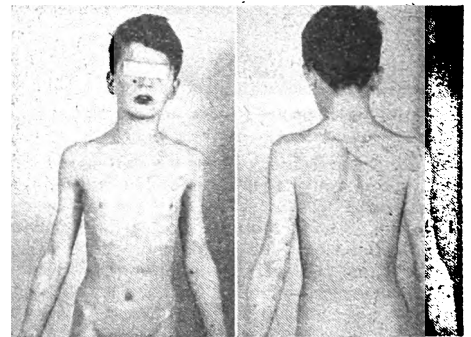


Fig. 1—Case 2, showing absence of rash from trunk.

until complete resolution on the 19th day of illness. The papules had scaled off and the vesicles had dried by the 14th day of illness. Red or brown stains remained at the sites of the papulovesicular lesions, but there was neither pitting nor induration. The last areas to clear were the hands and feet.

DIFFERENTIAL DIAGNOSIS

In both patients the rash might have been mistaken for erythema multiforme, but the character and distribution of the lesions, the absence of burning and tingling, the formation of vesicles in the mouth, and the severity of the illness were against such a diagnosis.

The absence of the usual prodromata and backache, the distribution and character of the papules, their failure to mature, and the appearance of fresh spots over a period of some days excluded smallpox.

The bullæ in the mouth suggested pemphigus, but the development of the skin vesicles on existing papules and not on normal skin, the absence of raw areas on rupture of the skin vesicles, and the course of the illness were against it.

The possibility of a drug rash was considered, but in neither patient did the character of the exanthem or enanthem or the history support this diagnosis.

COMMENTS

The clinical picture presented by these cases appears to have been described in America by Stevens and Johnson (1922). I have been unable to find any reference to its occurrence in England, apart from a brief communication by Dowling (1940), who reports having seen, during the winter of 1939-40, six cases which resemble the two recorded here. He mentioned pemphigus, erythema multiforme, and smallpox in the differential diagnosis of his cases, but concluded that they were a reaction to a specific infection, probably streptococcal.

Though both my cases had stomatitis, conjunctivitis, and rash, apparently this triad may not always be present. In one of Dowling's patients mouth, penis, and scrotum were alone attacked, but in all six of his cases the genitalia were involved.

Kove (1945), who reviewed the American reports and described further cases, expresses the opinion that the enanthem rather than the exanthem is the most constant feature of the Stevens-Johnson syndrome. He records a case where the rash was limited to a superficial area of erythema with crusting in the urethral orifice and mentions that the rash may be macular, papular, or vesicular, and that it varies in severity in individual cases. In some of his own cases the vesicles on the hands became confluent and increased in size to several square centimetres, the desquamation of such vesicles not being complete until the 31st day. Stevens and Johnson (1922) state that new skin lesions may appear up to the 18th day of illness.

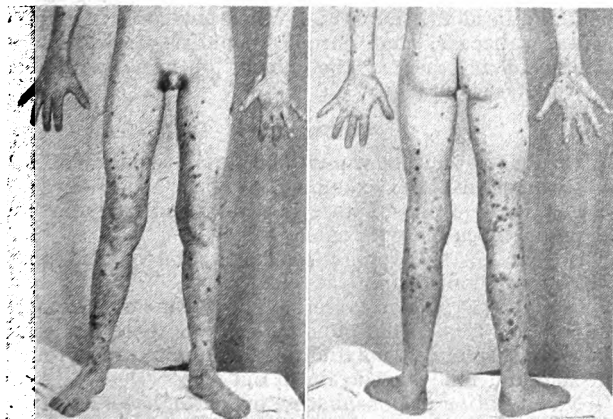


Fig. 2—Case 2, showing distribution of rash on limbs.

Stomatitis appears to be a constant feature of the syndrome and may be severe enough to make swallowing difficult and to necessitate intravenous infusions. According to Kove (1945) the sloughing of membranous exudation in the mouth may continue up to the 36th day.

The involvement of the eye may be serious. In two cases described by Stevens and Johnson (1922) there resulted blindness in one and impaired vision in the other.

The patients may be acutely ill. Temperature of 106° F, with profound prostration and toxæmia on the 2nd day of illness, has been recorded (Kove 1945). Fever may persist for some weeks (Stevens and Johnson 1922, Kove 1945) or may be of short duration, as in the two cases recorded here (4-6 days).

This syndrome may be preceded by or coincident with other conditions. In both my cases there was an antecedent lesion of the lips: circumoral herpes in one case, and an infected laceration in the other. One case recorded by Kove (1945) was preceded by mumps, the patient being in hospital five days before fever, stomatitis, and conjunctivitis developed. Cases associated with Vincent's angina (Chick and Witzberger 1938) and complicated by a bronchopneumonia or otitis media (Kove 1945) have been described.

Either a leucopenia or a mild leucocytosis may be present, but there are no characteristic laboratory findings (Kove 1945). A very comprehensive laboratory investigation was made in one case by Edgar and Syverton (cited by Kove 1945), who failed to recover a transmissible agent from vesicular fluid by animal inoculation.

I wish to thank Dr. E. T. Conybeare, of the Ministry of Health, for his interest in these cases and for drawing my attention to the published work; and Prof. A. W. Downie and Dr. E. R. Jones, Kent County pathologist, for the laboratory investigations.

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URINARY EXCRETION OF PHOSPHATASES IN MAN

A. S. V. BURGEN
M.B. Lond., M.R.C.P.

From the Department of Pharmacology, Middlesex Hospital
Medical School

VARIOUS methods have been used to estimate urinary phosphatase. Demuth (1925), Dmochowski (1933), Kutscher and Wolbergs (1935a and b), and Kutscher and Wörner (1936) all estimated the phosphate liberated from various ester phosphates. The fact that there are in urine relatively large amounts of inorganic phosphate which cannot be removed without loss of phosphatase reduces the accuracy of this method. Rabaté and Courtois (1941) estimated the glycerol liberated from sodium glycerophosphate with periodic acid and iodine titration, but the method is insensitive, and glycerophosphate is a poor substrate for acid phosphatase. The method of King and Armstrong (1934) could not be used directly, because the Folin-Ciocolteu reagent for phenol reacts strongly with uric acid, and the precipitation of uric acid by silver lactate (Folin and Denis 1915) is tedious and time-consuming; Scott and Huggins (1942), however, removed the chromogenic substances by twelve hours' dialysis and then used the King-Armstrong method.

The method we finally adopted was to use monophenyl phosphate substrates and to estimate the liberated phenol by the very sensitive diazo method of Theis and Benedict (1924), which is unaffected by uric acid. The urinary phenols do not interfere with the estimation except in very concentrated urines, which should be diluted before

estimation. Phenolic drugs, especially salicylates and sulphonamides, interfere with the reaction. In all cases 24-hour specimens of urine were used for the estimation.

METHODS

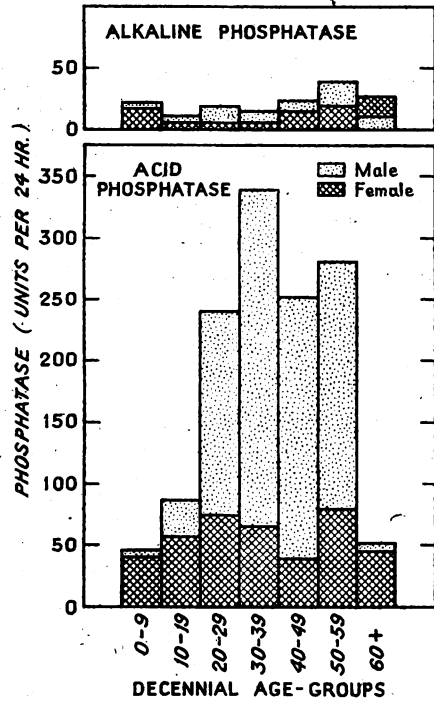
Preparation of Alkaline Substrate, pH 9.4.—Dissolve 10.3 g. of sodium barbitone and 1.09 g. of disodium phenyl phosphate in 1 litre of water.

Preparation of Acid Substrate, pH 4.9.—Dissolve 18.91 g. of citric acid in 180 c.c.m. of normal NaOH, dilute to about 500 c.c.m. with water, then add 100 c.c.m. of N/10 HCl and 1.09 g. of disodium phenyl phosphate, and make up to 1 litre with water.

Add a few drops of chloroform as a preservative and keep in the refrigerator.

Phosphatase Determination.

(1) In two test-tubes put 10 c.c.m. of substrate, and place the tubes in a water-bath at 37.5° C. After five minutes add 0.5 c.c.m. of urine which has been diluted with an equal volume of water, and mix. After exactly thirty minutes add 2 c.c.m. of protein precipitant (one part of 10% sodium tungstate, one part of 3/8N H₂SO₄, and eight parts of distilled water), mix by inverting several times, and remove from the water-bath. If



Daily output of phosphatase in King-Armstrong units in decennial age-groups.

the solution becomes cloudy, allow it to flocculate for five minutes, then centrifuge, and remove 10 c.c.m. of the supernatant fluid; otherwise transfer 10 c.c.m. of the solution to a clean tube and add 1 c.c.m. of 1% gum acacia, 1 c.c.m. of 50% sodium acetate, and 1 c.c.m. of phenol reagent (1.5 g. of p-nitroaniline dissolved in 40 c.c.m. of conc. HCl and diluted to 500 c.c.m.); take 25 c.c.m., cool in iced water, add 0.75 c.c.m. of 10% sodium nitrite, and mix; this reagent keeps for twenty-four hours). Mix and allow to stand for a minute, then add 2 c.c.m. of 20% Na₂CO₃.

(2) An unincubated control is prepared by adding protein precipitant to a mixture of substrate and urine without preliminary incubation. Then proceed as above.

(3) A blank, prepared by using 10 c.c.m. of water instead of the incubated substrate, gives a pale yellow colour.

(4) A standard is prepared by taking 0.5 c.c.m. of standardised (10 mg. per 100 c.c.m.) phenol (King and Armstrong 1934), which is equivalent to 25 units of phosphatase per 100 c.c.m. of urine and gives an orange-red colour.

The colour was estimated in a Millikan photo-electric colorimeter, using a micro 3 green filter and setting to zero with the blank.

RESULTS

The results of the estimations in 50 males and 25 females out of an ordinary hospital population without genito-urinary disease are shown in the accompanying figure. The acid-phosphatase output in females is about the same for all ages, at a mean level of 50-60 King-Armstrong units per twenty-four hours. In males, however, a remarkable rise in the excretion begins in the second decade, reaches a maximum of 300-400 units in the fourth decade, and then falls away abruptly after the

sixth decade, until it is almost equal to the female level again. There was considerable intra-group variation, but the differences between males and females in age-groups 20-59 years were highly significant (P=0.01-0.001 by Fisher's "t" method). The alkaline-phosphatase excretion is scanty and highly irregular and shows no significant variation with age or sex.

The source of the urinary phosphatase has been the cause of speculation since Demuth (1925) surveyed organ and secretion phosphatases. Kutscher and Wolbergs (1935a) found a diurnal variation in the urine acid phosphatase which was maximal in the early morning and after lunch. These results were confirmed by Courtois and Biget (1943), who found a similar acid phosphatase in men after cystotomy and ablation of the prostate; their figures, however, were not significant quantitatively. Wolbergs (1936) found that the urine of adult women contained about a quarter of the phosphatase activity of the urine of adult men. Waldschmidt-Leitz and Nonnenburg (1935) suggested that the acid phosphatase was derived from the red blood cells, but King et al. (1945) showed that packed red cells contained 200-400 units of acid phosphatase per 100 c.c.m., an amount sufficient to explain all the female output on the accepted rate of haemolysis of the red blood cells but inadequate to explain most of the male output. Gutman and Gutman (1938, 1941) and Gutman (1942) have shown a rise in the acid-phosphatase content of the prostate from a few units per g. before puberty up to 250-1150 units per g. in the adult, and that prostatic fluid contains large amounts of the enzyme.

The great rise of acid phosphatase in the urine in the reproductive period of males points to most of the "excess" male over female output being derived from the prostate. Scott and Huggins (1942) found similar changes in the acid-phosphatase content of the urine and showed that the first part of the urine passed by males, which is known to have a greater prostatic admixture, contained more phosphatase than later samples. But 24-hour specimens which we collected from suprapubic cystotomy in 3 men gave values of 104, 140, and 223 units per day. These values, considering that the men's ages were 68, 66, and 55 years, are within the range for urethral urine at the same ages, suggesting that the urinary acid phosphatase is at least in part being excreted through the kidney and not directly into the urethra.

In disease of the prostate no significant difference in the output of acid phosphatase has been noted, either in benign hypertrophy or in carcinoma. Breedis et al. (1943) showed that there was a considerable decrease in the alkaline phosphatase in the kidney and an increased alkaline-phosphatase output in the urine of rats poisoned with uranium. Wilmer (1944) showed a similar decrease in the kidney alkaline phosphatase in human nephritis. In view of these findings it was thought that an increase in the alkaline-phosphatase output in the urine might be found in human nephritis. In a few cases of human acute, subacute, and chronic nephritis, however, no significant increase in the output of urinary alkaline phosphatase was found.

SUMMARY

The daily excretion of phosphatases in the urine of men and women has been examined.

The alkaline phosphatase is scanty and irregular and shows no variation with age or sex.

In females the average daily excretion of acid phosphatase is about 50 units at all ages.

In males the level of excretion is the same as in females in childhood, but from puberty onwards there is a sharp increase, reaching a maximum of 350 units in the fourth decade and falling off again in old age.

No alteration in phosphatase excretion has been found in disease of the prostate or in nephritis.

I wish to thank Prof. Samson Wright and Dr. D. Slome for much help and encouragement. The expenses of this research were partially defrayed by a grant from the Medical Research Council to Prof. Samson Wright.

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Preliminary Communication

ACTIVITY OF PENICILLIN ESTERS

AMONG the various procedures for prolonging the time during which penicillin remains in the blood-stream at a therapeutic level, with an accompanying reduction in the rate of urinary excretion, the use of water-insoluble penicillin esters has been suggested. I have made a detailed study of the methyl and benzyl esters of "pure" penicillin, having an activity of 1500 i.u./mg. The details of this work will be published elsewhere in full¹; meanwhile the general conclusions may be of interest to penicillin users.

I find that some species of animals, including mice, rats, and guineapigs, have in their sera an esterase that hydrolyses the methyl and benzyl esters of penicillin in 10 minutes. This enzyme, or complex of enzymes, is absent from the sera of rabbits and man. When the esters are injected into the rabbit or man no therapeutic effect is exerted. No penicillin can be detected circulating in the blood of rabbits or men during periods between 1 and 48 hours after injection. Furthermore, it appears that the ester, though it exerts no antibacterial effect, is destroyed in the body, for it cannot be found in the blood or urine of rabbits and men after injection. On the other hand, the enzymatic hydrolysis of these esters in mice, rats, and guineapigs, with the resulting liberation of penicillin, confers on them an antibacterial action of the same order as that of corresponding quantities of the free antibiotic.

These conclusions have consequences both in applied therapeutics and in laboratory technique. It is clear that the esters cannot have any value as compounds for prolonging the penicillin effect when injected into man, because, not being hydrolysed, they have no antibacterial effect at all. On the other hand, the existence of a penicillin esterase in the sera of mice, rats, and guineapigs makes these sera, particularly those of guineapigs, useful agents for investigating the effect of the esters in various species of animals. Incubation at 37° C with guineapig serum, for example, causes liberation from the methyl and benzyl esters of free penicillin, which can then be estimated in the usual manner. This method gives a convenient and quick method of detecting penicillin esters in different organs and body fluids, and should also prove useful in testing therapeutic agents.

Glaxo Laboratories Ltd., Greenford, Middlesex. J. UNGAR.

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Medical Societies

ASSOCIATION OF CLINICAL PATHOLOGISTS

THE association's annual meeting was held in London on Jan. 24 and 25, under the chairmanship of Dr. J. G. GREENFIELD.

The Interpretation of Blood-sugar Levels in Children

was discussed by Dr. J. L. EMERY, who showed cases of celiac disease with clinical hypoglycæmia despite normal fasting blood-sugar levels. The pallor and sweating are relieved by glucose without a rise in the blood-sugar, and adrenaline also relieves the symptoms. Clinical manifestations should be recognised as real evidence of hypoglycæmia irrespective of the blood-sugar content, especially since symptoms may occur, even with a rising blood-sugar, following administration of insulin.

Dr. N. F. MACLAGAN described a modification of the Lange colloidal gold curve using buffered solutions. The advantages of buffered solutions are that they are more exactly reproduced and give more dependable results, because they are unaffected by traces of acid and alkali and because false positives are less common. The standard ten tubes are unnecessary since it is only the precipitation in the lower dilutions which indicates globulin increase.

Dr. B. E. TOMLINSON, speaking on the chronic appendix, said that there was no appreciable difference between the appendices in 100 surgical cases and those in 100 bodies following sudden death. In the surgical cases, however, localised inflammatory changes were seen in the internal muscle layer; these suggested a retrogressing lesion. Local areas of fibrosis and local collections of eosinophils were demonstrated in the muscle coats; but as far as the mucosa was concerned eosinophil counts were often higher in the controls than in the surgically removed appendices. He concluded with a plea for more exact pathological appraisal of the surgically removed appendix.

Dr. J. T. DUNCAN described the widespread lesions which may be found in *torula meningitis*. Infection, he suggested, usually takes place via the tonsil or by trauma of the skin, and the organism, *Cryptococcus neoformans*, has a predilection for the central nervous system and the lungs. It is hard to recognise this organism unless it is properly stained, preferably by mucicarmine. There are probably more cases of *torula meningitis* than is appreciated, for with a careful look-out they are identified fairly often.

Dr. V. D. ALLISON and Miss B. HOBBS discussed the epidemiology of *pemphigus neonatorum* from observation of 200 cases seen in one large and two small epidemics, using serological typing of *Staphylococcus pyogenes*. This showed that the sources of infection are the upper respiratory tract and skin of carriers. Carriers are commoner among nurses than the general public; and one series of cases originated from a carrier whose task it was to fold clean napkins in a laundry. It is important not to incriminate an attendant until it has been proved that the serological type found in her agrees with that causing the epidemic. It may be worth applying penicillin to the anterior nares of chronic tonsil carriers.

Dr. J. G. GREENFIELD, reviewing the causes of cerebral abscess, emphasised the importance, in the differentiation from meningitis, of estimating the sugar in the cerebrospinal fluid; this is early reduced with meningitis, while with abscess it usually remains normal until meningitis supervenes. Usually the cerebrospinal fluid is clear; the cell-count in his cases varied from 4 to 800 per c.mm., with lymphocytes predominating; and protein varied from 10 to 200 mg. per 100 ml. The organisms were very variable: of 45 cases, 15 were due to staphylococcus, 10 to anaerobic streptococcus, 10 to fusiform bacillus,

6 to pneumococcus, and 6 to proteus. The prognosis is best with pneumococcal and streptococcal infections.

Dr. C. E. DUKES, speaking on the *hereditary factor in polyposis of the intestine*, described families in which the disease was transmitted as a dominant character; the gene can be carried by male or female.

Dr. S. C. DYKE showed that in the *treatment of refractory anæmia with folic acid* there may be a double rise in reticulocytes. In pernicious anæmia and in refractory anæmias expected reticulocyte and red-blood cell levels are always reached. In 2 cases of pernicious anæmia with previous histamine-fast achlorhydria the acid returned in the gastric secretion after treatment with folic acid.

In a discussion on the *laboratory applications of the Rhesus factor* a general plea was made for the adoption of Fisher's nomenclature. It was considered that every prospective mother should be Rh-grouped, and that difficult cases should be referred to the laboratories at the Lister Institute.

Reviews of Books

A third edition has appeared of *CLINICAL PRACTICE IN INFECTIOUS DISEASES* (Edinburgh: E. & S. Livingstone, pp. 679, 22s. 6d.) by Dr. E. H. R. Harries and Dr. Maurice Mitman. After publication of the second edition in 1943, a fire at the printers destroyed the blocks, and made reprinting impossible. The book has therefore been completely revised, and contains a new chapter on the pneumonias, and short sections on the common cold, febrile herpes, epidemic nausea and vomiting, epidemic myalgia, and infective polyneuritis. The account of penicillin has been expanded, and a note added on streptomycin. Social conditions are discussed in relation to epidemiology, and more space has been given to "influenzal" meningitis, food-poisoning, homologous serum jaundice, typhus, virus diseases of the nervous system (which includes a critical review of the Kenny method of treating poliomyelitis), mass chemoprophylaxis, and many other subjects of recent and growing interest. This valuable work is thus larger by some 100 pages than in its last edition.

Dr. Wilfrid Sheldon's *DISEASES OF INFANCY AND CHILDHOOD* (5th ed., London: J. & A. Churchill, pp. 775, 30s.) bids fair to become as popular as Still's. The advent of penicillin is the outstanding new development since the last edition, and its use is well described in a brief appendix. The sections on tuberculosis, coeliac disease, and poliomyelitis have been revised, and growing interest in the newborn period is reflected in the text.

ACIDOSIS (London: W. Heinemann, pp. 225, 18s.) is written by Dr. Esben Kirk, chief physician to the medical service of Holstebro District Hospital, Denmark, and was first published in 1942 to convince his colleagues of the importance of treating acidosis with isotonic sodium bicarbonate solution. His specialised approach to the problem detracts from the value of his otherwise interesting survey of a perplexing problem; and few British clinicians will agree with his emphasis on isotonic sodium bicarbonate in the treatment of diabetic coma.

By recording belief as fact and omitting pros and cons, Prof. Rolland J. Main, F.H.D., of the Medical College of Virginia, has usefully summarised the salient facts of human physiology. His *SYNOPSIS OF PHYSIOLOGY* (London: H. Kimpton, pp. 341, 18s.) is intended to serve as a quick reference book for students already acquainted with their subject. It gives plenty of numerical data, supplemented with useful tables and few but graphic diagrams. While unsuitable for either the advanced student or the beginner, it is satisfactory for its own purpose.

Dr. F. M. R. Walshe, F.R.S., writes in the preface to the 5th edition of his *DISEASES OF THE NERVOUS SYSTEM* (Edinburgh: E. & S. Livingstone, pp. 351, 16s.) that he has made such minor additions as the advance of knowledge, the flux of opinion, and the suggestions of correspondents make expedient. The student will again find the principles of neurological diagnosis and the common diseases of the nervous system well described; but the psychoneuroses are still given only 23 pages. It might be better to omit this section from a textbook in which it is hardly at home.

Nineteen new coloured photographs appear in the 3rd edition of Dr. Henry Semon's unique *ATLAS OF THE COMMONER SKIN DISEASES* (Bristol: J. Wright, pp. 343, 50s.), but unfortunately some of them are below the original high standard, the colour-values being erratic, or blurred. The text is terse and highly informative. It is noteworthy that Dr. Semon roundly condemns the local use of sulphonamides in skin diseases.

Prof. Maurice Loeper is professor of clinical medicine to the Faculté de Médecine of Paris. His collection of essays (*HÉPATITES RARES*, Paris: Masson, pp. 214, fr. 290) is not confined to hepatitis but includes chapters on oxaluria and liver disease, anaemia in cirrhosis, and cystic disease of the liver. The theories presented often seem strange, and many statements are unsupported by data. The bibliography refers mainly to Continental work.

Dr. F. M. Pottenger, medical director of his own sanatorium in California, sets out his views on the reflex action of the spinal and automatic systems in visceral disease. The 6th edition of his *SYMPTOMS OF VISCERAL DISEASE* (London: H. Kimpton, pp. 442, 25s.) is essentially the same as its forerunners. He urges the relationship of many apparently unconnected symptoms with the morbid process, sometimes using readily acceptable evidence, at others evidence which lacks scientific support. The work can only be recommended to those who know enough to read it critically.

In *AMPUTATION PROSTHESIS* (London: J. B. Lippincott, pp. 305, 50s.) Dr. Atha Thomas, associate professor of surgery in the University of Colorado, and Mr. Chester C. Haddan, president of the Association of Limb Manufacturers of America, have collaborated to discuss the problems faced by surgeon and limb-maker in fitting prostheses. They cover well such topics as the moulding of the stump by bandaging, re-education of the stump muscles, functional values of stumps of various lengths, and the training of the patient in the use of his limb, and they lay emphasis on the importance of fit and alignment. A good section deals with prostheses in children.

Mr. H. E. Cox, D.Sc., is an experienced public analyst, and the techniques detailed in his *CHEMICAL ANALYSIS OF FOODS* (3rd ed., London: J. & A. Churchill, pp. 317, 24s.) are probably those commonly used in his laboratory. Though they have stood the test of time, many of them have been superseded in the eight years since the last edition, and might well have been omitted in this one. Thus the Kjeldahl method described is now out of date, and there is no mention of the selenide catalyst which has accelerated the tempo of all total nitrogen assays. Fuller accounts of some of the more modern methods would have been welcome. The scope of the book is wide, and there is an appendix on the preservative regulations and prohibited colouring matters.

Mr. W. H. Maxwell's compendious, indeed discursive, guide to the engineering side of water-supply (*CURRENT WATERWORKS PRACTICE*, London: B. T. Batsford, pp. 254, 18s.) will be useful on the M.O.H.'s reference shelf, and rural doctors will find it interesting in the light it throws on the problem of getting pure water into every home, however remote. The fact that gas prefers to run uphill and electricity doesn't mind its poor compensation for the fact that water refuses to do so; and the community is only just beginning to realise that gravity cannot be made an excuse for penalising the rural population. Mr. Maxwell might usefully turn his attention next to this side of the problem. His photographs of big dams and reservoirs are beautiful.

There are twenty contributors to *PREOPERATIVE AND POSTOPERATIVE TREATMENT* (2nd ed., London: W. B. Saunders, pp. 584, 35s.), under the editorship of Lieut.-Colonel Robert L. Mason, of the Cushing General Hospital, Framlingham, Massachusetts, and Dr. Harold A. Zintel, of the University of Pennsylvania school of medicine. In the first part, which covers such general problems as the management of the surgical patient with heart disease, the strong influence of physiology on American surgery is well seen. Of particular interest are the chapters on water balance and on postoperative venous thrombosis; in the latter, ligation of large veins is freely recommended. Though the second part, arranged under regional headings, is insufficiently concise and has important omissions—for example, the eye, and elective surgery of the chest and head are not mentioned—the book as a whole is interesting and instructive.

THE LANCET

LONDON: SATURDAY, MARCH 15, 1947

First Things First

IF we return again and again to the problems of nursing, it is because the coming effort to improve medical services in this country will be wholly frustrated unless there are enough nurses properly trained for their work. Since State registration was introduced in 1919 the General Nursing Council has been the body that decides what training is proper, and its curriculum has been one of the principal factors regulating recruitment to the profession. At a time, therefore, when this recruitment is patently insufficient, the council may fairly be asked to justify its requirements and to show that these are related to the requirements of the nation.

The question is all the more necessary because the syllabuses confronting the student nurse have just been redrafted, and apparently there is to be an increase rather than a decrease in the number of subjects covered. The draft has not been published, but at the council's meeting on Feb. 28 it moved a medical member, Dr. RUSSELL BRAIN, to strenuous protest. It embodies, he said, the very faults that medical educators are trying to eliminate from the medical course, and many of the sort of facts that 90% of doctors forget as soon as they are qualified and never need again. Commenting on the proposed content of the 40 lectures leading up to the preliminary examination, he asked what for example is the use of the nurse knowing "the names and position of the bones of the cranium and face, the bony structure of the orbit, nose, mouth, and base of the skull, and the principal characteristics of the bones of the cranium, maxilla, and mandible," or the "special characteristics of vertebræ from the cervical, dorsal, and lumbar regions"—peculiarities of practical interest only to an orthopædic surgeon. All that can be said in favour of including the thymus, he thought, is that the little known about it could burden nobody's memory: but why should the nurse have to learn the effect of hyper- and hypo-parathyroidism? The "position, structure, and functions of the mid-brain, pons, and cerebellum" cannot usefully be considered without much more study than she has time for, and the same is true of "a brief outline of the limb plexuses." The title of the course is "elementary anatomy and physiology," but there is in fact no elementary way of dealing with such topics. Dr. BRAIN invited the council to refer the syllabus back to its education and examination committee, but he found no seconder for his motion. So the draft syllabus was passed, subject to the approval of the Ministry of Health.

A glance at papers set this year for the preliminary and final State examinations shows how cogent were Dr. BRAIN's objections to putting further detail into the syllabus:

"Describe the shoulder girdle. What are the chief muscles attached to it?"

"What do you understand by the term sewage effluent? What means are taken for its purification?"

"Describe a case of acute rheumatic fever and give an account of the nursing and medical treatment of this condition. Enumerate the complications which might arise."

Why should the nurse be examined on the medical as well as the nursing treatment of a case? And what is gained? Having set a specialised question, the examiner finds himself obliged to mark it on a low standard, whereas a question of general importance can be marked on a high one. The nursing syllabus, even in its present form, contains too many items that are not of general importance. Admittedly, any or all of them might appropriately be mentioned in teaching a group of intelligent girls, but that is quite different from setting them down in black and white as subjects that may figure in the examination and must therefore be tackled by every conscientious student and every conscientious teacher, at Grimsby and Gillingham as well as at Guy's. Ability to divine what is relatively unimportant, and pay no attention to it, is not a gift with which young students are generally endowed.

The medical profession appreciates and admires the work of those who, both here and in America, have overcome great difficulties in their constant endeavour to raise the quality of nursing and the status of the nurse. As W. M. FIORO,¹ the American surgeon, puts it, "the road travelled by the nursing profession has been a long and ever broadening one. The leaders have tried to keep nursing education abreast of the rapidly advancing front in medical knowledge." But this laudable effort, as he points out, has had "at least two undesirable consequences that make it imperative for the leaders in nursing education to pause and take their bearings. These . . . are: first, the failure of this program to attract and to hold an adequate number of young women to meet the needs of the country; and second, the nurse of today is not being trained primarily to care for the patient." Has not the time in fact come to reconsider the nursing curriculum in the light of its essential purpose? Education, alike for medicine and for nursing, should, we suggest, be directed always towards the good of the sick—not towards advancing the status of nurse or doctor. The General Nursing Council no doubt has the ultimate welfare of the sick very much in mind; yet, here as in America, there is reason to believe that "the nurse of today is not being trained primarily to care for the patient." Moreover the council, holding a position where its power exceeds its responsibility, seems sometimes to forget that, if patients are to be nursed at all, there must be not only good nurses but enough nurses. The present syllabus and examinations are too much for many girls who become student nurses, and so long as training is uniformly based on them a substantial proportion of useful entrants will be lost through discouragement and dismay. Certainly at this stage any increase of bookwork must make a bad situation worse. What is needed, on the contrary, is a shift of emphasis towards bedside nursing. We have to make arrangements that will attract well-educated women into a profession demanding all their powers, but will nevertheless permit any sensible girl to attain the title of nurse if she shows aptitude for the care of the sick.

1. *Surg. Gynec. Obstet.* January, 1947, p. 122.

Cardiac Catheterisation and Beyond

THE technique of intracardiac catheterisation,¹ based mainly on the pioneer work at the Bellevue Hospital, New York, and on subsequent research in Atlanta and at the British Postgraduate Medical School, continues to develop, and its use has now spread to many hospitals in the United States as well as to Sweden, France, and Switzerland. In practised hands the method is free from risk and no more difficult than ureteric catheterisation; its applications are only beginning to be explored.

COURNAND and his colleagues² in New York have used the cardiac catheter for optically recording intracardiac pressure pulses on the right side of the heart. To the end of a catheter of sufficiently wide bore they attach a small membrane manometer recording optically on moving photographic paper. By means of a double-lumen catheter simultaneous records may be made from two parts of the cardiovascular system, such as the right auricle and ventricle, or the right auricle and peripheral veins. The maximum pressure reached in the right ventricle is, of course, the same as the systolic pressure in the pulmonary artery, and in normal people this has been found to average 25 mm. Hg. In patients with emphysema without heart-failure the pulmonary systolic pressures ranged from normal to 57.5 mm. Hg, and there was apparently no correlation between pulmonary hypertension and the severity of the emphysema. One case of mitral valve disease had a pulmonary systolic pressure of 43 mm. Hg though there was no rise in the right auricular pressure. When heart-failure develops, a whole series of changes take place in the intra-auricular and intraventricular pressure curves. In a patient with emphysema and heart-failure the pulmonary systolic pressure was raised to 68 mm. Hg, and in mitral stenosis with severe failure it was much higher—in one case it reached 103 mm. Hg, falling to 57 mm. Hg as the patient recovered from the failure. In other forms of heart-failure (hypertensive and arteriosclerotic) the pulmonary systolic pressure rises to 50–80 mm. Hg. Ordinary arterial hypertension without failure, however, does not affect the pressures on the right side of the heart, the pressure in the pulmonary artery remaining normal. By studying the pulse pressure and the amplitude of the auricular and ventricular pressure waves conclusions can be drawn regarding the changes in output per beat during the respiratory cycle.³ Inspiration assists the filling of the chambers of the right heart, so stroke output is increased; while during expiration the output of the right auricle and ventricle falls. In the early part of inspiration the increased output of the right ventricle is accommodated in the lungs, but a little later the left ventricle gets the increased flow and the systemic arterial pressure rises. This technique opens up new possibilities for the detailed analysis of human cardiodynamics in health and disease.

Proceeding along simpler lines of measurement of filling pressure and output per minute, HOWARTH, McMICHAEL, and SHARPEY-SCHAFFER⁴ at Hammer-

smith have continued their studies on heart-failure. They found that in "low output heart-failure" venesection lowers the venous pressure and raises the output of the heart. By comparison in similar groups of cases, they showed that lowering venous pressure by mechanical means and by digitalis have identical effects on cardiac output. Venesection, however, lowers the blood-pressure, while digitalis may leave it unchanged or even raised; so the heart is actually doing more work after digitalis than after venesection. Whether this can be interpreted as a stimulating action of digitalis on the heart is uncertain, but these studies seem to have established the importance of a primary reduction in venous pressure by means of digitalis in the treatment of the failing heart. WARREN and others⁵ have drawn attention to the possibility of errors in the estimation of cardiac output arising from incomplete mixing of blood in the right auricle. Duplicate samples taken in this situation were found to differ from one another in oxygen content by more than 0.4 vols. per cent. in a fifth of the cases studied. Similar studies by COURNAND⁶ showed, however, that the differences between duplicate samples from the right heart were very seldom more than 0.4 vols. per cent. McMICHAEL⁷ thinks that anomalous samples are obtained only about once in 20 cases. Any error arising from incomplete mixing is readily detectable by comparing right ventricular with right auricular samples and by duplicate sampling at critical points in all experimental observations; if this is done the results obtained should be highly accurate, but isolated observations may be open to suspicion.

The catheter's potentialities as an instrument of investigation do not end at the heart. A catheter with an angle bend near the tip can be passed through the auricle into the inferior vena cava, and under fluoroscopic screen control it may be manipulated into the hepatic or renal veins. BRADLEY and his colleagues⁸ have made quantitative studies of the hepatic blood-flow in man by an ingenious method. Bromsulphthalein, a substance which is removed from the blood-stream by the liver, is infused into a vein at a rate equal to the rate of excretion, so that the blood-level remains constant. The concentration of bromsulphthalein in the blood entering the liver is taken to be the same as that in the peripheral blood, and by sampling the hepatic-vein blood the amount extracted from each 100 ml. can be estimated. A sample calculation may make this clear.

Rate of removal (or infusion) of bromsulphthalein = 4.80 mg./min.; peripheral serum concentration = 1.08 mg./100 ml.; hepatic vein serum level = 0.57 mg./100 ml.; hematocrit = 43%.

$$\text{Estimated hepatic blood-flow} = \frac{4.80 \times 100}{1.08 - 0.57} \times \frac{100}{100 - 43} = 1651 \text{ ml./min.}$$

A considerable range of values can be obtained in one subject—e.g., from 945 to 1618 ml./min.—according to the position of the catheter in the liver. It is possible that the rate of flow does vary in different parts of the liver, and it is a slight drawback to the method that mixed hepatic-vein blood cannot be obtained. BRADLEY and his colleagues, and WARREN

1. See *Lancet*, 1946, i, 541.
2. Bloomfield, R. A., Lauson, H. D., Cournand, A., Breed, E. S., Richards, D. W. *J. clin. Invest.* 1946, 25, 639.
3. Lauson, H. D., Bloomfield, R. A., Cournand, A. *Amer. J. Med.* 1946, 1, 315.
4. Howarth, S., McMichael, J., Sharpey-Schafer, E. P. *Clin. Sci.* 1946, 6, 41.

5. Warren, J. V., Stead, E. A., Brannon, E. S. *Amer. J. Physiol.* 1946, 145, 458.
6. Cournand, A. *Fed. Proc.* 1945, 4, 207.
7. McMichael, J. *Ibid.*, p. 212.
8. Bradley, S. E., Ingelfinger, F. J., Bradley, G. P., Curry, J. J. *J. clin. Invest.* 1945, 24, 890.

and others⁹ have passed the catheter into the right renal vein. They studied the clearance of sodium *p*-aminohippurate by the kidney and found that, on the average, 85–88% is removed by the kidney, thus proving the value of clearance of this substance as an index of renal blood-flow. The further work with catheterisation of the renal vein now being done in America may throw light on some of the obscurities of renal physiology and pathology.

Epidemiology of Lobar Pneumonia

LOBAR pneumonia is an infectious disease caused most commonly by pneumococcus types I, II, V, and VII. Its greatest prevalence is among males of 15–65 and, though sulphonamides or penicillin can reduce the case-mortality by more than half, the disease is a major cause of illness and death in a very important section of the community. Yet little is known of its mode of spread, and few direct attempts have been made to control its incidence.

War-time outbreaks of pneumonia, among young men brought together for training, can be studied in more detail than is possible in civilian practice. HODGES and McLEOD,¹⁰ for example, describe experience in an army technical school in the Mid-west of the United States, where during three successive winters there were over 1600 cases of primary pneumococcal pneumonia, with a weekly attack-rate sometimes above 150 per 1000 men. The area has a hot dry summer and a bitterly cold winter, with long spells of cold damp weather in spring and autumn. The barracks and classrooms were of rude design with rough concrete floors that favoured dust, while the heating was uneven and ventilation in winter very poor. The men stayed 16–24 weeks in the camp, spending six hours a day in the classrooms, and apart from a continual influx and outflow the community of 8000–17,000 remained pretty well isolated. In short, the conditions were well suited to the epidemic spread of respiratory infections, especially in the first winter when most of the intake were new recruits. The first case of pneumonia was admitted in September, 1942, and in the following January there was a rapid increase in admissions, which remained at a high level until May when there was a sudden drop. Next winter the curve began to rise in November, reaching a peak in December, but the incidence was lower in the spring months, probably because sulphadiazine was used as a prophylactic. A big reduction in the third winter is attributed to inoculation with polysaccharides of the prevalent pneumococcal types. Other training-camps in the area did not have similar outbreaks and it seemed likely that acute respiratory disease among unseasoned troops in the first winter predisposed to dissemination of the epidemic pneumococci—whose order of frequency was type II (35% of all cases), I, V, VII, XII, and IV. Pneumococci of the epidemic types were found in the dust of both classrooms and barracks, in the same proportions as in the throats of carriers. The investigators found no evidence that transfer from another climate, chill, or fatigue significantly predisposed to pneumonia.

During the third season an attempt was made to ascertain the relationship, if any, between carrier-rates and the incidence of pneumonia. The total pneumococcal carrier-rate, rising from 40% in the summer to 60–70% in the winter, bore no close relation to the incidence of pneumococcal pneumonia or other respiratory infections. There was a good correlation between the carrier-rate of specific epidemic types (e.g., IV and XII, which were predominant in the third winter) and illness due to these types; yet carrier-rates of 10–20% of these two types were found in the early winter months, before there was much pneumonia. This suggests that some other factor had to come into play before clinical infection could take place, and HODGES and McLEOD believe that this factor is an antecedent non-bacterial respiratory infection. The winter prevalence of pneumococcal pneumonia showed a close time-relation to upper-respiratory infections including influenza, with a relative incidence of 1:10; but in the first winter, when presumably there were few carriers of the epidemic pneumococcus types, an outbreak of acute respiratory disease was unaccompanied by pneumonia. When the carrier-rate became high, outbreaks of influenza in 1943 and 1945 were associated with peaks of pneumococcal pneumonia. It is of course a traditional observation that pneumonia is often preceded by a common cold.

Against lobar pneumonia in civil life this study points to three lines of attack. The first is to reduce (where we can) the incidence of non-bacterial respiratory infections. The second is to reduce the carrier-rate of epidemic pneumococcus types in places where pneumonia is occurring with unusual frequency; for this purpose chemoprophylaxis might be effective, but in view of the viability of pneumococci in dust it should be combined with dust control. The third is to raise specifically the resistance of the susceptible community by inoculation with the capsular polysaccharides of the prevalent pneumococcus types. McLEOD and his colleagues,¹¹ with a single injection containing 0.03–0.06 mg. of each of the polysaccharides of types I, II, V, and VII, practically eliminated pneumonia due to these four types in the treated group, while incidence in the control group was reduced probably because of an overall reduction in carrier-rates of these epidemic types: the incidence of pneumonia due to types XII and IV, against which no protection was attempted, remained unaffected. For groups of people exposed to abnormal risk of infection—such as foundry-workers, miners, and recruits in training-camps—this simple safeguard may well commend itself.

The National Situation

THE economic situation debated by Parliament this week must colour our lives for years to come. The means chosen to retrieve that situation will affect the whole social framework, of which medicine is a part. On another page a correspondent challenges the dictum "export or starve" and urges that instead of dislocating our economy by an increasingly difficult policy of forced exports we should set about producing far more food, ensuring rapid expansion of agriculture by paying higher prices to the farmer. The arguments advanced, and their sociological implications, deserve close attention.

9. Quoted by Goldring, W., Chasis, H. *Hypertension and Hypertensive Disease*, New York, 1944, p. 219.

10. Hodges, R. G., McLeod, C. M. *Amer. J. Hyg.* 1946, 44, 183, 192, 207, 231, 237.

11. McLeod, C. M., Hodges, R. G., Heidelberger, M., Bernhard, W. G. *J. exp. Med.* 1945, 82, 445.

Annotations

MEDICAL STAFFING OF HOSPITALS

WHAT medical staff does a hospital need for full efficiency? Prof. G. E. Gask, F.R.C.S., tackles this question in a memorandum to the Oxford and District Joint Hospitals Board.¹ He begins by collating information on the present staffing standards of various types of general hospital. At one extreme is the old poor-law ratio of one doctor to nearly 170 beds; at the other is a surgical professional unit where there is one clinician for every 10. On theoretical grounds a standard of one doctor to 25 beds would, he believes, be insufficient for first-class service in a 1000-bed hospital, especially on the surgical side. Examining the staff structure of two first-class county (municipal) hospitals he finds the following proportions of medical staff to beds:

| | St. Helier (Surrey) | Central Middlesex |
|-------------------------------|------------------------|----------------------|
| Medical | 1:28 | 1:48 |
| Surgical | 1:23.2 | 1:24 |
| Obstetrics and Gynaecology .. | 1:19.4 | 1:27 |

Taking into account pathologists, physiotherapists, and registrars, St. Helier has one medical officer to 18.2 beds and the Central Middlesex one to 28, but the inadequacy of the latter figure is recognised, and a further 14 additional house-officers are to be appointed as soon as possible, bringing the ratio to one to 19. This contrasts favourably with a borough hospital which has only three doctors for 600 beds (410 chronic).

After considering Stark Murray's estimate of one doctor to 18 beds (work including outpatients and domiciliary visits) and Robb-Smith's estimate of one to 12 beds (admittedly too high for the immediate future) Professor Gask concludes that the minimum standard for the recognition of a hospital as first class should be the allowance of one medical officer to 20 beds, or fifty to a 1000-bed hospital; but he regards this figure as low, and until the aim of one to 15 beds can be attained the doctors should have all the aid an efficient clerical and record department can give them. Ancillary workers are provided in many departments, but clinicians are too often expected to write their notes in long-hand, keep their own records, and follow up their own cases.

"The formation of a first-class hospital cannot rest on a mere formula of power-mathematics. The staff of a good hospital must be professionally and spiritually contented. They should not be so driven by stress of work that they have no time to think, to study and to visit and confer with their professional brethren, both at home and abroad. Good hospitals should become 'seedplots of wisdom,' germinating ideas for promoting the positive health of the people as well as for curing disease."

Professor Gask's estimate of the medical staff required to maintain a first-class general hospital will be widely accepted by those familiar with the running of such a hospital; and it is well, even in these times of shortage, that the need should be known. By general consent, some 5 acute hospital beds per 1000 of the population (or 200,000 for England and Wales) are needed. These are not all available, nor are those that are available all suitable for their purpose. If they were, their full use would demand the whole-time service of some 10,000 doctors. Though the chronic, infectious, tuberculosis, and mental beds, which are also necessary for a complete hospital service (and which will amount in sum to nearly double the acute beds), may not want a staff ratio of this magnitude, it is all too evident that the adequate medical staffing of our hospitals is a problem as great as it is fundamental.

1. Included in report of the Ad-hoc Planning Committee on the planning of hospital services in the board's area. Obtainable from the secretary at 16, King Edward Street, Oxford.

PARALDEHYDE ACCIDENTS

THE accidental deaths from paraldehyde poisoning, of which two more examples were reported in THE LANCET of Feb. 1 (p. 188), arise from two closely similar causes. In the latest cases there was confusion between pure paraldehyde and a dilute solution; in the case at Swindon in 1942, among others, there was confusion between the drachm and ounce signs. The second risk should be eliminated as the fluid drachm disappears from general use; the first has not yet received the attention it deserves. In many hospitals paraldehyde is stored in the wards or theatres both in the pure state (B.P. dose 60-120 minims) and in a dilute solution, termed "haustus paraldehydi" or "paraldehyde draught," the dose of which is usually 1 or 1½ fluid ounces, according to its strength. The draught is not an official preparation, and its use is one of the reasons for mistakes. The medical student (and hence the house-officer) and the nurse in training often fail to distinguish between a drug and a preparation of a drug. Thus many a young doctor or nurse would loosely call paraldehyde draught by the short name paraldehyde. And some never grow out of this habit. How many times has one heard the expression, "8 minims of morphine was given" when 8 minims of solution of morphine was meant? But here there is more excuse for muddles, because paraldehyde draught varies in different hospitals: in some it is a clear solution resembling paraldehyde itself; in others it has a layer of paraldehyde floating on a layer of water; while in yet others it contains liquid extract of liquorice and other ingredients which readily distinguish the draught by colour from the pure liquid. Surely if paraldehyde draught is required in the wards a uniform formula and a uniform and distinctive colouring should be adopted in all hospitals. It should be an invariable rule, too, that bottles containing either draught or pure substance must have the dose clearly stated on the label.

INDIA'S NECESSITY

Sir Frederick James¹ gives us an excellent popular exposition of the monumental report of the Bhore Committee, of which he was a member. Here in small compass are the essential facts about the health situation in India, written in language which everyone can understand.

Perhaps the most striking of these facts concern deficiencies in India's health personnel. Of the 47,400 doctors (one for every 6300 of the population) only 4000 are women, though only women doctors can hope to bring modern medicine to India's women and children. There are only 1000 qualified dental surgeons, 7000 trained nurses, and 75 pharmacists in the whole of British India. About half of the districts and three-quarters of the municipalities of British India have no qualified health officers. It is against the background of such deficiencies that the infant-mortality of 160 and the expectation of life of 27 years have to be considered. James does not, however, content himself with painting a grim picture; he also summarises the proposals which form the second volume of the Bhore report. These include the provision of a health centre for every 20,000 of the population, each 30 centres being grouped under a more specialised secondary unit, with a district headquarters for every 5 secondary units; 125 such headquarters, each serving a population of 3 million, would cover the whole of British India. The service planned would include public health and preventive medicine, and also home and hospital treatment. It is a surprise to read that the estimated cost of this scheme is only 3 rupees (4s. 6d.) per head per year for the first ten years.

1. The Battle for Health. By F. E. James. Bombay: Tata Studies in Current Affairs. Pp. 91. Rupee 1.

A large part of India's health campaign, in James's words, consists of "encouraging the will to be healthy, and spreading the knowledge of the meaning of health"; and wide circulation of his booklet will certainly help this aim. Nevertheless a health service, no matter how complete, cannot by itself solve India's health problem. Until there is a substantial rise in the standard of living people will continue to die of starvation and of the diseases attendant on malnutrition; the nutritional and dietary surveys by members of the Servants of India Society² emphasise this fact. These studies include accounts of famine conditions in Malabar, Madras, and Kanara, and contain many valuable family dietary surveys, which illustrate vividly the shortcomings of the typical Indian diet and the poverty of the Indian peasant. The curses of inadequate price control and of ineffective administrative measures are here translated into terms of mouthfuls of rice and morsels of meat and fish. The great volume of facts revealed by these painstaking studies underline the need for rigid control of the price and distribution of all foodstuffs, and not only the basic cereals. Stress is also laid on the need for irrigation and subsidies to encourage food-production. For India, at present, food is the best medicine.

COLDS AND CONSTITUTION

NEWS of the reopening of the laboratory's offensive against the common cold reawakens interest in the other means of studying civilised man's most persistent enemy. With so much clinical and epidemiological material on every hand, there is little excuse for any failure to extract all possible information from observations in the field. Yet opinion is still divided even on so simple a topic as whether some people catch colds more frequently than others.

A group of workers at Boston³ endeavour to answer this query. Under the rather formidable title of Stability of Resistance to the Common Cold, they analyse the incidence of upper respiratory infections during four years among the boys at the Phillips Exeter Academy. Previous work at the Harvard School of Public Health⁴ had suggested that the frequency of colds in individuals was not, as deduced by Gafafer and Doull,⁵ explicable by the operation of the laws of chance, and the Exeter Academy study provides fresh evidence that each person has a relatively constant incidence; the number of colds each year seemed to be characteristic for the individual, and slightly increased as the investigation progressed from 1935 to 1939. Sargent and his associates deduce that some factor such as the constitution must play a significant part in determining the incidence of a disease which appears to be thus correlated with the individual host, but the value of their study is somewhat lessened by the inclusion of all cases of coryza, pharyngitis, laryngitis, bronchitis, tonsillitis, and even pneumonia under the heading of common colds, even though 95% of all cases were diagnosed as "nasopharyngitis." It is probable that epidemic influenza, for instance, was therefore included, and it would surely have been fairer to have used for such a mixture a term such as A.R.D. (acute respiratory disease), as adopted by the United States Army.⁶

The thesis that constitution affects the incidence of an acute infection is not new, and has been applied by several authors to poliomyelitis.^{7 8} Constitutional factors which

determine the incidence of disease could, of course, be genetic, as suggested by Webster's work on the inbreeding of mice,⁹ or might depend on individual influences such as the hormones. Mention of hormones in connexion with the common cold reminds one of some remarkable and unexplained facts recorded by the School Epidemics Committee of the Medical Research Council.¹⁰ Boston boys may develop colds by numbers, but the M.R.C. report suggests that British schoolgirls suffer from colds three or four times as frequently as their male coevals—though boys and girls suffer equally from influenza.

VITAL STATISTICS AND THE M.O.H.

IN discussing innovations in the methods of national vital statistics at the meeting of the Society of Medical Officers of Health on Feb. 20, Dr. Percy Stocks, medical officer to the Registrar-General's Office, described a morbidity survey of E.M.S. hospital patients. The hospital records were sampled and the main features of each of the 1 in 5 cases selected were transferred to punched cards. The populations exposed to risk could not be enumerated, but proportional rates based on the non-seasonal diseases gave some indication of the ebb and flow of serious illness, and some useful specific investigations were made on motor-cycle injuries and transfusion hepatitis. This experience will be valuable as a basis for a complete and accurate scheme of recording the clinical material in the National Health Service hospitals. A more novel kind of morbidity-sampling inquiry is being conducted by the governmental agency known as Social Survey. Here a statistically representative sample of the population numbering 2500 is selected each month. Each person is questioned about his health in the previous three months by a field worker. The refusal-rate is negligible, and Dr. Stocks was confident about the general accuracy of the results. When combined with the fuller notifications of infectious disease now in hand, the sample survey has much to commend it as an epidemiological tool for the M.O.H.

Mr. Louis Moss, director of Social Survey, said that the picture of the cross-section of the adult population given by the sample agrees with that obtained from the more usual national statistics, and the incidence of serious illness in the sample corresponds with estimates based on E.M.S. surveys. However, validation studies involving a clinical examination of a sample of those interviewed are under way. Later speakers, while appreciating the limitations and difficulties of morbidity surveys, agreed on their potential value to the M.O.H., when, freed by the new Act from other responsibilities, he can concentrate on the environmental aspects of sickness as well as death.

WHITE PENICILLIN

FROM the beginning of this year a "white" penicillin free from the impurities that gave the drug its yellow colour has been obtainable. White penicillin is sold at the price which yellow penicillin used to cost, while the less pure product is reduced to three-quarters of its original price—the lowest charge for penicillin anywhere in the world. The unitage of this white penicillin ranges from 1200 to over 1600 units per mg., but there can be no guarantee that brands of the same unitage will be equally effective therapeutically unless we know what proportions of the different penicillins the preparations contain. Thus white penicillin may contain from 10% to 30% of penicillin IV, which, from American evidence, is quickly inactivated by the human tissues and therefore of little therapeutic value. However, two of the principal producers claim that their products contain at least 90% of penicillin II, which is known to be active in vivo as well as in vitro against a wide range of bacteria. One of

2. Food Control and Nutrition Surveys in Malabar and S. Kanara. Inadequate Diets, Deaths and Diseases, and a Food Plan for Madras. Studies by members of the Servants of India Society. Madras: Servindia Kerala Relief Centre. Pp. 300 and 83. Rupees 4 and 1.
3. Sargent, F., II, Lombard, O. M., Sargent, V. W. *Amer. J. Hyg.* January, 1947, p. 29.
4. Wilson, E. B., Worcester, J. *Science*, 1944, 99, 468.
5. Gafafer, W. M., Doull, J. A. *Amer. J. Hyg.* 1933, 18, 712.
6. Commission on Acute Respiratory Diseases. *Amer. J. publ. Hlth*, 1946, 36, 439.
7. Draper, G., Dupertuis, C. W. *J. clin. Invest.* 1939, 18, 87.
8. Aycock, W. L. *Amer. J. publ. Hlth*, 1937, 27, 575.

9. Webster, L. T. *Medicine, Baltimore*, 1946, 25, 77.
10. *Spec. Rep. Ser. med. Res. Coun., Lond.* 1938, no. 227.

these preparations is a crystalline sodium salt of penicillin which is said to withstand high temperatures for long periods without deterioration. In addition to their greater stability the purified penicillins should be less liable to cause painful or allergic reactions or to irritate delicate tissues like the meninges and the conjunctiva, while highly concentrated solutions of say a million units per c.cm. can be used for parenteral injection. The need now is for some amendment of the regulations under the Therapeutic Substances Act to ensure that these purified penicillins are as effective in the host's tissues as they are in the test-tube.

FEEDING THE LONELY ADULT

THE fact that there has been no obvious deterioration in the national health in the past seven difficult years has made most of us feel that our nutritional policy is basically sound. Even the rationing of bread—the most serious step which has been taken in determining the consumption of food—aroused no serious objections on nutritional grounds. In conformity with the Ministry's usual plan of adjusting the rations roughly in accordance with nutritional needs, manual workers and adolescents receive more than the standard adult ration of 9 oz. of bread daily, while children under five receive less. Children between five and eleven receive the same as a normal adult. Many children do not consume the whole of their ration—for example, the child of six does not usually consume as much as 9 oz. of bread in one day, nor a child of two as much as 5 oz. Thus, the adults in a family with children can often benefit from the children's ration of bread, as they also no doubt benefit from their ration of tea and to a lesser extent meat and cheese. On the other hand, the children probably receive more than their share of eggs, jam, and sugar. There is thus a redistribution of food within the family which is a great help in feeding its members. The study of Schulz¹ in Oxford suggests that the extent to which adults can practise "symbiosis" with their children may determine the total adequacy of their diet. In a series of papers published at six-month intervals, beginning in the spring of 1941, Schulz has devised low-cost diets obtainable by an Oxford family of two adults and three children. In the last two papers she has included a reasonable distribution of the food within the family to meet accepted dietary habits as well as nutritional needs. For example, the adults are allotted appreciably more than their ration of bread, bacon, and cheese. The striking fact which emerges from Schulz's last paper is that, with bread rationed, a distribution within the family which is to give sufficient calories for the adults must involve a diversion of rationed foods from the children. In the diets suggested by Schulz, this diversion is equivalent to some 9 points or bread units weekly to the two adults.

How do adults fare who are living alone and therefore denied the advantages of family distribution? It appears from Schulz's paper to be impossible, with bread rationed, for such people to obtain enough calories with reasonable ease and at reasonable cost. They must either consume unappetisingly large quantities of unrationed foods which supply a fair number of calories (for example, something like 4 lb. of potatoes daily for each adult) or they must take a meal out on most days of the week. Meals out are not always practicable and would raise the cost of the diet appreciably, though British Restaurants and works canteens have done much to overcome these obstacles. There remains a third possibility—the consumption of much more expensive unrationed foods, such as ready-cooked pies or sandwiches. But this would raise the cost still more and is not considered by Schulz, who is concerned only with low-cost diets. The difficulty of providing adequate adult diets at low cost, where neither meals out nor children's rations can be drawn on,

did not arise so long as bread was unrationed. But that it now exists can be confirmed by anyone with a knowledge of present-day food-supplies, and the patience to spend tedious hours with a set of food tables and a slide-rule.

PENICILLIN IN URINARY INFECTIONS

WE have become accustomed to think that penicillin is of little value in infections of the urinary tract, since most of the common infectors are either gram-negative or belong to the less sensitive gram-positive groups. The value of penicillin in *Staph. aureus* perinephritis, and in association with surgery in renal abscess and stone, is well known. At the Royal Society of Medicine, section of urology, on Feb. 27 Mr. A. L. Peeney drew attention to the possibility of using the drug to control the other more common, but less sensitive, infections due to *Strep. faecalis*, *Proteus morgani* and *vulgaris*, *Bact. coli*, and *Ps. pyocyanea*. He finds, in common with Helmholz and Sung,¹ that many of these organisms are sensitive to high concentrations of penicillin. Of 199 strains isolated from urinary cultures (see table), 132 (66%) were killed by urinary concentrations below 200 units of penicillin per c.cm. Most strains of *Staph. pyogenes* are killed by a urinary concentration of 0.03 unit/c.cm., but other gram-positive organisms may require a concentration up to 10 units/c.cm., and the gram-negative bacilli up to 200 units/c.cm. *Ps. pyocyanea* is entirely insensitive up to this level.

MINIMUM BACTERIOSTATIC CONCENTRATIONS IN 199 STRAINS OBTAINED FROM URINARY CULTURES

| Organism | Total strains | Penicillin units per c.cm. urine | | | | | |
|-------------------------------|---------------|----------------------------------|---------|--------|-------|--------|-------|
| | | > 200 | 200-100 | 100-50 | 50-10 | 10-0.5 | < 0.5 |
| <i>Staph. pyogenes</i> | 33 | 2 | .. | .. | 2 | .. | 29 |
| <i>Strep. viridans</i> | 8 | .. | .. | .. | .. | .. | 8 |
| <i>Strep. faecalis</i> | 22 | .. | .. | .. | .. | 22 | .. |
| Colliforms | 81 | 32 | 20 | 21 | 7 | 1 | .. |
| <i>Proteus morgani</i> | 24 | 16 | 1 | .. | 6 | 1 | .. |
| <i>Proteus vulgaris</i> | 18 | 4 | 2 | 1 | 5 | 6 | .. |
| <i>Ps. pyocyanea</i> | 13 | 13 | .. | .. | .. | .. | .. |

The courses of penicillin adopted in urinary infections have clearly been far too low in dosage and far too short. Routine estimations of the urinary concentration are usually not feasible, and it is therefore important to know what scale of dosage can be relied on to produce an effective concentration. Furthermore, since these dosages may have to be continued for a long time, and possibly for conditions which in themselves are not painful, the method of administration chosen should not be too unpleasant. The oral route, which could be used in outpatients, would be ideal. Unfortunately, however, Sir Howard Florey told the section of urology that when enteric-coated capsules are given by mouth only 8-23% of the penicillin administered is secreted in the urine, compared to 33% after beeswax and peanut-oil injection, and 65-80% after injection of saline solutions. Peeney, using salol-coated capsules, found that combination with a slow-release vehicle is no advantage. Using ordinary penicillin (90,000 units) in these capsules he obtained urinary concentrations of 40 units/c.cm., but these fell rapidly in spite of further three-hourly doses of 20,000 units and reached 10 units/c.cm. in twelve hours. After a single intramuscular injection of 100,000 units of penicillin in saline the urine (50 c.cm.) at one hour contained 680 units/c.cm.; bulked urine between three and four and a half hours after injection (608 c.cm.) contained 85 units/c.cm.; and at eight hours (132 c.cm.) still contained 2.6 units/c.cm. This is an

1. Schulz, T. *Bull. Oxfl Univ. Inst. Stat.* 1946, 8, 375.

1. Helmholz, H. F., Sung, C. *Amer. J. Dis. Child.* 1944, 68, 236.

adequate level for *Staph. aureus* and some strains of *Strep. faecalis*. A dose of 200,000 units six-hourly would probably be lethal to most gram-positive organisms and about 50% of gram-negative bacilli. There is, however, wide individual variation in the levels obtained, and further work is required on this subject.

Another field for inquiry is the use of penicillin in the prevention of urinary infections. If the drug will prevent urethritis and ascending infection due to the indwelling catheter, one of the urologist's main difficulties will be overcome. Preliminary reports are encouraging.

New advances bring new problems. Thus, in specialist surgical units, where there are many similar cases, there is a danger of a penicillin-resistant strain being spread round by cross-infection unless the strictest precautions are taken; this must be borne in mind in urological wards. Another danger is that the removal of staphylococci from an infected area may lead to an increase in gram-negative contaminants. This may not greatly matter in surface wounds, but a heavy infection with insensitive proteus or *Ps. pyocyanea* might be serious in the urinary tract. It must also be remembered that in many urinary infections relapse will be inevitable unless the mechanical efficiency of the tract is restored by surgery.

OF NOT SMOKING

THE cost of tobacco imports this year is estimated at £50 million—a full £15 million more than the total for consumer goods and only £10 million less than the anticipated expenditure on machinery and equipment. Much of this tobacco comes from the United States; and the Government are said to have decided that, to conserve our dollar resources, the amount must be reduced. American growers are so confident of this cut that they have already scaled down their production plans.

If the cut were made, it could be argued that, tobacco being non-essential, ordinary private trade might be left to take its course, with the demand constantly exceeding the supply. Again, the tax might be increased until the demand came down to the level of the supply; here the objection is that any further imposition might make of smoking a pastime only for the rich. Again, rationing could be introduced, as on the Continent—a solution that would at least have the merit of tending to provide equal shares for all. Finally, what was lost from America might be made good by purchases from "soft-currency" countries; and Greece is said to have been marked as the source best able to make good the deficit.

It is not easy to gauge the priority which tobacco may justifiably be given. With essentials, such as food, our requirements can be assessed within narrow limits; while the morale value of luxuries, such as films, can also be judged with fair accuracy. Unfortunately, there is no yardstick for the measurement of tobacco's virtues. Hitherto authority has pandered to the growing national taste for a smoke; all through the war the country had as much, or almost as much, as it demanded; and there is little doubt that any restriction now would be violently opposed. Tobacco is, in fact, commonly regarded as an essential comfort, though why it should occupy this place in our affections is not clear. Plainly, smoking has not, as some have supposed, simply a symbolic value; for the chewing of gum, though better than none, is a poor substitute. Nor is its effect wholly explained by its pharmacological action. It seems likely that the comfort it brings is derived, as with alcohol, from a complex of conditions which defy rational analysis. Empirically, there is no doubt of its capacity to allay anxiety; the enhanced demand during the war was probably related less to increased spending-power than to the troubled times. For a great many people smoking has become a means of keeping a mild psychiatric

disability within bounds, and we must face the fact that any sudden or drastic reduction in supplies of tobacco would cause a sharp rise in the incidence of overt anxiety.

LIGUE INTERNATIONALE CONTRE LE RHUMATISME

This body has been reconstituted, under the presidency of Dr. Ralph Pemberton, of Philadelphia, and has been subdivided into a European Ligue and an American Ligue. A European congress will be held in Copenhagen next September and an international congress in the United States in 1949. The British branch of the Ligue is represented by the scientific advisory committee of the Empire Rheumatism Council, with Dr. W. S. C. Copeman as chairman and national representative, Dr. G. D. Kersley as treasurer, and Dr. Oswald Savage as secretary. New members will be welcome, and particulars may be had from the organising secretary, Empire Rheumatism Council, Tavistock House North, Tavistock Square, London, W.C.1.

SMALLPOX

In the Grimsby outbreak, where infection occurred in a lodging-house for seamen and farm labourers, the number of cases up to March 11 was 15, and 6 of these patients have died. All secondary cases have occurred in the direct line of contact. At least 8 contacts in this outbreak are still at large and remain unidentified.

A case of semiconfluent smallpox has now been reported in a man of 66 years, a resident member of the staff of the Empire Memorial Hostel for Seamen, in Commercial Road, Stepney. No direct connexion with the Grimsby cases has been established. This man sickened on March 3, and was removed to Mile End Hospital (L.C.C.) on the 5th. He remained there until the 9th, when he was removed to a smallpox hospital. The Ministry of Health recommends that people who visited the seamen's hostel between March 2 and 6 should be under careful surveillance until March 20, and any person who has visited the hostel since Feb. 14 should be medically examined. The source of the infection in Stepney has not yet been identified, and it is assumed that an abortive or ambulant case—probably a woman—is still at large.

Several cases of smallpox have lately been reported in Paris, and the outbreak is expected to spread.

RELEASE OF DOCTORS FROM SERVICES

THE Central Medical War Committee have been informed that the release of medical officers in class A will be as follows:

Royal Navy.—April, group 60; May and June, group 61.

Army.—*General-duty Medical Officers*: April, group 57; May, group 58; June, group 59. *Specialists*: April 1-20, group 45; April 21-May 11, group 46; May 12-25, group 47; May 26-June 4, group 48; June 5-15, group 49; June 16-30, group 50.

Royal Air Force.—April, group 58.

WE regret to report that Dr. B. A. McSWINEY, F.R.S., dean of the medical school and professor of physiology at St. Thomas's Hospital, died on March 8 at the age of 52.

WE have also to record the death of Dr. LOUIS COBBETT, a former professor of pathology in the University of Sheffield and lecturer in pathology in the University of Cambridge, who died on March 10. Since his retirement in 1929 Dr. Cobbett had continued his work on the bacteriology of tuberculosis. He was 85 years of age.

THE INDEX and title-page to Vol. II, 1946, which was completed with THE LANCET of Dec. 28, is published with our present issue. A copy will be sent gratis to subscribers on receipt of a postcard addressed to the Manager of THE LANCET, 7, Adam Street, Adelphi, W.C.2. Subscribers who have not already indicated their desire to receive indexes regularly as published should do so now.

Reconstruction

THE NATIONAL SITUATION

Exports and Agriculture

FROM A CORRESPONDENT

THE Government are now so convinced of the doctrine "export or starve" that it seems almost disloyal to cast doubt on the economics on which it is based. Yet neither the Government spokesmen nor the economists have so far advanced any substantial arguments to justify their belief in the course on which we are embarked.

Clearly there is need for a major change in the basis of our national economy if we are to survive; but the first essential is to determine our goal in the broad context of our economic history. A slight knowledge of the past is sufficient to raise uncomfortable doubts whether we are now heading in the right direction.

As every schoolboy knows, the export trade of the 19th century was built up on the manufacturing capacity of Great Britain. We had led the way in the industrial revolution, and the rest of the world was glad of our products. With the proceeds and the help of our exports of coal we were able to buy our imports of food and raw materials. But as the years passed, and at a quickening tempo during the last few decades, the rest of the world has learned to manufacture for itself. Before the war it was widely understood that the market for our exports was steadily contracting, though the effects were often masked by the rapidity of technical advance and our ability to switch from one export to another. In 1938 the position was, in round figures, that our net retained imports amounted to £857 million, including £385 million for food, while our exports stood at £470 million. The balance we made good with the income from foreign investments, and with our invisible exports.

It is this balance which has largely disappeared, and on which so much emphasis is placed today. If exports could be doubled, all would be well; but there is surely no solid ground for supposing that once the pent-up demand created by the war has been exhausted the underlying tendency to contract will fail to reassert itself. The Government have assured us that there is no danger of over-production for a long time to come; and so far as this goes it is a comforting statement. But does it not conceal an element of wishful thinking? Of course the rest of the world whose economy is almost as badly shaken as our own would like to buy all sorts of things today; but others too are trying to set their houses in order, and before long we shall surely encounter the old desire to manufacture for themselves. In some industries this will come soon, in others it may be long delayed; but the principle stands. And if exports settle down again at our pre-war level we shall indeed be stranded.

The decision lies finally not with our workers or their output—though these are of course important factors—but with the politicians of the world at large; and the world will take our exports only to the extent that suits its convenience. Gradually a new world of freer trade may emerge, but not in the next two or three critical decades.

FOOD AND ITS PRICE

What then? Let us proceed for a moment on the assumption that the above diagnosis is correct. Shall we starve? It is not enough to answer automatically Yes; we must look more closely at the age-old mechanism of supply and demand and its monetary consequences.

What really happened under the régime of the 19th century was that Great Britain was enabled by her advantage in manufactures to devote a relatively small part of her energy to the production of food. In the old phraseology, our exports enabled us to buy food abroad at a price below that at which we could produce it at home. So long as free trade endured, the price of food was bound to remain low. But with the whittling away

of free trade, and now with its virtual disappearance, a new situation has arisen of which too little account has been taken. We have not got the means to pay. The whole of the proceeds of our exports are needed for obtaining goods, chiefly raw materials, which we cannot in any circumstances produce at home. The position is obscured by the readiness of other countries to send us foodstuffs at prices lower than those at which we can produce them in sufficient quantities. Since, however, those countries are unwilling to admit freely our manufactured goods, and the other half of the free-trade equation has fallen away, the low price at which we can obtain imports from abroad has become meaningless, for the simple reason that we cannot get them save by running into debt.

The remedy is a great increase in the production of food at home, and our war-time experience shows that this is within the realm of practical politics. In the war years we achieved an increase of 35% in our food-production, and this with the very limited man-power of war-time. With peace-time facilities, our production could certainly go much higher still, and, with the exception of wheat, approximate to 100%. (The importance of the bill for imported wheat should not be over-emphasised: grain and flour cost us in 1938 only £55 million out of a total import bill of £857 million.) What prevents this increase of production? One thing alone, the price-level.

The corrective to the situation outlined above is a sharp rise in the price of food at home. Food should tend to occupy an increasingly important relative position in our home economy. Higher prices for agricultural products would mean higher wages and more man-power—in other words a greater call upon our national productive capacity. If this simply corrective mechanism of supply and demand were allowed to operate today, a significant and probably dramatic rise in our food-production would quickly follow. If this sounds too good to be true, it is because the idea that Great Britain is a country dependent on food from abroad—the industrial millions and the bread to sustain them from abroad—has become a fixed idea. It is an idea based on the assumption that we must continue for ever to fix the price of food at home at a level determined by imports from the food-exporting countries. Yet if we care to pay the price in terms of national energy, we can expect an increase in our food-production vastly greater than that of our war-time effort with its limited man-power. We might in fact come well within sight of the total which in 1938 we imported from abroad; and our old 1938 level of exports would suffice very roughly to pay for the balance of the necessary foodstuffs, raw materials for industry, and other essential imports.

It will be at once objected that a substantial rise in the price of food at home is out of the question, that it would mean a rise in the cost of living, and that this would in turn damage the export trade. But this little group of arguments is full of fallacies, and must be abandoned once we accept the full implications of the argument so far followed. A rise in the cost of living? If it means that a greater proportion of the household budget would have to be spent on food, it is true; but that is not the whole story, for the policy also holds out the prospect of an easing of the drive for exports with its pressure upon the supply of consumer goods for the home market. Thus higher prices for food would be balanced by a tendency towards lower prices for many other consumer goods. Damage to the export trade? To argue so is to put the cart before the horse. If the export trade is likely to run into heavy weather and lead us into an impasse, is it right to argue that the only possible corrective process must be abandoned because it would hamper the export trade?

BUYING WHAT WE CAN PRODUCE

So far from allowing the internal level of the price of home-produced food to rise until it commands man-

power and the other resources proportionate to our national need, we are pursuing the opposite policy. We have devised an elaborate system of artificial restriction of the price of food partly compensated by subsidies to the producer. It would take us too far afield to discuss in detail the effect of subsidies on the amount of food produced, but it may be observed that subsidies do no more than partially make up to the producer with one hand what the State has taken away with the other—the opportunity to sell his produce at prices regulated by supply and demand. Imports are a national luxury when the means of paying for them no longer exist; yet not only do we accept them on credit, but we allow them directly or indirectly to dictate the level of food prices at home.

A simple example will help to bring out the point. Let us take the case of a crop where effort is directly determined by price: that of potatoes grown in gardens and allotments. At the present controlled price at which the individual can buy potatoes (10s. a sack), it is not worth while either to employ one's own energies in the production of potatoes or to employ labour for the purpose. Were the price of food allowed to find its true economic level the price of potatoes would rise by a multiple of probably two to three times, and it would at once become advantageous to some millions of persons to grow their own potatoes. To suggest that such an action would be a waste of national energy, since potatoes can be purchased cheaply, is no answer in present circumstances, and is to drag in the assumptions of a world of free trade which no longer exists. The point on which attention should now be concentrated is that the country simply has not got the available exports with which to buy food of a kind which can be produced at home.

DEAR FOOD ?

The necessary long-term adjustment of the price-level of food relative to other goods does of course present difficulty. It involves abandoning conceptions which in the course of a century and a half have become fixed in our minds. There are, however, various ways by which the disturbances which such an adjustment would inevitably cause might be rendered bearable, and its dislocating effect upon the low-income groups be mitigated. What this article is meant to stress is the fact that the crisis which confronts us today can be remedied only by setting clearly before us the goal which a straight reading of our economic situation dictates—a major upward adjustment of the price-level of home produce in relation to the price-level of other commodities.

Frenzied efforts to capture an evanescent export market involve a further dislocation of our economy in precisely the wrong direction. Let us by all means export all we can; let us by all means take advantage of the "sellers' market" now open; but let us keep our eyes open and cease to obscure the fundamental tendencies to which we must in the long run conform. It is juggling with food subsidies, price-levels, and imports purchased on credit that is blinding us and leading us to real disaster.

A FALL IN THE STANDARD OF LIVING ?

It looks as though, sooner or later, we shall have to dispense with those imports, chiefly food, which we can produce at home if we devote to them a sufficient proportion of our productive resources. To adjust our economy in this way would involve a doubling—or perhaps even more—of the man-power and other resources allocated to agriculture and certain other allied occupations. It would involve too a sharp rise in the price of food, bread alone perhaps excepted. Prices of all other food may have to rise to something like twice their present proportion of the ordinary householder's budget.

Does this mean that we must face a fall in the real standard of living as compared with pre-war days ?

The present Government propaganda, backed by all the powerful industrial interests with a stake in the export market, asks us to believe that such a state of affairs is a dark abyss which we dare not contemplate. It is surely nothing of the kind. Let us look at the items of debit and credit in turn.

DEBIT AND CREDIT

The two chief debit items which must be faced are (1) the difficulty of adjusting the internal price-level for agricultural produce as contrasted with other consumer goods; and (2) the immediate check to industrial expansion in so far as it depends upon an expanded export market. Both of these effects, however, are transitory, and both would cease to be noticeable in a relatively brief period, perhaps 3–5 years. The effect of the check on the export industries should not be exaggerated, since by far the greater part of the excess exports of today over 1938 levels is of goods for which there is a home market already strained to the breaking-point by the divergence between demand and supply.

The items on the credit side of the account are surely of far greater consequence. Let us start with the simpler points.

First, by inviting an increased flow of man-power into agriculture we at once check and reverse many of the tendencies towards urbanisation which are themselves one of the great social problems of our time.

Second, we begin to release for the home market the productive capacity of our export industries. Do not let us forget that our present forced-exports policy can really promise little or nothing in this direction: we are told to wait till tomorrow or the next day, but there is no solid assurance that in 3 or 5 years' time the export balance will have been attained.

Third, by substituting a moderate export policy for a forced one we achieve a far greater degree of national independence; and, to the extent that we set employment at home free from the vagaries of political and other circumstances abroad, we improve our bargaining position. The state of the world is today such that nothing but the present panic about our export balance would blind us to the importance of this objective. It is linked with the fourth item on the credit side—the advantage the policy offers of enabling us to proceed without "direction" with our programme of social justice upon which all parties are at heart agreed.

EXPORT DRIVE AND DIRECTION OF LABOUR

This last point is of great significance and deserves to be closely considered. The present forced-exports policy carries with it the necessity for man-power for the export industries, but the need to sell abroad forbids any real elasticity in the wage-rates offered. This fact underlies the present "shortage of man-power"; what the outcry really means is that whereas it is notorious that many distributive and luxury trades can secure the man-power they require, the export trades, and certain other basic industries like coal-production whose costs affect the export market, are finding themselves gravely short of man-power. The Government are at present at the stage of trying moral suasion; but it is not surprising that we hear whispers of the necessity for direction. It is indeed the next step, and if the Government are driven to it our liberty will be gone, and socialism will have sold its birthright.

There is only one way of avoiding this impasse—by building our internal economy on foundations which permit of a free play of incentive and reward as between the various occupations. It must be possible for more man-power going into one industry to be compensated by less going into another, and in this vital respect we must return to the elasticity of the old economic system. Such an economy is not incompatible with socialism; but it is hopelessly incompatible with a policy of forced

exports, where wage-rates become fixed by the necessity to sell goods abroad. Socialism as understood in this country implies an economy in which man-power is distributed among the different occupations according to the free choice of the individual, and not according to the will of an authoritarian State; and that means that each industry must be free to expand or contract in accordance with the demand for its products or services measured in terms of a price-level free to move up or down.

Need we then refuse to face the implications of the policy here advocated on the ground of its effects upon our standard of living? The answer is surely No; it offers the only course which will not carry us straight towards both the dictator State and an economic disaster.

SOCIAL OBJECTIVES

A word must be added in regard to the new meaning of the phrase "standard of living."

It happens that the economic crisis due to the loss of our foreign assets has coincided with the first serious attempt in this country to control the economic machine, and to put social objectives above purely economic objectives. The country has decided to put steady employment above private profit; to put a fair share of the necessities of life for all above the unrestricted distribution of the days of *laissez-faire*; and so on. It has in fact decided—and we are not likely to go back in this—to make a great change in the conception of "standard of living." It is not practical politics to embark on a programme of social justice and to judge the results by the purely material formula devised by the economists of a generation since. The sooner this is recognised the better; and our Government today, by accepting the view that failure to achieve a pre-war "standard of living" would amount to disaster, are doing themselves less than justice.

Medicine and the Law

"Wilful Refusal" to Consummate Marriage

HOWEVER simply a parliamentary draftsman may frame an enactment, some difficulty may be expected in its application. What could be clearer than these words in section 7 of the Matrimonial Causes Act, 1937 (for which Sir Alan Herbert, that master of the written word, had some responsibility)—"A marriage shall be voidable on the ground that the marriage has not been consummated owing to the wilful refusal of the respondent to consummate the marriage"? What is consummation? What is wilful refusal? One question was answered in 1945 in *Cowen v. Cowen*. The other is answered, subject to the final opinion of the House of Lords, in the recent case of *Baxter v. Baxter*.

In the *Cowen* case (*Lancet*, 1945, ii, 183) the parties agreed, as their married life began in the Persian Gulf where hospitals were not yet air-conditioned and where, as they believed, childbearing would be dangerous for a European woman, to practise contraception. The husband used a rubber sheath; later he practised coitus interruptus. Subsequently, when the element of danger to the wife from childbirth no longer existed, he continued to insist upon contraceptive methods. She begged him to lead a normal married life and allow her the chance of motherhood. He refused to change his course and he left her. She petitioned for annulment of the marriage under section 7. Mr. Justice Pilcher felt obliged to hold that complete penetration must amount to consummation. His decision was reversed.

"We are of opinion," said the Court of Appeal, "that sexual intercourse cannot be said to be complete when a husband deliberately discontinues the act of intercourse before it has reached its natural termination or when he artificially prevents that natural termination, which is the passage of the male seed into the body of the woman. To hold otherwise would be to affirm that a marriage is consummated by an act so performed that one of the

principal ends, if not the principal end, of marriage is intentionally frustrated."

The court held that the husband had wilfully refused consummation; the wife was awarded her decree of nullity. *Baxter v. Baxter* was, in a sense, the converse case. The wife firmly refused to have a child, and her parents supported her in that determination. Throughout their married life she declined to allow her husband to have intercourse with her unless he took the precaution of using a contraceptive. According to the *Cowen* decision she had wilfully refused consummation. The husband, however, had to establish that the non-consummation was due to her wilful refusal. This he failed to do. The trial judge found that the non-consummation was due rather to the husband's own action in acceding to his wife's "request"; he had not made an attempt to have intercourse without contraceptives. Whether it was the request or the demand or the insistence of the wife, the husband was not entitled to the annulment of the marriage if he had acquiesced in the wife's requirements. In such a case, said the Court of Appeal, the husband would not be entitled to say that the wife had been guilty of wilful refusal within the meaning of section 7 until at least he had unsuccessfully brought to bear "such tact, persuasion and encouragement as an ordinary husband would use in the circumstances." The husband had acquiesced, though no doubt reluctantly, in the conditions imposed by his wife. "A reluctant acquiescence is nevertheless an acquiescence."

The *Baxter* petition, like the *Cowen* petition, was undefended. The King's Proctor was asked by the court, in view of the importance of the questions involved, to instruct counsel to argue in support of the trial judge's decision. The Court of Appeal upheld that decision and dismissed the husband's appeal, though leave was granted for the case to be taken to the House of Lords. It will be of interest to see how far the supreme appellate tribunal can discourage an impression that the "weaker sex" has the less difficulty in rebutting the allegation of acquiescence. In the *Cowen* case counsel who addressed the Court of Appeal as *amicus curiæ* suggested that the wife's conduct, if it amounted to acquiescence, might bar her from judicial relief. The judges, however, accepted the explanation of the origin of her consent to her husband's refusal of free intercourse and took into account her subsequent attempts to change his mind. In both cases the Court of Appeal declared that judicial decision must depend on the facts proved.

Public Health

Infectious Disease in England and Wales

WEEK ENDED MARCH 1

Notifications.—Smallpox, 5; scarlet fever, 1167; whooping-cough, 2290; diphtheria, 186; paratyphoid, 0; typhoid, 5; measles (excluding rubella), 13,337; pneumonia (primary or influenzal), 981; cerebrospinal fever, 74; poliomyelitis, 8; polioccephalitis, 2; encephalitis lethargica, 2; dysentery, 92; puerperal pyrexia, 109; ophthalmia neonatorum, 67. No case of cholera, plague, or typhus was notified during the week.

The 5 cases of smallpox were notified at Grimsby (see p. 339).

Deaths.—In 126 great towns there were no deaths from enteric fever, 2 (0) from scarlet fever, 5 (1) from diphtheria, 25 (0) from measles, 15 (0) from whooping-cough, 83 (12) from diarrhoea and enteritis under two years, and 121 (32) from influenza. The figures in parentheses are those for London itself.

The number of stillbirths notified during the week was 300 (corresponding to a rate of 28 per thousand total births), including 42 in London.

Winter in Scotland

During the long cold spell Scotland seems to have had less sickness than usual for the time of year. This view was given to a press conference on Feb. 28 by Sir Andrew Davidson, chief medical officer of the Department of Health, who added that three or four weeks previously children's ailments had threatened to be heavy but then died down as the weather became colder. Practitioners, he said, described the people as "miserable, but not ill."

In England Now

A Running Commentary by Peripatetic Correspondents

I HAVE often thought that a handbook for prospective wives of G.P.s would be worth publishing. Each chapter would deal with some aspect of the life, and at the end the candidate ought to be able to decide whether the game was worth the candle. I haven't time to write the book but I propose to dash off a few concise notes while the doctor is out on his rounds. They are not intended to be read by the minute percentage of doctors' wives-to-be who expect to spend the early years of marriage surrounded by nannies, maids, cooks, gardeners, chauffeurs,

and secretaries, but by the austerity bride who will have to give up the dining-room in her villa for use as a consulting-room and strive to keep down expenses and maintain morale by looking after the children, the house, the meals, the garden, the patients, the telephone, the back door, the front door, and above all the doctor, practically single-handed.



Let us start with *The Telephone and How to Deal With It*.

One is warned as a bride of the dangers of living with relations, but the phone is a far more exacting companion than any mother-in-law—one can at least leave the good lady to look after the babies. The instrument is magnetic for children. I shall not forget trotting in from the garden one afternoon to answer it only to find my four-year-old standing on the chair and lisping into the mouthpiece: "My doctor will be back at ten-thirty." She replaced the receiver as I reached her. The call was urgent. Her daddy was asleep in a deck-chair.

If you have only one instrument put it in the kitchen near a comfortable chair by a table with a packet of digestive and alkali tablets thereon. (It is worth while finding out whether you have hyper- or hypo-acidity.) Have a line laid to every room with a plug and switch for connecting (and particularly disconnecting) the thing. If you can afford only one extension line have it laid to the w.c. At meal-times always go to the phone with your mouth full. It is more convincing. If your man hasn't a microphone manner like Stuart Hibberd it is better to answer the call yourself; better for the practice, I mean. Always gain the upper hand by asking more questions than the caller. This is more soothing for you both and transfers some of the responsibility to the caller. Get the facts. Truth is stranger than fiction and safer than friction. If caught cooking, turn off all gas and electricity before answering the call; an extra call after dinner is better than a burnt offering for a meal. If you hear nothing on lifting the receiver, shout loudly "Press button A!" Your voice must carry over the traffic. Then listen carefully. Country people do not willingly waste tuppence to tamper with infernal machines. Sweetening is vital when dealing with supervisors, but the men on at night are usually dears. When it's woman to woman you will know how to cope, sister. You will soon find that one of the most infuriating questions is "When will the doctor be here?" The correct answer is only learnt after hours of practice understudying B.B.C. actors. The answer comes with a light, broken laugh mixed in with this phrase: "Well—sometime—I hope."

How to deal with what you know to be an unwanted call: *You*, "I'm sorry, he's out." *Caller*, "When'll he

be in?" *You*, "I don't know." *Caller*, "Can you...?" *You*, "I'm going out." *Caller*, "I really wanted to speak to him personally. It's er..." *You*, "Can I take a message?" *Caller*, "Well, not really... I..." *You*, "Then will you ring at midnight? He'll be in then. There's a baby on the way." (There is one born every minute.) *Caller*, "I see, well, er..." *You*, "The milk's boiling over. Goodbye." A final word: don't use the blockage gambits such as "The doctor is just (having a bath, in a snowdrift, the lavatory, the chemist's, town, &c., &c.)." They won't work and he'll never remember the alibi anyway.

My finest hour was when the firstborn of the night supervisor at the local exchange was being delivered. Tied to his post of duty, he rang me up every so often to find out if the doctor was back, saying, "It's so nice to have someone to talk to at a time like this..."

* * *

Our penchant for collecting lamps, antique and otherwise, from the ships in which we serve, ensured that we had two lamps in commission in our temporary house when the "Save-the-Transformers" cut followed close on the "Forbidden Period." A fine swinging model in our country kitchen suggested the roll of the ship and the creak of the timbers, and a table-lamp transformed the dining-room to a Nelson cabin. The problem was candles for stairways and bedrooms. The graceful Nell Gwynns, like the dressing-table candlesticks, were still not unpacked; but we had been using Gurr's embedding paraffin wax (remaining from my pre-war laboratory) to coax morning fires, so at least we had the raw material, and the wax melted quickly in a jam-jar on the hearth. Two tumblers in a basin of cold water, with a string wick hanging centrally from covering pieces of cardboard, were the first moulds. The next refinement was a wick of cut taper, inserted during cooling *au moment critique*; but a corkscrew wick was the reward of the tiro. The result at the end of an hour was: candles, 3; tumblers, 1. The final products had but a faint resemblance to the ecclesiastical species.

Did you know that there is a subtle relationship between the number of wick fibres and the diameter of the periparaffinium? This proportion was not quite right in my giant night-lights—so to the manufactory once more, this time to attempt a carriage-candle. I can now produce a carriage-candle such as they turn out tailor-made from a mould. I use a quarto sheet of paper, rolled to a tube and closed at one end, filled with melted wax and then cooled in water in a quart milk-bottle, and William Tell has nothing on my central placing of the taper. I might even consider accepting honorary membership of the candlemakers' union.

* * *

All this talk about dangerous drugs being stolen from doctors' cars conjures up painful pictures in the layman's mind of small boys chewing phenobarbitone tablets by mistake for acid-drops. The actual risk of any harm being done is very small indeed—so far as I know there has never been a death from this cause—but the average member of the public doesn't see it that way. When he hears one of the periodical announcements on the wireless his immediate reaction is one of righteous indignation. "Why the blazes can't these doctors look after their darned drugs? They're always leaving their stuff about. They ought to be prosecuted..." and so on, and so forth. There is only one certain protection: never to leave any case, parcel, bag, or other package containing dangerous drugs in one's car unattended. It is a beastly nuisance having to remember such details when one is busy with more important matters. But all this gets the profession a bad name. If a doctor likes to take a chance with his rugs or even his instruments, that is his affair. But when it comes to dangerous drugs I'm afraid it is a public duty to be careful. While there are sneak-thieves about we shall have to carry as few drugs about as possible, and either carry them in a pocket case or lug our bag into every patient's house. There seems to be no alternative.

* * *

It was good to receive my *Lancet* again; to tear off the wrapper, and throw it in its accustomed ball to the cat; and to go back with a click of the pleasant routine of early February. Thank you, Mr. Shinwell!

Letters to the Editor

THE INTRAVENOUS DRIP

SIR,—There is a present tendency to regard an intravenous drip—whether of saline, plasma, or blood—as a necessary concomitant to any major surgical procedure.

No-one with experience of what blood-transfusion has contributed to the surgery of injury will question its value. No-one with wide experience of abdominal surgery can deny the extreme importance of intravenous fluids in certain conditions. It is the abuse of the method that I would be glad to see restrained.

It is an abuse to set up an intravenous saline drip as a routine for a major surgical operation, not because the fluid is needed but in anticipation of trouble. An intravenous drip has obvious dangers. It may cause thrombosis, and in the debilitated it increases the likelihood of bronchopneumonia. Because, for instance, once in a hundred times a surgeon may have difficulty with the left gastric artery, must a hundred patients for gastrectomy suffer the liabilities of an intravenous drip? If the patient is well prepared for operation and the operative technique is impeccable, most cases of gastrectomy recover with uniform smoothness. A drip is rarely needed. The blunderbuss use of intravenous fluid therapy does not improve the results, and does cause trouble.

Other and more able writers have written to the same effect in the last few years; yet, returning to abdominal surgery after some years away, I find myself encompassed by this barrage of bottles, this dangle of drips. The intravenous drip is an exact method of treatment, with precise indications for its use. We need to teach our registrars and house-surgeons what these indications are. We should, I think, make it equally clear that an intravenous drip will not assist a failing myocardium, or take the place of fluids given by mouth into an alimentary canal capable of absorbing them, or compensate for defects in surgical and anaesthetic technique. Such uncontrolled use increases the liabilities of the method.

I trust that this attitude will not be looked upon as reactionary. It is an old adage that there is reason in all things.

F. H. BENTLEY.

Department of Surgery, Newcastle-upon-Tyne.

DEATH FROM X-RAY APPARATUS

SIR,—One hesitates to stimulate public alarm by further comment in the case of the radiographer who lost his life in the performance of his duties at the Derby Borough Health Department's chest centre last November (*Lancet*, Jan. 25, p. 156). But I fully endorse the coroner's reported observations to the effect that the corporation had failed in its duty to staff and public in permitting the use of obsolete non-shock-free X-ray apparatus. It is nonsense to say that shock-free equipment is very difficult to obtain.

During the past 16 years, as consultant technical adviser to the Central Bureau of Hospital Information (British Hospitals Association), I have had ample opportunity to observe the reactions of local hospital committees to the suggestion that apparatus which still appears to function adequately should be scrapped. I have found that the situation is governed, not by recommendations from official bodies, consultants, or engineers, but by financial considerations. A qualified radiographer would be upheld in refusing to use unsafe equipment, but familiarity and reluctance to quarrel with the employing authority would make his refusal less likely.

Advice on the subject has always been available through the British Hospitals Association; but, unless there is another accident, nothing short of a general census and survey throughout the country will bring to light the highly dangerous working conditions you describe.

The radiologist is a medical man whose time is fully occupied in the diagnosis and the treatment of medical and surgical conditions revealed within this scientific branch of medicine, and the number of radiologists is greatly exceeded by the number of X-ray sets in existence. In the National Health Service experienced X-ray

engineers at regional level, working in consultation with area radiologists responsible to a senior consultant at the Ministry of Health, might be the solution.

Any person can purchase and operate X-ray apparatus, obsolete or new. Legislation is obviously required within the new health services if patient and operator are to be protected against repetition of the distressing occurrence at Derby.

London, S.W.1.

H. T. FERRIER.

AMPHETAMINE IN SURGERY

SIR,—Since reading Dr. Houghton's article of Dec. 14 on the effect of amphetamine in pulmonary tuberculosis I have had an opportunity of putting this drug into use.

Six weeks ago a man, aged 54, suffering from chronic suppurative pneumonitis of the right lung which was breaking down into two abscesses and producing about 15 oz. of foetid sputum a day, was operated upon more or less as an emergency, owing to increasing toxæmia and hæmoptysis. His general condition was poor and the disease was spreading rapidly. Right pneumonectomy was performed and the patient, profoundly toxic, took two days to regain consciousness. When he woke he was extremely depressed and exhausted and had lost any hope of recovering. When, twenty-four hours later, he began to receive two tablets of 'Benzedrine' twice a day his spirits rose quickly. He suddenly started coöperating in the postoperative treatment and, though still extremely weak, responded to the efforts of the physiotherapist to make him cough, move about, and believe in his recovery. He has since completely recovered.

Patients occasionally die, when seriously ill, from resignation and loss of hope. I am convinced that the raising of his spirits by amphetamine was the main factor in his survival.

Hillingdon County Hospital,
Uxbridge, Middlesex.

L. FATTI.

TREATMENT OF TUBERCULOSIS

SIR,—The well-run modern sanatorium is completely successful within its limits; these are at both ends of residential treatment and are defined without its opinion or consent. The medical superintendent does not choose to admit 80% of his patients in stages II and III; nor does he have any power to implement his advice to them on discharge. He knows quite well that 60% of the B II and 90% of the B III cases will be dead in five years if all he can do for them is to increase their resistance by graduated rest in hygienic conditions; he knows also that his patients can maintain that resistance only as long as they enjoy the sheltered conditions demanded by their lessened function. It is not his fault that sanatorium treatment is "all middle and no ends."

It is twenty-eight years since Bardswell demonstrated that mortality after sanatorium treatment is dependent upon the extent of disease on admission. Every survey since his report has supported him, and several have added to our knowledge the fact that the average length of life from the first appearance of tuberculous cavitation is five years. One conclusion he drew was that something more than passive residential treatment was necessary.

At the admission end we are now trying to find our patients at an earlier stage of disease and at a time before their resistance is broken. One method is mass miniature radiography. By this method we also help to disclose unsuspected sources of massive infection that are producing adolescent primary phthisis and post-primary adult-type phthisis in children; for these sources of massive infection will operate with or without the conditions of overcrowding and bad hygiene which prevail amongst large sections of our community.

In the middle we have added collapse therapy. Since its introduction the prognosis of patients at Midhurst Sanatorium in stage B I has improved steadily; for those admitted in the years 1933-35 the five-year survival-rate was 93%. In spite of this everyone will agree that a surgical unit which brings only mental anguish is better shut down. An operation that has not been explained to the patient in its function, preparation, and aftercare as only a modification of the basic principles of rest, and has not the full coöperation of the patient is as useless to him as it is to his physician and surgeon. In 1946 175 major operations were performed in the surgical.

unit at Papworth; the only tension observed was in the overworked nursing staff who carried on with magnificent spirit in spite of their depleted numbers since the withdrawal of the Essential Works Order. Many of them have known the benefits of collapse therapy in pneumothorax and thoracoplasty.

At the end of discharge the average patient has a bleak outlook. To maintain his resistance he needs economic security for the leisure outlined for him by the sanatorium superintendent. Any treatment that is not followed by a full pay-packet so that the patient can get sufficient food is a mere mockery. Lessened function and ostracism soon undo the benefits of the sanatorium. We are all anxious to see the rules of health carried out in airy homes and workshops, a high standard of living with the maintenance of real wages, and a happy atmosphere of work. These are the conditions which could rapidly reduce the incidence of phthisis. That we cannot see them in our day is no reason why we should not do more now to provide them for our ex-patients in new village settlements.

Let us keep our sense of balance. Why blame the sanatorium?

R. R. TRAIL

Medical Director, Papworth and Enham-Alamein Village Settlements.

London, S.W.1.

FETAL DEATH AND ECLAMPSIA

SIR,—Dr. Zondek in his article of Feb. 1 clarifies some anomalies when he says: "Death of the fetus may be either primary—i.e., independent of the placenta—or secondary, due to death of the placenta."

Browne¹ states in connexion with eclampsia: "If foetal death occurs the patient always improves." The following case-history provides an exception:

A woman, aged 42, was admitted in the 26th week of her second pregnancy, after having had an eclamptic fit. Foetal movements had suddenly stopped 4 days previously; and all signs and symptoms of toxæmia had developed thereafter. She had massive generalised œdema, severe headaches, and epigastric pain on the day of admission. There is no doubt that the fetus had died as long as 4 days before admission, for it was in an advanced state of maceration when delivered.

In this case it seems that foetal death occurred independently of the placenta, which when delivered showed only small areas of old infarction.

It appears to be generally accepted that viable placental tissue must be present for pre-eclamptic toxæmia to develop. It is therefore important to realise that the placenta may survive after foetal death and that, as in the above case, pre-eclamptic toxæmia and eclampsia do not subside, and may even develop. One must guard against complacency when foetal death has occurred in a case of pre-eclamptic toxæmia or eclampsia.

General Hospital, Nuneaton.

W. P. HIRSCH.

DOCTORS' SALARIES

SIR,—The advertisements in your columns of vacant medical appointments leave me anxious about the sufficiency of salaries offered to medical men for responsible posts, especially for those requiring residence in or about London.

Many salaries are in the region of £800-£1000 a year. I wonder if it is generally realised that it is extremely difficult for a man and his wife, even without children, to live in London on such amounts. The following is the approximate position:

| | £ |
|--|-----------|
| Rent, rates, and garage | 200- 250 |
| Food and laundry | 208- 260 |
| Electricity, gas, light, coal | 25- 35 |
| Holidays and fares | 35- 50 |
| Clothes and furniture renewals | 100- 150 |
| Insurance, sickness, &c. | 50- 100 |
| Telephone | 10- 20 |
| Presents and entertainment | 10- 25 |
| Car | 50- 100 |
| Income-tax | 175- 300 |
| | £863-1290 |

To this must be added the cost of recreation and sport, fees and clothing for children (if any), domestic help, subscriptions to medical societies, doctor's and dentist's accounts, and out-of-pocket petty cash.

1. Browne, F. J. *Antenatal and Postnatal Care*, London, 1942, p. 360.

Many of today's salaries are instituted on the advice of senior medical men; and what we offer ourselves is the "yardstick" which the Ministry of Health and Treasury officers will use in determining salaries to be paid to doctors by the State.

London, W.1.

HAROLD DODD.

PENICILLIN IN GENERAL PRACTICE

SIR,—In general practice I have found that moderately and very ill patients can often be treated satisfactorily with penicillin by the following method. For a moderately ill patient suffering from a complaint considered clinically suitable for penicillin therapy 100,000 units in distilled water, together with 300,000 units in oil, are given intramuscularly at the earliest opportunity. Daily injections of 300,000 units in oil are repeated thereafter until the patient is out of danger.

The initial dose of penicillin in distilled water seems to produce a rapid rise of penicillin-level in the blood which is lethal to sensitive organisms; meantime the slowly absorbed penicillin in oil gradually takes over and when repeated daily provides an effective and fairly constant level. Ambulatory patients can be given penicillin in oil into the upper arm for several days. The application of cold compresses and immobilisation of the injected arm might be worth trying as an aid to slow absorption.

Louth, Lincs.

ANDREW S. HUNTER.

** The method suggested has considerable advantages, but a daily dosage of 300,000 units will not ensure blood-levels high enough to deal with all strains of staphylococci. The dosage required depends not so much on the severity of the illness as on the resistance of the organism and how well it is entrenched in avascular or necrotic tissue. Thus impetigo may require a higher dosage than cavernous sinus thrombosis. If necessary 600,000 units in beeswax-oil can be given at a dose without causing overmuch local swelling, and this dose can be continued daily for at least 8 days. It should however be noted that beeswax and peanut-oil mixtures are more liable than aqueous solutions to produce hypersensitive reactions.—ED. L.

TOXICITY OF THIAMINE

SIR,—Your timely annotation of Feb. 8 is, I think, the only contribution to this question published in England, apart from my own paper¹ in 1943. I would therefore like to make some comments.

You say, Sir, that Jolliffe² did not observe any toxic effects in over 3000 patients and that Borsook administered 100 mg. of thiamine daily to 70 patients intravenously for three years without untoward reactions. All Jolliffe's patients, however, and very probably Borsook's patients, had clinically manifest deficiency disease, but most of the published cases of untoward manifestations after vitamin-B administration did not have manifest symptoms of deficiency at the time of the incident. Moreover, some of these patients had frequent and regular injections of thiamine without any side-effects for a long time, and unpleasant reactions occurred only when the course was interrupted or the interval between injections was prolonged sufficiently to produce hypersensitivity. There is certainly need for further investigation into the frequency and severity of these reactions, especially into the immunological response in the hypersensitive state, and, as you suggest, into the stability of commercial thiamine preparations. This is the more important because the scope for thiamine therapy appears to be widening rapidly—e.g., in Russia large-scale investigations have recently been made of its use for the acceleration of labour and reduction of pain during parturition.

It is likely that most cases with an allergic reaction would have been found to have a well-marked eosinophilia after thiamine administration, as in my case 1.

Your annotation attributes to me the suggestion that the thyrotoxic reaction observed in some cases after thiamine therapy is due to overdosage, and you say: "overdosage in therapy is so common that it must be supposed that supersaturation, with or without faulty excretion, causes the thyrotoxic symptoms and not

1. Leitner, Z. A. *Lancet*, 1943, II, 474.

2. Jolliffe, N. *J. Amer. med. Ass.* 1941, 117, 1496.

simply an overdose." The word overdose was used by me in a quite different sense, and I certainly did not state that the thyrotoxic reaction was due to thiamine overdose. Furthermore, it is questionable whether simple supersaturation could cause it, since the storage of thiamine in thyrotoxicosis seems to be reduced³ and the excretion of thiamine in sweat is more or less proportionally increased with the increased perspiration of the thyrotoxic patient.⁴ It is evident that the thyrotoxic reaction in the cases observed was due to the administration of thiamine, but it appears to be caused neither by simple overdose nor by supersaturation with thiamine. Recent work on the inter-relationship between the various members of the vitamin-B group⁵ suggests that disturbance of the balance between the members of the vitamin-B group after administration of comparatively large doses of thiamine may precipitate the thyrotoxic symptoms.

Lastly, you say in your annotation that "the anaphylactic phenomena have been shown to be due to thiamine and not to the usual preservative chlorobutanol" and quote Mills⁶ and Haley and Flesher.⁷ But the latter carried out a series of experiments on rabbits and concluded that "anaphylaxis plays no part in thiamine hydrochloride toxicity as seen in rabbits. However, injections of a sensitising dose apparently increase the resistance of the animal to toxic injections of thiamine hydrochloride."

London, W.1.

Z. A. LEITNER.

LUCKY LUTON

SIR,—Your annotation on Some Luton Families should lead many of us to read Mr. C. G. Tomlinson's book *Families in Trouble*. Luton is so fortunate in its social and economic structure that its "submerged tenth" is reduced to a submerged hundredth. In such happy circumstances the submerged family stands out in striking contrast with its social surroundings and is all the more easily studied.

Amongst the factors causing submergence the first mentioned is "subnormal mental capacity"—a finding with which all who have studied this problem will agree. Your annotation then proceeds: "Moreover, most of the families exhibiting mental deficiency are not problem families; so that to be subnormal mentally is by no means a necessary first step towards becoming a social problem." How can these statements be reconciled?

Hornsey, London, N.S.

R. P. GARROW
Medical Officer of Health.

** We intended to suggest that mental subnormality in a family does not necessarily mean that it will become a social problem.—ED. L.

PSYCHOSOMATIC APPROACH TO ORTHOPÆDIC SURGERY

SIR,—Mr. Le Vay in his enlightened essay (Jan. 25) emphasises the relation between the emotional state and recovery in orthopædic conditions. He pays a graceful tribute to the orthopædic service of the Royal Air Force; but he makes a statement that might be misunderstood. He says: "The magnificent results in the Royal Air Force were achieved with such first-class material that it was possible to separate the sheep from the goats without being wasteful, and for a specific end."

Royal Air Force orthopædic rehabilitation centres catered not only for aircrew but for ordinary ground tradesmen who represented a normal cross-section of labour available for industry. The final results after rehabilitation in the two groups—aircrew and ground personnel—were comparable.

Orthopædic rehabilitation was organised on an injury-group basis. The personalities of men undergoing rehabilitation were, as the result of six years' experience, classified as follows: (1) first-class personnel who would get better by their own efforts; (2) the average type who could be greatly improved by the organisation; (3) the passive non-cooperators whose morale could be improved

by the group they were working in; and (4) the active non-cooperators who were treated as individuals, being removed from their injury group because of their bad influence but still retained at the centre. The only "goats" not retained and treated by the organisation were the basically abnormal or psychotic personalities. We confirmed that every case of physical trauma has some psychological trauma whose degree is conditioned by the basic personality.

The problem of returning aircrew to the air was similar, to that of returning the miner to the pit: both go back to the environment which gave them their injury. Sir Reginald Watson-Jones has organised rehabilitation centres for miners in England, Scotland, and Wales, using the proven methods of the Royal Air Force, and these centres have in the past three years had results similar to those at the R.A.F. centres.

R.A.F. MEDICAL OFFICER.

THE FAMILY

SIR,—Prof. J. C. Spence's lecture summarised in your issue of Jan. 11 is another welcome sign of increasing interest in the wider implications of health. If, as would seem probable, the family is the normal environment of the human person, in which, especially during childhood, he can most readily attain wholeness of being, this provides a useful yardstick for assessment of every new or old ideology, law, or fashion. If its effect is to strengthen the family institution, it is good; otherwise it is bad.

The test may be demonstrated in a seemingly small matter in my own sphere of work, public health and school medicine. Midday meals at school for all children: is the principle good or bad? While a convincing case can be made for meals at school for some children in some circumstances, their effect if taken by all children as a normal part of school life would be to loosen home ties and so weaken the family.

By this test a great deal of what has rather uncritically been accepted as evidence of progress is found to be of dubious value. Professor Spence has condemned the industrial revolution for its effect upon neighbourliness. (It stands equally condemned for destruction of joy in craftsmanship, for the divorce from the land, and for mechanical, passive means of recreation.) The lapsing of the mass of the population from positive religious belief might be shown, I believe, to have been equally disastrous for human wholeness and happiness. And while he would be bold who, in England today, assailed the notions of equality and liberty, to which we all pay lip-service, it may be well to consider carefully what we mean by these terms, how far we are in fact equal or free, and how much good the current conceptions are to us.

To come from theory to practical suggestion. While we continually talk about the importance of the family, there is scope for study of the family in fact. Some excellent work has, of course, been done in this respect by the workers at the Peckham Health Centre, and contributions are made from time to time to the medical press by medical officers of health and others on particular family problems and on problem families. But the field still awaits exploration, and for those whose whole-time duty it is to study and advance the public health it seems as important as ever was epidemiology in a past generation.

B.A.O.R.

J. V. WALKER.

RUBELLA AND CONGENITAL DEFECTS

SIR,—I have heard of two recent cases of rubella early in pregnancy. In one case the mother had rubella in the first 3 weeks of pregnancy. It was a mild attack with no sore throat or enlarged glands, and she was in bed for only 2 days with slight fever and a rash. The child, born in 1946, has bilateral cataract and is also deaf. In the second case the mother had a similar attack of rubella at 8–11 weeks of pregnancy. The risk of congenital defects was recognised in this case because the mother had heard Professor Haldane's reference to it on the wireless, so the child has been carefully observed. The child is now 3 months old, and no defects have appeared. There is certainly no cataract or heart lesion, and no severe deafness; it is of course too early to say that hearing is normal.

3. Drill, V. A., Sherwood, R. *Amer. J. Physiol.* 1938, **124**, 683.
4. Cornbleet, T., Kirch, E. R., Bergheim, O. *J. Amer. med. Ass.* 1943, **122**, 426.
5. Richards, M. B. *Brit. med. J.* 1945, **i**, 433. Leitner, Z. A. *Ibid.*, p. 609; *Lancet*, 1946, **ii**, 960.
6. Mills, C. A. *J. Amer. med. Ass.* 1941, **117**, 1501.
7. Haley, T. J., Flesher, A. M. *Science*, 1946, **104**, 567.

It seems particularly important in the present state of our knowledge that cases should be recorded where the mother has rubella early in pregnancy and the child is born without any malformations.

Galton Laboratory, University College,
London.

JULIA BELL.

AMYLOID MACROGLOSSIA

SIR,—Dr. M. D. Baber's case (Feb. 8) is of great interest and helps to show that cases of primary amyloidosis, notably those accompanied by obvious macroglossia (the Lubarsch-Pick syndrome), are not of such extreme rarity as was supposed until ten years ago.

When an example was described by Weber, Cade, Stott, and Pulvertaft in 1937¹ macroglossia due to amyloidosis was unknown in Britain, though cases had been published in America. Since then besides the two recorded by Barnard, Smith, and Woodhouse² quite a number of cases of primary amyloidosis—with or without macroglossia—have been brought forward and others have remained unpublished. Personally I have seen two typical examples of the Lubarsch-Pick syndrome shortly before the commencement of the war, and I hope they will be described by the doctors through whose kindness I was able to examine them. I suspect that some cases recorded in medical literature—even during the last ten years—have not been recognised as examples of the Lubarsch-Pick syndrome.

For instance, I recently came across the account of a case demonstrated by Dr. G. H. Belote³ as one of "tertiary syphilis with amyloid deposits in the eyelids, lips, tongue, pharynx and larynx" in a man, aged 56, complaining of sore tongue. Ten years previously the tongue had shown "some thickening, but no ulceration." When this case was demonstrated there were waxy flesh-coloured papules on eyelids and lips; and there was thickening of the tongue, of the alveolar regions, of the tonsillar region, of the pharynx, and of the larynx. The serological reaction for syphilis was negative, and a biopsy showed amyloid material.

Surely, that was an example of the Lubarsch-Pick syndrome. I do not know if it was described later at greater length.

London, W.1.

F. PARKES WEBER.

SIR,—Dr. Margaret Baber's report of another case of amyloid macroglossia (Feb. 8) prompts a brief note of two further cases of atypical amyloidosis, both men, one with macroglossia.

CASE 1.—A man, aged 59, bedridden for two years, died at home in October, 1945, in a manner suggesting congestive heart-failure. He came to necropsy because he had received a full military pension for rheumatoid arthritis since the war of 1914–18. The notes are summarised: widespread rheumatoid deformities of all limb joints; wasting; gross generalised œdema; pallor and puffiness of the face, with thick lips; tongue enlarged to fill the mouth; sterile pus in one knee-joint; heart 420 g.; microscopically, much amyloid in the tongue, heart, kidneys, spleen, and adrenal glands. (One of the cases reported by Edwards⁴ had rheumatoid arthritis.)

CASE 2.—A boiler fireman, aged 61, was admitted to hospital in August, 1945, with congestive heart-failure after 18 months of ill health; he had dyspnoea, retrosternal pain on exertion, aching legs on exertion, giddiness, insomnia, and swollen ankles. The blood-pressure was 60/35 mm. Hg in hospital, and the hæmoglobin 77%. The condition was diagnosed as myocardial fibrosis. Necropsy four hours after death on the third day in hospital showed œdema of legs, moderate ascites, and bilateral hydrothorax; large thick-walled heart (580 g.), pale, of rubbery consistence, and with many subepicardial petechiæ; spleen (340 g.) of a striking red colour, firm and friable, resembling a cake of wax; no macroglossia. Microscopically, amyloid was present in very large amount in heart, spleen, kidneys, and adrenals; in rather less amount in liver, pharynx, tongue, gastrocnemius, pancreas, meninges, a meningioma, diaphragm, prostate, thyroid, and lung; and none was found in biceps and skin.

1. *Quart. J. Med.* 1937, 6, 181.

2. *J. Path. Bact.* 1938, 47, 311.

3. *Arch. Derm. Syph., N.Y.* 1937, 35, 540.

4. Edwards, J. L. *J. Path. Bact.* 1945, 57, 283.

The spleen contained many giant-cells of foreign-body type, presumably a reaction to amyloid which almost replaced the whole bulk of the organ. The gastrocnemius also showed a striking myositis. (The notes of more than one case previously recorded mention pains in the legs comparable with claudication.)

Specimens and sections of these two cases were demonstrated at a meeting of the Association of Clinical Pathologists in January, 1946.

Where the amyloid deposit is slight, it is in sheaths of smaller blood-vessels and in interstitial fasciæ. The three cases which have now been seen in this department suggest that atypical systemic amyloidosis is a disease sui generis, which may affect any tissue in the body.

Department of Pathology,
Royal Infirmary, Preston.

F. B. SMITH
R. T. COOKE.

PREVENTION OF EPIDEMIC NEONATAL DIARRHOEA

SIR,—In his article of Jan. 11 Mr. Stern suggests that "infection may be spread by the heavy and increasing contamination of the film which forms in feeding-bottles in constant use." Is it not time that the narrow-necked bottle was discarded altogether and the 'Hygeia' type of wide-necked, straight-sided bottle, with large rubber teat, substituted? I believe these bottles are widely used in Canada and the U.S.A., and feel sure they could be produced in England too. The hygeia bottle is readily cleaned with hot water, to which washing soda has been added, and a stiff brush; and all parts of the bottle are easily accessible to the brush, which is patently not so with the narrow-necked bottle. The formation of film is thus easily prevented, and the bottles must of course be boiled for each feed.

With regard to the suggestion that sterilisation by boiling destroys rubber teats, I have been using the same teat for my own baby for over 4 months now. It has been boiled daily for at least 5 minutes and shows no sign of perishing yet; and this is not an isolated experience.

Johannesburg, South Africa.

ELIZABETH LUND.

RECRUITMENT OF STUDENT NURSES

SIR,—Speaking from personal experience, based on the entry of a daughter into general nursing training, I strongly support the need for revision of the pay of student nurses along the lines suggested by your correspondent of Feb. 8. The position is worsened by the fact that the Commissioners of Inland Revenue have decided that no allowance is given for any child who earns more than £50 per annum (except for scholarships). This decision at once excludes any tax relief for parents paying higher rates of tax who have been public-spirited enough either to agree to, or to stimulate, the entry of their daughters into nursing.

It is obvious, of course, that if the pay of student nurses is increased similar increases must be granted to all the more senior grades. Increases beyond those proposed in the Rushcliffe scales are needed, in my opinion, if conditions in the nursing profession are to compete with those of industry and commerce.

Public Health Department,
Walthamstow.

A. T. W. POWELL.

THYROID AND COLD SENSITIVITY

SIR,—Dr. S. L. Simpson makes the interesting suggestion (March 8) that thyroid should be given to healthy volunteers in order to investigate its capacity to increase resistance to cold and induce well-being. A word of warning is needed, however, should such an experiment be undertaken.

S. W. Patterson¹ has warned that thyroid may cause addiction. It acts as a tonic by increasing energy, improving the appetite, and enhancing mental alertness; and neurotics are apt to take to it. The widespread administration of thyroid to otherwise healthy obese patients and to those with assumed "slight glandular underfunction" has created quite a few cases of moderate addiction. Happily, the metabolic effects are often not too harmful, possibly because the present diet is poor in

1. *Brit. med. J.* 1934, II, 6.

proteins, and perhaps also because of the formation of antihormones. I saw such a patient quite recently who had taken 15 grains of thyroid daily for eighteen months and had remained well, except for a tachycardia of 106-120. It took more than six months to reduce the dose to $1\frac{1}{2}$ -2 grains daily.

London, S.W.3.

V. C. MEDVEI.

STAMMERING

SIR,—Speech therapists should be indebted to Dr. Chrysanthis (Feb. 15) for his data on the incidence of stammering in the Greek elementary schools of Nicosia, Cyprus. A number of factors mentioned in this connexion—such as anthropological peculiarities, intelligence, handedness, and sex—are still so controversial that they cannot be discussed briefly. I must, however, challenge the statement that “according to many investigators, stammering is unknown among the Chinese, whose language consists of monosyllables.”

This opinion can be traced back to Colombat d'Isères (*Traité de tous les vices de la parole et en particulier du Bégaiement*, Paris, 1840). He mentions that a boy born of a Chinese mother and a French father was able to speak Chinese perfectly but stammered when speaking French. With reference to Colombat's opinion, James Hunt, in his book on stammering (London, 1865), explicitly says that “the assertion which has been made on various occasions, on very slender grounds, that there are no stutters in China is refuted by the fact that the Chinese language possesses a term for impediments of speech.” Kussmaul (*Pathologie der Sprache*, 1877) again gives it out to be an established fact that there are no stammerers in China. He attributes stammering to a lesion of a hypothetical centre of syllable coordination, and it is therefore probable that he adduced Colombat's statement concerning the absence of stammering in people speaking a monosyllabic language in support of his theory. Kussmaul was a great expert on the pathology of speech, and it is therefore not surprising that, on his authority, other authors took the statement for granted. Chinese physicians whom Gutzmann (*Sprachheilkunde*, 1912) asked about the truth of Colombat's statement were greatly astonished and declared that stammering was just as common in China as in Europe. They also informed him that the Chinese term was *kchi-ko*.

For the sake of historical accuracy I should be grateful if you would publish these lines, particularly as the erroneous statement has since then been quoted in the daily press.

Tavistock Clinic, London, W.1.

LEOPOLD STEIN.

BENIGN LYMPHOCYTIC MENINGITIS AND GLANDULAR FEVER

SIR,—I was interested in Sir Henry Tidy's article of Dec. 7, particularly because by chance I recently discovered another study of this relationship from America. Coogan and colleagues¹ concluded that “a suggestion is contained here that at least some cases of lymphocytic meningitis are really cases of infectious mononucleosis with meningismus.” They quote Huber,² who reported 3 cases of glandular fever exhibiting meningismus, 2 of which showed a lymphocytosis in the spinal fluid.

C.R.S., Brancepeth, Co. Durham.

R. N. JOHNSTON.

TRAUMATIC PARAPLEGIA

SIR,—In your account of the recent discussion on traumatic paraplegia at the Royal Society of Medicine (Jan. 4, p. 23) you misquote my instructions for the introduction of a suprapubic catheter. It should be inserted at the highest point of bladder dullness, or midway between the umbilicus and the symphysis—whichever is the lower. There is no advantage, and some possible danger, in a tube put in higher than the mid-point.

Your leading article of Feb. 15 (p. 258) seems to infer that I advocate permanent suprapubic drainage for these cases. This is far from being the case, and I have pointed out that one of the advantages of the small high suprapubic fistula is the readiness with which it closes when the tube is removed. The majority of our cases at Stoke Mandeville have their bladders closed, and much of my time there is spent in closing surgically the bladders

of those who have been unfortunate enough to be given a low fistula. The use of the suprapubic catheter is to provide adequate drainage during the period before the development of automatic bladder activity or the return of voluntary micturition, while at the same time preventing serious or ascending infection. In my experience it does this more safely and certainly than the urethral catheter, even with tidal drainage.

London, W.1.

E. W. RICHES.

THE PERIODICALS

SIR,—The suspension of the periodicals, and the manner in which it was effected, raise considerations whose importance has not, I submit, been fully appreciated. Two explanations of the suspension, conflicting with one another and with the facts, were given in the two Houses of Parliament, but in both Houses all pretence of any statutory sanction was immediately abandoned. On Feb. 25 in the Commons, the Prime Minister, challenged at question time for the statutory authority upon which suspension had been made, declared, twice over, that it was “done by agreement” between the Periodical Proprietors Association (P.P.A.) and the Government. Lord Chorley, replying for the Government in the Lords (Feb. 27), repudiated the “agreement” argument. “Suspension of publication was secured,” he said, “by an instruction issued after consultation with bodies representing major interests in the newspaper and periodical press.” Speaking with all the authority of a professor of law in the University of London, he declared categorically that “instruction is the word which I think most accurately describes” the procedure adopted. The ascertained facts are that Mr. Shinwell had issued the “instruction” three days before any consultation with the P.P.A. was attempted. The “instruction” had, and was intended to have, all the appearance of an imperial rescript. The P.P.A. taking that view of it, and confronted with an accomplished fact, had no alternative but to “agree.”

House of Commons.

E. GRAHAM-LITTLE.

* * Like the *Economist*, we felt that “some latitude of authority should be conceded to His Majesty's Government, if they are acting in good faith in an undoubted national emergency,” but we trust that “instructions” of this kind will never be issued again. The P.P.A. agreed with the Ministry that, in order to equalise sacrifices, duplicated issues should not be published; and our membership of the P.P.A. therefore prevented production of the token issues by which we had hoped to maintain continuity of publication.—ED. L.

WELFARE OF DEAF CHILDREN

SIR,—My attention has been drawn to the letter of Miss Edwardes, secretary of the Deaf Children's Society, in your issue of Dec. 21 (p. 923). There is much to be commended in this letter but it raises some points which call for a reply.

Deaf children have suffered too long from lack of proper facilities and from the fact that their parents have been given incomplete or inaccurate advice. There is not sufficient accommodation at the moment for all deaf children to be admitted to schools immediately their affliction is diagnosed, but it is essential that practitioners, and the parents of deaf children, should be made aware of the best and only satisfactory method of providing for their education.

Your correspondent says that the young deaf child need not be instructed by a fully qualified teacher. But the whole foundation of the deaf child's education and his whole outlook on life depend on the training in his early years. Only the qualified teacher can meet the needs of the young deaf child. It is to be hoped that the efforts of parents and such societies as that represented by your correspondent will be directed to ensuring increased facilities for young deaf children under fully qualified teachers.

A further point is the advisability of young deaf children attending a residential school. There are comparatively few deaf children whose homes are so situated that it is convenient or suitable for them to attend day schools even when they have reached normal school age let alone nursery-school age. Even in the large cities the travelling involved would often be much more than a young child could be expected to undertake, and

1. Coogan, T. J., Martinson, D. L., Mathews, W. H. *Illinois med. J.* 1945, 87, 296.

2. Huber, W. *Schweiz. med. Wschr.* 1938, 68, 892.

it would probably be out of the question for the mother to escort her child a long distance twice daily. It must be our purpose to ensure that special education is provided for every deaf child at the earliest possible age. Only residential schools can meet this need. The system will not fulfil the requirements of the Education Act if it caters only for the few who can attend day schools. The underlying principle of all residential schools for young deaf children is to approximate as nearly as possible to home conditions, with a staff of people specially qualified to care for, and deeply interested in, the welfare of the young deaf child.

Royal School for the Deaf, Exeter.

A. W. KETTLEWELL
Hon. Secretary.

EMPLOYMENT OF EPILEPTICS

SIR,—Many of your readers are interested in one aspect or another of the difficult problem of the epileptic. These unfortunate people often find it hard to secure a place in industry even with the assistance of the D.R.O.'s at the employment exchanges. A considerable number are known to be drifting about in the community in need of medical advice or of help with their social problems.

In an endeavour to meet this situation a clinic has been established by the London County Council at St. John's Hospital, St. John's Hill, Battersea, on Wednesday afternoons, at 2.30. The medical officer in charge is a senior officer seconded from St. Ebba's Hospital, and an experienced psychiatric social worker is in attendance. The clinic works in close association with the employment exchanges and with the colonies for epileptics, and it is understood that excellent results are being obtained. Doctors in private practice or on hospital or clinic staffs who wish for advice on epileptic patients living in London should apply to the psychiatric social worker at the hospital.

County Hall, London, S.E.1.

ALLEN DALEY
Medical Officer of Health.

Parliament

ON THE FLOOR OF THE HOUSE

MORE heat in the Commons again last week. Monday's announcement of martial law in Palestine was received grimly. Then there was a flaming row over some Africans convicted of murder on the Gold Coast who were due for execution next day. The royal prerogative, the governor's power to exercise it, and the Colonial Secretary's power to influence the governor got all mixed up, and members raising points of order were sprinkled over the benches like firecrackers. A dubious case was used, very warmly, as a method of attack on a Minister. The House is "hetting up" because opponents of the Government do not like the speed with which they are carrying out their election programme. A long-drawn struggle followed on their decision to fix a definite time-table for the discussion and passage of the Transport Bill and the Town and Country Planning Bill. This time-table was the answer to the Opposition's refusal to come to an arrangement "through the usual channels" which would have enabled business to proceed at a reasonable pace. For it seems probable that now there will be all-out warfare all the time, and that means long sittings—all-night sittings—calling in the forces of physical exhaustion to upset the programme. On Tuesday there was comparative calm, but even then there were some heated exchanges about Polish resettlement, and the Bill was not read a third time and passed until 3 A.M.

On Wednesday the House turned to a two days' debate on India, opened by Sir Stafford Cripps and concluded on Thursday by the Prime Minister in a speech which was probably the best he has made in Parliament and was cheered by his supporters for some two minutes. The Opposition, led by Mr. Churchill, did not dissent from the objective of the Government—the bringing of India to self-government—but objected to their fixing a date next year after which Britain will not continue to carry the responsibility of the administration of India. On the other hand, the Labour view is that the Opposition plan would involve us in another twenty years in India, which is out of the question. India will have the opportunity of either remaining in or going outside the British Commonwealth, but we may hope that in either

case our relations with her will be good. Dealing with the criticism that we are not discharging our duties to the minorities, Mr. Attlee described his visit to a village of the scheduled castes in Madras. "There was not even a road that was allowed to be laid in the village." And this was after a hundred years of British rule. The existence and position of the scheduled castes is part of the whole Hindu social system, and we, the British, cannot change the Hindu social system: the responsibility rests on the Indians themselves. Mr. Attlee also said a word on our obligations in India: "of course His Majesty's Government will carry out all their proper obligations to members of the Services, who can be assured that they will not be let down." That statement will take a load off the minds of the Civil Service and the I.M.S.

On Friday the estimates of the Ministry of Food were subjected to a grilling examination but were not fully challenged. Prices are going up; the wholesale prices in the U.S.A. have risen by more than 30%, and that is giving a lead to prices elsewhere. We shall have to produce even more than we have been doing of foods for our own consumption.

MEDICUS, M.P.

QUESTION TIME

Rationed Foods and Nutrition

Mr. W. ELLIOT asked the Minister of Food whether the intake of rationed food of the average British rationed person was at present of the order of 1400 calories per day; and what respective supplement in calories the average person in a household and the single person living alone was reckoned by him to obtain from a normal expenditure of points.—Dr. EDITH SUMMERSKILL replied: The figure of 1400 calories for rationed foods is reached by strict reference to the amount of such foods allowed to the ordinary consumer, whereas the average of 2900 calories covering all commodities is obtained by dividing the calorie value of the total foods moving into civilian consumption by the number of the civilian population. The two cannot therefore be readily compared. The dispersion around the average of 2900 calories must be very wide, as it includes at one end of the scale such consumers as children, whose intake is considerably less than the average, and at the other end heavy workers, who receive considerably more. Between these extremes there are many gradations. The average of 2900 calories over the whole community is greater than the weighted average requirement of the population.

Calorie Value of Meat Rations

Sir GIFFORD FOX asked the Minister of Food if he would state the calorie value of the meat ration issued to civilians, prisoners-of-war, and the Armed Forces, respectively, in this country; and how it compared with this time last year.—Mr. J. STRACHEY replied: The approximate daily calorie value of the meat ration is 160 for civilians, 150 for prisoners-of-war, and 340 for the Armed Forces at the present time. In January, 1946, the figures were about 150, 150, and 380, respectively.

Rations in British Zone

Mr. T. C. SKEFFINGTON-LODGE asked the Chancellor of the Duchy of Lancaster if he would list those foodstuffs in the British zone, the distribution of which had so far fallen below the 1550 calories ration-scale agreed on in the Anglo-U.S. bi-zonal food programme.—Mr. J. HYND replied: In January the only material deficiency was in processed cereal foodstuffs, representing an average loss of about 80 calories a day. In February there were additional shortages of cheese, skimmed milk, and, in Niedersachsen only, of fish; these increased the daily loss to about 100 calories. The deficiency in cereals for both months will be made good as soon as possible; the other items cannot be replaced. Meat was also short in February, although extra distributions of sugar prevented any loss of calories.

Sanatorium Beds

Mr. JOHN MORRISON asked the Minister of Health what was the total number of cases suffering from pulmonary tuberculosis who had applied, or been recommended, for admission to a sanatorium and who had not yet been found accommodation and what steps he proposed taking to expedite this matter.—Mr. JOHN EDWARDS replied: In England and Wales, at Dec. 31, 1946, the number who had been on waiting-lists for institutional treatment for longer than ten days was about 7000. The chief difficulty is shortage of staff, and the utmost efforts are being made to remedy this:

Obituary

MARK BATES

O.B.E., B.M. OXF., F.R.C.S.

THE death of Mark Bates on Jan. 25 ends 68 years of family service to Worcester and its hospitals. His father, Tom Bates, was appointed surgeon to the Royal Infirmary in 1879, and his brother, another Tom Bates, was still on the staff of the hospital when he died in 1943.



Mark Bates was born at Worcester in 1881 and educated at the Cathedral King's School. With a scholarship he went to St. John's College, Oxford, in 1899, and later to St. Bartholomew's Hospital. After graduating B.M. in 1908 he held house-appointments at St. Bartholomew's Hospital and at the Royal Infirmary, Worcester, before settling in practice in his native town. In 1913 he took his F.R.C.S. and the following year he was appointed anaesthetist to the Royal Infirmary, but almost at once on the outbreak of war he joined the R.A.M.C. and left Worcester to become surgical specialist to no. 15 General Hospital at Alexandria, and later senior medical officer in the Haifa area. Twice mentioned in despatches, he was appointed O.B.E. in 1919. On demobilisation he returned to Worcester and was appointed surgical pathologist to the infirmary and in 1922 full surgeon, an appointment which he held till in 1932 he decided to specialise in venereal diseases and took charge of the clinic at the infirmary.

Mark Bates was a proud son of Oxford," writes W. H. McM., "and his greatest joy was to revisit the quadrangles and gardens of his undergraduate days; then sauntering out hatless from the Golden Cross he would browse at the bookshops and libraries. Once for a wager he walked from Oxford to Worcester in 24 hours. Setting off up the Woodstock Road soon after noon on a fine day in June with an escort of supporters to encourage him for the first few miles, he reached Chipping Norton in time for an evening meal, had a rest on the top of Bourton Hill, and entered Broadway village at dawn. The sight of the clear water in the village horse-trough tempted him to refresh his weary limbs. Not a soul was abroad, so he undressed and bathed in preparation for the third stage of the 58-mile journey. He reached his father's home in the Foregate Street just as the bells of St. Nicholas Church struck noon.

Mark and his elder brother Tom, though dissimilar in many ways, both resembled their father in possessing a restful personality, a cultured mind, and a love of tradition. Medical newcomers to Worcester will recall the welcome and hospitality invariably extended within the first week by each of the Bates brothers. Although modest and retiring by nature, Mark could, on occasions, arouse himself to fine oratory, and his recent spirited diatribe against English cooking will long be remembered amongst his fellow members of the Vignorian Clinical Society.

Clean-shaven, with straight white hair and blue eyes, he was to be seen almost daily, in a camel-hair coat, his hands clasped behind his back, strolling towards the post office, while ruminating on the clues in the *Times* crossword puzzle."

JOHN BROOK HENDERSON HOLROYD

M.R.C.S., D.A.

Dr. John Holroyd, anaesthetist to the Sheffield Royal Infirmary, died on Feb. 8 at the age of 68. After a short period in business he entered the Sheffield medical school in 1905 and qualified in 1910. He held house-appointments at the Royal Hospital, Sheffield, before he went to the Birmingham Midland Eye Hospital as senior house-surgeon. But he decided not to specialise in ophthalmology and he returned to Sheffield to spend a year as a medical officer at the City General Hospital, later settling in practice in the Pitsmoor district of the city. During the 1914-18 war he served in India and elsewhere with the R.A.M.C.

Holroyd had always been attracted to anaesthetics, and early in his career he became one of the visiting

anaesthetists to the Royal Hospital in Sheffield and later to the Royal Infirmary. One of the original members of the council of the Society of Anaesthetists, in 1935 he was awarded the diploma in anaesthetics. In 1942 he gave up his general practice to devote himself to his speciality. During the recent war he gave valuable service as an anaesthetist in the E.M.S., and as temporary lecturer in anaesthesia in the university. He insisted that every new resident at the Royal Sheffield Infirmary and Hospital had to give anaesthetics under the supervision of one of the honorary anaesthetists before being allowed to take a case on his own responsibility. For many years he had offered a gold medal to the student who did best in a competitive examination on the theory and practice of anaesthesia, and it is hoped that the faculty of medicine will perpetuate the Holroyd medal in memory of its founder who did much for his students and for anaesthesia.

"With Jack Holroyd in charge of the anaesthetic," writes the surgeon with whom he worked for 25 years, "the surgeon's anxiety on that score was eliminated. He always gave due warning as to what might be attempted with safety and always carried on quietly and efficiently, starting all anti-shock therapy without bothering to wait until it was suggested to him. He took perhaps a long time in the opinion of some in the induction stage, but this is no fault, and when once the patient was under there was never any impatience shown, nothing mattered to him but the well-being of the patient. Our relationship was most happy, for each had the confidence of the other, and the fortunate result from what often appeared to be a desperate surgical interlude was due in no small measure to the skill, care, patience, and personality of the anaesthetist."

FERGUS LESLIE HENDERSON

M.B. GLASG.

Dr. F. L. Henderson, radiologist to the Glasgow public-health department, died on Feb. 28 at the age of 54. A son of the manse, he was educated at Glasgow Academy and in 1914 graduated M.B. at the University of Glasgow. After a short period in general practice and in the city hospitals his interest in radiology was stimulated by the late Dr. James Riddell, one of Glasgow's pioneers in the use of X rays, and with Sir Alexander Macgregor and the late Dr. John Wilson he correlated the appearances which he saw in the film with the findings of the clinician and established the place of the radiogram in diagnosis. When the corporation opened its first radiological diagnostic station at Ruchill, Dr. Henderson was therefore their natural choice as consultant, and as the tuberculosis service expanded he became the final arbiter on the chest radiography carried out by the public-health department. When, in 1923, the McAlpin Home introduced radiological equipment he became consultant there, and this work brought him into intimate contact with a wide circle of medical colleagues, who as the years passed came to value his opinion more and more. He was also radiological consultant in the West of Scotland to the Ministry of Pensions, and for many years he was in charge of radiotherapy in the Cancer Hospital.

Important as his medical work became, two other interests were the crown of his life. A man of sincere religious beliefs, he formed an association with Ruchill Church in 1914 when he became an officer in the 69th company of the Boys' Brigade. Two years later he assumed charge of the company, and during the last thirty years built it up to become one of the largest and most effective in the city. A pioneer in his realisation of the need for proper recreational opportunities among working-class boys, he set in train schemes which led to the purchase for the company of an athletic ground at Maryhill which might have been the envy of any wealthy public school. His constant interest in the lives of members and ex-members made "the Doc," as he was called, a guiding influence for a host of boys in Maryhill, and his holidays were all spent with them at a large camp which he organised at Crianlarich. His other enthusiasm was music, and the 69th's annual Gilbert and Sullivan productions were excellent. A life-long supporter of the Scottish Orchestra, he was a valued member of the committee of management for many years. His circle of close friends was small, for his natural modesty and shyness kept him somewhat aloof, but a wide circle

respected him as a man of real integrity whose sense of responsibility was great and whose opinion was always fearless and forthright.

W. W. G.

ALFRED CLARK

F.R.C.S.E.

Dr. Alfred Clark died in Auckland, New Zealand, on Feb. 1, as the result of X-ray injuries received some forty years ago. Though his disability was severe—he twice had amputations of his right arm—he faced it with courage, discussed it with detachment, and did not allow it to interfere with the important research in tropical nutrition which he undertook after the 1914–18 war.

Born at Cerne Abbas, he was educated at Dorset County School and at University College, London. He continued his medical studies at the Middlesex Hospital, taking the Scottish Conjoint qualification in 1892. Six years later he obtained the Edinburgh fellowship. After a period of general practice in this country he emigrated to New Zealand, where he worked among the Maoris and served as radiologist to the Auckland Hospital. Later he was appointed school medical officer to that city. During the 1914–18 war he served with the N.Z.M.C. in Egypt, France, and Germany.

In 1928 he began his nutritional work for the Colonial Office in Trinidad, and in 1932 in the *Transactions of the Royal Society of Tropical Medicine and Hygiene* he discussed the relationship of diet to nephritis in the tropics. The following year, for the Medical Research Council, he investigated in Nigeria the syndrome of epithelial and nervous lesions. He observed that cyanogenic foodstuffs, such as maize, millet, and sugar-cane, were common in the diets of all people suffering from pellagra and allied nutritional diseases, which he therefore concluded were due to slow prussic-acid poisoning (*J. trop. Med. Hyg.* 1939). During the late war Dr. Clark continued his nutritional research in Ceylon, though latterly he was much handicapped by ill health.

Births, Marriages, and Deaths

BIRTHS

- ARTHUR.—On March 4, at Northampton, the wife of Dr. W. D. Arthur—a son.
 BARENDT.—On March 4, the wife of Dr. G. H. Barendt, Southampton—a son.
 DOWN.—On Feb. 21, at Exeter, the wife of Dr. A. H. G. Down—a son.
 GASK.—On March 6, at Oxford, the wife of Dr. John Gask—a son.
 GRANT.—On March 2, at Woolwich, the wife of Dr. W. R. Grant—a son.
 HARLEY.—On March 7, at Reading, the wife of Dr. H. C. Harley—a daughter.
 HARPER.—On March 1, at Maidstone, the wife of Mr. Ernest Harper, F.R.C.S.—a daughter.
 LAING.—On March 3, at Southampton, the wife of Mr. J. E. Laing, F.R.C.S.E.—a daughter.
 NEWNHAM.—On Feb. 23, at Beaconsfield, the wife of Dr. Claude Newnham—a son.
 O'SULLIVAN.—On March 5, in Manchester, the wife of Dr. J. G. O'Sullivan—a son.
 WARREN.—On Feb. 26, in London, the wife of Dr. A. J. Warren—a daughter.
 WYLIE.—On March 3, at Oxford, the wife of Dr. J. A. H. Wylie—a son.

MARRIAGES

- LANGFORD—POTTER.—On March 1, at Bramley, Surrey, Richard Crawford Langford, M.R.C.S., lieutenant-colonel R.A.M.C., to Lois Potter.

DEATHS

- BALLINGER.—On March 1, at Malvern, Owen David Ballinger, B.M. Oxid, aged 48.
 DEWAR.—On March 5, at Arbroath, William Johnston Dewar, M.D. Aberd.
 FRAME.—On March 2, at Worthing, David Frame, M.D. Glasg., aged 86.
 HARTLEY.—On Feb. 27, John Whittam Hartley, M.B. Vict., late of the West African Medical Service, aged 65.
 HUBERT.—On March 5, at Chelsea, William Henry de Bargaue Hubert, B.A. Camb., M.R.C.P.
 INGRAM.—On March 4, at Devonport, John Ingram, M.B.E., M.B. Aberd.
 MOLYNEUX.—On March 2, at Kew, John Francis Molyneux, M.D. Brux., M.R.C.S., aged 90.
 NEWMARCH.—On March 1, at Worthing, John Henry Newmarch, M.B. Camb., M.R.C.P.
 OLVER.—On March 7, Richard Sobey Olver, M.R.C.S.
 STEWART.—On March 6, Walter Graham Stewart, M.B.E., M.B. Lond.
 THORP.—On March 7, at Harrogate, Henry Carter Thorp, M.B. Camb., aged 74.
 TODD.—On March 6, Aldred Bertram Slingsby Todd, M.B. Leeds.

Appointments

- CALVEY, E. M., M.R.C.S.: asst. tuberculosis officer, Warwickshire and Coventry Joint Committee for Tuberculosis.
 ELLIOTT, C. C., D.S.C., M.D. Birm.: asst. school M.O., Cornwall County Council.
 EVANS, G. C. D., M.B. Wales, B.Sc., D.M.R.: chief radiotherapist, South Wales and Monmouthshire Joint Cancer Committee.
 GRIMALDI, P. R. B., M.R.C.S., D.L.O.: surgeon i/c ear, nose, and throat department, Royal Isle of Wight County Hospital.
 HENDTLASS, R. F., M.R.C.S., D.M.R.T.: asst. radiotherapist, Royal Northern Hospital and Prince of Wales Hospital joint radiotherapy centre.
 KEALL, J. H. H., M.D., B.PHARM. Lond.: pathologist, Bromley and District Hospital, Kent.
 LONDON, J. J., M.B. Camb.: asst. school M.O., City of Birmingham education department.
 MARSHALL, T. S., M.R.C.S.: regional blood-transfusion officer, Leeds.
 O'DONNELL, R. F., M.B., B.Sc. N.U.I.: pathologist, Royal Victoria and West Hants Hospital, Bournemouth.
 PIERSE, D. J., M.Ch. N.U.I., D.O.M.S.: ophthalmic surgeon, South Eastern Hospital for Children, Sydenham.
 PRIOR, A. P., M.B. Sydney: county pathologist, Warwickshire.
 PROCTOR, S. S., M.D. Aberd.: M.O.H. and asst. school M.O., Salisbury, Wilts.
 REES, HARLAND, B.M. Oxid, F.R.C.S.: surgeon to outpatients, Hampstead and North-West London Hospital.
 ROSE, DORIS, M.R.C.S., D.O.M.S.: asst. ophthalmic surgeon, Princess Alice Memorial Hospital, Eastbourne.
 STEED, G. R., M.D. Lond., M.R.C.P.: physician, City General Hospital, Plymouth.
 STURTHIDGE, G. S., M.B. Melb., M.R.C.O.G.: consultant asst. obstetrician and gynaecologist, General Hospital, Northampton.
 THOMAS, A. J., M.B., B.Sc. Wales, M.R.C.P., D.P.H.: resident consultant physician, Llandough Hospital, Cardiff.
 THOMPSON, N. J. W., M.B. Bell., D.P.H.: asst. M.O., St. Helens.
The Middlesex Hospital, London:
 HART, E. W., M.B.E., M.D. Camb., M.R.C.P., D.C.H.: physician i/c children's department.
 KELHAM, GEOFFREY, M.B. Camb., D.M.R.E.: jun. asst. radiologist (diagnostic).
West London Hospital, Hammersmith:
 BURGE, H. W., M.B.E., M.B. Lond., F.R.C.S.: general surgeon.
 HINDENACH, J. C. R., M.D. N.Z., F.R.C.S.: orthopaedic surgeon.
The Queen Elizabeth Hospital for Children, Hackney Road, London:
 COWAN, H. A., F.R.C.S.E., D.L.O.: ear, nose, and throat surgeon.
 HODSON, C. J. C. G., M.B. Lond., D.M.R.E.: radiologist.
 HOWARTH, ELIZABETH, M.R.C.S., D.M.R.E.: radiologist.
St. John's Hospital, Lewisham:
 BARLOW, D. S. M., M.S. Lond., F.R.C.S.: consultant in thoracic surgery.
 ECKHOFF, N. L., M.S. Lond., F.R.C.S.: consultant in plastic surgery.
 HOWKINS, JOHN, M.D., M.S. Lond., F.R.C.S., M.R.C.O.G.: gynaecologist.
 HUGHES, K. E. A., M.R.C.S.: pathologist.
 WASS, S. H., M.S. Lond., F.R.C.S.: surgeon.
Willisden Corporation:
 BRESTON, JOHN, G.M., M.B., D.P.H.: deputy M.O.H.
 DUNSBY, CISSIE, M.B. N.U.I.: asst. M.O.
 JONES, ESTHER, M.R.C.S.: asst. M.O.
 LYCETT, C. D. L., M.B. Lond., D.P.H.: asst. M.O.
 SNOW, ANGELE, M.B. Lond.: asst. M.O.
London County Council:
Second Asst. M.O.s in Mental Health Services:
 DE BASTARRECHEA, M.B. Lpool, D.P.M.: Friern Hospital.
 BLAIR, R. A., M.B. Lond., D.P.M.: Banstead Hospital.
 BRIDGER, W. E. W., M.D. Lond., D.P.M.: Bexley Hospital.
 COFFEY, BRIDGET, M.B. N.U.I., D.P.M.: Tooting Bec Hospital.
 EDWARDS, A. M., M.B. Lond., D.P.M.: St. Bernard's Hospital.
 RAE, G. E., L.M.S.S.A.: Bexley Hospital.
 ROLLIN, E. R., M.B. Leeds, D.P.M.: Cane Hill Hospital.
 SANDERS, MARJORIE, M.B. Edin., D.P.M.: St. Francis' Mental Observation Unit.
Middlesex County Council:
 BIGBY, MARY, M.D. Lond., M.R.C.O.G.: obstetrician and gynaecologist, Central Middlesex County Hospital.
 PATRICK, H. F., M.R.C.S., D.A.: anaesthetist, Chase Farm Hospital.
 PORTER, R. J., M.B. Camb., M.R.C.P.: physician, Central Middlesex County Hospital.
 TALBOT, R. J. F. L., F.R.C.S.E., D.PHYS.M.: director, department of physical medicine, Hillingdon County Hospital.
Kent County Public Health Department:
 SHARVELLE, DORIS, M.R.C.S., D.P.H.: asst. county M.O.H.
 WALLACE, G. P., M.B. Aberd.: asst. county M.O.H.
Cumberland Infirmary, Carlisle:
 HILL, R. M., M.D. Edin., F.R.C.S.E.: surgeon.
 NEILL, A. G. C., M.B. Edin., F.R.C.S.E.: asst. surgeon.
Royal Salop Infirmary, Shrewsbury:
 GRANT, G. H., B.M., B.Sc. Oxid: pathologist.
 JONES, A. C., M.B. Lond.: bacteriologist.
St. James's Hospital, Leeds:
 FEATHER, D. B., M.B. Leeds: surgeon.
 JACKSON, E. W., M.D. Leeds: physician.
Stockton and Thornaby Hospital, Stockton-on-Tees:
 DICKSON, D. C., M.B. St. And., F.R.C.S.E.: senior surgeon.
 HUNTER, N. M., M.B. Edin.: asst. senior surgeon.
 MARSHALL, R. M., M.B. Edin., F.R.C.S.E.: asst. ear, nose, and throat surgeon.
 PARKER, GILBERT, M.B. Aberd., F.R.C.S.E.: asst. surgeon.
 TRAVERS, E. H., M.B. Edin., F.R.C.S.: asst. surgeon.

Notes and News

EXPENSES OF ILLNESS IN DOCTORS' FAMILIES

THE London Association for Hospital Services Ltd., which is sponsored by King Edward's Hospital Fund, has issued a leaflet presenting to doctors its "hospital service plan" providing against charges for medical and surgical treatment in hospitals or nursing-homes anywhere in Great Britain or abroad. For one person the annual standard subscription is £2 12s. and the maximum is £5 4s.: a subscriber with one adult and three or more child dependants would pay a standard subscription of £5 5s. or a maximum subscription of £10 10s. The standard benefits include weekly maintenance charges (up to six weeks' annually) of £6 6s. while the maximum benefit is £12 12s. a week. Other benefits include physicians' fees, operation fees, and payments for radiodiagnostic, pathological, and bacteriological investigations and radiotherapy, but certain forms of illness (e.g., pulmonary tuberculosis) are specifically excluded, and benefits are not obtainable till six months after joining. Subscribers must be under 60 years of age, but enrolments may continue after that age. When doctor-members or their dependants are patients, the benefits allowed for medical and surgical fees may be paid direct to the surgeons and physicians who have given the treatment, not as a fee but as a gift, and the association finds that this procedure is often a satisfactory solution to the problem of acknowledging the help of professional colleagues.

In relation to the benefits offered the rates of subscription are low, and this is possible because no profit is to be made. The plan is open to all members of the medical profession, wherever they reside, and it will make a strong appeal to many of us. Further information may be had from the secretary of the association, 10, Old Jewry, E.C.2.

AMBULANCES FOR ALL

AFTER the 1914-18 war the British Red Cross Society and the Order of St. John set up the Home Ambulance Service which has done such good work ever since. During the 1939-45 war new editions of the register of ambulance stations could not be printed, but the 1946 edition has now appeared, giving addresses and telephone numbers of the many stations, housing some 1000 ambulances among them, in England, Wales, Northern Ireland, the Channel Isles, and the Isle of Man. Under the National Health Service Act ambulance transport arrangements are permitted between local authorities and voluntary organisations; so the service is likely not only to continue but to develop. The ambulances are bought by the Order and the Society, and the responsibility of running, housing, and maintaining them is undertaken by voluntary workers. Maintenance costs are covered in various ways. In most cases a charge is made for the use of the ambulance, but where the patient cannot afford to pay he is carried free. The usual charge is therefore calculated to cover the cost of running the ambulance with a margin sufficient to allow for such remissions to needy cases, and for a small sinking fund to meet replacements. The aim has been to put an ambulance within reach of anyone who may need it, and a glance at the register shows that this must have been largely achieved. In 1923 a mobile X-ray unit was added to the service, and during the recent war a fleet of such units was put at the disposal of the Emergency Medical Service. In 1945 the ambulances carried 364,048 patients, and by December of that year nearly 4 million patients had been carried since the service was set up. Doctors and hospitals alike will welcome this new copy of the register.

SOCIAL STRUCTURE AND DISEASE

SPEAKING in Edinburgh on Feb. 27, Prof. F. A. E. Crew, F.R.S., suggested that, in countries like this, most ill health originates in social institutions which man himself has invented.¹ The society he has brought into being is in many ways out of harmony with his biological needs. An adverse psychological communal environment is associated with an increase in chronic sickness; and even the best-organised health service might not affect the morbidity-rates so long as this adverse environment exists. One of the major tasks of the immediate present is to create a social environment that will cripple and confine nobody.

There is no doubt, said Professor Crew, that the institution of marriage is crumbling and the family grouping is breaking

down; nothing is more important for the maintenance and advancement of society than that the causes of marital disharmony should be known and removed. The morbidity-rates reveal the imperfections of our social structure and flaws in our social policies. It is coming to be recognised that disease usually springs not from a single cause but from a constellation of causes. Medicine has too long been concerned with the issuing of certificates saying that men are not fit to work. All too often the work, the home, the group life, the whole way of life has not been fit for men.

STAFFING FEVER HOSPITALS

THOUGH all hospitals have staffing troubles just now, fever hospitals are perennially faced with a special difficulty, for during epidemics they must staff crowded wards which at other seasons are nearly empty. To meet this situation the London County Council¹ have recommended that hospital aids should be appointed for part-time emergency duty in such hospitals. They are to work for not more than 12 hours a week, their duties being to help in the wards and, "under close supervision," to assist the nurses. They would only be used in times of epidemics, but since it would be hard to enrol them rapidly a panel of candidates will be formed in advance. The appeal will probably be made through advertisements in local and evening papers, and by means of posters in Underground stations near fever hospitals; these will draw attention to the social value of the work and to the fact that volunteers will only be called on in an emergency and for a short time.

IODISED VITAMIN TABLETS

A SMALL amount of potassium iodide has now been added to the vitamin A and D tablets issued to expectant mothers at antenatal clinics. Each tablet now contains 4000 I.U. of vitamin A, 800 I.U. of vitamin D, 230 mg. of sodium calcium phosphate, and 0.13 mg. of potassium iodide. The addition has been made in the hope of lowering the incidence of simple goitre in expectant mothers.

EXPORT OF DRUGS FROM GERMANY

THE revival of the German pharmaceutical industry is considered in an article in the *Pharmaceutical Journal* for Feb. 22 by Mr. F. B. Royal, M.P.S., senior control officer of the Control Commission, chemical industries branch. Before the war, he says, Germany exported pharmaceuticals valued at £12 million—a far greater volume, allowing for depreciation in money, than Britain's 1946 figure of £12,800,000. In the British zone, where about half the industry is situated, the yearly output is now valued at about £14 million, and a substantial part of this has already been earmarked for export, though the policy in regard to trademark names for export has still not been settled. "We have done our utmost," Mr. Royal says, "to oppose the export of pharmaceuticals in small packs under trade names, but the desire to make Germany self-supporting by 1949 will, I fear, override any section trade interest in this country."

GENEVA AND HAGUE CONVENTIONS

IN view of the resolution, passed at a preliminary conference of red-cross societies,² to revise the Geneva Convention, the International Red Cross Committee is conferring this month with the Comité International de Médecine et de Pharmacie Militaires to discuss the latter's proposals regarding this revision. Past events leading up to the present situation are reviewed by Général-Major Médecin J. Voncken,³ who points out that the terms of not only the Geneva Convention concerning land operations, but also the two Hague Conventions, one concerning sea warfare, the other fixing the customs of war, have been hopelessly outstripped by the development of modern methods of waging war, notably aerial bombing. All three conventions, the Comité International de Médecine et de Pharmacie Militaires suggests, should be superseded by a single new convention covering war waged on land, at sea, and in the air.

The film *Your Children and You*, discussed by a peripatetic correspondent on Feb. 8 (p. 231), can be obtained from the Central Film Library, 16 and 35 mm., sound, 28 minutes; directed by Brian Smith with the Realist Film Unit.

1. Report of the Hospitals and Medical Services Committee (no. 1), Nov. 26 and Dec. 10, 1946, and Jan. 21, 1947.
2. See *Lancet*, 1946, ii, 889.
3. Voncken, J. *Bull. int. Services Santé Armées*, 1946, no. 11.

1. *Scotsman*, Feb. 28.

University of Oxford

On March 1 the following degrees were conferred :

D.M.—W. E. Gibb.
B.M.—Elizabeth M. C. Dyke.

University of Cambridge

On Feb. 15 and March 1 the following degrees were conferred :

M.D.—John Aspin, D. M. Baker, G. F. Barran, E. D. H. Cowen, A. P. Dick, F. S. A. Doran, M. A. Rugg-Gunn, J. F. Stokes, C. C. Thomas, J. C. Waterlow, P. H. Willecox, G. H. Wooler.

M.B., B.Chir.—* A. P. Baker, * G. T. F. Braddock, * J. A. S. Forman, * Robert Marshall, * R. H. B. Mills, A. G. Norman, * Donough O'Brien, * T. C. L. Parry, * Arnold Pines, * D. J. Watt, * M. E. E. White.

* By proxy.

On March 15 a grace will be submitted to the senate that the honorary degree of doctor of science be conferred upon Sir Edward Mollanby, F.R.S., secretary of the Medical Research Council.

Dr. Robert Marks and Dr. E. D. H. Cowen have been appointed to Elmore medical research studentships.

Prof. T. B. Elliott, F.R.S., has been elected an honorary fellow of Trinity College.

University of Leeds

Dr. F. S. Fowweather has been appointed to the new chair of chemical pathology, with effect from Oct. 1, 1946.

Dr. Fowweather originally trained at Liverpool as a chemist, graduating B.Sc., with first-class honours in chemistry, in 1914, and M.Sc. in 1915. In 1917 he became an associate, and in 1922 a fellow, of the Royal Institute of Chemistry. After some time in industrial and analytical chemistry he took up the study of medicine, and qualified at Liverpool in 1922. For two years he was in general medical practice until, in 1924, he was appointed lecturer in chemical pathology at the university, and chemical pathologist to the General Infirmary, Leeds. He obtained the D.P.H. in 1924, and graduated M.D. in 1925. In 1930 he was promoted to a readership. He became M.R.C.P. in 1934, and F.R.C.P. in 1943. His chief interest, apart from chemical pathology, is in industrial medicine; he is chairman of the medical committee of the Leeds Joint Council on Industrial Medicine. He is the author of a *Handbook of Clinical Chemical Pathology* and of numerous papers, including some on silicosis.

Royal College of Surgeons of England

A course of lectures on anaesthesia will be held at the college on weekdays at 6.15 P.M. from April 14 to 25, and at 5 P.M. on April 28 and 29. Further particulars may be had from the assistant secretary of the college, Lincoln's Inn Fields, London, W.C.2.

Royal College of Surgeons in Ireland

A postgraduate course in surgery will be held at the college from April 14 to June 6. Further information may be had from the registrar of the college, St. Stephen's Green, Dublin.

University College Hospital

Mr. A. W. McKenny Hughes, D.I.C., a member of the staff of the natural history section of the British Museum, has been appointed hon. entomologist to the hospital. During the war Mr. McKenny Hughes lectured at the Army School of Hygiene.

Scholarships for Nurses

The Hospital Saving Association will this year devote over £5000 to postgraduate scholarships for nurses training as nursing administrators, nursing dietitians, sistor-tutors, superintendent health visitors, tutors to health visitors, health visitors, industrial nurses, or midwife teachers. They are open to nurses registered in the general part of the State register who have graduated in a hospital within the area of King Edward's Hospital Fund for London, and they will be awarded on the results of a competitive examination. Particulars may be had from the director in the education department, Royal College of Nursing, 1A, Henrietta Place, London, W.1.

Planning Under 1939 Cancer Act

The period for submission of plans under this Act has been extended to March 31, 1948. A Ministry of Health circular recalls that until the National Health Service Act comes into operation local authorities have a statutory obligation to make and submit for approval suitable arrangements for the treatment of cancer. The Minister, while recognising the undesirability of setting up joint boards at this stage, emphasises the importance of efficient interim arrangements, which should be suitable for merging into the new hospital services; and it is suggested that plans already approved or proposed should be reviewed to see whether modification is needed to fit them in with these future services.

Harvelan Society of London

The Buckston Browne prize for 1946 has been awarded to Dr. Michael Kelly, of the University of Melbourne, for his essay on the Pathology and Treatment of Fibrositis.

Royal Appointment

Major-General William Foot, M.C., late R.A.M.C., has been appointed honorary physician to the King in succession to Brigadier J. S. K. Boyd, who has retired.

Association of Industrial Medical Officers

On March 28, at 2.30 P.M., in the orthopaedic department of the Western Infirmary, Glasgow, Mr. Roland Barnes will give a talk on Back Injuries in Industry, followed by a clinical demonstration.

Postgraduate Lectures at Leeds

The University of Leeds postgraduate committee is holding a fortnight's refresher course for general practitioners, to begin on May 5. It has also arranged a series of clinical meetings at Leeds General Infirmary on Tuesdays at 3.15 P.M., from April 15 to July 15. Further particulars will be found in our advertisement columns.

Survey of Child Health

The Berks, Bucks, and Oxon Regional Hospitals Council is to carry out a survey of the child-health services in its area. On this survey will be based proposals for the development of these services in the new region to be established under the National Health Service Act, which is considerably larger than the council's present territory. Prof. Alan Moncrieff has been appointed chairman of the committee which will make the survey.

World Federation of Scientific Workers

Mr. J. G. Crowther, D.Sc., has been appointed secretary-general designate of the federation, which was founded last year at a conference convened by the British Association of Scientific Workers. The president of the federation is Prof. F. Joliot-Curie, the high commissioner for atomic energy in France. The federation is preparing a charter of the rights and duties of scientists to serve as a guide to scientists in all countries.

New York Academy of Medicine

The centenary celebration of the academy opened with a dinner on March 6, when Prof. J. A. Ryle was the principal speaker; his subject was Social Pathology and the New Era in Medicine. In connexion with the centenary, meetings have been arranged by the sections of the academy and by a number of affiliated organisations; and five "institutes" are being held—on library methods and problems, social medicine, public health, medical education, and hospitals.

Health in U.S. Zone of Germany

A black picture of health conditions in the United States zone of Germany is painted in the latest monthly report of General McNarney, the military governor. The report, says B.U.P., speaks of increasing danger of the spread of infectious diseases, owing to the shortage of hospital beds; of the 113,461 known cases of tuberculosis in the zone, nearly 100,000 are walking the streets. It adds that rationing is beginning to affect children in the zone: "children between 8 and 15 years of age show serious weight deficiencies and some retardation of growth as evidence of the long-standing inadequacy of their food consumption."

Health Education in Northern Ireland

The activities of the Central Council for Health Education in Northern Ireland were officially launched in December when Mr. William Grant, the minister of health and local government, presided over a gathering in Belfast of delegates representing local authorities, professional groups, and voluntary organisations. The minister said he was as much concerned with the prevention as with the treatment of ill health. It was the duty of every man and woman in the country to do all they could to look after their own health as well as that of their dependants. The chairman of the central council, Mr. Henry Lesser, and the council's medical adviser and secretary, Dr. Robert Sutherland, spoke of the encouragement received from the ministry, and of the part education could play in improving the community's health. Personal contact through responsible people—parents, teachers, doctors, nurses, youth leaders, and welfare officers—was the key to success.

London College of Osteopathy

A nine-month course in osteopathy is to be held at this college, beginning in October. Only qualified medical men and women will be accepted. Further information may be had from the secretary, 25, Dorset Square, N.W.1.

End of the Scarce Substances Orders

The last remaining Scarce Substances Order, under which alternatives could be dispensed when the liquid extract or tincture of ipecacuanha was prescribed, was revoked on March 1.

Great Ormond Street Dining Club

The 19th annual dinner will be held at the Savoy Hotel, on Friday, April 11, at 7 P.M., when Dr. Harold Sington will be in the chair. Members who wish to attend are asked to communicate with the honorary secretary, at the Hospital for Sick Children, Great Ormond Street, London, W.C.1.

American Research into Diseases of the Aged

The National Institute of Health's programme of research into diseases of the aged is now being resumed. One unit, under Dr. Nathan Shock, is starting work on kidney diseases in Baltimore City Hospital. Another group, B.U.P. reports, is to study the processes of ageing; a thousand or more healthy adults, aged from 30 to 90, will undergo tests at intervals of one, two, or five years.

Australian Medical Honours

The King has made the following appointments to the Royal Victorian Order:

M.V.O.

ASHLEIGH O. DAVY, M.B. Sydney, F.R.A.C.S.
 LORIMER F. DODS, M.D. Sydney, F.R.A.C.P.
 Prof. B. T. MAYES, M.B. Sydney, F.R.A.C.S., F.R.C.O.G.
 Group-Captain H. R. G. POATE, M.B. Sydney, F.R.C.S., F.R.A.C.S.,
 R.A.A.F.

Return to Practice

The Central Medical War Committee announces that Mr. Harold Burge, M.B.E., F.R.C.S., has resumed civilian practice at 14, Upper Harley Street, London, N.W.1 (Welbeck 4824).

Medical Society of London

At the 167th annual dinner, on March 6, Lord Oaksey, who as Lord Justice Lawrence presided over the Nuremberg trials, spoke of these trials as a vindication of international law. Without laws between the nations, which necessarily limited their sovereignty, what was to become of the world? Since the 14th century at least there had been rules of war, and Germany had been one of the 63 nations party to the Kellogg Pact which renounced war as an instrument of policy. The charter of 1945 represented a great step forward in the progress of international law. Thanks to the seizure of vast numbers of documents, the prosecution's case against the Nazi leaders had been based almost entirely on what they themselves had said, and it would now be difficult to deny their guilt. To say that soldiers and officials could not be held responsible for what they did under orders was itself a denial of international law.

Sir Philip Manson-Bahr, the president, spoke of Lettsom's injunction to the society to continue in amity and good fellowship—an injunction applicable today to the whole profession. It was right that we should consider and debate the place of medicine in the world, but it was wrong to introduce pure politics into our professional life, setting one man against another. Mr. Dickson Wright, who proposed The Guests, recalled that Lettsom was the last and only surviving member of a family consisting of seven sets of twins. He compared the presidents of the three Royal Colleges, in their new-found unity, to the three bears who said "who's been at our porridge?" or even "who's been at the Minister's porridge?" Lord Moran, in reply, said that the society's great past was associated with individual effort. The change which most disturbed him in recent times was the dread of responsibility and the dread of public opinion which had invaded every department of life.

B.C.G. is to be used in New York State; the programme, according to B.U.P., is to be established by Dr. Konrad Birkhaug, the Norwegian authority.

CORRIGENDUM: *Thyroid and Cold Sensitivity.*—In Dr. S. L. Simpson's letter last week the reference was to M. L. Turner (not Tanner).

Diary of the Week

MARCH 16 TO 22

Monday, 17th

ROYAL COLLEGE OF SURGEONS, Lincoln's Inn Fields, W.C.2
 3.45 P.M. Prof. F. Wood Jones, F.R.S.: Visceral-Outlet of the Hind End.
 5 P.M. Mrs. E. K. Dawson, M.D.: Genesis and Spread of Mammary Cancer.
 HUNTERIAN SOCIETY
 7.15 P.M. (Pimm's, 3, Poultry, E.C.2.) Sir Reginald Watson-Jones, Dr. J. B. Menell: Sprains and Strains.

Tuesday, 18th

ROYAL COLLEGE OF PHYSICIANS, Pall Mall East, S.W.1
 5 P.M. Dr. F. Avery Jones: Hæmatemesis and Melæna. (Goulstonian lecture.)
 ROYAL COLLEGE OF SURGEONS
 3.45 P.M. Mrs. Dawson: Diagnosis and Prognosis of Mammary Cancer.
 5 P.M. Prof. H. A. Harris: Clinical Anatomy of the Chest.
 ROYAL SOCIETY OF MEDICINE, 1, Wimpole Street, W.1
 5.30 P.M. General meeting of fellows.
 8.15 P.M. *Pathology.* Prof. A. W. Downie, Dr. J. A. Dudgeon, Prof. S. P. Bedson, F.R.S., Dr. F. O. MacCallum: The Laboratory Diagnosis of Virus Infections.
 CHADWICK LECTURE
 5.30 P.M. (Westminster Hospital medical school, 17, Horseferry Road, S.W.1.) Prof. W. M. Frazer: A Medical Pioneer in Sanitation.
 ROYAL PHOTOGRAPHIC SOCIETY, 16, Princes Gate, S.W.7
 6.30 P.M. *Medical Group.* Dr. R. G. W. Ollerenshaw: Production of the Surgical Teaching Film.
 EUGENICS SOCIETY
 5.30 P.M. (Burlington House, Piccadilly, W.1.) Mr. E. B. Ford: Recent Advances in Genetics.
 LONDON SCHOOL OF DERMATOLOGY, 5, Lisle Street, W.C.2
 5 P.M. Dr. Henry MacCormac: Principles of Treatment.

Wednesday, 19th

ROYAL COLLEGE OF SURGEONS
 3.45 P.M. Prof. C. L. Oakley: Toxins of *Clostridium welchii* and *Cl. oedematiens*.
 5 P.M. Professor Harris: Clinical Anatomy of the Abdomen.
 ROYAL SOCIETY OF MEDICINE
 5 P.M. *Comparative Medicine.* Sir Edward Salisbury, F.R.S., Mr. Ian Galloway, D.Sc., Mr. John Hammond, F.R.S.: The Span of Life.
 ROYAL INSTITUTE OF PUBLIC HEALTH AND HYGIENE, 28, Portland Place, W.1
 3.30 P.M. Dr. Noel Harris: The Health of the Mind.

Thursday, 20th

ROYAL COLLEGE OF PHYSICIANS
 5 P.M. Dr. Avery Jones: Hæmatemesis and Melæna. (Goulstonian lecture.)
 ROYAL COLLEGE OF SURGEONS
 3.45 P.M. Professor Oakley: Toxins of *Cl. welchii* and *Cl. oedematiens*.
 5 P.M. Professor Harris: Clinical Anatomy of the Abdomen.
 ROYAL SOCIETY OF TROPICAL MEDICINE AND HYGIENE
 8 P.M. (Royal Army Medical College, Millbank, S.W.1.) Laboratory meeting.
 MEDICO-CHIRURGICAL SOCIETY OF EDINBURGH
 8 P.M. Joint discussion at Glasgow with the Royal Medico-Chirurgical Society of Glasgow: that the Nation is tending to become Disease-conscious rather than Health-conscious.

Friday, 21st

ROYAL COLLEGE OF SURGEONS
 3.45 P.M. Dr. Cuthbert Dukes: Tumours of the Rectum and Colon.
 5 P.M. Prof. John Kirk: Anterior Abdominal Wall.
 ROYAL SOCIETY OF MEDICINE
 8 P.M. *Obstetrics and Gynaecology.* Mr. Rufus Thomas, Mr. J. H. Peel, Mr. C. MacIntosh Marshall, Miss Katharine Lloyd-Williams, Dr. C. J. Massey Dawkins, Dr. J. N. Cave: Anaesthesia for Cesarean Section.
 8 P.M. *Radiology.* Dr. J. F. Brailsford: Bone Tumours.
 FACULTY OF RADIOLOGISTS
 2.30 P.M. Diagnosis Section Meeting (Royal College of Surgeons). Dr. S. Cochrane Shanks: Hiatus Hernia.
 BRITISH INSTITUTE OF RADIOLOGY
 5 P.M. (French Institute, Queensberry Place, S.W.7.) Dr. F. Baclesse: Cancer of the Larynx.

Saturday, 22nd

BRITISH INSTITUTE OF RADIOLOGY
 10.15 A.M. Prof. D. W. Smithers: presidential address.
 11.20 A.M. Papers on carcinoma of the cervix.

Dr. W. S. Flowers has left England to join Sir Clutha Mackenzie on a St. Dunstan's mission to advise the Chinese government on the training of blinded soldiers and civilians. Dr. Flowers has been chief medical representative on the Red Cross China Commission, and Sir Clutha has been in charge of the St. Dunstan's training centre at Dehra Dun, for blinded Indian and Gurkha soldiers, since he established it in 1943.

THE CHRONIC SICK IN HOSPITAL A PSYCHIATRIC APPROACH

JAMES WHIGHAM AFFLECK
M.B. Glasg., F.R.F.P.S., D.P.M.

DEPUTY MEDICAL SUPERINTENDENT, OUTER GROUP OF
MUNICIPAL GENERAL HOSPITALS, CITY OF LEEDS

A SURVEY of 788 chronic-sick patients was undertaken to ascertain what types are found in the wards allotted to this group. It was hoped to make suggestions to better the lot of these patients by further classification, amendment of routine, and improvement of equipment. As the great majority had been examined in the wards of an acute hospital before admission, it was assumed that the diagnosis and prognosis would generally be correct. It was felt that in wards where improvement and recovery are the exception rather than the rule, one of the chief items in life would be the mental state and attitude of the persons in the adjoining beds. Special attention was therefore given to the mentality of the patients and to arrangements for bringing special types together.

Patients were examined in five hospitals. Three admitted chronic sick only; another had also a large modern maternity unit; and the fifth had some wards for treating tuberculosis. The hospitals had 56, 100, 316, 102, and 251 chronic beds—a total of 825—and in them 788 cases were examined. In each case some facts regarding the social status and background of the individual were noted, and the physical and mental conditions assessed. The case-record from the acute hospital was generally available and gave the diagnosis on admission. Physical examination was limited to confirming this diagnosis and to determining the present state of the disease and of the patients' functional capacity—i.e., sight, speech, hearing, walking, &c. A nurse who knew the patients was always present to give information about habits, abilities, and behaviour. Since most of the mental abnormalities were organic reaction types, the psychiatric interview tended to be limited to assessing their degree; but, where other symptoms were present, it was appropriately expanded.

Social Aspects

Women outnumbered men by almost 2½ to 1 (552 to 236, or 70.1% to 29.9%). The youngest patients were aged 15, and the oldest was 101. Almost 80% were over 65, and of the remainder more than a third were over 60. The age- and sex-incidence are shown in table I:

TABLE I—AGE AND SEX

| | No. of cases | Male | Female |
|-------------------|--------------|-------------|-------------|
| All age-groups | 788 | 236 | 552 |
| 65 years and over | 628 (79.7%) | 183 (77.6%) | 445 (80.6%) |
| 60 years and over | 688 (87.3%) | 204 (86.5%) | 484 (87.6%) |
| Under 65 years | 160 (20.3%) | 53 (22.4%) | 107 (19.4%) |
| Under 60 years | 100 (12.7%) | 32 (13.5%) | 68 (12.4%) |

A quarter of the patients had been in hospital less than a year—which might indicate that many were admitted to pass their last days there. Indeed the weak state on admission was often only too obvious. On the other hand, an eighth of the patients had been in hospital more than 5 years, and one woman more than 43.

Most patients came from working-class homes and had led active lives, but a section of the men, who had been taken from an old workhouse infirmary, contained a number of uncompromising ne'er-do-wells whose habits and language made accommodation among ordinary people difficult.

Most cases obviously required constant nursing of a type unobtainable at home. Several had been looked after at home until some war circumstance—e.g., a daughter taking up war work—made it impossible.

Many so settled in hospital will not return home; housing is more difficult, and many families are not inclined to resume the burden of an invalid. Some families may be taking an unnecessary and unfair advantage of the public facilities; on the other hand relief has been granted to many deserving it. Mental and psychosomatic disorders in unmarried women who have given many years (consciously willing but unconsciously rebelling) to the nursing of a parent are commonly seen in psychiatric practice, and the physical effects on the young wife who tries to run both her own and her sick parent's home may be equally unfortunate. The patient in many cases does not understand the family's point of view, with unhappy results for all concerned, though many independent invalids adjust themselves philosophically to hospital. Special visiting facilities, including the admission of children, are appreciated by chronic hospital invalids, old and young, and may help to prevent the invalid from assuming that he is unwanted.

It is interesting to compare the marital status of this group with the group of old people on poor relief though not in hospital studied by Curran et al. (1946). In the present study, as in theirs, a large proportion of both sexes were widowed, but in this group there was a much larger proportion of single people (table II). The presence of a high proportion of widowed and single people in hospital compared with those married is not surprising, but it may also help to explain the continued presence of some persons who were not really ill though unable to look after themselves in their own homes.

TABLE II—MARITAL STATUS

| | Curran et al. (1946) | Present study |
|---------------|----------------------|--------------------|
| Widowed women | 507 of 728 (69.6%) | 273 of 400 (59.3%) |
| Widowers | 95 of 273 (38.4%) | 79 of 200 (34.5%) |
| Single women | 68 of 728 (9.3%) | 105 of 400 (26.3%) |
| Single men | 35 of 273 (12.8%) | 69 of 200 (29.3%) |
| Married women | 153 of 728 (21.2%) | 58 of 400 (14.5%) |
| Married men | 143 of 273 (53.4%) | 52 of 200 (26.0%) |

The occupation of chronic-sick beds by recovered patients and by infirm old people who could be in their own homes if help was available has been commented on elsewhere (Amulree and Sturdee 1946), and was noted in the present survey to the extent of about 12% of the total cases (5.4% of the females and 6.7% of the males). Those who are in the category of infirm were able to be up for half a day and could attend to their toilet. Many were admitted to hospital in acute illness and had not recovered enough strength to look after themselves completely. Hostels and home-helps are required for such cases, but are not available for all. Meanwhile the presence of the recovered and infirm cases in hospital lengthens the waiting-list for chronic beds but to some extent relieves the burden of the nurses.

Physical Disorders

Table III summarises the types of disorder responsible for the retention of the patients in hospital.

TABLE III—PHYSICAL DISORDERS

| | 236 Males | 552 Females |
|---------------------------|------------|-------------|
| Senile weakness | 47 (19.9%) | 80 (14.0%) |
| Cardiovascular disorders | 22 (8.8%) | 62 (10.2%) |
| Central nervous disorders | 78 (33.0%) | 169 (30.6%) |
| Respiratory disorders | 24 (9.6%) | 33 (5.9%) |
| Allimentary disorders | 9 (3.6%) | 8 (1.4%) |
| Genito-urinary disorders | 2 (0.8%) | 4 (0.7%) |
| Locomotor disorders | 24 (9.6%) | 107 (19.4%) |
| Skin diseases | 6 (2.4%) | 6 (1.1%) |
| Metabolic disorders | 4 (1.6%) | 11 (1.9%) |
| All carcinoma cases | 13 (5.5%) | 24 (4.2%) |
| Recovered cases | 16 (6.7%) | 31 (5.6%) |
| Mental illness alone | 8 (3.4%) | 21 (3.8%) |

Many geriatric cases were recorded as senile weakness where cardiovascular degeneration or myocardial weak-

ness might have been equally appropriate; some of them had senile dementia, with presumably a degeneration of the cerebral cortex which would also be a factor in the weak muscular state. Nearly a third of all cases had a lesion of the central nervous system. As might be anticipated, the degenerations and cardiovascular accidents associated with old age were very much in evidence: 15% of the patients had hemiplegia. Osteoarthritis occurred in 11% of the female cases and in 5% of the men, whereas rheumatoid arthritis (3.9%) was almost limited to females. Chronic bronchitis and its complications were seen in nearly 10% of the patients. Other conditions occurring in more than 4% of cases were carcinoma, epilepsy, and fractures of the femur. Among the younger patients cases of relatively rare diseases of the central nervous system presenting interesting symptoms and signs were found, tucked away far from the path of even the most enthusiastic student. The familial and hereditary nature of some of these diseases was made obvious by the presence of brothers and sisters with the same conditions in the same hospital. Unusual conditions, such as diaphragmatic hernia and hermaphroditism, were present incidentally.

The academic classification given above, however, is less important from the point of view of routine hospital work than the functional disabilities (table IV). Blindness, feeding difficulties, incontinence, &c., are the matters of immediate import to the chronic-sick patient and his nurse.

TABLE IV—FUNCTIONAL DISABILITIES

| | Males | Females |
|------------------------------------|-------------|-------------|
| Sight: | | |
| Blindness | 19 (8.1%) | 25 (4.6%) |
| Poor sight | 19 (8.1%) | 16 (2.9%) |
| Hearing: | | |
| Deafness | 17 (7.2%) | 41 (7.8%) |
| Poor hearing | 19 (8.1%) | 31 (5.6%) |
| Speech (aphasia and dysarthria) .. | 35 (14.8%) | 48 (8.7%) |
| Inability to feed self | 32 (13.6%) | 38 (6.8%) |
| Walking: | | |
| Incapable of walking | 80 (33.9%) | 230 (41.7%) |
| Requiring help | 108 (45.8%) | 247 (44.7%) |
| Incontinence: | | |
| Of urine | 20 (8.5%) | 58 (10.5%) |
| Double incontinence | 26 (10.6%) | 63 (11.4%) |
| Occasional incontinence | 9 (3.8%) | 12 (2.2%) |
| Fits | 9 (3.8%) | 27 (4.4%) |

An examination of the disorders found, from the point of view of prognosis, reveals that the following types of patient can be admitted:

- (1) Incurable.
- (2) Long-term cases—e.g., some cardiac, chronic bronchitis, hemiplegia, genito-urinary and skin patients—in whom recovery is possible but uncertain.
- (3) Recoveries.

Included in these types are patients with diseases due to old age who may recover or become infirm or incurable.

Mental Disorders

Though patients were not admitted primarily for mental symptoms, the incidence of mental disorders was high (table v).

TABLE V—INCIDENCE OF MENTAL DISORDERS

| | Total | Male | Female |
|---------------------|--------------------|-------------------|--------------------|
| All patients .. | 294 (37.3%) 788 | 92 (38.9%) 236 | 202 (36.6%) 552 |
| Aged 65 and over .. | 221 (36.2%) 628 | 68 (37.1%) 183 | 153 (34.4%) 445 |
| Aged under 65 .. | 73 (45.6%) 160 | 24 (45.3%) 53 | 49 (45.8%) 107 |

Of the 788 patients 294 (37.3%) showed obvious mental symptoms. The sexes were equally affected. Among those aged 65 and over, 35% showed symptoms.

It is perhaps more surprising to record that 45% of the younger group displayed serious disorders. In 80% of cases the condition was apparently due to organic change in the brain. The remaining 20% (60 patients) included 28 mental defectives and 32 others whose psychosis or neurosis was of a more functional type. The disorders were mild in the sense that they did not lead to gross abnormality of behaviour or thought, but the patients affected usually could not carry on a normal conversation and join or enjoy communal activities or interests. The following cases illustrate the types of mental disorders found:

CASE 1.—Apathetic senile dementia. A widow, aged 85, had been in hospital for six years. She had been admitted to the acute hospital for senile weakness and chronic ulceration of the right leg, which was epitheliomatous. She had average sight but poor hearing. She could feed herself but could not walk. She had double incontinence and had to be "changed" regularly. Mentally she was quiet. She was sometimes restless at night and dirty in her habits. Her speech was normal but her talk confused. She never spoke unless addressed. She was apathetic, showed no interest in her surroundings, and appeared to eat automatically. She was completely disoriented and appeared to be unable to remember anything but her name.

CASE 2.—Restless senile dementia. A widow, aged 79, had been in hospital three months. She had been admitted from the acute hospital as a case of cerebral thrombosis. She had average sight and hearing. She could walk but needed help to avoid falling. She was often incontinent. She was restless and would often come out of bed and proceed along the ward holding on to the other beds. She required assistance with her meals, as she ate spasmodically and would play with the food. At night she would talk and sometimes wished to walk. She was confused in her ideas but was keen to converse and could give her name and address and age fairly accurately, though not every time she was asked. Memory for recent events was poor.

CASE 3.—Presenile dementia following hemiplegia. A labourer, a widower aged 59, had been admitted with hyperpiesia and right hemiplegia of three years' duration. Sight, hearing, and speech were normal. He could feed himself but was doubly incontinent. He was quiet, spoke only when addressed, and was completely apathetic. His memory was very poor, and he was disoriented for time and place.

CASE 4.—Presenile dementia due to disseminated sclerosis. A married man, aged 44, a sheet-metal worker, had been admitted three years ago with disseminated sclerosis, giving paraplegia and incontinence. His sight and hearing were normal but there was some difficulty in speech. He could feed himself. He was quiet and ready to converse but this was difficult and slow because the speech was dysarthric, and there was some difficulty in thinking. His mood was amiable and tended to euphoria. His memory was poor, and he could not give the day or month. His thoughts were rather simple and facile and sometimes confused.

Forgetfulness of variable degree is normal in senescence. If a man lives long enough he will become forgetful. It is of the same nature as the stiffening of aged joints and the weakening of aged muscles. Some difficulty in recalling recent events was observed in patients between 65 and 70, whereas apparent complete lucidity was observed in one or two over 90. Forgetfulness by itself was not regarded as senile dementia, nor was the state of apathy with loss of interest in time and in day-to-day events which was often present in these old people in hospital. This distinction, however, is artificial, in the sense that it separates only two stages of the same pathological process. It might have been more accurate to have labelled these cases "simple senile deterioration" and added them to the total of mental disorders. Cases of this type progress to dementia when the patients become disoriented for time and place and person, show complete apathy to their surroundings (though usually retaining some interest in meals), and become incontinent. There were 86 patients (37 males and 49 females) in the forgetful category.

Table VI shows the different types of mental disorders. Among the clinical types of senile dementia found in these wards the apathetic one described above predominated. The confused and restless conditions associated by Howell (1945) with progressive cerebral ischaemia were observed and nursed when possible in

TABLE VI—TYPES OF MENTAL DISORDERS

| | 93 Males | 202 Females | Total 294 |
|-----------------------------|------------|-------------|-------------|
| Senile dementia .. | 44 (47.8%) | 123 (60.9%) | 167 (56.8%) |
| Presenile dementia* | 14 (15.2%) | 27 (13.4%) | 41 (13.9%) |
| Taboparesis .. | 4 (4.3%) | — | 4 (1.4%) |
| Paranoid states .. | 10 (10.9%) | 13 (6.4%) | 23 (7.8%) |
| Depression .. | 3 (3.3%) | 15 (7.4%) | 18 (6.1%) |
| Neuroses .. | 5 (5.5%) | 8 (3.9%) | 13 (4.4%) |
| Congenital mental defect .. | 12 (12.9%) | 16 (7.9%) | 28 (9.6%) |

* Including cases with arteriosclerosis-like symptoms, disseminated sclerosis, myxoedema, cerebral tumour, and epilepsy.

cot beds. The more obvious results of cerebral arteriosclerosis, such as hemiplegia and aphasia, were observed in some cases of both types.

Mental disorders in the younger chronic-sick patients were also often the effect of organic brain disease. Among those between 50 and 65 years of age the dementia which may accompany arteriosclerotic hemiplegia and other hypertensive manifestations was fairly common.

That some functional states were discovered might be surprising, though the anxiety states were mostly associated with hypertension and heart disease. One outstanding case of hysterical paraplegia responded well to treatment.

Chronic delusional states with some systematisation (paranoid states) were found, especially among the deaf and the older people. These patients were often quarrelsome and regarded their attendants as accomplices in a plot to deprive them of their rights or to injure them. Some were hallucinated and others quietly grandiose.

Long periods in hospital tend to produce depression and apathy, especially among the older patients and others who have difficulty in establishing new interests to help in their adaptation to hospital life. Besides these reactions a few cases of abnormal depression were encountered, nearly all of which had originated before admission. Most had some severe environmental strain besides their chronic illness. The physical disabilities in most cases made suicidal attempts unlikely, but one cannot avoid the impression that the possibility of this event in depressed states is not sufficiently recognised.

The mentally defective group included patients with Little's disease and congenital syphilis and several of

TABLE VII—SENILE DEMENTIA

| | Male | Female | Total |
|------------------------|-------------------|--------------------|--------------------|
| Total senile dementia | 44 | 123 | 167 |
| Of all patients .. | 44 (18.8%) 236 | 123 (22.3%) 552 | 167 (21.2%) 788 |
| Of mentally disordered | 44 (47.8%) 92 | 123 (60.9%) 202 | 167 (57.5%) 294 |
| Of organic dementias | 44 (67.6%) 65 | 123 (77.2%) 167 | 167 (71.6%) 232 |

the patients admitted for epilepsy—which in these cases was a complication of their mental deficiency. Mental defectives and epileptics in the community who are not suitable for occupation or training present a problem which is nearly insoluble owing to the great scarcity of institutional beds. At present they must live as a burden to their families, and it is not surprising or particularly inappropriate that they are fairly numerous in the institutions for chronic sick.

Though some psychotic patients were transferred to mental hospitals for treatment or safety, the fact that the remainder are nursed near their homes and in general hospitals is usually appreciated by their relations and

friends. Their removal elsewhere could not in most cases be justified, but the existence of such a large psychiatric population in some of our general hospitals is not generally appreciated, though there is a general impression that cases of senile dementia are so accommodated. Table VII shows the distribution of senile dementia.

If the psychiatric disorders are surveyed from the prognostic angle, the same mixture of recovery, long-term improvement, and incurability is found as among the physical disorders. The proportion of potential recoveries is much less, but nevertheless they do exist.

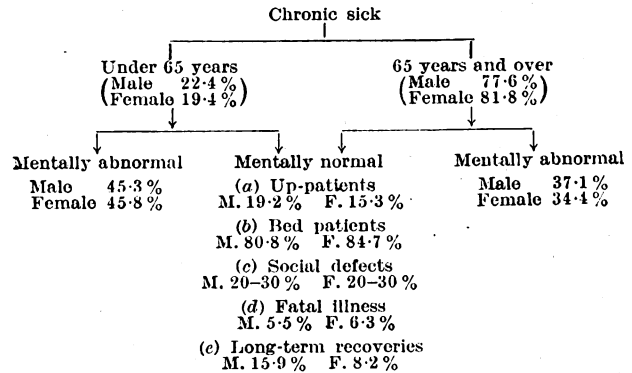
Classification

Many of the regional survey commissioners commented on and deplored the absence of classification in the arrangements for these patients (see Nuffield Provincial Hospitals Trust 1946). The ideal would be to have separate accommodation for cases of each type of prognosis and for the aged group, thus :

- (1) Long-term cases (recovery anticipated) in special rehabilitation hospitals.
- (2) Incurable cases in best present accommodation for chronic sick.
- (3) The aged sick in the geriatric hospital department, with acute departments.
- (4) The infirm in hostels or "eventide homes."

Meanwhile, however, the pressure on acute beds is so great that a patient whose illness is going to be lengthy

TABLE VIII—CLASSIFICATION



must be accommodated elsewhere whenever this seems reasonably possible. The result is that the patient sometimes passes from one doctor and hospital to another and even in some cases completes his recovery in a chronic-sick ward. In the attempt to contend with this situation a system of classification has been applied (table VIII). The fundamental clinical subdivision is the segregation of those with major disorders of the mind. After this, the younger patients are nursed separately from the aged, and special arrangements are made for the types with social defects (incontinence, epilepsy, &c.). These arrangements are often made by the ward sisters, but to be effective they must be planned and supervised by someone with wider authority. When the general scheme has been developed, rearrangement of patients must be expected and be regarded as part of the right of the chronic sick. Potential recoveries have not yet been separated, but physiotherapy is available.

Table VIII indicates the relative distribution of some of the classes for whom special arrangements may be needed.

Management

ACCOMMODATION

Size of Units.—The number of beds in a chronic medical unit is unimportant if there are enough subdivisions in the accommodation to allow proper classification of the

patients. Thus a 150-bed unit composed of 25-bed wards usually leads to the mixture of types of cases which it is desirable to separate. This has been demonstrated in our own hospitals—as a result of staff shortage which necessitated the closure of wards allocated to special types of patients. Of the patients in this survey 70% were in wards of 3–15 beds.

Admission System.—All patients should be admitted first to a hospital for acute cases and be thoroughly examined. During this time the mental state should be assessed and arrangements made to transfer the patient to the chronic ward which is suitable to his capacity, interests, and age-group. If patients are admitted directly from their homes, an admission ward or bed is required in the chronic unit so as to avoid the system whereby a new patient is placed in any available bed, irrespective of the type of ward.

Buildings.—None of our buildings were built for the purpose, but most have undergone structural adaptation and alteration to house the chronic sick. One hospital was very favourably commended in the regional survey (Eason et al. 1945) as an example of good chronic-sick accommodation. Cheerful decoration and provision of a light for each bed are two features which we insist on having in our own homes but which appear in the past to have been regarded as an unnecessary extravagance. Perhaps the most valuable item which is lacking is adequate single-room accommodation for the dying, those who have constant pain and need quiet, and those whose disease gives rise to offensive odour or unsightliness. Three single rooms for each 100 beds are the minimum required for medical reasons only. Extensive single-room units in these days of shortages of nurses and domestics are a doubtful asset.

Up-patients require day-rooms, and many who have difficulty in walking or can move about in a chair are found accommodation on the ground floor, so that they have every opportunity of getting outside. A daily change of view means a great deal to a person who is always in bed, and the use of a veranda or balcony is much appreciated.

MEDICAL STAFF

Local general practitioners or medical officers who have other duties are the usual physicians to these wards, for which they can spare too little time. It is essential that the medical officer should have access to the consultants and facilities of the acute hospital. At the same time the status, efficiency, and morale of these hospitals could be raised immediately if a visiting physician, orthopaedic surgeon, and perhaps ophthalmologist of consultant rank were appointed to visit the wards regularly, though not necessarily often.

MEDICAL AUXILIARIES

Physiotherapy.—The physiotherapy generally indicated in these wards is satisfactorily given under the supervision of the trained nurses. Passive movements of limbs and the use of simple lamps can be prescribed; but, where more expert service is required, the patient is transferred to the acute hospital or to the chronic one within the same grounds.

Occupational Therapy.—The absence of activity between meals in the male wards is most noticeable in comparison with the female side, where most patients who have the use of their hands and minds are doing knitting or crochet. In spite of this, only about 20% of the female patients can engage in this activity. The mental benefits of diversional activities are so important that a special effort must be made to ensure that all who can be employed, including the men, are employed. The part-time services of an occupational therapist are desirable, so that the maximal variety of activities with

expert teaching can be provided; but failing this an enthusiastic ward sister can give the necessary stimulus.

Blind Welfare.—Workers trained in this subject do good work, with the result that blind patients often receive more outside attention and corresponding benefits than those unafflicted.

Almoners are helpful and popular. It may be hoped that, when almoners are freed from financial duties by the National Health Service Act, the patients will benefit by the expansion of their social services, which might suitably include the further coördination of voluntary services with the official workers.

NURSING STAFF

Table IV summarises to some extent the special nursing duties in connexion with chronic-sick work, but there must be added to them the disorders of behaviour and lack of coöperation which accompany some of the mental states described.

The nursing of the chronic sick is perhaps the least attractive of all nursing. There is little reason why staff should be attracted to chronic work while shortage exists elsewhere. Even assistant nurses are being made welcome now in acute hospitals and in industry, with the result that many chronic hospitals have to rely more and more on their ward orderlies. Thus the domestic worker finds herself assisting the nurse in ways which make both parties wonder where the distinction lies. When the non-resident orderly does not come to work, the acute situation is heroically handled and remains unrecorded. It seems inevitable that, for some time to come, most chronic patients in hospital will need to be attended by inadequate numbers of assistant nurses aided by ward orderlies, and that those hospitals which have a satisfactory proportion of fully trained staff will be regarded as extremely fortunate. The cure for such conditions is outside the scope of any single authority, but provision of training for assistant nurses at all suitable hospitals, with allocation of teaching duties to ward sisters, should to some extent arouse interests at present absent. Lectures on simple medical and nursing psychology and demonstrations of occupational therapy should be included in the training of assistant nurses. In work for the chronic sick the usual objections to the three-shift system for nurses do not apply; so where this is desired by the staff (and the staff are available) it should be in operation.

SOCIAL DEFECTS

Blindness.—Patients are often greatly assisted by being placed beside others who are willing to act as eyes by reading to them and by commenting on the events of the day. Such virtue is not without reward, and the team-work is of value to the ward morale.

Deafness.—In the absence of an effective hearing-aid this is perhaps the most awkward problem. Its serious effect on mental health is illustrated by the fact that of the paranoid personalities a third were deaf.

Incontinence.—It is customary to nurse these cases together in so-called “changing” wards, where regular attention is given with the minimum disturbance to other patients. Since such incontinence is accompanied by, or the result of, dementia, this arrangement is usually acceptable; but it is essential to see that here also the mental state of the patient justifies inclusion in a special ward.

Postencephalitic Disabilities.—The unsightliness and dysarthria associated with many of these conditions justify some segregation. Total segregation, however, leads to injustice, as the conversational powers of so many are so limited that the less severely affected are unduly penalised. The feeding process is so slow that the nursing time-table in such wards is difficult to maintain.

Epileptics are often so quarrelsome and self-righteous that some separate accommodation is required with a separate day-room. Exceptions will be made when fits are infrequent and personality traits acceptable. Dietetic and medicinal therapeutic measures are facilitated by segregation of the group.

FATAL ILLNESSES

The admission of a cancer patient does not demand any special procedure, as many such patients for many months or even years enjoy the company of other patients. The presence of pain or any other unrelieved symptoms, however, deserves the provision of separate and quiet accommodation.

VOLUNTARY HELP

Here above all is a field relatively little explored wherein the voluntary worker can find inexhaustible outlet for energy with satisfying reward. The Red Cross Library workers are greatly appreciated. Concert parties who visit the wards of immobile patients in small groups are popular. (The voluntary society at one of our hospitals has provided a portable stage for the day-room and supplies monthly concert parties which are attended by up- and chair-patients and relayed round the wards through the loudspeakers.) Film shows are also practicable and welcomed. Such services as letter-writing and reading can be provided for some patients, as shortage of staff makes it difficult for nurses to perform this service, which they cheerfully do in better circumstances. The patients' own relations and friends are usually loyal helpers, and they should be admitted to the wards as much as possible.

REHABILITATION, CHRONIC SICKNESS, AND THE FUTURE

Rehabilitation means essentially the prevention of chronic sickness, though it is not generally thought of in association with the type of invalid found in these hospitals. An examination of the physical conditions responsible for the presence of these patients in hospital does not suggest that many of their ultimate states could have been prevented under present conditions. When admission to a chronic-sick ward is granted, the aims of rehabilitation must be modified. Patients without gross lesions can, with help and encouragement, be prevented from becoming bedridden, and their mental faculties can be stimulated and maintained by talking, reading, radio, occupational diversions, concerts, and visitors. In these cases the aim is not always recovery but to make the patient fit to live outside hospital, either at home with some domestic help or in a hostel or home for similar people. Younger incurable patients are often more handicapped physically than older ones—e.g., some of the disseminated sclerosis and post-encephalitis groups—but a few remain who may regain connexion with the outer world by the use of some simple crafts which may bring them some remuneration.

The chronic rheumatic conditions and the effects of chronic bronchitis are two groups which might be reduced to some extent. Methods of attack on the chronic rheumatic diseases are suggested by the Medical Advisory Committee (Scotland) (1945) which recommends that there should be more hospital beds for articular rheumatism, with peripheral clinics at which specialist personnel would advise and supervise treatment. Such a scheme would ensure that admission to a chronic-sick bed was not the result of inaccessibility of expert advice and supervision.

Chronic bronchitis and its complications are at least theoretically preventable and might be largely reduced by proper rehabilitation after recovery from acute chest infections. Rehabilitation might be described as "supervised convalescence in suitable surroundings," an item which the average man is denied. For most of those

about to leave hospital it is very hard even to find a place in a convalescent home. Hence the convalescence is spent in the unsatisfactory environment of the patient's home and street, and he often returns to work before health is regained. The provision of convalescent and rehabilitation accommodation within reasonable distance of the town is a necessity for each acute unit—medical or surgical. It would help to reduce the incidence of subclinical ill health which allows chronic catarrhal states to develop.

If the present chronic sick were subdivided into long-term cases and incurable, and separate accommodation were provided for the two groups, we could concentrate our knowledge and services for the benefit of those whose outlook may be doubtful.

Services such as those described above would fulfil the needs of the incurable group. The long-term cases require to be amalgamated with the ordinary convalescents and provided with a greatly extended rehabilitation service, which might include vocational training for those who need a new rôle in life. A sub-committee of the medical faculty of Leeds General Infirmary have suggested the provision of a rehabilitation village where long-term cases of all the specialties could be housed. Educational services for children, workshops for adults, occupational and physiotherapy departments, community social centres, houses, flats, and hostels for staff, and administrative offices would all be required, besides the hospital and hostel for patients. Such a scheme illustrates the extent of our needs if chronic illness is to be reduced to a minimum.

The study of diseases of the aged would be greatly assisted if, as suggested by Warren (1946), the "geriatric specialty" was developed in this country to the same extent as the *pædiatric*, to which it is analogous. There is already in our chronic-sick wards and hospitals a large nucleus which, if organised with appropriate acute and outpatients' departments added, might develop into one of the most important services of the future.

Summary

A survey was made of 788 cases in the chronic-sick wards of five hospitals.

The outstanding social aspects were the advanced age of most of the patients, the high proportion of widowed and single people, and the presence of many recovered cases.

Physically, lesions of the central nervous system, senile weakness, arthritis, and chronic bronchitis were the most numerous conditions.

Mental disorder was found in 294 (37·3%). In the great majority of cases this was the result of organic brain disease, though most of the common mental disorders were found.

The classification of chronic-sick patients is discussed, and some problems of medical administration connected with the accommodation of these patients in hospital are mentioned. Suggestions are made about the possibility of preventing some of the conditions, and the reorganisation required to this end.

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TREATMENT OF ANURIA FOLLOWING INTRAVASCULAR HÆMOLYSIS

RICHARD H. DOBBS
M.D. Camb., M.R.C.P.

LATE LIEUT.-COLONEL R.A.M.C.

ANURIA following extensive post-transfusion hæmoly-
sis has a mortality greater than 50%. Treatment in
the past has for the most part been empirical. Adminis-
tration of alkalis, to prevent the blocking of tubules with
acid hæmatin, has not proved of great value in preventing
the onset of anuria, and decapsulation of one or both
kidneys has not been generally accepted as a rational
alternative to conservative treatment.

The case described here* is that of a soldier who appeared
to be dying of extreme oliguria and uræmia following
a massive hæmolytic transfusion. Peters (1945)
considered this condition to be the result of raised
intrarenal tension, and summed up the position by
stating that "both kidneys should be decapsulated as
soon as the syndrome can be established by the presence
of oliguria or anuria and azotæmia." Under the influence
of this dogmatic statement one kidney was decapsulated
—the other being left owing to the unique operative
difficulties—and an immediate diuresis ensued with the
eventual recovery of the patient. Urinary and blood
findings were followed during the period of recovery.

A healthy, obese, thickset English soldier fell from a window
in November, 1945, and sustained a fractured femur. After
some ten weeks he was transferred to the orthopaedic unit
of a general hospital.

The femur was plated by Lieut.-Colonel W. Parke on the
afternoon of Jan. 26. There was considerable hæmorrhage
and 2 pints of group-O citrated blood, followed by glucose
saline, was transfused while the patient was still under
anæsthesia. His condition on return to the ward was poor;
he vomited several times, was restless, and the pulse was
rapid and of poor volume.

Early next morning he was shivering and febrile, and later
conjunctival icterus was observed. Before midday he passed
some 20 oz. of reddish urine containing blood pigment and some
red cells. No further urine was passed on that day or the next,
but, though fever continued, his general condition improved.

* The case was reported by Lieut.-Colonel W. Parke in a letter in
THE LANCET, 1946, II, 847.

TABLE I—FINDINGS IN BLOOD AND URINE

| Date | Fluid intake (oz.) | Urine | | | | Blood | | |
|---------|--------------------|---------------|---------|--------------|-------------------------|--------------------------|--------------------------|-----------|
| | | Out-put (oz.) | Sp. gr. | Albu- min | Deposit | Urea (mg./ 100 c.cm.) | Urea (mg./ 100 c.cm.) | Hb (%) |
| Jan. 27 | 18 | 20 | .. | .. | .. | .. | 64 | .. |
| " 28 | 24 | 0 | .. | +++ | Few red cells | .. | .. | .. |
| " 29 | 42 | 1 | .. | .. | .. | 225 | .. | .. |
| " 30 | 24 | 3 1/2 | .. | .. | .. | 260 | 63 | 150/115 |
| " 31 | 33 | 3 | .. | .. | Red cells; no casts | 305 | .. | 160/112 |
| Feb. 1 | 22 | 3 | .. | +++ | .. | 380 | .. | 155/105 |
| " 2 | 30 | 13 1/2 | 1.010 | .. | Red cells; few casts | 400 | .. | .. |
| " 3 | 38 | 17 1/2 | .. | .. | .. | 510 | .. | .. |
| " 4 | 35 | 28 | 1.010 | .. | .. | 430 | .. | .. |
| " 5 | 39 | 21 | .. | .. | Few red cells | 850 | .. | 160/110 |
| " 6 | 29 | 34 | 1.012 | ++ | .. | 510 | .. | .. |
| " 7 | 46 | 68 | .. | .. | .. | 1000 | 530 | .. |
| " 8 | 75 | 47 | 1.012 | ++ | .. | 1200 | 30 | .. |
| " 9 | 91 | 72 | .. | + | .. | .. | 22 | 170/108 |
| " 10 | 102 | 102 | .. | .. | .. | 1450 | .. | .. |
| " 11 | 54 | 74 | .. | .. | .. | .. | 40 | .. |
| " 12 | 43 | 48 | .. | .. | .. | 1700 | 62 | 180/115 |
| " 15 | 70 | 65 | .. | .. | .. | 1600 | 125 | .. |
| " 16 | 65 | 54 | 1.020 | .. | Few red cells | .. | .. | .. |
| " 17 | 78 | 56 | .. | .. | .. | 1250 | 72 | 160/112 |
| " 22 | .. | .. | .. | .. | .. | .. | 50 | .. |

Transfusion hæmolytic took place on Jan. 26.
Decapsulation was performed on Feb. 1.
Transfusions were given on Feb. 10 and 11.

Hæmolytic and anuria following transfusion was diagnosed.
The hæmoglobin was 63% on the fourth day after operation,
and differential agglutination revealed that more than 90%
of transfused red cells had been hæmolytic. Both donors
were regrouped and found to be group O, and direct matching
with the recipient's serum showed no evidence of incompati-
bility. There had been no previous transfusions, and the only
explanation of the hæmolytic seemed to be that the blood had
been stored two weeks in a citrate anticoagulant solution not
containing glucose.

Until decapsulation six days later there was almost complete
anuria and a rising blood-urea level. On the second day no
urine was obtained, and subsequently about 3 oz. was removed
daily by catheterisation. The urine was at first faintly red

TABLE II—SPONTANEOUS DIURESIS THIRTEEN DAYS AFTER HÆMOLYSIS

| Day after transfusion | Urine | | Blood-urea (mg./100 c.cm.) |
|-----------------------|--------------|----------------------|----------------------------|
| | Output (oz.) | Urea (mg./100 c.cm.) | |
| 10 | 1 1/2 | .. | .. |
| 12 | 0 | .. | .. |
| 13 | 13 1/2 | .. | 340 |
| 14 | 44 | 730 | 360 |
| 15 | 59 | 640 | 380 |
| 16 | 101 | 850 | 368 |
| 17 | 106 | 1060 | 360 |
| 18 | 96 | 1200 | 385 |
| 19 | 31 | .. | 400 |
| 20 | 38 | .. | 360 |
| 21 | 48 | 1460 | 380 |
| 25 | 48 | 1740 | 310 |
| 29 | .. | .. | 232 |
| 53 | .. | .. | 40 |

High spinal anæsthesia given on evening of 15th day.
Fibrillation and heart-failure on evening of 18th day.

and contained red cells; it gradually changed to brown and
contained free bile, and later became amber. There was
constantly a fairly heavy cloud of albumin, but no casts were
seen.

Associated with anuria there was evidence of transient
liver damage; the liver became enlarged and tender, jaundice
developed, and the serum van den Bergh reaction was direct
immediate positive. This appeared to have subsided by the
sixth day.

The blood-urea level was already 225 mg. per 100 c.cm. on
the third day after transfusion and thereafter continued to
rise steeply. Fundal changes were absent and the blood-
pressure was 150 mm. Hg systolic and 110-115 diastolic,
remaining constant throughout his illness. The patient's
general condition remained good; he felt comparatively well,
his tongue was moist, and he was alert and talkative; there
were no gastro-intestinal symptoms other than constipation,
and his appetite remained excellent.

Medical treatment to induce diuresis was instituted as soon
as hæmolytic was diagnosed. The daily fluid intake from all
sources was restricted to about 1 1/2 litres, and glucose saline
with added alkalis and sodium sulphate was infused; these
measures were without effect on the urine output.

On the sixth day, though there was little deterioration in
the general condition, catheterisation again yielded barely
3 oz. of urine, and the blood-urea level had risen to 380 mg.
per 100 c.cm. (see table I and figure). Decapsulation of the right
kidney was performed under spinal anæsthesia by Lieut.-
Colonel W. Parke.

The patient's physique and obesity and a waist-high spica
plaster made delivery of the kidney almost impossible. It
appeared normal in size but was dull purple, and on incision
the capsule gaped, exposing the cortex, which was also dark
purple and congested. Reflection of the capsule was easy,
and each half was stripped over the upper and lower poles
and pushed round to the hilum without being excised. The
wound was closed, and, as oozing from muscles was free and
difficult to control, a rubber drain was left in situ.

During the operation the patient appeared fairly comfort-
able. There was a fall in blood-pressure to 95/55 mm. Hg,
presumably in part due to spinal anæsthesia, but pulse and
general condition gave no cause for anxiety. He spent a
fairly comfortable night, and next morning, though in some
pain, appeared little affected by his operation.

Some fourteen hours after the patient's return from the
theatre he passed urine voluntarily for the first time, and by
the end of the first twenty-four hours 13 1/2 oz. had been

passed. Diuresis was thereafter satisfactory and reached a maximum of 102 oz. in twenty-four hours on the ninth day, after which it gradually subsided.

The patient's general condition was not, however, immediately improved by the operation. Specific gravity of the urine remained at 1.010 for many days, and during the first four days after decapsulation the concentration of urea in the urine remained very little higher than that in the blood. The blood-urea level, though it ceased to increase so rapidly, continued to rise daily, and six days later 530 mg. per 100 c.cm. was recorded.

At this stage and for the next few days the clinical picture was complicated by an increasing anemia as a result of oozing from the renal wound. A week after decapsulation, with sighing respiration, hiccough, a thickly coated tongue, and a return of conjunctival icterus, he was more seriously ill than at any time previously.

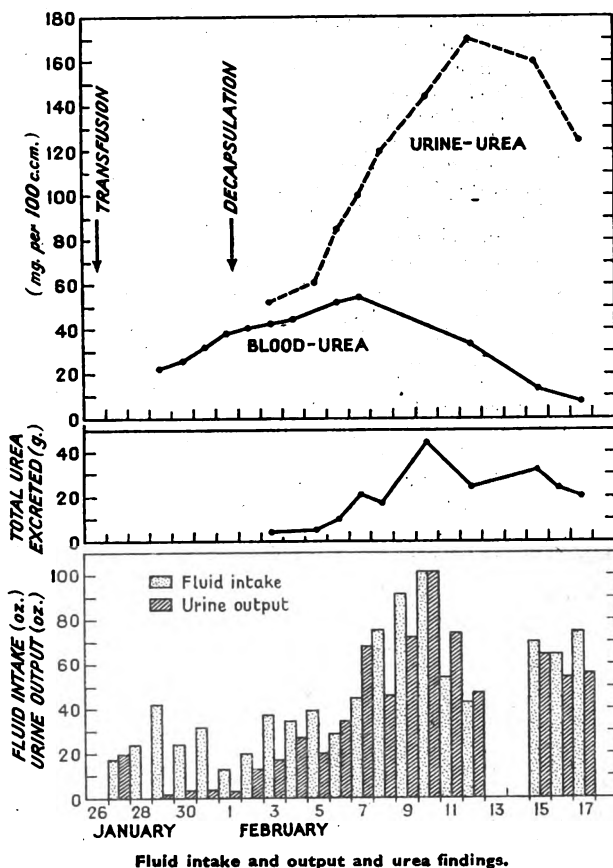
With a large urinary output, however, and as urine-urea concentration rose, the blood-urea level began to fall, and eventually did so as rapidly as it had risen. After a large transfusion with freshly drawn matched blood there was a further big improvement, and from this time on the patient made an uninterrupted recovery.

Ten days after decapsulation the blood-urea level had fallen to 320 mg. per 100 c.cm., and a week later to 70 mg. per 100 c.cm. On the twenty-third day after the initial operation, and seventeen days after decapsulation, he was repatriated to the U.K., thus making a final check on renal efficiency impossible.

The various findings during these twenty-three days, and including the fluid intake, urinary output, and urine-urea and blood-urea levels are shown in table I and the accompanying figure.

DISCUSSION

The patient had a severe intravascular hæmolysis following transfusion. Hæmolysis was followed by an almost complete anuria, and its usual sequel of progressive nitrogen retention but normal blood-pressure. Decapsulation of one kidney under spinal anaesthesia was followed by an immediate diuresis, which reached a maximum in ten days, and by a more gradual return



Fluid intake and output and urea findings.

TABLE III—RESULTS OF DECAPSULATION

| Authors | Days after transfusion | Amount of urine before decapsulation (oz. daily) | Uni-lateral or bilateral | Amount of urine after decapsulation | Result |
|---------------------------------|------------------------|--|--------------------------|---|--------------|
| Bancroft (1925) | 9 | 1-6 | Bilateral | 9 1/2 oz. on 1st day, increasing daily to 50 oz. on 5th day | Good |
| Younge (1936) | 5 | 2-3 | Uni-lateral | 8 oz. on 1st day; big excretion from wound for 5 days* | " |
| Ravich (1941) | 7 | 0-3 | " | 12, 47, and 166 oz. in first 3 days | " |
| Talbott (1942) | 4 | Anuria | " | Flow established from both kidneys within 24 hours | " |
| Flo and Cummings (1943) | 9 | 2-3 | " | 7, 20, and 10 oz. in first 3 days; incontinent 3rd day | " |
| Lyons and Raines (1945) | 3 | 2-3 | " | 3, 12, and 71 oz. in first 3 days | " |
| Beraud (cited by Bancroft 1925) | 6 | Complete anuria | " | Flow established in 12 hours | Died 2nd day |
| Present case | 6 | 0-3 1/2 | " | 13, 17 1/2, and 28 oz. in first 3 days | Good |

* This patient lost large quantities (about 1000 c.cm.) of fluid, "almost indistinguishable from urine," from the renal wound for five days after decapsulation.

to normal of urine and blood-urea level and by eventual recovery of the patient.

The efficacy and the mode of action of decapsulation will be discussed later. If, for the moment, it is assumed that diuresis and recovery were not fortuitous but the results of the operation, the important issue is immediately raised of how soon after the establishment of anuria should operation be performed. Table I and the figure show that, though a satisfactory diuresis followed immediately, there was neither an immediate return of renal function, as shown by the urine-urea concentration, nor a rapid improvement in the uræmia, as judged by the clinical condition and the blood-urea level. The urine-urea level was, for several days, little higher than the blood-urea level, which rose from 380 to 530 mg. per 100 c.cm. by the sixth day after operation.

These findings in blood and urine were closely paralleled in a second case in which, after post-transfusion hæmolytic, twelve days' almost complete anuria terminated in spontaneous diuresis. The relevant data, summarised in table II, show that, four days after diuresis set in, the urine-urea concentration was still only 850 mg. per 100 c.cm., whereas the blood-urea level remained at 360-370 mg. per 100 c.cm., a concentration of only just over double, instead of about 50 to 100 times. This patient developed a toxic fibrillation and heart-failure, which led to a temporary check in the flow of urine, but, significantly, did not prevent a continued improvement in the concentrating power of the kidney.

It appears that, though diuresis was satisfactorily established, in one case apparently as the result of surgical interference and in the other spontaneously, the urine was, for a few days, little more than a glomerular filtrate undergoing little concentration in the tubules. This is not surprising. The products of hæmolytic are toxic, and as they pass down, and are concentrated in, the tubules they produce damage which, though

reversible, is undoubtedly extensive. The findings suggest that tubular damage will not be repaired until anuria is relieved and the cellular debris, acid hæmatin, and other toxic products are washed away by the resulting diuresis. It follows that, if decapsulation or any other form of interference can be shown to be effective in producing diuresis, it should be done early—as soon as anuria is established. Though diuresis may be immediate and profuse, the concentrating power of the kidney recovers more slowly, and improvement in the patient's condition will be delayed for some days.

But is decapsulation effective? And if so, how does it initiate diuresis? The operation has, in the past, been used in the treatment of various anuric conditions. It is comparatively simple and of little danger to the patient compared with continued anuria. The whole subject was well reviewed by Abeshouse (1945), who held that it was effective in the anuria following mismatched transfusion. Despite considerable interest in the operation over a number of years, and much intensive study of the renal lesions in this and allied conditions during the war years, reported cases of anuria following transfusion treated either conservatively or by operation are curiously few. Of 46 patients treated conservatively, 31 (67%) died:

| Authors | No. of cases | No. of deaths |
|-----------------------------------|--------------|---------------|
| Bordley (1931) | 16 | 11 |
| Bordley (1931) (additional cases) | 10 | 10 |
| Daniels et al. (1941) .. . | 13 | 7 |
| Goldring and Graef (1936) .. | 7 | 3 |
| Totals | 46 | 31 |

Of 8 patients (including the present case) who underwent decapsulation 7 recovered (table III). Though the figures are too small for statistically significant conclusions to be drawn, they suggest that decapsulation does in some way lead to diuresis, and the impression is greatly strengthened by the uniform rapidity of its onset in every case, including the patient who died two days later.

Another significant point regarding the mode of action of decapsulation is that a good result appeared to follow operation on only one kidney in 7 of the 8 cases in table III. What little evidence is available suggests, moreover, that both kidneys recover their function though only one is decapsulated. After unilateral decapsulation for transfusion anuria, for instance, Lyons and Raines (1945) found normal phenolsulphonphthalein excretion (23% in half an hour from each kidney) twenty-six days later. Talbott (1942) performed unilateral decapsulation on the fourth day of oliguria and inserted ureteric catheters, collecting the urine from each kidney. There was good urinary flow, equal on the two sides, within twenty-four hours, and no striking difference in the renal efficiency on the two sides a fortnight later.

Talbott interpreted this result as implying that "unilateral decapsulation in this patient had no beneficial action on renal function." This does not necessarily follow, and the rapid recovery of renal function in both kidneys after one-sided decapsulation is a factor, were it established, that needs considering not only in explaining the good effects of the operation but also, by implication, in the elucidation of the ætiology of the anuria. Peters (1945) rejects plugging of the lumen of the tubules as sufficient explanation, and favours a mechanically raised intrarenal pressure produced by gross tubular damage and interstitial œdema. He demonstrates with an ingenious mechanical kidney that increased pressure, such as might be expected, will lead to a cessation of flow, and that lowering of tension to the extent that might be achieved by decapsulation can reinstate the flow, through his nephron. The theory is reasonable, and he naturally concludes that relief of intrarenal pressure by bilateral decapsulation will give

the best results. Abeshouse (1945), on the other hand, discards tissue trauma, release of proteins from damaged muscles, drainage of subcapsular toxins, and other incidentals to operation, and considers, as do Lyons and Raines (1945), that removal of sympathetic tonic nerve-fibres reaching the kidney through the capsule, rather than relief of tension, is the most probable explanation of the resulting diuresis.

If the apparent success of decapsulation is due to removal of sympathetic tonic nerve impulses, is the resulting diuresis due, wholly or in part, not to the operation itself but to the high spinal anæsthesia usually employed; and would not spinal anæsthesia alone, or perhaps sympathetic nerve block, achieve the required result? The sympathetic nerves reach the kidney from the last two thoracic and first lumbar segments via the splanchnic nerves and the semilunar ganglion to the renal plexus. They influence renal secretion through their vasomotor action, stimulation producing diminished urinary output, and removal or paralysis causing polyuria. Neuwirt (1922) reported a case of reflex anuria due to very severe left-sided renal colic, in which bilateral splanchnic anæsthesia was followed by diuresis within a few hours. He considered this method preferable to spinal anæsthesia, because lowering of the blood-pressure was avoided. In the second case referred to in the present paper high spinal anæsthesia, induced on the day indicated in table II, was followed by an increase in urine from 59 to 101 oz. next day. Spontaneous diuresis was, however, already in progress and could well have been responsible for such a rise.

Peters (1942) appears to have described the first case in which splanchnic block was deliberately used in the treatment of anuria following hæmolysis. His patient, a Rh-negative subject, had complete anuria for ten days. Within five hours of bilateral block 700 c.cm. of urine was passed, and soon 1500-6000 c.cm. was being passed daily; recovery was complete. Since this article was written O'Sullivan and Spitzer (1946) have recorded a second case. Reporting a series of cases of acute renal failure complicating abortion, they describe two in which dramatic response followed bilateral splanchnic block. In one the anuria followed extensive hæmolysis after the last of several transfusions in a Rh-negative subject. In the second, a case of anuria complicating abortion, probably an essentially similar condition, in the treatment of which they consider decapsulation has no place, the patient also recovered, though only after a second splanchnic block done a few days after the first.

During the last, few years it has become generally recognised that a similar pathology underlies the anuria developing in various conditions—e.g., crush syndrome, cortical necrosis in pregnancy and abortion, and sudden extensive intravascular hæmolysis from whatever cause. Recently evidence has been accumulating that in these conditions a redistribution of blood-flow within the kidney takes place, and that a closing down of the circulation through the cortex and its glomeruli gives rise to anuria, and, if sufficiently complete, cortical necrosis. This condition of affairs Maegraith and Havard (1946) have called renal anoxia. This conception has been vindicated by the important preliminary communication published by Trueta et al. (1946), wherein they claim that they have evidence, in animals, of the existence, via vasa recta and medullary blood channels, of an alternative route for blood passing through the kidney. They have demonstrated, radiologically and by direct inspection, a shunt of blood from the cortical to the medullary circulation as a result of various peripheral and central stimuli. They suggest that the lesion in "many loosely related syndromes—e.g., sulpha-kidney, incompatible transfusion kidney, Weil's disease, and some forms of nephritis—is the result of a defence device by which the cortex of the kidney is excluded from the circulating toxin or

other noxious agent, and thus protected. Too prolonged operation of this device may result in permanent damage."

If this mechanism is under the control of the sympathetic nervous system, it is easy to see how the process may be reversed by blocking the sympathetic. If this were done soon after the onset of anuria, flow of blood through the glomeruli would be re-established, so preventing further cortical damage and also leading to diuresis and a more prompt elimination of toxic agents in the tubules. There is sufficient evidence to justify further trials of this comparatively trivial procedure in the treatment of all these allied types of anuria.

SUMMARY

A case of post-transfusion anuria is described in which decapsulation was followed by immediate satisfactory diuresis and eventual recovery. Improvement in urea concentration by the kidney and in the uræmic condition of the patient was delayed several days. Probably such improvement cannot take place until diuresis sets in. It follows that, where decapsulation or other operative procedure is contemplated, it should be undertaken early.

The mortality in reported cases treated conservatively was over 65%, whereas 7 of 8 patients recovered in whom decapsulation was performed. Moreover diuresis invariably followed within 12-24 hours, suggesting that coincidence is not an adequate explanation of their recovery.

Unilateral decapsulation appears to be sufficient and is probably followed by diuresis and eventual recovery in both kidneys.

Rapid diuresis but slow recovery of the concentrating power of the kidney suggests that anuria and tubular damage have a separate aetiology. Tubular damage is sustained as the toxic products of hæmolytic pass down and are concentrated in the tubules. Raised intrarenal tension possibly plays its part in the production of anuria, but a more satisfactory explanation is that it is reflex in origin, and that decapsulation is effective by removing sympathetic nerve impulses. Recent work has suggested how such a reflex anuria may operate.

The spinal anaesthesia used in the operation of decapsulation may be a factor in initiating diuresis.

Splanchnic block would be a more satisfactory method and has been used with success in reflex anuria and in transfusion kidney. The procedure is simple and deserves further trial.

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"A phrase which seems to have arisen during the war is the radiologist's stock report: 'No osseous lesion detected.' Three of the words here are 'boss words,' and apparently preferred in the way that Pinkerton preferred 'hebdomadary' to 'weekly.' 'Osseous'! Why not 'bony'? 'Lesion' is a word slowly making its way into medical English as a general utility word for 'fracture, wound, disease, congenital deformity.' For 'injury' it is right enough; '*lædo*, the Latin root, means 'I hurt'; by a stretch it may include disease, but I cannot see it fairly used in any other sense. And 'detected': the radiologist does not detect; Mr. Holmes did that. . . ."
 —Dr. S. F. McDONALD, *Med. J. Aust.* 1946, **ii**, 701.

PALPABLE EPITROCHLEAR GLANDS INCIDENCE AND RELATION TO SYPHILIS

LAURENCE MARTIN
M.D. Camb., M.R.C.P.

PHYSICIAN TO ADDENBROOKE'S HOSPITAL, CAMBRIDGE

THE epitrochlear lymph-glands are seldom palpated as a routine in clinical examination but are more often sought for in special cases when their enlargement is expected. This practice has tended to establish a belief that all palpable epitrochlear glands are abnormal, because their normal limits of size and frequency of occurrence are not generally appreciated. There is, in particular, a common belief that their enlargement is suggestive of syphilis in the stage of general adenitis which precedes secondary skin eruptions. The origin of this sinister association, which still survives in some modern textbooks, is both ancient and dubious.

Richard Wiseman (1696) observed the epitrochlear glands in "King's evil" and believed that they were not "naturally born with us . . . but . . . arise upon the occasion of this disease," and their omission from writings of contemporary anatomists such as Salmon (1714) and Cheselden (1722) suggests that they were then unrecognised as normal structures.

Enlargement of the epitrochlear gland in primary syphilis when associated with a digital chancre aroused the curiosity of John Hunter (1810), who commented on one case in which epitrochlear adenitis had developed instead of an axillary bubo, and on another in which both epitrochlear and axillary glands were enlarged.

The belief that enlarged epitrochlear glands have a special diagnostic significance in syphilis at the pre-eruptive stage of adenitis is of obscure origin, and the literature contains conflicting opinions. Zeisler (1894) cited Sigmund as attaching particular significance to them at this stage, and Gruenfeld as having found them "without exception at certain periods of the disease." Hinton (1936) wrongly attributed to Fournier the opinion that enlarged epitrochlear glands were almost pathognomonic of tertiary syphilis. Fournier (1873) had, in fact, especially emphasised the rarity of their enlargement in the stage of general adenitis, insisted that their diagnostic significance had been grossly exaggerated, and fiercely reviled physicians who sought for non-existent glandular enlargement in the tertiary stage.

Lancereaux (1868) included the epitrochlear glands among those more rarely affected in the stage of general adenitis, whereas Ricord (1851) and Sir Jonathan Hutchinson (1909) did not mention them.

There is thus scanty support for a diagnostic significance of enlarged epitrochlear glands in syphilis from some of the greatest authorities, who in the pre-arsenical era probably saw more of the progressing disease than do most physicians living today.

PRESENT SURVEY

Palpable epitrochlear glands were so commonly observed in soldiers during the late war that I made a survey to define their normal limits of size and their incidence in adult males.

Of the 200 soldiers who were first examined, none had any disease which might cause a general adenitis or isolated enlargement of the epitrochlear glands. None were included who gave a history of "desert sores" on the hands or arms or who showed recent manual abrasions. Most had been referred for chest investigation, dyspepsia, fibrositis, sciatic pain, or urinary symptoms. It was not practicable to have a Wassermann reaction done in every case, but there was no evidence of syphilis in any.

The best method of detecting epitrochlear glands is to flex the patient's elbow to 90° and to palpate above the medial epicondyle of the humerus with a circular movement of the finger-tips. The glands can thus be rolled between the fingers and the lower end of the humeral shaft. It is more difficult to detect them in fat subjects than in thin.

TABLE I—EPITROCHLEAR GLANDS IN SOLDIERS

| Age-group (years) | No. of cases | Palpable glands | | | |
|-------------------|--------------|-----------------|------------|-----------|------------|
| | | Bilat-eral | Right only | Left only | Total |
| 16-20 .. | 12 | 2 | 1 | 1 | 4 (33.3%) |
| 21-25 .. | 43 | 10 | 8 | 3 | 21 (48.8%) |
| 26-30 .. | 46 | 12 | 5 | 5 | 22 (47.8%) |
| 31-35 .. | 46 | 17 | 4 | 1 | 22 (47.8%) |
| 36-40 .. | 36 | 8 | 4 | 0 | 12 (33.3%) |
| 41-45 .. | 14 | 2 | 1 | 0 | 3 (21.4%) |
| 46-50 .. | 3 | 0 | 0 | 0 | 0 0 |
| Total .. | 200 | 51 | 23 | 10 | 84 (42.0%) |

Table I shows that epitrochlear glands were palpable in 42% of 200 soldiers, with a remarkably constant frequency between the ages of twenty-one and thirty-five. In 17 cases one or both glands exceeded the size of a cherry-stone, and in 33 they were unilateral.

It seemed possible that some special factor in soldiers, such as repeated hand abrasions on the weapons and machinery of modern warfare, might have predisposed to minor infections and so increased the frequency with which epitrochlear glands were palpable. A control series of civilians not engaged in manual work would therefore have been desirable, but this presented obvious difficulties. Male civilians of military age were then in factory, agricultural, or transport work, which entailed equal opportunities of manual abrasions with military service, and few suitable hospital patients who were not so engaged were available. Nevertheless 100 civilian males, including hospital patients, healthy doctors, and laboratory-workers, were examined.

Table II shows that epitrochlear glands were palpable in 39% of 100 civilian males. In 3 cases they exceeded the size of cherry-stones, and in 16 they were unilateral.

TABLE II—EPITROCHLEAR GLANDS IN CIVILIANS

| Age-group (years) | No. of cases | Palpable glands | | | |
|-------------------|--------------|-----------------|------------|-----------|------------|
| | | Bilat-eral | Right only | Left only | Total |
| 16-20 .. | 10 | 3 | 0 | 1 | 4 (40.0%) |
| 21-25 .. | 13 | 4 | 1 | 1 | 6 (46.1%) |
| 26-30 .. | 16 | 3 | 2 | 1 | 6 (37.5%) |
| 31-35 .. | 19 | 6 | 4 | 3 | 13 (68.4%) |
| 36-40 .. | 15 | 2 | 0 | 1 | 3 (20.0%) |
| 41-45 .. | 19 | 3 | 0 | 1 | 4 (21.0%) |
| 46-50 .. | 8 | 2 | 0 | 1 | 3 (37.5%) |
| Total .. | 100 | 23 | 7 | 9 | 39 (39.0%) |

There was no significant difference in their incidence between manual and non-manual workers.

It seems, then, that epitrochlear glands are palpable in about 40% of males between the ages of sixteen and fifty, whether soldiers or civilians. In the combined series of 200 soldiers and 100 civilians 197 epitrochlear glands were palpable, of which 28 (14.2%) exceeded the size of a cherry-stone. These findings indicate the need for caution in declaring a palpable epitrochlear gland to be abnormal or enlarged.

It is not denied that enlarged epitrochlear glands may be part of a syphilitic adenitis, but there is no reason for attaching a diagnostic significance to them, for they are often enlarged in other adenopathies, such as those of leukemia, glandular fever, Hodgkin's disease, and

tuberculosis. The present survey suggests that no epitrochlear gland smaller than a cherry-stone can safely be regarded as abnormal. Apart from the criterion of size, other factors, such as tenderness, the degree of mobility, and consistency of the gland, must be taken into account before describing palpability or enlargement as pathological.

SUMMARY

A survey comprising 200 soldiers and 100 male civilians between the ages of sixteen and fifty showed that epitrochlear glands were palpable in about 40%.

Of the palpable epitrochlear glands, 14% exceeded the size of a cherry-stone.

Appreciation of these normal limits is essential before describing a palpable epitrochlear gland as enlarged or pathological.

There is no reliable evidence to support the belief that enlarged epitrochlear glands are more characteristic of syphilis than of other diseases which cause glandular enlargement.

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REVACCINATION IN ADULTS

J. C. BROOM

M.D. St. And.

From the Wellcome Laboratories of Tropical Medicine, London

DURING 1945 civilians were recruited by UNRRA to administer the camps then being set up in North-Western Europe for "displaced persons." On the assumption that the risk of infection would be high in these camps it was decided that every member of the staffs should be vaccinated against smallpox unless he, or she, possessed a certificate of vaccination less than a year old.

The result of the vaccination performed by us, and the length of time which had elapsed since previous vaccination, were recorded. The following notes are based on 1364 vaccinations for which complete records are available. All vaccinations and readings of results were carried out by one person under conditions standardised from experience gained during a series of 400-500 vaccinations not included in this report.

MATERIALS AND METHODS

The subjects were adults of all ages between 20 and 60 years. Records of age were not made, but the numbers were fairly evenly distributed among the different age-groups. The sexes also were about equally represented.

The histories of earlier vaccinations varied greatly: many of those with long residence abroad or service in the Armed Forces claimed to have been vaccinated on numerous occasions; nearly half had not been vaccinated since infancy; and about 10% had never been vaccinated.

Lymph was obtained in ampoules containing 25 or 50 doses fresh each week from the Government Lymph Establishment. Part of each batch was stored at 4° C until required; the remainder was heated at 65° C for 30 min. to destroy the virus and was used as a control for protein sensitivity. The first few batches of heated lymph were tested by intradermal inoculation into rabbits to ensure that the virus had been killed; later, the fact that normal lymph "took" in susceptible persons, whereas the heated did not, was accepted as proof of inactivation of the virus.

The heated and unheated lymphs were of the same batch at any one session, but many different batches were used throughout the whole series of vaccinations.

Technique of Vaccination.—The average number of persons vaccinated at one session was 40–50. The left arm was the site of election, but a few females insisted on vaccination on the thigh. The deltoid region was cleaned by gentle swabbing with a mixture of ether and methylated spirit, and dried with cotton-wool. One drop of heated and one drop of active lymph were placed some 2 in. apart on the cleaned area. An incision about 1/4 in. long was made through the heated lymph with a scalpel, and the material was rubbed into the cut with the flat of the knife; with the same scalpel, the process was repeated with the active lymph. The arm was left bare until the lymph had dried. No dressing was applied.

Reading of Results.—Each vaccination was observed after 2 or 3 days and again on the 8th day. Reactions were graded according to the time taken for the maximum to be reached, no account being taken of relative severity. This follows the line suggested by Leake,¹ though it was not possible to make daily measurements of the area of erythema which his complete method involves.

The following types of reaction are recognised by the International Sanitary Convention, 1944:

Typical Primary Vaccinia.—Maximum between 8th and 12th days, indicates complete susceptibility.

Accelerated Reaction (vaccinoid).—Maximum between 4th and 7th days, indicates partial residual immunity.

Reaction of Immunity.—Maximum between 2nd and 3rd days, indicates complete residual immunity.

A positive control reaction was recorded when, at the site of insertion of heated lymph, the skin incision showed gaping edges and was surrounded by an area of erythema about 5 mm. or more in diameter. In the non-susceptible individual no erythema was normally visible and the incision was obviously healing.

A second vaccination was done on the 8th day in all cases showing "no reaction." Thereafter most of these patients were seen on a single further occasion only (3 days later), because they were posted overseas. The readings of the second vaccinations were therefore tentative and not final.

RESULTS OF REVACCINATION WITH CALF LYMPH AT VARIOUS INTERVALS AFTER PREVIOUS VACCINATION

| Years since last vaccination | Results | | | | | Control reactions |
|------------------------------|---------|-------------|--------|-----|-------|-------------------|
| | Primary | Accelerated | Immune | Nil | Total | |
| 0-2 | 9 | 67 | 64 | 20 | 160 | 14 |
| 2-5 | 15 | 97 | 40 | 43 | 195 | 25 |
| 5-10 | 8 | 48 | 8 | 25 | 89 | 10 |
| 10-15 | 16 | 31 | 0 | 20 | 70 | 8 |
| 15-20 | 25 | 54 | 3 | 30 | 112 | 16 |
| > 20 | 213 | 284 | 4 | 100 | 601 | 37 |
| Total .. | 286 | 584 | 119 | 238 | 1227 | 110 |
| Primary vaccinators | 135 | 2 | 0 | 0 | 137 | -- |

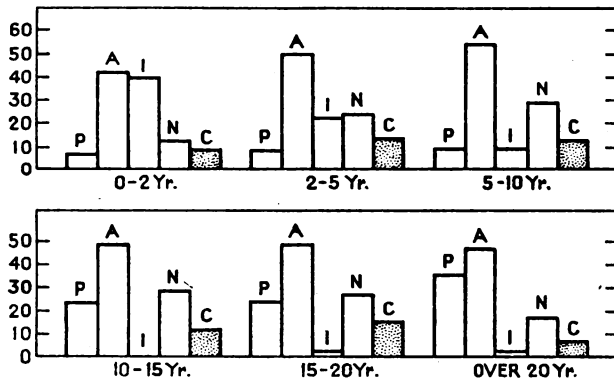
RESULTS

The results of these vaccinations are set out in the accompanying table, grouped according to the length of time which had elapsed since previous vaccination. In the accompanying figure the total in each group has been taken as 100 to facilitate comparison.

It will be seen that "control" reactions occur in all groups, and that the chance of such a reaction remains

high for at least 20 years after vaccination. The relative number of primary vaccinia rises, and of immune reactions falls, with increase of the time interval. On the other hand, the proportion of accelerated reactions lies between 40% and 50% at all periods.

The table also includes the results obtained in 137 adults vaccinated for the first time. All these vaccinations "took" successfully. They formed a useful check on the technique and on the potency of the lymph



Percentage distribution of results of revaccination after various intervals: P, primary vaccinia; A, accelerated reaction; I, reaction of immunity; N, no result; C, positive reaction with heated lymph.

because, by chance, two or more of these primary vaccinations were carried out at each session.

The results of second vaccinations are not shown because, as stated above, no final reading was made. It may be said, however, that of 201 second vaccinations 39 (20%) were considered as probable accelerated reactions when examined on the 3rd day, and the remaining 80% as again negative. It has been our experience that the beginning of an accelerated reaction can almost invariably be distinguished on the 3rd day; so these proportions are in all likelihood reasonably correct.

DISCUSSION

For practical purposes the occurrence of either an accelerated reaction or a primary vaccinia means that the vaccination has been "successful," but the differentiation into two types is of academic and epidemiological interest on the assumption that the former indicates partial immunity retained from previous vaccination and the latter shows complete susceptibility. In our experience the distinction can be made with confidence on the 8th day; an accelerated reaction is then obviously past the maximum and is beginning to form an eschar, whereas a primary vaccinia is just reaching the stage of pustulation.

The reaction of immunity, as a sign of complete protection resulting from previous vaccination, would be of great value if it could be recognised with certainty. This can be done when a papule surrounded by an area of erythema appears at the site of insertion of active lymph, and no reaction at all is caused by the heated material; such a result can be accepted as an immune reaction. Doubt must arise, however, when some reaction, though less in degree than that caused by the active lymph, is produced by heated lymph. It seems impossible to assess these cases by an objective standard, and it was our custom to take the past history into account. If the previous vaccination had been within 5 years and had left an obvious scar, the result was recorded as an immune reaction. After a longer interval, or if no scar was apparent, and in all cases of doubt, a second vaccination was performed. It is probable that this method erred on the side of safety because, as noted above, 80% of cases classed as "nil" on first vaccination showed no greater reaction 3 days after the second attempt.

1. Leake, J. P. *Publ. Hlth Rep., Wash.* 1927, 42, 221.

The occurrence of about 5% of primary vaccinia in persons last vaccinated within 2 years was unexpected. Since, however, no scar related to that "vaccination" was ever observed, it seems likely that a non-specific reaction had been mistaken for a reaction of immunity. This was certainly the explanation in the case of a nurse who had been vaccinated, for the first time since infancy, a few months earlier, and had been certified immune. Feeling that the result was unlikely, she requested revaccination. After 3 days there was marked erythema round both active and heated lymph insertions, but a typical primary vaccinia developed later. This case also illustrates the lack of correlation between immunity and sensitivity to vaccine products, to which attention has often been drawn before.

The value of the immune reaction can thus be questioned for two reasons. First, the existence of persons who, without being immune to living virus, react to heated lymph in a manner which may closely simulate the reaction of immunity and may lead to mistaken readings. Secondly, the existence of others who are immune to vaccinia virus on the evidence of lack of response to repeated vaccinations but do not show a reaction of immunity.

There are grounds, therefore, for suggesting that some alteration in the international certificate of vaccination against smallpox would be advisable, because therein the reaction of immunity is accepted as valid, whereas no provision is made for lack of susceptibility—indeed it is stated, "A certificate of no reaction will not be accepted." The method adopted by the British Army seems to offer a good alternative: the first vaccination is made by a single insertion and is examined a week later, no earlier observation being made. If a satisfactory "take" has not occurred, revaccination is carried out with three insertions; if again no reaction is obtained, "insusceptibility to vaccination" is recorded, and this certificate is valid for the same period as one of successful vaccination of the same date.

SUMMARY

A series of 1227 adult revaccinations against smallpox is described.

Details are given of the method of vaccination, including the insertion of killed virus as an indicator of sensitivity to vaccine lymph.

The results are grouped according to the type of response and the length of time since previous vaccination.

Sensitivity reactions are shown to develop at all intervals and to be unrelated to immunity.

It is suggested that these reactions lead on occasion to misinterpretation of the response to vaccination.

Attention is drawn to the lack of provision, in the international certificate of vaccination against smallpox, of a category to include persons who are insusceptible to vaccinia but do not show the reaction of immunity; an alternative method of certification is proposed.

"Some . . . benefit by taking only one meal a day . . . while others . . . make it a rule to take lunch as well as dinner. . . . For the one class, if they lunch though to do so is not beneficial to them, are at once heavy and sluggish in body and mind, being overcome with yawning, drowsiness and thirst, and if they go on to take dinner as well, they suffer from flatulence and colic, with violent diarrhoea. . . . On the other hand, if a man in the habit of taking lunch . . . refrain from doing so, he experiences at once . . . severe prostration, trembling and faintness. In addition, the eyes become hollow, the urine yellower and hotter, the mouth bitter, his bowels seeming to hang, with dizziness, depression and disinclination to exertion. Besides all this, when he tries to take dinner . . . this mere food, descending into the belly with colic and noise, burns it up; the patients sleep badly, with disturbed and troubled dreams."—From *Ancient Medicine* (ANON. ? 430-400 B.C.), translated by W. H. S. JONES (*Bull. Hist. Med.* suppl. no. 8: Philosophy and Medicine in Ancient Greece).

SEXUAL INVERSION AN ETHICAL STUDY

D. STANLEY-JONES
M.B., B.Sc. Lond., F.R.C.S.

SEXUAL inversion is an attitude of mind in which the affections are turned toward members of the same sex. It is also called homosexuality (from the Greek *homos*, "same," as distinct from *heteros*, "other"; it is in no way connected with the Latin *homo*, "man"), and is properly considered only in relation to heterosexuality, in which the affections are turned towards members of the opposite sex.

Homosexuality does not necessarily imply any overt manifestation of physical sex. Lack of recognition of this fact is but one of many misconceptions that obscure clear thinking on this topic; there are many thousands of adults whose conduct is beyond reproach and who are useful and valuable members of their community, but whose interests lie exclusively with those of their own sex, and who with every propriety in the use of the word may be termed homosexual. The word itself bears, or should bear, no stigma of shame.

Heterosexuality also implies no connotation of physical sex, and may be correctly used to indicate a mixed group of males and females, such as a co-educational school, which is a heterosexual group, whereas the conventional public school may be described as a homosexual group. Popular prejudice, however, makes it unwise to use these terms in this way. As with a group, so also with the range of individual affections: the love of a mother for her son, of a brother for his sister, of husband and wife, are examples of heterosexual attitudes, whereas friendships between man and man, pupil and teacher, father and son, are all well-recognised types of homosexuality.

EVOLUTION OF AFFECTIONS

The growing child stands in an ambivalent attitude towards his parents, in which there are not only rapid alternations of love and hate, of laughter and tears, but also the closely interwoven strands of heterosexual and homosexual love, twin motifs which blend themselves into the pattern of subsequent love relationships. It is necessary to trace the normal course of both these strands as they change with the growing years.

The infant boy directs his affection toward the mother who feeds and tends him, and for the first five or six years his orientation is predominantly heterosexual. Sooner or later, however, there comes a change, and father comes into notice, at first merely as a source of supply and security, an ever present background to the little world of the nursery, but later in a more personal way as a friend and, if the home is happy, as a hero.

As the boy's interests spread, he chooses his heroes from other boys' fathers, from his school-teacher, his club-leader, or his scoutmaster, of whom unwittingly he makes father-substitutes; later his hierarchy is recruited from those nearer his own age, the athletes and elder boys of his circle, and the process reaches its climax in the period aptly termed by Furfey¹ "the gang age" of small-boydom, which is familiar to all parents who have watched their son pass through this trying stage. Mother, nurse, and sister have no place among the gods of the pre-adolescent, the group is all-in-all, and feminine influence disappears from his life: it is necessary that this should be so.

The attitude of this phase is exclusively homosexual; but, as the first age of friendship typically occupies the years of pre-adolescence, sexual manifestations on a physical or genital level are the exception, though some harmless sadism (which is not without its deeper significance) is not infrequent.

1. Furfey, P. H. *The Gang Age*, New York, 1926.

The break-up of the gang is brought about by the onset of puberty, which ushers in the critical period. Feminine influence demands readmission after its long exile, and from now onwards heterosexual development takes its normal course, starting with the first shy and clumsy calf-love, till the full circle of the generations enters its final phase. The boy, now approaching manhood, takes up a protective attitude toward a mate of the same sex as his mother who first gave protection to him. There has been brought about a complete reversal of heterosexual relationship, from the attitude of infantile dependence, taking all and giving nothing, to that of protective love.

This reversal of the stream of affection from the self to another is rendered possible only by the disappearance of the mother, and all who resemble her, during the long latent period between childhood and puberty. The homosexual phase, therefore, and the homosexual attitude, far from being a malign perversion of all that is natural, is no less essential than heterosexuality itself in the development of the adult personality.

THE CRITICAL STAGE

At the critical stage of passing from homosexuality to heterosexuality there commonly occurs a transient phenomenon in which a pure affection may be aroused by a younger boy, and not infrequently a real friendship may develop. To the elder partner in this romantic attachment there is afforded a most helpful link in the transition from group loyalty to heterosexual love, and he is given an opportunity to exercise on familiar ground the sense of protection and chivalry which soon must play an important part in his approach to the other sex, to which he is as yet a stranger. The youth is fortunate in his friendships who can pass smoothly from a girl-like boy to a boy-like girl during this decisive phase.

In some cases, however, this smooth passage is interrupted. If the circumstances of the boyish friendship are such as to invest it with an unusual degree of pleasure, if the elder boy has been starved of his normal quota of respect which is his due, or if his vanity has been fed by unwise influences at home, he may find that the element of hero-worship which characterises this type of companionship is so much to his liking that he is content to remain here. If, moreover, there are obstacles in the way of his further progress, such as a degree of adolescent gaucherie or a sense of inferiority which cripples his relations with girls of his own age and class, a deeply rooted fixation will arise at the level of homosexual friendship.

Undoubtedly the commonest cause of emotional blockage at this stage is the public-school system of education, in which boys are thrown together in circumstances that necessitate an artificial prolongation of the homosexual group of earlier years, which in a more natural environment should have suffered disintegration at or before the time when the impulses of physical desire make their appearance. The group is maintained in a condition of metastable equilibrium, and the spirit of the gang crystallises as loyalties which by their unreasoning intensity betray their complexive origin. But these youthful deviations are corrected with the onset of maturity, and there is no doubt that the capacity for leadership, and in particular for leadership of men, together with the sense of loyalty which characterise the British race are directly attributable to the boarding-school type of education which is so typical of this country. Sublimated homosexuality plays an immensely important part in the structure of society both at home and abroad, in every way comparable to the rôle of heterosexuality, which, as the foundation of family life, is acknowledged as the basis of our social system.

There remains, however, the problem of the individual who does not conform to type, and in whom the element

of sexual desire has arisen to complicate his already grave psychological difficulties. Not infrequently it is the superior type of boy, who in the best sense of the word is an "individual," who finds himself unable to adapt himself to an unwonted distortion of emotional development. The endocrine system compels the inexorable changes of body and mind, and rather than stoop to masturbation—that most unnatural of vices because so entirely the product of an artificial civilisation²—the boy injects his adolescent ideals of physical beauty into the romantic friendship of the moment, and fixation at this level persists into the years of manhood. In less abnormal circumstances he would have withdrawn from the homosexual gang with the onset of puberty, and entered the age of romantic friendship before the appearance of physical desire, whose resurgence should coincide with the renewal of contacts with the opposite sex which furnish his natural phantasies with their material. If a youth is starved of this essential stimulus to sexual growth he will remain throughout his adult life at the sexual orientation of pre-adolescence, though having attained the bodily stature of maturity. The principal factor, therefore, in the onset of this condition is an external maladjustment of timing, operating on a fundamentally normal personality at a most critical phase of its development; there is no question, in the majority of cases of homosexuality, of endocrine dysfunction, the "female soul in a male body," still less of any streak of moral delinquency or inborn vice.

MEDICO-LEGAL ASPECTS

The clinical aspect of homosexuality which is most likely to obtrude itself on the notice of the general practitioner is in connexion with an alleged seduction of a young boy by a male invert. In many cases it is to the family doctor in the first instance that the harassed parents turn for advice, before taking the irrevocable step of reporting their suspicions to the police. There immediately arises a grave problem of responsibility, and it is no light matter to decide in which way a doctor may best discharge his duty when confronted with an issue of this nature. There is an acute dilemma at the highest ethical level.

It cannot be denied that the profession has obligations to society at large as well as to individual patients, but the controversy over the proposed State medical service has indicated in no equivocal manner that most doctors consider that their duty to the State is discharged most usefully through their duty to their patients who collectively form the State, rather than to a suprapersonal entity or abstraction to which individuality, their own no less than their patients', is subordinated.

Every doctor is entitled to act on the judgment of his own conscience, and in a matter such as this there can be no doubt that the first (but not the only) consideration is the welfare of the young boy who has been seduced, and whose best interests the family doctor has been called in to protect. This burden cannot wisely be discharged by passing it on to an unimaginative and uninstructed inspector, whose outlook has been conditioned by the conspiracy of silence for which the profession as a whole must take a major share of the blame. Such a step would inflict grave injury on the boy in question, who would perforce be subjected to the most sordid interrogation, and then be enmeshed in all the paraphernalia of criminal litigation. It would be along the path of least resistance, but also of least benefit to everyone concerned, least of all to the unfortunate boy whose interests the family doctor holds in trust as the one person who is in a position to give enlightened advice.

The emotional trauma suffered in the first instance by a boy who has been involved in a homosexual friend-

2. Stanley-Jones, D. *Brit. med. J.* 1940, ii, 206.

ship is minimal, even when it is complicated by manifestations of physical sex.³ Thousands of young boys at boarding school every year make some acquaintance with the problem, and among boys from other strata of society mutual masturbation and other sexual peccadilloes are of frequent occurrence during the years of puberty; they have in fact until quite recently formed one of the main channels—albeit undesirable—of sexual education among the masses. No attempt at exculpation is to be interpolated into these remarks, but a sense of proportion is necessary here.

By far the most important factor touching the boy's inner psychology is completely and invariably overlooked—namely, that he has allowed himself, probably against his wishes, to be drawn into homosexual practices solely because of his attitude of hero-worship toward the man who has led him astray. His ideals in this respect are at far greater hazard to suffer damage than the natural course of his sexual growth, which has behind it the irresistible urge of the endocrine glands to restore him to the path of normality. His concept of manhood should descend in unbroken line through his successive father-substitutes, and for better or for worse it will have decisive influence not only on the tone of every detail of his adult behaviour but also on his whole approach to the wider issue of fatherhood. It is difficult to imagine a more certain way of inflicting irreparable damage on adolescent ideals than to drag through the mud of the magistrates' court, and later of the assizes, the unwholesome details of an intense friendship with which these ideals were inextricably bound, and which, however undesirable in the physical plane, was (unless the boy was utterly depraved) almost certainly not without another and less unpleasing side.

This aspect of sexual inversion may be unfamiliar to some; but, far from being revolutionary, it is merely a return to the commonplace beliefs of classical Greece, which in the opinion of many scholars contributed not a little to her greatness. This point of view was ultimately displaced by the Hebrew traditions of sexual severity that inform the patterns of morality in our western world.⁴ The following quotation is from a book published in 1896 and now in its nineteenth edition⁵:

"Personal affection was not the basis of married life; romance took a different form, that of passionate friendships between men. Such friendships among the Greeks were an institution. Their ideal was the development and education of the younger by the older man, and they were recognised and approved by custom and law as an important factor in the state.

"In Sparta, for example, it was the rule that every boy had attached to him some elder youth by whom he was constantly attended, admonished, and trained. The celebrated 'Theban band,' consisting exclusively of pairs of lovers, marched and fought in battle side by side, and by their presence and example inspired one another to a courage so constant and high that 'it is stated that they were never beaten until the battle of Chæronea, and when Philip, after the fight, came to the place where the three hundred lay dead together, he wondered, and understanding that it was the band of lovers, he shed tears.' (Plutarch, *Pelopidas*, chap. 18.)

"Greek legend and history resound with the praises of friends, names that recall at once all that is most romantic in the passion of Greece. Not only, nor primarily, the physical sense was touched, but mainly and in chief the imagination and intellect. The affection of Achilles for Patroclus is as intense as that of a lover for his mistress (*Iliad* XXIV). It was his insistence on friendship as an incentive to a noble life that was the secret of the power of Socrates.

"So much indeed were the Greeks impressed with the manliness of this passion, with its power to prompt to high thought and heroic action, that some of the best of them set the love of man for man above that of man for woman. It is in the works of Plato that this view is most completely and exquisitely set forth; among all the forms of love, that one is chief which is conceived by one man for another. Such a love is the initiation into the higher life, the spring at once of virtue, of philosophy, and of religion.

"That there was another side to the matter goes without saying. This passion, like any other, has its depths as well as its heights. Still the fact remains that it was friendship that supplied to the Greeks that element of romance which plays so large a part in modern life; and it is to this, and not to the relations between men and women, that we must look for the highest reaches of their emotional experience."

Two thousand years of heterosexual civilisation have intervened since then, and the Greek view of life is unlikely to commend itself to the average general practitioner or to the anxious parents who have come to him for help. The immediate pressure of circumstances moulds our opinions and forms our beliefs, besides dictating our actions, but an enlightened view of the habits of other times is the mark of the man of culture. A widely sympathetic approach to the difficulties of the problem may serve to keep under control a situation which in less cautious hands would inevitably progress into a major tragedy. The family doctor who is resolute in his endeavour to protect the interests of the injured boy will see that so far as possible his young patient is spared the horror of having to give detailed evidence in criminal proceedings; his decision to advise the parents on these lines will be greatly fortified by a familiarity with ways of thinking that derive from other days.

THE DOCTOR'S RESPONSIBILITY

The general practitioner's responsibility as regards the offender also demands consideration. To counsel the parents to seek police intervention in no way discharges that responsibility, but merely passes on the burden to others who are less fitted to bear it, besides implicating in unsavoury proceedings the very patient whom he is seeking to protect. Should he be tempted to delude himself into thinking that it is to the invert's ultimate advantage to be kept in protective custody while undergoing treatment for his abnormality, and that the prison authorities will study the patient's convenience to the extent of sending him to the particular gaol (if any) where such treatment is available, he would do well to reflect that a major factor in the causation of homosexuality is a fixation at the point of transition to heterosexuality, and that, no matter how skilled the physician, his best work is wasted without a change of circumstance which will facilitate the development of heterosexual friendships. To commit a cultured invert to the soul-crushing duration of a long term of penal servitude, where his only contact with the opposite sex is an occasional sight of the prison charwoman, is as futile from the point of view of treatment as to hope to rehabilitate a chronic alcoholic by giving him occupational therapy in a brewery.⁶

To enter into the technicalities of treatment of sexual inversion is no part of the purpose of this article; rather is it to indicate in a simple manner those aspects of homosexuality which are most likely to come to the notice of the family doctor, and to suggest how best he may reconcile the conflict of loyalties, the conflict between the State and the two patients with whom he is directly concerned. For there can be no doubt that contact must be made with the elder boy or man who is the offender, and that this contact can be only on a professional basis, which at once and automatically establishes the doctor-patient relationship: the guilty person can face the doctor only as a healer and not as a judge, and

3. Bennet, E. A. *Brit. med. J.* 1946, i, 280, 450. Rosanoff, A. J. *Manual of Psychiatry and Mental Hygiene*, London, 1938, p. 556 (quoted by Dillon, F. *Brit. med. J.* 1946, i, 450).

4. Stanley-Jones, D. *Sexual Inversion and the English Law: a Study in the History of Culture. Med. Pr.* 1946, 215, 396.

5. Dickinson, G. L. *The Greek View of Life*, London, 1896, p. 184.

6. Stanley-Jones, D. *Brit. med. J.* 1946, i, 179.

he as a patient is entitled to the fullest benefit of the seal of professional secrecy.

There is, further, the burden of moral responsibility occasioned by mere juxtaposition of circumstance, which is clearly recognised in the case, say, of a traffic accident, and this also lays upon the doctor who is concerned with the incident the duty of getting into touch with the offender, if necessary on his own initiative, and of helping him in a need which is a thousandfold greater than that of the injured party.

Sufficient has been said to indicate that this burden cannot be laid aside by taking the easiest way out of an unpleasant situation; not only does police intervention effectively and finally bar the way to any possibility of cure, but also it is difficult to see how a moral duty to society can be discharged by causing irreparable injury to one of its members, unless one is prepared to defend the ethical position that the greater good justifies the lesser evil. In which case the hypothetical greater good, after being defined, must establish its claim to certainty without a reasonable doubt, and in the present instance this is far from being so.

In the final analysis the problem resolves itself into a special case of the question of professional secrecy, and a return to first principles would indicate that, when a doctor is entrusted with a secret of guilt, he must be assured that the welfare of the future is sufficiently safeguarded, but he is under no obligation to satisfy the claims (other than to due recompense) of the irrevocable past. He must use his utmost endeavours to guard against a recurrence of the offence, but even here he should duly weigh the very problematical risk of further damage to boys in the patient's neighbourhood against the certainty of utter damnation if the law is allowed to exact its merciless and unfeeling penalty. There may be indications for the therapy of fear, albeit tempered with wisdom, and the wise doctor will ensure that the elder patient places himself unreservedly in the hands of a competent psychotherapist and remains there until the possibility of a relapse has passed. It is unlikely, however, that any suggestion of threat or coercion will be necessary, since the type of invert whose compulsions lead him into criminal offences with younger persons has acute insight into his unhappy condition, and is ever willing to grasp the hand of any who will stretch out to save him.

In the case of the irreclaimable offender (whose moral responsibility may be likened to that of a known typhoid carrier), undoubtedly the only satisfactory solution lies in a permanent segregation under humane conditions of the type aimed at in the "treatment" of incurable insanity. This, however, is at present a counsel of perfection. The burden of this essay is that it is the medical profession collectively that is responsible, by its policy of silence, for the present lack of facilities for the treatment of sexual psychopaths, and therefore it is the moral duty of medical practitioners individually to shoulder in the first place the heavy responsibility of dealing with cases of this nature. To the conflict between the claims of the community and the needs of the individual there can be, in this as in many other issues, no finality. The line of thought here suggested is but one out of several possible avenues of approach.

"The limited tenure of research positions under short-term grants is precarious and injurious for the investigator in training or pursuing a career. The determination and direction of fields of research by the distant control, often from beyond the grave, of available funds is inhibitory and stultifying to those who prefer to follow freely the bent of their own curiosity. In some instances a foundation has sought to remedy the situation by granting 'fluid' research funds to certain medical schools to be administered by the faculty of the school itself. Wherever this has been tried I believe it has been eminently successful."—Dr. ERNEST W. GOODPASTURE, *Science*, 1946, 104, 473.

ANTERIOR BONE GRAFT FOR RECURRENT SHOULDER DISLOCATION

J. C. R. HINDENACH
M.D. N.Z., F.R.C.S.

ORTHOPÆDIC SURGEON, WEST LONDON HOSPITAL; ORTHOPÆDIC CHIEF ASSISTANT, ST. GEORGE'S HOSPITAL

THERE are already many different operations for recurrent dislocation of the shoulder, and this is not an attempt to introduce a new one. My aim is to call attention to an operation which is popular in Sweden and the United States and has a definite application in some difficult cases.

Treatment by anterior bone graft was first instituted by Eden in 1917. It is comparable with Putti's shelf operation for congenital dislocation of the shoulder, corrects the lesion at the appropriate site, and is fairly easy.

The pathology of recurrent anterior dislocation of the shoulder has been well recognised since Bankart's (1938) paper, and its amplification by Hill and Sachs (1940), Eyre-Brook (1942), and Bost and Inman (1942). The salient points are:

- (1) Primary trauma which drives the head directly forwards.
- (2) Injury to the labrum glenoidale, which, with the anterior capsule, is torn from the glenoid margin.
- (3) Failure of the labrum glenoidale to become reattached to the glenoid rim, with resulting lack of restraint to the forward passage of the humeral head.
- (4) A compression fracture of the posterolateral portion of the humeral head, caused by a digging-in action of the anterior glenoid rim during dislocation. This is a late phenomenon, present in old recurrent cases and demonstrable by radiograms of the shoulder taken with the arm in full internal rotation.
- (5) Secondary changes, with traumatic arthritis, proliferation of bone at the scapular and humeral necks, eburnation of the glenoid rim, production of loose bodies, synovial thickening, and cartilaginous degeneration of the humeral head.

The operations for preventing recurrence have been aimed at various structures in the joint: capsule and ligaments (Bankart 1938); tendons and muscles (Nicola 1929); and bony structures (Eden 1920).

Bankart's operation, by which the torn edge of the capsule is reattached to the glenoid margin, has certain disadvantages: the boring of the drill holes is difficult, even with a dentist's angled drill, and the holes tend to cut out; the articular cartilage of the glenoid fossa is damaged by the drilling; an old fracture of the anterior rim may complicate the procedure; and the capsule may be thin and unsuitable for suturing.

Repair by bone block is simple and effective.

Eden (1920) inserted a tibial graft under the periosteum of the scapular neck, allowing it to project 10 mm. beyond the glenoid rim.

Hybbinette, as reported by Orell (1940), used first a tibial graft in 1917, and later an iliac graft.

Oudard (1924) displaced a graft from the coracoid process to the anterior glenoid rim.

Speed (1927) placed a tibial graft extracapsularly on the anterior scapular neck in three cases.

Orell (1940) made a cleft extracapsularly in the scapular neck with a special osteoperforator and inserted a pointed os-purum transplant. Owing to rapid new bone formation immobilisation of the arm was necessary for only fourteen days.

A combined procedure of an anterior iliac graft and a Nicola tenosuspension was described by Ilfeld and Holder (1943).

All the above have reported good results with no recurrence and with full range and power in the arm.

OPERATION

The anterior iliac graft operation is simple, the removal of the graft from the ilium taking little more time than the tedious drilling and threading of the holes in the glenoid rim required by Bankart's operation. The technique is as follows:

(1) The joint is approached through a longitudinal incision separating the deltoid and pectoralis major muscles.

(2) The tip of the coracoid process, with its attachments of pectoralis minor, coracobrachialis, and short head of biceps, is cut across with bone forceps and turned down.

(3) The anterior circumflex vessels are isolated and divided between ligatures.

(4) The subscapularis muscle is exposed, cut across near its insertion, and reflected medially to expose the capsule. The division should not be too lateral, as the blending of the tendon with the capsule renders separation difficult.

(5) The capsule may then be found attached to a free labrum glenoidale and, on pulling the latter laterally, the joint and humeral head are exposed. Sometimes, owing to scarring, the capsule may have to be incised close and parallel to the glenoid rim to expose the detached labrum and the bare anterior border of the glenoid fossa which communicates directly without hindrance with the anterior neck of the scapula.

(6) A vertical incision is made in the periosteum of the scapular neck about $\frac{1}{2}$ in. from the glenoid margin. With a 1-in. osteotome a bone flap is easily raised in the cancellous tissue of the neck, and the bone is also rawed between this incision and the glenoid rim.

(7) The anterior part of the crest and outer surface of the ilium is exposed subperiosteally, and a bone graft 1 in. by $2\frac{1}{2}$ in. is excised. The graft should consist of half the thickness of the crest and the outer cortex. The curve on this graft is eminently suitable for its close fitting to the hollow of the scapular neck. The graft is inserted under the scapular bone flap so as to project about $\frac{1}{2}$ in. beyond the glenoid margin and lie extracapsularly. If the approach allows, the graft may be fixed in position with a vitallium screw.

(8) The cut subscapularis muscle is sutured over the graft and holds it firmly in position. The coracoid is replaced and retained in position with chromic catgut sutures through its surrounding ligaments. The skin is closed, and the arm is bandaged to the side.

The patient may get up on the fourth day. Movements of the shoulder are not allowed for six weeks.

CASE-RECORDS

CASE 1.—An African lance-corporal, aged 24, was admitted to a military hospital on Feb. 12, 1945, with a dislocated right shoulder. This was reduced without an anaesthetic.

He gave a history of an original injury while playing rugby football in September, 1943; when he fell on the back of his right shoulder and dislocated it. Since then the shoulder had dislocated many times and had been reduced sometimes with an anaesthetic, sometimes without.

On examination on the 15th he was a small well-developed young man. His right shoulder had full range, active and passive, and power was good. Radiograms of the shoulder were normal.

On the 28th an operation as described above was performed. The glenoid fibrocartilage was found torn from the anterior glenoid rim, which was smooth and bare.

His arm was bandaged to his chest wall for six weeks, and then active movements were begun. Four weeks later he had full range of movement of his shoulder. He returned to South Africa six months later, during which time there had been no recurrence.

CASE 2.—An Indian soldier, aged 26, was admitted to an Indian military hospital in February, 1945, with a history of recurrent dislocation of right shoulder. Examination showed full range and power in his shoulder, and a radiogram was normal. He dislocated his shoulder in the ward a few days later while putting on his coat.

Operation on March 12 showed that the glenoid fibrocartilage had been separated from the anterior glenoid rim and had not reattached itself. An iliac bone graft was inserted. The shoulder was immobilised for six weeks, and then active use was begun. He was slow in regaining full range, and

three months later had 20° of limitation of full elevation. There was no recurrence within the first six months, and he then returned to India.

CASE 3.—An Italian cobelligerent, aged 22, was admitted to a British military hospital on Sept. 28, 1945, with a dislocation of left shoulder following an injury in a fight the previous night.

Radiography confirmed a subcoracoid dislocation, which was easily reduced without anaesthesia. He gave a history of an original dislocation following a parachute jump in 1942, when he landed on his left shoulder. Since then there had been about ten recurrences, some of which were reduced by the patient.

Radiography showed some irregularity and absorption of the anterior glenoid lip, and absorption of bone on the posterolateral aspect of the humeral head.

On Oct. 5 the left shoulder-joint was exposed, a raw anterior lip of the glenoid fossa seen, and an iliac bone graft inserted. The graft-projected $\frac{1}{2}$ in. beyond the glenoid margin.

Six weeks later active movements of the shoulder were begun. Patient's improvement was slow. Six months later he had had no recurrence of his dislocation, but there was limitation of full elevation by 20°. Both he and case 2 were poor patients and did not try hard to rehabilitate themselves.

COMMENTS

Though those surgeons who follow Bankart's technique may not wish to change, it is suggested that they would find the iliac graft method useful when the capsule is thin, short, or friable; when the bore holes cut through the bone; or when there is old damage to the anterior glenoid rim, with displacement and consequent difficulty in drilling.

The three cases described here have not been followed sufficiently long for the final result to be assessed, and, owing to the war, it will be impossible to review them later (case 1 being an African, case 2 an Indian, and case 3 an Italian). However, the operation has been performed many times on the Continent, and Thomasen (1944), in a review of the literature, states that after 169 recorded bone-graft operations (Eden-Hybbinette) only one recurrence was recorded.

SUMMARY

The operative procedure for the treatment of recurrent dislocation of the shoulder by an anterior iliac bone graft is described.

Three cases are reported.

This operation is especially indicated where the capsule is thin and friable, and when there is difficulty in Bankart's operation in drilling the anterior glenoid rim.

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"... In times past, the doctor's field was shared, and productively tilled, by saint, monarch, mountebank, cleric, apothecary, and astrologer. Surgery waited upon stellar manifestation of divine approval, and epidemic disease was a visitation. Witches poisoned the patient during the doctor's absence, and demons strangled the sick. Anyone could concoct the simple drugs, conveniently drawing upon the materials of hennery, orchard, weed-patch, stable, and meat-stall. The physician's concept of human function was based upon a system inherited from philosopher and scholastic. His notion of bodily structure was tintured with these same beliefs, and included no knowledge of cellular composition. Man didn't even stay human; he did not remain fixed in his proper phylum; he could be amphibious, arboreal, or subterranean. It was a world whose malleability was disconcerting to the doctor."—BARRY J. ANSON, *Quart. Bull. Northwest Univ.* 1947, 21, 1.

Medical Societies

MEDICAL SOCIETY OF LONDON

At a meeting of this society on Feb. 10, with Sir PHILIP MANSON-BAHR, the president, in the chair, a discussion on the

Surgical Treatment of Pulmonary Tuberculosis

was opened by Dr. GEOFFREY MARSHALL. Forty years ago, he said, there was an iron curtain between the physicians, who treated intrathoracic tuberculosis, and the surgeons, who treated tuberculosis elsewhere in the body. The physicians used only constitutional treatment and the surgeons only surgical treatment; and both got bad results.

About 1912 Rollier showed the amazing results obtainable with constitutional treatment in surgical tuberculosis. The next big advance was the introduction of the artificial pneumothorax; but physicians found themselves often frustrated by pleural adhesions. The problem was referred to the surgeons, who responded magnificently, changing the whole outlook in the chronic destructive type of disease.

In the treatment of cavitation, collapse therapy is essential; and only a minority get a lasting result from artificial pneumothorax without further intervention, usually consisting in the division of adhesions. Surgeons are sometimes reluctant to intervene when tubercles are seen on the pleura and adhesions, but even when these are present results are quite good. Often an artificial pneumothorax is not obtainable at all owing to dense adhesions, but it is essential to collapse the lung: "My experience is that if you do not close the cavity the patient will not recover." Of patients with uncollapsed cavities, 85% die within five years, while the remaining 15% survive to spread infection. It is true that the cavity disappears with two or three years' bed-rest; but it reappears when the patient gets up.

It used to be said that before thoracoplasty the patient should first be stabilised, in accordance with the principle that there was never any vital cause to hurry the operation. But the modern thoracoplasty, conducted in many stages by a team, is less dangerous and less of an ordeal, though it remains a trying and disfiguring operation.

Apicolysis has no place in present-day treatment. The operation for extrapleural pneumothorax is dangerous, patients often having a stormy passage in the first few weeks; but in those who survive it the results are almost ideal if the cavity is in the upper lobe. Better criteria for the selection of cases are needed.

Interruption of the phrenic nerve by crushing, the effect of which lasts 3 to 18 months, is ineffective with large cavities. It is, however, a safe and useful operation in the hands of the chest surgeon, and is particularly applicable to the symptomless cases now being picked up by mass radiography. When these young people are treated with simple bed-rest the lesions sometimes enlarge, perhaps proceeding to actual cavitation. An artificial pneumothorax can be done, but this is a two-edged weapon whose use is contrary to the dictum that the treatment should not be more dangerous than the disease. If there is some improvement with initial bed-rest phrenic interruption should be tried before pneumothorax.

PATHOLOGY OF CAVITATION

Mr. C. PRICE THOMAS said that the whole problem facing the surgeon in pulmonary tuberculosis is the problem of cavitation. The tuberculous cavity is from the first a tension cavity; the capillaries in its walls are also under tension, so that blood, instead of going to the cavity wall, goes to the nearby capillary bed. The cavity does not persist because of tuberculosis, but tuberculosis persists because of the cavity. "It is absolutely necessary to close tuberculous cavities."

Healing may be either "closed" or "open." Some small cavities may close by drainage through the bronchus. Usually, however, they close by closure of the bronchus; this is followed by absorption of air from the cavity, reduction of the tension, improved blood-supply, and healing. All cavities heal by the same principle. Where the patient is treated only with rest it is conceivable that the partial stenosis of the bronchus may

become, with quiet inspiration, an absolute functional stenosis; otherwise the cavity will persist. All other methods depend on active relaxation. The best method is a complete artificial pneumothorax, with which 95% of cavities close. It should be remembered that with lateral thoracoplasty there is only lateral relaxation, and the vertical stress persists; the result therefore depends on the position of the bronchus or bronchi ending in the cavity.

Only two methods approximate to the perfect pneumothorax—thoracoplasty with extrapleural apicolysis, and extrapleural pneumothorax. Phrenic crush is effective against recent cavities under one inch in diameter. It has been observed with artificial pneumothorax that the diseased areas relax most—which makes the long-range effect of phrenic crush more understandable. Patients must be carefully selected for this operation, since once it has been done the risk of basal collapse following further intervention is greatly increased.

The extrapleural pneumothorax is effective, again given proper selection; but the idea of it as a substitute for thoracoplasty is to be deprecated. The morbidity and mortality tend to be under-rated; in 58 cases the mortality in the early phases was 15%; and 7 of the patients got tuberculous empyemas, 4 of which persisted. Pleural adhesions represent an attempt to get an extra blood-supply from the periphery; and it is important to select patients with early lesions (when the central blood-supply is not impaired). The operation should not be undertaken when it is likely to be difficult. When successful it is very satisfactory, providing a perfect pneumothorax without the changes in volume associated with the usual artificial pneumothorax. Experience shows that toxæmia is controlled more quickly and that cavities close more rapidly. However good the result from the extrapleural pneumothorax, it is a mistake to abandon it deliberately.

Thoracoplasty is a more definitive operation; but if it is done well and the disease is controlled no further treatment is needed—which is more than can be said of any other treatment. The depressing effect of the deformity can be minimised by gaining the patient's confidence before the operation. Cavity-closure ensues in 85-90%. The early mortality in Mr. Price Thomas's experience is 11.6%, and the late mortality 21.6%; mortality among the "stable chronics" is 8%, among the "relapsing chronics" 15.8%, and among the "slipping chronics" 55%. When the operation is undertaken during the first two years of the disease the early mortality is 1.9% and the late mortality 4%. The surgeon should be called early; and the guiding principle should be, "once you've put your hand to the plough don't turn back. Never take risks at the patient's expense; difficulties are for surgeons—not for patients."

DISCUSSION

Dr. A. HOPE GOSSE said that the operation of phrenic crush needs considerable experience and skill. Of a series of young people with early lesions treated in this way all except one now have sputa free of the tubercle bacillus; and, with this one exception, the cavities have closed. For this treatment the lesion must be early and unilateral, and the cavity narrow-walled and with a diameter not much larger than a florin. Any patient suitable for an artificial pneumothorax should first have a phrenic crush; the need for an artificial pneumothorax should be assessed after one month's interval. In this way some patients are saved the tedium and the risks of a pneumothorax.

Dr. R. R. TRAIL thought it apposite that the discussion should take place at a time when "a rather foolish correspondence" was going on in THE LANCET. He had never given up his faith in the surgical treatment of pulmonary tuberculosis.

Dr. JOSEPH SMART said that without a free pneumothorax it was not possible to get the concentric relaxation which was so important. He had often divided adhesions when tubercles were present on the pleura; and usually the reaction was no more severe. In any case the patient was better off with a free pneumothorax. As for the dangers of extrapleural pneumothorax, he thought the crux of the matter was the selection of cases. Given proper selection the results were quite dramatic.

Mr. R. C. BROCK could not think it safe to divide adhesions in the presence of tubercles; it was hard to assess the age of adhesions. A French surgeon had told him recently that he was doing one hundred cases of extrapleural pneumothorax a week; but perhaps the cases at the Brompton were not as favourable for this operation as those in sanatoria on the Continent. It was a dangerous operation, and he was not sure that the results on the Continent were better than in Britain. The disadvantage of replacing thoracoplasty by extrapleural pneumothorax was that a thoracoplasty had often to be done afterwards. If the patients were carefully looked after the deformity from thoracoplasty was usually negligible; in any case it was better to be deformed than dead. The dictum that delay in thoracoplasty is always desirable was "horrifying." In his view the critical phase in the life of the patient with chronic pulmonary tuberculosis was when he left the sanatorium for the first time: unless his disease was completely controlled by a perfect pneumothorax he was unsafe; and if surgeons would only step in with thoracoplasty much better results would be obtained. As for pneumonectomy, he was feeling his way gingerly, and the few cases he had done had been very carefully selected.

In reply, Dr. MARSHALL said that in the treatment of bilateral cavitation thoracoplasty was a dangerous remedy; but this was a dangerous disease. A thoracoplasty on one side and an artificial pneumothorax on the other was much less dangerous and was often highly successful. Mr. PRICE THOMAS said that about half the patients he operated on had bilateral disease. On the subject of pneumonectomy he was as cautious as Mr. Brock.

Reviews of Books

An Approach to Social Medicine

JOHN D. KERSHAW, M.D. Lond., D.P.H., medical officer of health, Accrington. London: Baillière. Pp. 329. 15s.

THIS book seeks "not to teach the reader social medicine but to show him where it lies and how it may be sought." The first half could well stand by itself as a description of the origin and purposes of our social fabric; in the second half Dr. Kershaw indicates the place he would give to medicine in this larger framework. Since medicine entered late into the scientific field, doctors followed the lead of their colleagues in the physical sciences, and adopted a mechanistic outlook—to the neglect, he suggests, of philosophy. Yet we must not forget that it was the sharp reaction from earlier unfounded theorising which gave us the hard facts on which we build today. This thoughtful book gives the casual reader a good idea of medicine's widening functions in a changing world; for those who wish to make a serious study of social medicine there could be no more encouraging introduction.

The Psycho-analytic Theory of the Neuroses

OTTO FENICHEL, M.D. London: Kegan Paul. Pp. 703. 35s.

THE author of *Outlines of Clinical Psycho-analysis*, published in 1934, rather than produce a second edition, has completely altered his previous book, and added a general introduction, a bibliography of over 1600 references, and an index of 40 pages. His facility in writing, which survived translation in the former book, is preserved now in his own English. His useful book not only covers many points of Freudian theory but illustrates the divergences of the psycho-analytic discipline from formal psychiatry. Thus "traumata" are never "physical," they are associated with castration and implied insecurity, and the intellectual and physical factors which form so important a part of Meyer's "psychobiology" are hardly mentioned. The index has only three references to the climacteric, three to "physical" matters, seventeen to the "body," and twenty to "organic" conditions; "neurology" is not indexed at all, and the thalamic centres and the sympathetic nervous system not even mentioned. The title of the book may justify this dichotomy, but the rift between

neurology and psycho-analysis has not been bridged by Dr. Fenichel, able writer though he is; and we could wish he had written the book of a dweller in both worlds, like Stanley Cobb's *Foundations of Neuropsychiatry*.

He is notably frank in discussing contra-indications to treatment and trial analyses, but offers no suggestions for shortening psycho-analytic treatment. He emphasises the emotional character of "shock," but later admits that insulin and leptazol act best on different disorders, thus implying that the word "shock" itself may have other connotations. Similar and more serious difficulties may be found in formulations about the origin of the ego; but, open to dispute as these may be, his clarity in general and his careful documentation make the volume essential for the psycho-analyst, and to others a valuable book of reference.

Gray's Anatomy

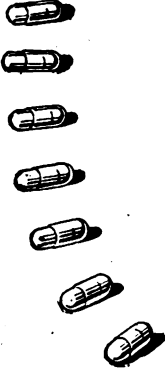
Descriptive and Applied. (29th ed.) Editors: T. B. JOHNSTON, C.B.E., M.D.; J. WHILLIS, M.D., M.S. London: Longmans, Green. Pp. 1597. 70s.

THE basic facts of topographical anatomy have not altered since Gray wrote his first edition in 1858, yet his book has now reached its 29th edition—roughly a new edition every three years. "Gray," containing as it does sections on histology, embryology, and neurology, all subjects which are rapidly progressing, is more than a reference book of topographical anatomy; and it is largely because these sections must be kept up to date that new editions are needed frequently. Though there are advantages in having all branches of anatomy collected together in one reference work, few medical students rely on "Gray" for their histology, embryology, and neurology; but if these sections are to be included it is important that they should be factual and accurate, without too much discussion of controversial subjects or unlikely theories. In this edition, for example, perhaps too much space is devoted to Carey's theory of muscle structure, which is far from being generally accepted; but Sharpey-Schafer's classical diagram of the sarcomere has at last been omitted. The picture of a spermatozoon is drawn at a magnification well beyond the resolution of any ordinary microscope and is therefore misleading. In future editions electron microscope pictures should replace such diagrams. It is impossible for the authors to please everyone, but a discussion of blood-groups, and especially of the Rh factor, seems out of place in an anatomy book. Much new matter has been added, including sections on the work of Holmes and Young on nerve regeneration, of Weddell and Woollard on cutaneous innervation, and of Brock on the bronchial tree. Apart from drawbacks due to poor paper, most of the illustrations are first-class, and many new ones have been added. The X-ray plates too are good, and we could do with many more.

Entstehung und Früherfassung des Portiokarzinoms

Dr. med. HANSJAKOB WESPI, Chefarzt der geburtshilflich-gynäkologischen Abteilung am Krankenhaus Frauenfeld. Basle: Benno Schwabe. Pp. 91. Sw. fr. 11.

THIS book is concerned with the early diagnosis of cancer of the uterine cervix by means of the Hinselmann colposcope. The author, who has charge of the gynaecological clinic of the University of Zurich, has for seven years been using this method, together with the Schiller iodine test, to establish the diagnosis in early and difficult cases. The colposcopic picture and the histology of the normal and pathological cervix are carefully described, and the various types of white leucoplakia, red erosion, and irregular surfaces which may be seen are usefully discussed. Case-records show the care which is taken in the examination of every patient whose condition gives rise to suspicion of early neoplasia, and illustrate the possibility of distinguishing between certain early cancers and simple inflammatory conditions. The numbers of patients with cancer of the uterine cervix who can be treated early and with success are increased when routine colposcopic examinations are made. Such close observation is only possible, however, where facilities such as those offered by his clinic are available; and gynaecologists in Switzerland seem to be fortunate in seeing many of their cases at a stage when the diagnosis is still in doubt.



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THE LANCET

LONDON : SATURDAY, MARCH 22, 1947

Service Medicine

It is generally agreed that during the late war the medical services of the Armed Forces did their job remarkably well; but it is also generally agreed that their organisation left much to be desired. Many obstructions were broken down by forceful individuals of strong character, accustomed to insist that what was necessary must be done. But many tiresome arguments arose because the prevailing atmosphere in the regular Services—hard to define, perhaps, but impossible to ignore—does not at present encourage professional zeal and initiative. Further, the regular medical officer—with all respect to many admirable doctors—seldom enjoys such professional standing that he can confidently challenge even unenlightened orders or regulations.

This brings us to consider the nature of the authority which directs the medical services of the Armed Forces. The first astonishing discovery in this connexion is the absence of any single authority. The sailor, soldier, and airman, it seems, are such different persons that separate organisations are required to keep them in health and attend to their sicknesses. Yet the Navy, Army, and Air Force comprise a limited age-group, they share alike the stresses of tropical service, and their principal medical objective is the maintenance of health.

The consequence of having three small separate medical services, rather than one large organisation for the three branches, is best studied in the Army—the largest consumer of medical man-power. One bad result is that the Director-General of Army Medical Services is not a member of the Army Council. He makes his views known to the Army Council only through the Adjutant-General, who, however well informed he may be, is a soldier and a layman and therefore not the proper person to present a medical argument. Clearly, the spokesman of medicine ought to be a professional man constantly in touch with the highest administrative and political levels. It should be his duty and within his power to see that health considerations and medical problems are kept well to the front in any discussion of policy or in planning a campaign, instead of being fitted in after the main lines have been settled. The lack of status now accorded to Service medicine is further emphasised by the fact that the Director-General of Army Medical Services receives the rank of lieutenant-general. He is thus a person of less authority than the commander of a force of any size—of less authority, for example, than the chief of anti-aircraft command—and he does not, therefore, talk to important field commanders on equal terms. It is accordingly difficult for him to exercise what should often be a decisive influence, and many necessary enterprises—such as the field trial of penicillin in war wounds—have to be tactfully engineered on an "old boy" basis, often with resulting delay and frustration, instead of being organised with authority from the War Office. Devolution of authority to the man on the spot is

an excellent principle, but one that can be carried too far. In a campaign the final medical authority is vested in the commander-in-chief, who acts (or does not act) on the advice of his own director of medical services—an officer junior to the Director-General of Medical Services at the War Office, yet not under his control. In short, London may offer advice and arrange for the supply of men and equipment, but it lacks medical authority.

Manifestly this is absurd. Medicine must speak as an equal in the highest counsels of the Armed Forces, and the health needs of sailors, soldiers, and airmen must be rated much higher than hitherto. It is as important, and as difficult, to plan strategically against malaria, dysentery, and anxiety state as to plan against attack by enemy aircraft.

Our plea, repeated yet again,¹ is for unification of the medical services of the Navy, Army, and Air Force under a single head, with rank corresponding to that of a full general. All who know Service medicine are conscious of the need for a great raising of professional standards such as can come only from combined planning for the complete medical needs of all three Services—real planning at the highest instead of the second-highest level. We need a training school for Service medical officers which will bear comparison with that of the Americans; we must avoid wasteful competition among the three Services for our too few doctors²; and we must have every activity of the Service chiefs and the Treasury subjected to authoritative medical comment offered directly by doctors on equal terms. If the Navy, Army, and Air Force medical services do not themselves move towards such fusion as would be natural under the new Ministry of Defence,³ it seems to us that pressure ought to be applied when the National Service Bill comes before the House of Commons.⁴ The medical group in the House and perhaps also the presidents of the Royal Colleges, who will have access to full information about the state of British military medicine from their members who served the Forces as consultants, might reasonably ask the Minister of Health to consider whether, after all, he was wise to leave the Armed Forces out of consideration in making his plans for a comprehensive health service for the nation.

Postoperative Pulmonary Embolism

DESPITE almost exactly a century of study—for VIRCHOW established the nature of pulmonary embolism in 1846—there is much concerning this disastrous condition which remains mysterious. Fatal embolism is fortunately uncommon: though the majority of cases come to necropsy, the average incidence in post-mortems at general hospitals is less than 2%. It is moreover an affliction of mature years, almost unknown in childhood and adolescence, and rare in the twenties and thirties; nearly all the victims have been ill in bed for a long time, and more than two-thirds of them have had a serious operation within a fortnight; and often the embolism is merely the immediate cause of a death in any case soon inevitable. Nevertheless about a quarter of all the deaths are in patients who have had no operation at

1. *Lancet*, 1946, i, 349.

2. *Ibid.*, 1946, ii, 533.

3. Statement Relating to Defence. Cmd. 7042. H.M. Stationery Office. Pp. 12, 2d.

4. See *Lancet*, March 8, p. 308.

all, but suffer from such conditions as varicose veins and valvular disease of the heart.

It is the surgical cases that present the most dramatic picture. The patient perhaps was a man of 60, who had lain abed for months and had then had a gastrectomy. Convalescence was unsatisfactory; there was a low fever; he appeared anxious, and was a difficult man to nurse. Twelve days after operation, when he was becoming more active, he called for a bedpan, was found to be severely shocked, and died within a few minutes or hours. At necropsy the cardiac blood was fluid; but a massive clot filled both pulmonary arteries, and small thrombi could be expelled by pressure from the smallest vessels. We ask ourselves where and when did the clot form. Why did it form? Why did it move from its original site? Most urgently, what can be done to prevent the accident?

The pendulum has swung many times since VIRCHOW first suggested the pelvic veins as a site of the thrombosis, and since WELCH,¹ who began twenty years of study in 1887, demonstrated that the deep veins of the leg were often involved. An important further step has been the distinction between thrombosis in phlebitis, where the clots are firmly attached and seldom move, and thrombosis in undamaged veins, which does not cause œdema but carries a far greater risk of embolism. Some have supposed that this latter type of thrombosis in calf-muscle veins results from retrograde spread; others that the small veins in the soleus muscle, which itself is said to show degenerative changes, are the primary site. Latterly the work of HUNTER and other American investigators² has forcibly directed attention to this muscle; and all who have looked agree that a remarkably high proportion of bedridden patients—more than half in some hospital records—have these clots, though in one series, where over 50% showed them, only 3% died of embolism. BAUER³ in Sweden, by phlebography, satisfied himself that the clots form in the deep veins of the leg, and sections at various levels suggest that the oldest clots are in these deep peripheral veins. But if this is accepted, we still have to ask why they form there. Mere immobilisation is not enough: though supports behind the knees, or abnormal postures during operation, may aggravate the condition, plaster casts do not cause thrombosis or embolism. And if the majority of elderly patients kept abed with chronic illnesses develop these clots, we cannot very well hold surgery responsible for their formation, but only for their movement, and perhaps their enlargement. Here the work of MACFARLANE, begun in 1937 and now continuing,⁴ may prove of critical value. He has shown that a fibrinolysin can be identified in the plasma of patients after operation; that is to say, the fibrinolysin always present is activated in such patients; and he has made the fascinating observation that fibrinolysin activation depends less on trauma than on a state of anxiety—which might explain the higher incidence of pulmonary embolism during air-

raids. Equanimity has more than a moral value, and the bedside manner may extend its balm even to the veins of the soleus muscle.

How can pulmonary embolism be prevented? In the first place, every surgical patient of mature years must be considered a possible candidate. Massage of calf muscles and active movements of the leg are advisable both before and after operation, and prolonged preoperative decubitus should be avoided. Dilatory operative technique and dilatory operation are dangerous: peace of mind, confidence, and a calm environment are to be promoted. Pain on palpation of calf muscles and hyperextension of the foot will suggest that thrombosis is already present, and in such circumstances American practice favours ligation of the vein and extrusion of thrombi, though it is hard to know whether this is effective. Anticoagulants are in a different class; and in spite of its expense many believe that heparin should be given prophylactically to a large proportion of patients after operation. Presumably its action would be to prevent proximal spread of deep thrombi; for if the large veins are already involved its use might be risky.

We have travelled a long way, then, since VIRCHOW's observations a century ago. When we know the cause of fibrinolysis we may perhaps control the dislodgment of clots.

Atypical Smallpox

SMALLPOX is an import we could very well do without. Between January and June last year 55 cases of variola major were recognised in England,¹ and 15 of these were infected in or en route from India. The remaining 40 cases were certainly infected in England, and though a direct connexion with a known imported case could be established in only 7 of these, the other 33 were grouped into ten separate outbreaks all of which occurred in districts and at times which suggested indirect association with cases known to have been ship-borne. During the second half of 1946 the importation of fresh infection apparently ceased and there were no further indigenous cases, but it looks as if the events of last spring are now being repeated. The first 2 cases recognised in the present outbreak at Grimsby, where there have so far been 15 cases with 6 deaths, were permanent residents of a common lodging-house frequented by sailors. These 2 men were taken ill on Feb. 13, and the source of infection was probably one of a number of seamen who stayed at the lodging-house for a night or so early in February. On March 3 a member of the staff of a large seamen's hostel in Stepney developed what was later recognised as smallpox modified by vaccination. Here again the undetected source of infection was probably a seaman.* No link has been discovered between the two outbreaks, but both seem likely to have originated in modified or atypical cases connected with ships from abroad.

Atypical smallpox, sometimes with an almost negligible focal eruption, is not uncommon in vaccinated people whose immunity has waned or in whom revaccination has for one reason or another been

1. Welch, W. H., in Allbutt's System of Medicine. London, 1899, vol. vi, p. 155.

2. Hunter, W. C., Suedden, V. D., Robertson, T. D., Snyder, G. A. C. *Arch. intern. Med.* 1941, 68, 1.

3. Bauer, G. *Acta chir. scand.* 1942, 86, suppl. 74; *Lancet*, 1946, 1, 447.

4. Macfarlane, R. G. *Lancet*, 1937, i, 10; *Ibid.*, 1946, ii, 562; *Ibid.*, p. 862.

1. Maddock, E. C. G., Conybeare, E. T. *Mon. Bull. Min. Hth & E.P.H.L.S.* 1946, 5, 224.

* Rather than a woman, as was mistakenly suggested in an annotation last week (p. 339).

ineffective. As STALLYBRASS² has remarked, immunity to smallpox, whether produced by artificial or natural means, is not a mathematically precise process, and there are considerable individual variations in the solidity and permanence of the resultant increase in resistance. Moreover, immunity to smallpox cannot yet be measured or even roughly assessed by skin or serological tests as can that to diphtheria. In discussing difficulties in the diagnosis of atypical cases CONYBEARE³ has drawn attention to the help now obtainable from the laboratory tests recently described in detail by DOWNIE.⁴ It is not surprising that some atypical cases with a minimal focal eruption go completely undetected, since these people may never be sufficiently ill to call a doctor. After two or three days of malaise with headache and fever, at this time of year easily regarded as influenza, they suddenly feel better and may not pay any attention to the few spots—often not more than a dozen—which have appeared usually on the forehead and about the wrists or backs of the hands. In this infectious stage they go unhindered about their work and social occupations. So unless and until a more florid form of the disease appears in some person with a weaker immunity the presence of smallpox in a fairly well vaccinated community may remain unsuspected and all chance of tracing its origin may be lost. Even when smallpox is already in mind the clinical diagnosis of cases with a minimal focal eruption may be extremely difficult. Significant points are the prostration associated with the pre-eruptive illness, even when the rash itself is almost negligible, and the sudden cessation of the constitutional disturbance when the eruption appears. The centrifugal distribution of the eruption remains the sheet anchor of smallpox diagnosis; but the fewer the lesions the less evident is this characteristic pattern. The lesions of a minimal eruption lack the uniform shape and orderly development which are useful guides in a more pronounced rash; they also tend to be relatively superficial in the skin and to mature rapidly or sometimes to abort without pustule formation. Atypical smallpox should be seriously considered when papular lesions, however few, some of which have rapidly acquired vesicular or pustular heads, suddenly appear about the face, wrists, hands, or feet of any vaccinated person who has just recovered from so-called influenza. In most cases of this sort the clinical diagnosis, even when made by an expert, should be checked by laboratory tests.

The focal eruption of smallpox may be more or less profuse and yet remain in some respects atypical. Such cases nearly always come under medical observation and are not often completely overlooked though they may be misdiagnosed, usually as chickenpox. In these, careful attention to the distribution pattern of the mature rash and to the nature and development of the lesions, plus the history of the pre-eruptive illness, will usually be sufficient for a confident clinical diagnosis; but here again the help of the laboratory is not to be despised. It is worth noting that in some of the Grimsby cases the distribution pattern of the mature eruption has been typical but the order of the outcrop has been unusual in that the initial lesions were on the body.

Another form of smallpox which may not be promptly recognised is the severe toxic hæmorrhagic type which is sometimes fatal before the delayed focal eruption appears. Such patients are critically ill with extreme prostration. They usually have a diffuse erythema, sometimes with petechiæ or purpuric spots over the bathing-drawers area, and conjunctival hæmorrhage is common. These cases may be admitted to hospital as scarlet fever, measles, or septicæmia. Although usually unvaccinated, the patients sometimes give a history of a successful vaccination in childhood without revaccination, for infant vaccination does not necessarily provide lifelong protection against this severe and almost invariably fatal form of smallpox. At times like the present, when smallpox is prevalent, the medical staffs of hospitals should be specially on their guard against the inadvertent admission of such cases to open wards.

Annotations

BEFORE OR AFTER?

THE essence of the National Service Bill now before Parliament is that all men between 18 and 26 years of age shall be liable to 18 months' full-time military service, to be followed by 5½ years' part-time service during which they may have to undergo a total of 60 days' further training. Postponement of service is mentioned, though the grounds for postponement are not defined; and for doctors and dentists who are working for additional qualifications the age-limit for call-up is extended to 30. The 8-year span of liability may perhaps be necessary to include any who through illness or for some other reason cannot be recruited in their teens; but it leaves the young man uncertain as to when he will have to serve, and all would welcome a specific assurance that this latitude will not be used to gratify the administrative whims of Service departments. The wide sweep of the age clause enables the Minister of Labour, if he wishes, to defer the call-up of medical students until they are qualified; but we are not told whether this will in fact be done; and he might hold that by keeping such students in line with others he would avoid the perils of establishing a privileged group.

Before qualifying, the medical student has six years of arduous, expensive, and unpaid work; and, by an unhappy tradition, the young doctor often receives only an apprentice's salary for the first few years. Hence the price paid by nearly all who elect to study medicine is the deferment of marriage and a settled home; and if military service is to be interposed before medical training the possibility of marriage may be yet further postponed. Some medical educationists¹ approve of an interlude of military service, between school and medical school, because it broadens the student's outlook and improves his judgment; but it amounts to an addition of nearly two years to the curriculum, which could only be tolerable if the methods of paying young doctors were changed so that they could support a family soon after qualifying.

That is of course mainly a professional matter. But there are also strong national reasons for postponing the military service of medical students until they have qualified. Presuming that in time of war they are going to be used as doctors, can we doubt that a period of training in Service medical work, with responsibility for the care of troops, will stand them in better stead than a corresponding period of general training at 18 years of age? Is it economical to teach young men to drive tanks, or look after aircraft, or keep naval stores, when they are going to be employed as medical officers? Few will

2. Stallybrass, C. O. *Publ. Hlth, Lond.* 1947, 60, 77.

3. Conybeare, E. T. *Practitioner*, 1946, 157, 191.

4. Downie, A. W. *Publ. Hlth, Lond.* 1947, 60, 82; see *Lancet*, 1946, ii, 205.

1. See *Lancet*, 1946, ii, 305.

deny that the future doctor, like anyone else, will gain much by serving in the ranks; and if it were administratively possible there is something to be said for the suggestion² that his military service should be done in two spells—one after leaving school and the other after qualifying. But if the choice is between service entirely before medical training or entirely after it, the latter appears more advantageous to the Armed Forces themselves.

It is also less wasteful to the community as a whole. The latent shortage of doctors will become manifest when the National Health Service comes into operation, and this shortage cannot be overcome for many years because of the insufficient capacity of our medical schools. Until (if ever) there is a surplus of doctors, every man or woman who has passed successfully through a medical school must be regarded as a national asset. The effect of calling up men before military training is to subtract at least 18 months from their professional working lives, and such wastage of medical educational resources should be avoided if possible. The Services may say that in peace-time they could not find work for all the men who qualify in medicine each year; and the emphasis might have to be on training and observation of Service medical methods rather than on active employment for all. But is there any reason why a considerable proportion of these young men should not be seconded for part of their time to the Colonial Medical Service or indeed to any other national service which has need of them?

The medical schools can turn out only a limited number of doctors each year, and the greatest advantage will be gained if these qualify at the earliest age that they are competent for their work. Even with this principle conceded, they must still undertake "national service," but we hope that in course of time the present narrow connotation of that term will be extended (as it already has been with miners) and that it will come to include work in civilian hospitals abroad or even at home. If the different Government departments begin to compete for the services of young doctors, the Medical Priority Committee would be the right body to judge between them, and it will gain wide support if it tries to arrange a realistic distribution.

THE STEVENS-JOHNSON SYNDROME

THE rare syndrome of which two examples were described in these columns last week by Dr. Murray and Dr. Nellen is one of the conditions which may lead the doctor to suspect smallpox and the smallpox expert to say: "It isn't smallpox, but I don't know what it is." First noted in France in 1822 by Alibert and Bazin, it was not until a century later that Stevens and Johnson³ in the U.S.A. drew attention to its characteristic features—swinging fever, skin rash, stomatitis, and ophthalmia—though Hebra had included it in his *Diseases of the Skin* of 1866 under the name of erythema exudativum multiforme.

It is found almost exclusively in boys or young men. The rash is usually but not always preceded by several days of gradually increasing cough, malaise, headache, and vomiting. The distribution of the rash is mainly peripheral, the dorsum of the hands and feet, the forearms and legs, and the face being the sites of election. It starts as macules or papules about 1.5 cm. across, each surrounded by a ring of erythema; later, vesicles appear, followed by crusts which leave little or no mark. As a rule the rash does not itch. For about the first week the temperature swings between 102° and 105° F, after which it falls to around 99° F. The most unpleasant and dangerous part of the illness is the swelling and infection of mucous membranes, particularly of the conjunctiva, mouth, and urethra. The tongue and lips may swell to

twice their normal size, and the eyes may be gummed up with pus; the Rosenbergs draw attention to the air of dejection which these swellings give to the patient. Partial or complete blindness is a common sequel, resulting from corneal ulceration and scarring, bilateral suppurative keratitis, and other causes.

So far, attempts at incriminating an organism have failed—Vincent's organisms have not been found regularly in the mouth, fluid taken from a vesicle of one of Dr. Murray's cases proved negative when examined for variola-vaccinia antigen, and no predominant organism was grown from a purulent urethral discharge. The aetiology must be regarded as unknown, though allergic sensitisation seems to be a factor. As regards treatment, there is not much evidence that the sulphonamides have any specific effect; whether the fall in temperature had any association with the penicillin given in Dr. Murray's case is uncertain. The most urgent measure seems to be protection of the eyes.

THYROIDECTOMY OR THIOURACIL?

DISCUSSION of toxic goitre nowadays centres round the place of thiouracil in treatment. At the Medical Society of London meeting on March 10 the balance of opinion was against thiouracil; its drawbacks, said Dr. Horace Evans, are the risk of idiosyncrasy, the persistence of the tumour, and the need for protracted treatment. There is, he suggested, little to choose between the results with thiouracil and those after subtotal thyroidectomy by an expert surgeon; surely the short treatment by surgery is preferable. In his view thiouracil has its value in the preoperative preparation of iodine-sensitive patients, and in the treatment of those who refuse operation or are poor operative risks; it is a substitute for operation where expert surgery is unobtainable.

Mr. Geoffrey Keynes also preferred surgical treatment. He argued that the sustained use of thiouracil, which is a dangerous drug, must mean psychic trauma to both patient and doctor. Means, of Boston, found that the condition after withdrawal of the drug was satisfactory in only 10% of over 1000 cases; and when the drug was resumed toxic reactions became more frequent. Mr. Keynes mentioned cases in which thiouracil has proved ineffective or actually dangerous. Some patients with toxic goitre—particularly the nodular variety—get worse despite this treatment; some are intolerant of thiouracil; a pregnant woman treated with it may give birth to a baby with a large thyroid; and there is a possible, though unproved, risk of carcinomatous change. He preferred a carefully planned operation; in over 2000 cases operated on at St. Bartholomew's Hospital, London, the death-rate was under 1%. The trouble with thiouracil is that it does not act on the gland; by depriving the gland of iodine it stimulates it to further activity. Preoperative treatment with thiouracil may prejudice surgical chances, for after this treatment there is often torrential hæmorrhage at operation. Thiouracil may be of value in the preoperative treatment of patients whose condition is really acute; otherwise its use means loss of time and effort, since before operation its effect has to be damped down again with iodine. To the question "Have we gained from thiouracil?" Mr. Keynes's answer was: "While the drug is being given with enthusiasm we have lost heavily. So far, on balance, there is a heavy loss."

This view was largely supported by the meeting; for the young woman with thyrotoxicosis, it was suggested, "there is much to be said for leaving the invisible scar rather than the larger goitre." Dr. Evan Bedford's faith in surgery was unimpaired: "I cannot conceive of the heart patient," he said, "who cannot be prepared for surgery with iodine; I go on with it, if necessary, for a month." The aim, when there are cardiac complications, is not only to end the thyrotoxicosis but to produce

2. Hoffstaedt, E. G. W. *Ibid.*, p. 506.

3. Stevens, A. M., Johnson, F. C. *Amer. J. Dis. Child.* 1922, 24, 526.

myxœdema; with primary goitres there may be a case for thiouracil, and operation, if undertaken, must be radical. As a therapeutic test, Dr. Evans held that thiouracil is useless; others thought it might have some value.

The case for thiouracil was put by Dr. W. R. Trotter. The criterion in choice of treatment should, he maintained, be the case-mortality. The operative mortality of subtotal thyroidectomy in Mr. Keynes's series is under 1%; but the overall rate for the country is at least 5%, and there is little hope of the general run of surgeons ever gaining the proficiency of the expert. The claim for thiouracil is that it generally superseded surgery fewer people would die. In Dr. Trotter's opinion the danger of thyroid enlargement with thiouracil has been exaggerated. If there is any swelling this simply calls for reduced dosage; but usually the gland remains the same size or actually shrinks—probably because of a natural remission. Thiouracil, he agreed, is not a radical cure; so it is probably owing to spontaneous remissions that the drug can sometimes be discontinued without symptoms recurring. He agreed, too, that thiouracil is unsuitable for nodular goitres, since most of these are already causing, or are likely to cause, mechanical obstruction.

THE FILMSTRIP IN MEDICAL TEACHING

A FILMSTRIP resembles a box of lantern slides in being a collection of pictures or texts for projection on to a screen, but here they are assembled on a continuous strip of 35 mm. ciné-film. Its uses in the training of medical students were discussed at a joint meeting of the Royal Society of Medicine and the medical committee of the Scientific Film Association on Feb. 12. As Dr. Peter Hansell pointed out, filmstrip is much lighter to carry about but more easily scratched than slides, and it is tedious to change the order of the pictures. However, a teacher can have his various illustrations, tables, texts, and charts copied on a film-strip, slip it into his waistcoat pocket, and go off to his lecture secure in the knowledge that his projectionist cannot screen his pictures in the wrong order. If he wishes radically to alter the presentation of his lecture he must make up a fresh strip, but they are cheap enough for this not to be a serious deterrent. A special projector is necessary, and Dr. Brian Stanford emphasised that there is room for improvement in the design of those now on sale.

A more advanced concept of the filmstrip is a prepared sequence of pictures, each showing, for example, some change from the last, so enabling the stages of a process to be followed step by step. The advantage here over slides lies in the very fact that the order cannot be muddled by the projectionist, and the advantage over ciné-film is that each stage can be held on the screen for as long as the teacher desires. Indeed, he may project his pictures on the blackboard, draw in the next step with chalk, and then flick on the next picture, so building up an artist's presentation of the subject however imperfect his draughtsmanship. This technique has obvious applications in the teaching of anatomy and surgery. By extending it further, a subject, such as first-aid, may be broken down into its visual stages which are then presented at a speed convenient to the intelligence of the class. Sometimes, as Mr. J. P. Stephenson showed, no commentary is necessary, and the film-strip will have much the effect of an animated diagram film at a fraction of the cost. Other filmstrips require verbal explanation; this may be provided extempore by the teacher or may be based on a booklet issued with the filmstrip. An example of the last class is the nutrition series issued by Common Ground Ltd., with teaching notes for school-children and fuller ones for adult audiences.

The manufacture of the more ambitious kinds of film-strip is a growing branch of the film industry, which has specially trained artists already at its command. The making of instructional films is becoming more and more a composite function, involving the simultaneous production of strips, booklets, wall-charts, note-sheets, and even models by a team consisting of educational psychologist, practising teacher, subject expert, filmmaker, and unifying producer.

KIDNEY AND LIVER IN WEIL'S DISEASE

DIMINISHED renal function is one of the outstanding features of Weil's disease: fatal cases usually terminate with oliguria leading to anuria. This renal failure is of complex aetiology. The kidney lesion is mainly tubular and resembles the pigment kidney of incompatible blood-transfusion or crushing injuries.¹ There are at least three possible sources of the pigment. It may be bilirubin; and comparable changes occur in other forms of severe jaundice. It may be myoglobin, suggesting an analogy with the crush kidney; and severe muscle necrosis is a feature of Weil's disease.² It may be derived from hæmoglobin; in Weil's disease blood destruction occurring in the spleen is greatly increased.³ In addition to the pigment effects there is also the direct action of the spirochaetes on the kidney. The uræmia, however, is not only renal but also prerenal. The cardiac output is thought to be low, possibly because of the myocardial changes, and the blood-pressure falls; so there is probably a reduced renal blood-flow.

Though jaundice is the most obvious clinical finding in Weil's disease, it seems likely that hepatic failure contributes little to the fatal outcome. Hepatic lesions are, in fact, often minimal. Wylie⁴ found that necrosis of the liver is an inconstant feature of experimental leptospirosis icterohæmorrhagica. Hutchinson and his colleagues¹ described five fatal cases in an outbreak in the British Army in Italy and remarked on the absence of hepatic damage. Often the liver shows only lymphocytic infiltrations around the portal tract, resembling the late stage of acute infective hepatitis. Liver-cell mitoses indicate that repair is already in progress. It may be that the maximal liver damage is early and that recovery takes place while the renal damage is still progressing. Study of hepatic histology by aspiration biopsy in the earlier stages may reveal more severe damage than in patients dying later from uræmia.

In human Weil's disease much further research is needed into the mechanism of the uræmia and the jaundice. Careful studies of the circulation and of renal and hepatic function by modern methods are still lacking: the evidence at present rests almost entirely on necropsy studies and animal experiment. Uræmia being the most usual termination, treatment should be directed to the kidney. In mild cases a minimum fluid intake of 2 litres a day with early alkalinisation of the urine may be sufficient. In an anuric patient Williams⁵ established a diuresis by high spinal anaesthesia, but this measure lowers the already low blood-pressure, so peritoneal lavage or use of the artificial kidney⁶ may be more successful. It should, however, be remembered that Weil's disease is a severe acute toxæmia with lesions in almost every organ. Early diagnosis is essential, and, as Bulmer⁷ has shown, prompt penicillin therapy may prevent the development of the serious renal complications.

1. Hutchinson, J. H., Pippard, J. S., Gleeson-White, M. H., Sheehan, H. L. *Brit. med. J.* 1946, i, 81.
2. Jeghers, H. J., Houghton, J. D., Foley, J. A. *Arch. Path.* 1935, 20, 447.
3. Martin, L., Peppit, A. C. *Spirochétose Ictero-hémorrhagique*, Paris, 1919.
4. Wylie, J. A. H. *J. Path. Bact.* 1946, 58, 351.
5. Williams, M. H. C. *Lancet*, Jan. 18, p. 100.
6. Kolff, W. J. *The Artificial Kidney*, Kampen, 1946.
7. Bulmer, E. *Brit. med. J.* 1945, i, 113.

OPERATION NUTS

UNLESS new action is taken, the shortage of oils and fats will continue till 1960 or even longer. Britain's deficit alone is estimated as equivalent to 1¼ million tons of ground-nuts a year. India, once the largest exporter of these, now requires for her growing population all that she produces.

The world's hunger, it has been said, is Africa's opportunity, and last summer a mission went out to examine the feasibility of East and Central Africa taking India's place as chief provider. The mission's scheme,¹ which has the Government's full support, is inspiring not only in its scope but in its implications for a hungry world and a needy quarter of the African continent. Within the next six years 3,210,000 acres of undeveloped land in Tanganyika Territory, Northern Rhodesia, and Kenya is to be cleared and planted with ground-nuts. *Arachis hypogaea*, which bears this nut (better known also as the earth-nut, pea-nut, or monkey-nut), has been chosen because, of all annuals, it gives the highest yield of oil per acre, and because its production can be almost wholly mechanised. Speed is the essence of this vast programme, and already the world is being scoured for bulldozers to clear the 150,000 acres which are scheduled for planting before the end of this year. The cost to Britain will be in the neighbourhood of £24 million, but with a probable production of over 600,000 tons from 1952 onwards we shall be saved over £10 million a year on our food bill.

As a business undertaking the plan can hardly fail: what of it as a colonial enterprise? The governments in Africa have acclaimed it, stipulating only that labour shall not be diverted from established industries, that the land shall not be exploited, and that the project shall be capable of eventual integration into the African economy. These provisos, it seems, are to be met: labour is to be drawn from areas of over-population and under-employment; the quality of the land is to be improved, and the improvement maintained by its being kept under grass for two in every four years; and control is to pass, after an agreed period, to the local governments. The report suggests—though this will be for local decision—that Africans themselves, when once trained for the task, might farm the land collectively. In direct employment the immediate benefits are not great: once development is complete the scheme will require only some 30,000 African men. Many in this and other countries, however, will judge the quality of our intentions by the conditions of life and work which these men are offered. The surveyors' recommendation, endorsed by the Government, is, so far as it goes, clear enough:

"We consider that each of the 107 units could be so organised as to provide a centre for the introduction of improved standards of housing, health, nutrition and welfare, in short, as a model of better general standards of living for the African people. The adoption and maintenance of these standards should not present any insuperable difficulty since the project will from the outset provide housing, medical attention and welfare for these new communities and will also produce or procure for them the bulk of their staple foodstuffs."

Establishment of these new communities will be no small task. Families coming from different areas may not take kindly to mixing in a single community. As a pastime back-garden farming may catch on, but there must also be some substitute for the excitements of village life. Children must be schooled, and after leaving school employed—perhaps in village crafts—if hooliganism is to be averted. Here is town-planning with a vengeance. The Colonial Medical Service's resources

in personnel are already fully stretched; so the scheme must from the start be medically independent. The organisers, likening their undertaking to a military operation, are seeking to benefit by the Army's campaigning experience. Hospital and field medical equipment are to be of standard Army pattern, and a R.A.M.C. officer has been seconded as chief health officer, to be joined probably by an Army hygiene officer.

For Africa one virtue of the scheme is its flexibility: it can be scaled up or down as needs dictate, and the developed land may be used for other cereals and even for animal husbandry. Among the other likely benefits are a strengthened economy; improvements in water-supplies and in road, rail, and port facilities; the fruits of research into such fields as meteorology, soil fertility, and crop diseases; and the disappearance, through bush-clearing, of the tsetse fly from large areas. The greatest indirect benefit will be the opportunity for the African to learn modern farming methods. Only one man is needed for every hundred acres, but of the 300 farming each 30,000-acre unit 70 must be taught to be technicians. About the need for an object lesson on these lines the surveyors are emphatic:

"Some idea of agriculture in East and Central Africa can be gathered by imagining the deplorable state of production which would occur with farms in Britain if all straw and other crop residues were burnt, no manures of any kind were ever applied to the land, and a small hand-hoe was the only implement used in crop production. If we add to this a condition of malnutrition and such debilitating diseases as malaria and internal parasites, including hookworm, some idea may be formed of the conditions of crop production in tropical Africa."

Finally the scheme will provide much-needed living-space.

"Excess of population," says the report, "could be accommodated on millions of acres of potentially good agricultural land which exist both in Tanganyika and Northern Rhodesia. But much of this is tsetse infested and densely covered with bush. There can be no hope for migrations of people into such land, so long as they have to depend on the axe and the handhoe to bring it into use. Only by means of the tractor and the bulldozer, the ripper and the disc-plough can such land be brought into a state fit for permanent human habitation."

These are the methods now being called into use. For once, it seems, good business may go hand in hand with sound colonial development.

JOINT CHANGES IN CANCER OF THE LUNG

JOINT changes are occasionally recognised in cases of pulmonary carcinoma and other lung tumours, and they may even be the earliest feature which brings the patient to the doctor. Complete examination then reveals an unexpected radiological opacity which represents a neoplasm of the lung. This tumour may be symptomless, and on first sight it may seem difficult to establish any connexion between lung and joint conditions. It is common to find in such cases that the joints have been treated as rheumatic without benefit. They are characterised by a polyarthritis affecting principally wrists, fingers, and ankles—less often elbows, knees, and spine. There is considerable swelling of soft tissues, and bone changes typical of hypertrophic pulmonary osteoarthropathy are seen in advanced cases. Clubbing of the fingers is common and takes the drumstick form. Pain is a constant and distressing feature, associated with severe limitation of movement. There appears to be little relationship between the site and size of the lung tumour, and the severity of the joint lesions.

The arthropathy may be dramatically relieved on removal of the lung. Patients who were so crippled that it was difficult to place them on the operating-table have claimed loss of pain and improvement in joint movement on their recovery from anaesthesia after pneumonectomy.

1. A Plan for the Mechanized Production of Ground-nuts in East and Central Africa. Cmd. 7030. H.M. Stationery Office. Pp. 48. 1s.

Some have been walking about comfortably a week or so afterwards, and though structural changes persist the swelling of soft tissues may resolve.

Three cases which fall into this category are reported from Argentina by Rottjer and colleagues.¹ In their patients, whose ages were 44, 47, and 64, pneumonectomy was performed with sudden relief of the "rheumatic manifestations." The tumours were classed as adenocarcinomata, but they do not say whether there was the extensive tissue breakdown or infection which is usually seen in this type of case. No satisfactory explanation of the association of joint and lung conditions has been forthcoming. Anoxia can hardly be the link, since improvement results from excision of the affected lung. Theories based on dyspituitarism and endocrine disturbances have been advanced, but more attention should be given to sepsis from breakdown of the growth. The syndrome can only be regarded as an occasional occurrence, but it deserves more detailed investigation and should be borne in mind as a possible pointer to early diagnosis.

THE SPRINGS OF DELINQUENCY

STUDIES of criminal psychology have important bearings on juvenile delinquency and on remedial methods in punishment. The Institute for the Scientific Treatment of Delinquency was established fifteen years ago, after the Medical Research Council had shown that scientific methods of diagnosis and treatment could be applied to people serving prison sentences. A letter from the Archbishop of Canterbury, Lord Horder, Sir Cyril Burt, Mr. J. A. F. Fergus, and Dr. Edward Glover, in the *Times* of March 12, tells the present need of the institute for support. During the war it undertook many clinical studies of delinquent and antisocial disorders, and much successful treatment. The recent crime in an approved school, where the violent fantasies of adolescence found outlet in actual murder, illustrates the need to continue and expand such studies. The crime, horrifying as it is, reveals so little grasp of reality or of ability to picture consequences, such hunger for notoriety at any cost, and such disregard for the sufferings of others that it is a symptom of very grave disorders in the children who committed it. If we are to prevent similar disasters we must find methods of training delinquents more effective than our present ones. The institute exists to forward such studies, and many interested in juvenile delinquency will wish to give it their support. The address is 8, Bourdon Street, London, W.1.

PLASTIC EYES

THE acrylic resins, used for some time in dentistry, have proved satisfactory for making artificial eyes. Plastic eyes are unbreakable and can be added to or subtracted from if the socket changes in shape. It is also claimed that the constant action of the tears does not roughen their surface and necessitate a change of eye every 1 or 2 years, as happens with glass; but the eyes have not been long enough in use for anyone to make dogmatic statements about their lasting powers. In difficult sockets an impression of the socket can be taken with 'Negocoll,' which is just solid at body temperature and liquefies on further slight warming, the plastic eye being then shaped from this mould. The iris is painted on paper and incorporated in the eye behind a layer of clear resin.

These eyes are somewhat heavier than glass ones, but no other disadvantage has become apparent except the price, which must be reduced before they can hope to become popular. The cost is now five times that of a glass eye, and there seems no reason why this should be so. The skill required to blow a glass eye must surely be greater than that needed to make one in plastics.

The acrylic eye has been adopted by the American Veterans Administration for all ex-Servicemen who require artificial eyes, and no complaints have so far arisen.

CONTROL OF ANTIBIOTICS

THE Penicillin Bill, presented in the House of Lords on March 5 by Lord Listowel, makes it an offence to sell or supply penicillin (or similar substances included by regulations) to the public except by or under the direction of a doctor, dentist, or veterinary surgeon, or by a chemist on the prescription of a doctor, dentist, or veterinary surgeon. The Government's advisers think that free access to penicillin would be dangerous to the public health, and for this reason it has been decided to continue the measures of control made under the Defence Regulations by the Minister of Supply, even though there is now enough penicillin for all home purposes and a surplus for export.¹ The main danger is thought to be that indiscriminate and inadequate dosage might lead to the production of insensitive organisms. Penicillin might also be used for the self-treatment of venereal diseases, which would add greatly to the difficulty of preventing their spread.

The Bill applies only to the supply of penicillin to the public. It does not impose any controls on wholesale dealings or exports. Power is given to the Health Ministers to make regulations bringing under the same control any "other anti-microbial organic substances produced by living organisms," after consultation with the Medical Research Council.

STAFF SHORTAGE IN MENTAL HOSPITALS

THE murder of a patient in the Oxford County and City Mental Hospital last November, which was described at an inquest on March 3, was a dreadful result of the lack of nursing staff. The ward in which the murder was committed contained 91 patients, and only one nurse was on duty at the time. Two other patients were in the habit of helping the nurse in the mornings, and they were washing the murdered patient in the bathroom at 6.30 A.M. on the day in question. According to their evidence, they afterwards carried her back to bed, but the nurse testified that when she visited her at 7 A.M. she was dead, having been strangled. The verdict was of murder against some person unknown.

These dangerous staff shortages must not be allowed to go on. The mental hospitals should at once start considering the employment of part-time nurses on terms similar to those which have proved successful in institutions for the chronic sick. The mental subcommittee of the Rushcliffe Committee have already recommended scales of pay for such nurses, which the Minister of Health has approved.² For nurses working less than 30 hours a week they are: ward sister 3s. an hour, deputy sister 2s. 6d., staff nurse 2s. 3d., nursing assistant (class I) 2s., temporary war emergency nurse 1s. 10d.

LORD HORDER, who is chairman of the Standing Committee on Nutrition of Food and Agriculture Organisation of the United Nations, left for Washington on March 15 and will be away until April 14.

THE first scholarship for the British Empire Nurses' War Memorial Fund has been given by the Royal College of Physicians of London. Lord Moran, in announcing the gift, spoke of the nurses as colleagues to whom doctors owe everything: "it would be impossible for us to work without them." The sum of £200 a year for seven years has been given under covenant, which will bring in the necessary £350-375 for this travelling scholarship. A second scholarship has been given on similar terms by Viscountess Mountbatten!

1. Rottjer, E. A., Aguilar, H., Laschlea, M. C. *Rev. San. mlil.* 1946, 45, 1163.

1. See *Lancet*, March 8, p. 309.
2. Circulars 27/47 and 27A/47.

Reconstruction

GENERAL PRACTICE TOMORROW

H. H. LEESON
M.C., M.R.C.S.

REGULATIONS and terms of service for general practitioners under the National Health Service Act must soon be made. General practitioners are the shock troops of medicine—on whose skill, decision, and courage the whole service will stand or fall—and the new arrangements must be such that the finest type of men will want to undertake the work. What then will attract the best type into this branch of medicine? Here in brief is what we want:

Reasonable working hours.

Suitable premises to work in, with ready facilities for all forms of simple examination.

Relief from clerical duties other than patients' case-taking.

Reasonable holidays each year, and relief if sickness overtakes us.

A service in which we can practise our craft without having to build up a business connexion—one in which other doctors can be colleagues, not rivals.

Opportunities for study and refresher courses when necessary.

A living wage on qualification with prospects of making a good income, according to ability, by the age of 40 (or less).

A pension on which to retire in comfort in our old age.

REASONABLE WORKING HOURS

Most general practitioners begin their day about 9 A.M., with morning surgery, and thenceforward are more or less busily engaged till tea-time at 4.30–5 P.M. Then comes evening surgery, which may end at any time from 6.30 onwards according to the district. Most people would call this a good day's work, but the practitioner's day seldom ends there. The evening rarely passes without further calls, and when these have been attended to he may still be called out after he has gone to bed. This goes on week in, week out—Sundays and half-days excepted, unless an emergency arises. No-one could describe this life as "reasonable working hours." No wonder there will be a rush for specialist jobs.

What then should be considered a reasonable day for a general practitioner? Of course, he will have to hold morning surgery as usual, and also evening surgery as usual, and pay such visits during the day as are required; but once evening surgery is over he should be free of all duties until 9 A.M. next day. He should also be entitled to a half-day once a week and to a whole day off on Sunday. During his absence from duty the work must be taken over by an emergency officer. Easy to arrange when the health centres are started.

These proposals might at first meet with criticism from the public; but opposition should be dispelled when it is explained that doctors, like others, get tired, and that when tired their brains may become clouded and their judgment warped, with consequent risk of mistakes.

SUITABLE PREMISES

How many doctors have suitable premises to work in? The average general practitioner cannot afford the substantial sum needed for good accommodation and equipment. It is not his fault that he has not got the place he would like. What he wants in order to provide a better service is free and rapid access to a first-class X-ray and laboratory service: the swab, the blood-count, the hæmoglobin estimation, and the X ray have now become indispensable.

CLERICAL WORK

Those of us who are fortunate enough to employ a secretary or book-keeper dispenser know how much

they can relieve the busy doctor of clerical work. With the advent of health centres most of this non-professional labour will disappear, the general practitioner being responsible for his own case-takings only. All record-keeping, forms, and returns should be tackled by the clerical staff under the lay superintendent.

REASONABLE HOLIDAYS

A month's holiday each year is essential to any brain-worker whose work is as long and arduous as that of a general practitioner. It need not be taken all at once. Yet not many of us get it—principally, I believe, because of the expense. To begin with, thirty days' locum fees at £2 per day=£60. Then the house has to be run, and food, &c., provided; on top of which comes a month away, probably for four, at some hotel or farmhouse. £100 goes nowhere.

Under a national service, properly run, the picture should be very different. The locum is provided; the health centre goes on; and there are holidays with pay. The only expense to the doctor would be the cost of his family by the sea or in the country. In comparable forms of Government service at least a month's holiday with pay is allowed. Why not for the general practitioner?

COMPETITION OR COÖPERATION?

The time is long past when doctors should be forced to look on patients as a means to an end. Here I cannot do better than quote the Spens report:

"The help, support and comfort that a doctor can give to his patient must, in our judgment, be seriously affected if a doctor is himself seriously worried. . . . We have no doubt that low incomes have in fact been a source of great worry to many general practitioners and prejudiced their efficiency. If, therefore, we are to attract the finest type of man into the profession, we must ensure that he is able to look on each patient as a case and not as a source of income."

I am sure all of us who have been in the public service—in Army, Navy, or Air Force, or in municipal life—must have appreciated, as I did, the delightful spirit of camaraderie, and the mutual assistance and coöperation that existed there. In the late war, when many general practitioners worked under my administration, I was much impressed by the speed with which they acquired esprit-de-corps and their liking for it compared with the competitive and soul-breaking methods of civil life.

OPPORTUNITIES FOR STUDY

The science and art of medicine move so fast these days that it is difficult for even the most successful general practitioners to keep themselves up to date; yet all should be cognisant of the latest forms of treatment. Not very long ago, in a remote country district, an elderly practitioner told me that his initial dose of the sulphonamide group of drugs was one tablet three times a day; yet his patients thought a lot of him. A compulsory refresher course every three years should be provided without expense to the doctor, and should be followed by a rise in pay.

REMUNERATION

And now I come to the most controversial part of my article. What remuneration should a doctor receive in a publicly organised service and how should it be computed?

It is obvious that a young man or woman, on entering the service, must have something to live on; and this should be the basis on which all future emoluments are built up. The Spens Committee very rightly recommended for assistants a salary on entry of £500 per annum. If this were regarded as the basic salary for all doctors, it could then be supplemented according to age, length of service, ability, position held, and number of patients for whom responsibility is taken.

On this plan remuneration would fall under the following heads:

- Basic salary.
- Increments for length of service.
- Capitation fee.
- Administrative, specialist, or extra-duty pay.
- Locality allowance.
- Mileage allowance.

Every doctor would draw the basic salary of £500. In addition he would receive, say, £25 per annum for each year of service, and capitation fees according to the number of patients on his list. Doctors undertaking administrative or specialist work, or extra duties, would be paid according to the particular post held, and their income therefrom would take the place of the capitation fees paid to the general practitioner. A locality allowance would be given to doctors working in unattractive or congested or less healthy areas, and a mileage allowance to rural practitioners who, owing to distance, cannot look after as many patients as their urban counterparts. Finally, a higher capitation fee might be paid in respect of patients over 60 years of age, so as to compensate doctors working in places where there are many elderly people demanding more than normal attention.

The number of years a practitioner has already spent in practice should be allowed to count for seniority in the new service: thus a doctor of ten years' standing would enter with ten years' seniority for pay and other purposes. I have suggested elsewhere¹ that a practitioner of more than ten years' standing should be graded as a specialist in general practice.

PENSIONS AND SUPERANNUATION

General practitioners as a class are not well-to-do; in fact lack of means often obliges them to go on working long after the usual retiring age. On the institution of the new service some elderly doctors may find themselves in a somewhat parlous position: in these difficult years they may have saved little or no money, and the compensation paid by the State for the goodwill of their practices will not suffice to keep them. These men will be ineligible for a pension in the ordinary way, yet it will be in the interest of the community that some of them should now retire. How is it to be done?

I suggest that (save in exceptional circumstances) all practitioners who join the service on its formation and are 65 years of age or over shall be given the option of (a) receiving a cash settlement for their practices, or (b) forfeiting their right to a lump sum, receiving in lieu a pension for their lifetime. On this plan a practitioner whose financial position is sound could augment his capital by accepting a lump sum, while one whose resources are poor would be able to choose a pension instead.

What should this pension be? The ordinary Civil Service scale of $\frac{1}{60}$ of retiring salary for every year of completed service would not be applicable unless amended. If, however, this small body of men were allowed to reckon the number of years since qualification as years of service, then in most cases they would get $\frac{40}{100}$ of income on retirement, which should meet their needs in their old age. For this class of man some sort of "means test" might have to be devised, in which the applicant would be required to prove that in his case the concession was necessary.

CONCLUSION

After many conversations with all grades of medical men—young and old; consultant, specialist, or general practitioner—I am certain that the success or failure of the National Health Service will depend in the first place on the terms and conditions offered. Let us therefore profit by the lessons of the past. *No ship ever sailed well yet with a discontented crew.*

1. Leeson, H. H. Your Doctor of the Future, High Wycombe, 1944, p. 26.

Special Articles

LACTATION

A POSTGRADUATE LECTURE

In his lecture to postgraduates at the Royal College of Obstetricians and Gynaecologists on Jan. 10 Mr. S. J. FOLLEY, D.Sc., of the National Institute for Research in Dairying, Reading, discussed recent researches into the physiology of the mammary gland which are likely to have clinical applications.

Earlier work indicated that oestrogen mainly stimulates the growth of the mammary ducts, while progesterone is particularly related to lobule-alveolar development. Species differences in the mammary growth response to oestrogen have however been recognised. In species such as the rat, oestrogen causes very little alveolar growth; in guineapigs, ruminants, and probably monkeys, considerable (though not necessarily normal) alveolar as well as duct development results from treatment with oestrogen alone. In the ruminant these findings may be of practical importance in connexion with the artificial induction of udder development and lactation in barren animals. On one view ovarian hormones do not directly cause mammary growth but do so indirectly by stimulating the secretion by the anterior pituitary of two specific mammogenic hormones which are the direct agents promoting growth of the mammary ducts and of the alveoli. While the integrity of the anterior pituitary does seem to be necessary for normal mammary growth under experimental conditions, the truth of this "mammogen" theory has not yet been proved with certainty.

Modern studies on the function of the mammary gland date from the discovery in 1928 that the anterior pituitary is concerned in the initiation of lactation (lactogenesis). This work was the first of numerous studies which have culminated in the preparation, as a pure protein, of an anterior-pituitary hormone, prolactin, which is widely regarded as a specific lactogenic hormone solely responsible for lactogenesis. However, it appears probable that other anterior-pituitary hormones are also concerned in the initiation of lactation, so we are led to the conception of a lactogenic hormone complex. Prolactin is less effective than crude anterior-lobe extracts in stimulating already established lactation (galactopoiesis), and here again a hormone complex, which may or may not be identical with the lactogenic hormone complex, is probably involved. This explains the variable and sometimes disappointing results obtained in clinical trials of prolactin for the treatment of hypogalactia, since the preparations used are standardised only in terms of prolactin by the pigeon crop-gland method.

Experiments on small animals had led to the view that oestrogen inhibits lactation, a view which has been accepted and applied in practice by many clinicians. The reality of the inhibitory action of oestrogen has however been questioned, and some clinicians ascribe the beneficial effects of oestrogen in cases where lactation is contra-indicated to the relief of painful breast engorgement. The fact that oestrogen under some conditions exerts mammogenic and galactopoietic effects is illustrated by recent work on the artificial induction of udder growth and lactation in virgin goats and heifers.

The posterior pituitary is now thought to be concerned not with the secretion of milk but with the mechanism governing its egress from the mammary gland—in other words, with the process of suckling or milking. When a cow is milked, palpation of the teats or the operation of any other conditioned stimulus is quickly followed by a sudden rise in milk pressure in the udder cisterns—the so-called "let-down"—only after the occurrence of which can the correct yield be obtained. The let-down has been ascribed to a nervous reflex causing contraction of smooth muscle-cells associated with the alveoli, or alternatively causing "erection" of the udder tissues due to occlusion of venous vessels and the engorgement of a corpus cavernosum with blood. According to a recent view, the let-down results from the contraction of smooth muscle-cells associated with the alveoli under the influence of oxytocin reflexly secreted by the posterior lobe of the pituitary in response to the stimuli of milking.

The research done on the physiology of milking throws light on some of the difficulties encountered in infant-feeding, since a failure of the discharge mechanism will amount to a failure of lactation, and many cases of deficient lactation in women may be due not to secretory deficiencies but rather to a breakdown of the neuro-hormonal mechanism governing the discharge of milk from the mammary gland.

MICROFILM PROJECTORS

A CORRESPONDENT remarks that the microfilm projectors now available are, in general, adaptations of models originally designed for reading newspapers measuring about 18×24 inches, and radical changes in their design will have to be made if they are to be used for books and journals whose pages seldom measure more than 9×12 inches. He sends us the following suggestions for the design of a microfilm projector suitable for use in a medical library.

To be acceptable to the student (undergraduate or postgraduate) the projected image must be presented under conditions comparable to those under which he reads his book: it must be in front of him, inclined at an angle approximately normal to his line of vision, and so placed as to permit a notebook to be near at hand which is properly lit for comfortable writing but not much brighter or dimmer than the projected image. The viewing surface must be screened from the general room lighting, for otherwise the projected image would be diluted, and being low in contrast would be difficult to read.

One of the chief objections to microfilm is that, being a continuous strip, it is awkward to refer from one "page" to another some distance away. In fact, with existing apparatus, it is tedious to read a long text which refers over a number of pages to, for example, a diagram or chart which was printed on the page on which it was first needed. For this reason the projector should provide a mechanical means of transferring rapidly and easily from one section of the microfilm to another either forwards or backwards, and it may be desirable to make this mechanism foot-controlled.

A useful addition would be a numbered counter or dial which, when set initially to the page number, will change automatically as the pages pass through the projector. This is important in cross-referring, for as the "pages" flash through their numbers are illegible, and much time would be wasted and annoyance caused by continually stopping to find which page is now in the field; a counter will remain legible and can be followed all the time.

It is sensible to make the microfilm in such a way that, no matter what the size of the book, it appears a constant size on the microfilm; therefore the projected image, to be read comfortably, must be at least as big as the largest size of page customarily used, yet not much bigger or the angle of ocular scanning will be larger, and eye-fatigue set in rapidly. This is an important consideration which is closely allied with the contrast of the projected image, for if these two factors are neglected microfilm reading becomes tedious. But since different books are printed in different type-sizes variable magnification is desirable, ranging over ×6 to ×10.

A microfilm reader designed to satisfy the foregoing subjective requirements will also have to possess the following features.

Optics.—The optical train must be of first-class design, casting a clear, sharp, contrasty image, and be well ventilated. It should consist of a pre-focus compact-source lamp, backed by a mirror and facing an achromatic condenser system of sufficient diameter; the lens should be an anastigmat in a focusing mount. The film gate should consist of a plane-parallel glass pressure-plate bearing on a metal aperture. The entire optical system must be capable of being easily dismantled for cleaning, and so constructed that elements can be replaced only in their correct positions. The intensity of the light-source must be controllable.

Film Transport.—The pressure-plate must rise automatically before any film transport occurs, and fall back automatically when the film is stationary. It must be automatic, in that the film will come to rest with a "page" exactly in position over the gate, and not in any intermediate position. This

transport can be electric, so that pressure on one button will cause the film to advance continuously until the desired page is nearly reached, and then under stabbing pressure will advance one page at a time, while pressure on another button will cause the film to run backwards similarly. As mentioned previously, these buttons may be foot-controlled. An alternative system can be devised which, looking like a 3-bank typewriter in which each tier is numbered 0-9, will permit the exact page desired to be automatically presented by prodding the appropriate keys: or a telephone dial system can be used. It is evident from these proposals that the mechanism is activated by motor rather than by hand.

Loading.—The projector must take both short lengths (6 inch) and long rolls (of up to 100 ft.) of film. The sprockets should engage smoothly and positively and the counter must be capable of being set initially to the page number in the gate and then remaining automatically in step. It would be desirable for the gate to accept both loose rolls and permanently maintained cassettes.

Construction.—The microfilm reader so designed would be a library model, made for hard and constant wear. It must be rigidly and soundly constructed, with fool-proof loading and working mechanisms capable of being easily serviced or replaced.

But this is only one opinion. It seems reasonable to ask, say, five men who use microfilm occasionally to try the best existing types of apparatus and then to draw up their own list of requirements. (They must be occasional users, for regular users will have become accustomed to the characteristics of a given model, and one can get used to anything with practice.) With these desiderata for guidance, manufacturers might abandon their present production of ad-hoc adaptations of apparatus originally made for other purposes, and produce a microfilm projector designed from the start for the medical library.

B.C.G. IN SCANDINAVIA

A LARGE part of *Nordisk Medisin* for Jan. 10 is devoted to several papers on B.C.G. by representatives of the four Scandinavian countries.

In Denmark B.C.G. vaccinations enjoy such a vogue that they are numbered by the ten thousand, and in the island of Bornholm more than 22% of the whole population had undergone such vaccination by 1945. One of the Danish targets at the present time is to vaccinate with B.C.G. every tuberculin-negative child at the school-leaving age, and to catch all the older tuberculin-negative persons as they present themselves for admission to higher schools, universities, and fighting services. In Norway Dr. J. Heimbeck continues to pursue the careers of his B.C.G.-treated nurses as they grow older and older and are more and more difficult to trace. In Sweden type-determinations of the tubercle bacilli found in the rare cases developing tuberculosis after B.C.G. vaccination have yielded the reassuring information that these bacilli were of the human type—i.e., not to be identified with bovine-type B.C.G. At present every B.C.G. vaccination is a notifiable operation in Sweden, and it is hoped that even after this precaution has been shelved, reliable data will continue to be recorded with regard to the total number of vaccinations and the incidence of tuberculosis after vaccination. In Finland, as in the other three Scandinavian countries, experiences with B.C.G. are encouraging despite the fact that the B.C.G. vaccinations in the Finnish army were carried out during the war under extraordinary difficulties.

BOOKS FOR BRITISH MUSEUM

DURING the blitz the library of the British Museum lost 200,000 of its 19th- and early 20th-century textbooks. In medicine the specialties which suffered most were specific diseases of the various organs, midwifery, mental diseases and psychiatry, and climate and environment (including books dealing with spas and the Swiss and Mediterranean resorts). Though many of these books are no longer of any great value in themselves, copies should be kept on record in the national library, and Mr. A. F. Johnston-Wilson, the assistant keeper, would be grateful for any help which doctors can give him. He should be addressed at the Department of Printed Books, British Museum, London, W.C.1.

In England Now

A Running Commentary by Peripatetic Correspondents

IN the nurseryman's seed catalogue I was a bit startled to see under the heading "Herbs" not only sage, thyme, marjoram, and such like but belladonna and henbane. In imagination I saw the enthusiastic amateur, resolved on a herb garden to provide varied seasoning for monotonous dishes, planting a packet of every herb listed. Being indigenous plants, belladonna and henbane should grow from seed much more readily than sage or parsley. Any medical student will show you the shiny black berries of deadly nightshade in the woods and perhaps even the hairy leaves of *hyoscyamus niger*.

Cooks are not very discriminating. When the recipe tells her to put "a bunch of herbs" in soup or stew she will naturally pick a piece of every herb available. One cook I had boiled Michaelmas daisy leaves instead of spinach; they looked and smelt quite like spinach in the pot, but some intuition led me to ask her to show me the plant from which she had gathered the leaves. An Irish cook I had ignored the garden mint and made sauce of a wild, hairy variety growing in a waste corner of the garden; it tasted unusual but was harmless. Another Irish girl sliced, fried, and ate some hyacinth bulbs, under the impression that they were onions.

So I wrote a friendly note to the firm when I ordered my seeds, asking if it was not rather risky to include poisonous plants among herbs. They replied that the classification was "herbs" and not "culinary herbs" and that those for domestic use were starred. The demand for henbane and belladonna was so great, they said, that it seemed simplest to catalogue the seeds in this way, and they enclosed the labels of the seed packets in question which bore a warning note that these plants are dangerous and highly poisonous.

I suppose it is all right. But in a country where dangerous drugs seem to be constantly left in cars, dropped in the street, or used to flavour the icing of Christmas cakes one doubts whether poison labels get the respect they deserve.

* * *

When Adam delved and Eve span,
Who was the committee-man?
Surely the answer's plain as day—
Coiled beneath the tree he lay,
Waiting till man at last should reach
The doubtful faculty of speech,
And two, though company, should note
A third can give a casting vote.
Who else in Eden would incite
The first debate on wrong and right,
Or advocate as human food
Knowledge of evil and of good?
From which original mistake
No-one profited save the Snake,
Who watched, though source of all our woe,
Our proletarian parents go
To toil outside that Paradise
Where self-communing still he lies.

W. R. B.

Running commentary, or cautionary tale? I don't know. Perhaps both. During the Great Frost I had to drive 50 miles for a check-up on my resected colon. Despite a blizzard from the east, the outward journey was uneventful. The first note of warning was sounded when the radiographer invited me to strip and put on a dressing-gown. Shivering, I extended myself on the metal couch and a cold nozzle was introduced. A long pause; then the radiologist appeared, muttering, "Let's hope there won't be a cut. It plays Old Harry with the exposure." His assistant released the forefront of the barium enema and an icy sensation in the rectum made me gasp, but my colon was made of sterner stuff and clamped down firmly on the intruder. Much time passed, but after adjurations to "give it all you have," man triumphed over Nature, and a Zeppelin-like shadow appeared on the screen. An invitation to get rid of this in an adjoining apartment was hastily accepted, but subsequent screening revealed "a normal pool in the cæcum."

After a cup of tea had lulled my lower bowel into a deceptive tranquillity, I began the homeward journey. The blizzard mounted, and even in a heavy overcoat my teeth chattered and my hands and feet grew numb. At the 30th milestone the "normal pool" suddenly became highly abnormal. The only possible refuge was a railway culvert facing east. Huddling under its indifferent shelter, hasty preparations were made, when, as by magic, a female form on a bicycle rapidly appeared. A mad plunge into the heavy snow of an open field beyond, and catastrophe was just averted. As I brushed most of the snow from the inmost recesses, and regained the car, I fully determined to advise my patients that train was better than car on such excursions.

* * *

Rather incongruously the Sage was smoking a churchwarden and listening to the Children's Hour when I paid my last weekly visit to inquire about his pernicious hypermetropia. He switched off.

"I like hearing the B.B.C. trying to romanticise the Stuarts," he said. "D'you remember that bit in Pepys about Charles II and his naked women?" "Anyway I prefer them to the Tudors," I answered, remembering all I owe to Haig and Haig, Dewar, and the rest. "The Tudors had their uses. It has always been the function of Welshmen, people who can take a detached, outside view of our codes, to break up the established ways of the dominant Anglo-Scotch. Henry Tudor's son nationalised the Church and monasteries, rather selfishly perhaps; Cromwell, who was half Welsh, tried to nationalise everything; then in our time Lloyd George nationalised insurance; and now we have your Mr. Bevan." "My Mr. Bevan!" I snorted, but refused to be drawn further.

"You old men are all the same," said the Sage. "Where do you think this comes from?" He picked up a newspaper cutting and holding it at arms-length read:

"... in his Bill he was content with an antiquated notion of medicine and of medical service; he took for granted without inquiry a notion built of some vague knowledge of village clubs and the old-fashioned vade-mecum way of doctoring. . . . Gloss it as we may, contract practice will stand lower in public esteem and will be of lower average efficiency and much less humane; it will damp the aspirations and blot the high-minded ideals with which I, who know, say the young physicians of today are entering our profession; it will push them back to old-fashioned routine and to ill-remunerated and therefore undervalued services."

"Guy Dain?" I guessed. "No. Clifford Allbutt in the *Times* of Jan. 3, 1912." "Damn your eyes," I said.

* * *

Cautionary Tale.—During the war children's physicians often found themselves called on to help with adult wards. This is a necessary preamble to the following case-history.

A girl of ten years was sent to the children's outpatient department because of a curious loss of power in her limbs with inability to walk. It was obviously of psychological origin. The background was of a broken home: father had left mother about five years before, the child and her mother had been living with grandparents and various uncles and aunts and cousins. Suggestions about reconciliation and getting back to a normal home life were not well received. Child-guidance was arranged, but the child meanwhile got worse, refusing even to get out of bed, and it was thought that a period in hospital might help. The day she was due for admission happened to be the day of the outpatient clinic. I was told that her father wished to see me and when he came in he seemed to have a familiar face. He remarked that he thoroughly approved of my suggestions and was sure I could help his daughter because I had helped him so much!

It was not long before I had him placed in my memory. He had had a particularly objectionable peptic ulcer, liable to bleed at intervals and not responding to treatment. I had been asked to see him at our base hospital by a surgical colleague because, despite operative treatment, he was still full of symptoms. My inquiries had pointed clearly to domiciliary unhappiness and I had strongly advised him to leave a nagging wife. He had had five years of complete absence of symptoms; but was I responsible for his daughter's psychosomatic disorders?

Letters to the Editor

THE STUDENT NURSE

SIR,—It is grievous to think that the efforts of Dr. Russell Brain to obtain some amelioration in the teaching of medicine to nurses met with no support in the General Nursing Council. Those who failed to appreciate the importance of his proposal can have had little practical experience either of teaching medicine to nurses or of the examination itself.

Speaking as a teacher and examiner of some experience, I am convinced that the curriculum as established leads to the teaching of too much medicine with an infinity of useless details: many of these nursing trainees cannot possibly absorb what is placed before them, but their efforts lead to an appalling mental muddle. The answers to the questions in the last paper on medicine provided many characteristic examples, of which a few are given. The train of thought in each case is easily followed.

"The characteristic point in the joint is the appearance of Aschoff's nodules, consisting of small blisters." (Acute Rheumatic Fever.)

"The Basal Systolic Rate is carried out each week." (Idem.)

"Chloral Hydrate is present in the blood, and patients suffering from anæmia suffer from loss of it."

"In uræmia acetone nodules can be detected on the skin like beads."

"The child may be born without a mouth or nose." (Congenital Syphilis.)

"Has no accommodation of the pupils to light." (Idem.)

"Mumps is an enlargement of the Parathyroid glands. Treatment, exercises of the lower jaw, as chewing some apple."

The first reaction on reading such replies is to smile; this is followed by admiration for a gallant, if ineffectual effort of memory, succeeded in turn by fears as to the application of such imperfect knowledge in crises and the administration of drugs and, finally, by despair that schedules can be of such a calibre as to produce such answers.

The need for nurses is great, and calls for every effort to eliminate wastage. A reconditioning of the syllabus and examination should be one of the first steps of the General Nursing Council to meet the need.

Lastly, it is up to all of us, teachers and examiners, to take to heart those last dozen lines of your leader, "First Things First."

DOUGLAS FIRTH
Consulting Physician.

King's College Hospital.

SIR,—In your issue of Feb. 1 it is suggested that student nurses should receive a maintenance allowance, say £100 per annum, at a flat rate during training. This would certainly be a step towards recognition of student status. The increment system is a relic of the housemaid's wages, so much a year, rising. But the exact figure to be paid would require most careful consideration, having regard to all the alternatives now open, and should be designed to attract the optimum number of suitable candidates.

Apart from the special case of students, it seems a matter for regret that the Rushcliffe Committees did not seize the opportunity to work out a scientific scale of salaries based on some system of points. Such a scheme could have taken into account advantages and disadvantages—risks, real or imaginary, distastefulness of the work, deficiency of amenities, &c. It might also have more justly assessed the relative contribution made by members of each branch of the service (e.g., by ward sisters).

The practice of computing salaries as a cash payment, plus a valuation of emoluments which actually vary in real value from hospital to hospital, has drawbacks. It prevents exact comparison between the position of student nurses and other categories of student or of entrants into commerce or industry. It has permitted an unfair valuation of emoluments, so that the nurse who does live out often finds herself trenching on her cash salary to provide the necessities of life. Moreover, had all salaries been paid on a cash basis, each nurse paying for her board and lodging, even if obliged to live in, I doubt if the discrepancy between the salaries of

male and female nurses permitted in the Rushcliffe Scale could have been condoned.

A later article (Feb. 8) put in a plea for separate finance for training school and hospital. Such separation of accounts and aims would be easier if training in each region were organised on a regional basis, only selected hospitals being allowed to take students, and these being required to offer a high standard of staffing and equipment. So long as hospitals are allowed to recruit students without reference to the needs of the service as a whole the practice of relying mainly on student labour is likely to continue, with its attendant evils of long-drawn-out training and wastage and spoiling of good material.

I think all nurses are greatly indebted to THE LANCET for its constant discussion of the problems connected with the reorganisation of the nursing services on which much of the success of the National Health Service must depend.

London, W.2.

G. B. CARTER.

SIR,—I am in entire agreement with the argument and the conclusions of your correspondent of Feb. 8. May I, however, correct one misconception which may arise from the reference made to the Nightingale Training School at St. Thomas's Hospital?

Quoting from Worcester's book on *Nurses and Nursing*, your correspondent gives the impression that the Nightingale School is a separately endowed school, financially independent of the hospital. This is unfortunately not the case. Virginia Dunbar in her thesis *The Origin and Early Development of Two English Schools of Nursing*,¹ which was written during a year's study of original sources, deals specifically with this. Whereas, in 1864, when the school started, the Nightingale Fund undertook all the expenses of its fifteen students for one year, by 1867, when the number of students rose, the fund was unable to pay for their maintenance, and the additional students had to pay this themselves. By 1892 the hospital paid a deficit of £444 on the first year's maintenance of the "free" students, and after the first year accepted them all on the staff of the hospital for a further compulsory period of one or two years. By 1900 the hospital was also providing tuition during the second and third year of training, and today the position is very much the same. The Nightingale Fund now undertakes the tuition of probationers in their first year; but the training lasts four years, and the hospital is responsible for everything the fund does not pay.

The fund, raised as the nation's gift to Miss Nightingale in acknowledgment of her work in the Crimea, was £44,000, and this she put in trust for the Nightingale School and certain other activities connected with the training of nurses. I am not aware that any considerable additions have since been made to the fund, and from time to time the income has been applied to other activities within the ambit of the trust. The Nightingale School is not therefore a "well-endowed school," and in fact has almost lost its original independence. Its merit lay in its original conception and demonstration, but this conception has failed to gain acceptance in its country of origin.

OLIVE BAGGALLAY
Secretary, Florence Nightingale
International Foundation.

London, W.1.

AN EXPERIMENTAL COMMUNITY

SIR,—Questions of medical administration are at present diverting attention from the proper scope of medical endeavour. In two short generations the advance of biological, social, and medical science has transformed the potential field of medical practice. In the welter of information there seems danger of losing our way.

In medical teaching it is a platitude that an understanding of physiology is the necessary condition of a proper insight into pathology. Now that biological science has shown the intimate interplay between living things and their environment, on the nutritional, personal, and social levels, there is need to reapply this old saw. We must now distinguish normal living function within environmental complexes from pathological function.

1. This thesis in manuscript can be seen in the libraries of Bedford College for Women and the Royal College of Nursing where Miss Dunbar studied during her year as a scholar of the Florence Nightingale International Foundation.

This calls for qualitative judgment as to what these complexes are. Until such qualitative judgment is reached any hope that social medicine may one day become a mature science is certainly vain.

The fact of birth and the science of genetics make it clear that the fundamental unit—the cell of our social tissues—is the home. The life-history of the family and the physiology of the home are the keys to an understanding of the means by which health may be achieved within a social environment.

To set up an experiment which will give evidence relative to these questions is a vast undertaking. Judgment upon that evidence must in the first instance be qualitative and presumptive, but until qualitative judgment has been passed quantitative confirmation cannot be sought. It is lamentable that so little recognition is given to the need for experiment along these lines.

An experimental community of 2000 homes is at present being established at Brandon Woods, on the outskirts of Coventry. It has already succeeded in gaining experimental control of a fundamental part of its social environment by acquiring farmland on which protective foods of assured quality can be produced for its young children. At a later stage all families will move to a projected housing estate in the immediate vicinity of the farm and periodic health overhaul of families will be instituted.

It would be futile at this stage to forejudge the results of such an experiment. But whether it is to succeed or whether it is to fail, it is manifestly of the first consequence that experiments of this type should be carried out.

The preliminary expenses were raised by subscriptions from the families participating in the experiment, and others such as the Eugenics Society. Fortunately the housing development can be financed from Government and financial sources. The farm capital is being raised by public subscription at 3½% secured on the farm assets. Apart from money for investment, the project now requires funds for surveys and for the salaries of staff. These charges are necessary if the inquiry is to have even the flavour of science. It is a disturbing fact that from those who make provision for scientific research we have not, as yet, succeeded in securing the most modest contribution. May I therefore bring this matter to the attention of the profession and seek its assistance?

K. E. BARLOW.

Family Health Club Housing Society (Coventry) Ltd.
16, Regent Street, Coventry.

LESSER CIRCULATION OF THE KIDNEY

SIR,—In their letter of March 8, Dr. J. A. Barclay and his colleagues, referring to the recent report of the Oxford workers¹ write: "The techniques of these workers leave no doubt as to the existence of an anastomotic vessel, probably the Isaacs-Ludwig arteriole, which enables the cortical circulation to be short-circuited."

I have now been privileged to examine some of the radiomicrographs made by Dr. A. E. Barclay of Oxford, and I can confirm that these demonstrate very clearly that the altered circulation recently reported is, as I suggested,² a glomerular circulation via the juxtamedullary glomeruli only, the cortex being relatively avascular by reason of vasoconstriction of the intralobular arteries. These juxtamedullary glomeruli are the largest, and, in the rabbit, I have found that they constitute 15% of the total (200,000) in each kidney; I have calculated, from measurement of their capillary volume, that they can accommodate the whole normal glomerular capillary blood-volume, the rate of flow of which, in the medulla-diverted circulation, is in consequence proportionately speeded up. The efferent arterioles of the juxtamedullary glomeruli furnish the normal blood-supply to the medulla. Thus it will be obvious that no non-glomerular circulation has been demonstrated; nor is the postulation of such necessary.

In man, renal anastomotic vessels are described as of three kinds—capsular, cortical, and those in the sinus

renalis. The first are accepted as frequent but inconsequent save in the exceptionally rare instance of gradual occlusion of the main renal vessel(s) in a young subject when they can maintain the entire blood-supply to the kidney(s).³ Steinach⁴ in 1884 concluded that there were direct arteriovenous shunts between the larger vessels in the corticomedullary zone, but the frequent arteriovenous anastomoses described by Spanner⁵ in the walls of the calyces have not yet been confirmed; neither has his suggestion, that these provide an alternative shunt-supply from the level of the sinus renalis to the tubules through a retrograde circulation of the capillary bed, been accepted.

It is now generally accepted that the Isaacs-Ludwig arteriole and other non-glomerular twigs are so infrequent as to be considered rare anomalies. Even the recently popularised 'Neoprene' latex corrosion technique has furnished but one doubtful example in the normal kidney (Shonyo and Mann,⁶ fig. 6, rat). As regards the important rôle which this arteriole (Ludwig's arteriole of European literature) is said to assume by undergoing hypertrophy to supply aglomerular tubules in the kidney in chronic nephritis and in the "senile" kidney (Oliver⁷), it must be noted that the delicate dissected specimens which are depicted in Oliver's monograph, in aquatints of much artistic merit, are thickened arteriolar twigs which have not necessarily been shown to be aglomerular, hypertrophied, dilated, or even patent.

It seems to have been forgotten that Ludwig fully understood, as did Bowman, that practically all of the blood from the renal arteries passes directly to the glomerular capillary tufts in relation to the special function of filtration, and that Ludwig's was the brilliant conception of the filtration-reabsorption theory of urine formation, vis-à-vis the Bowman-Heidenhain secretion theory.

North Middlesex County Hospital.

J. F. HEGGIE.

DIPHTHERIA PROPHYLACTIC

SIR,—The diphtheria prophylactic P.T.A.P., described by Mr. L. G. Holt (March 8), represents a definite advance in standardisation; and, if adults will tolerate larger doses of this prophylactic than of A.P.T., the added labour and expense of preparation may well be justified. There are, however, a few points in his paper to which we should like to draw attention.

As prepared by the method described in 1941 by Barr, Glenny, Pope, and Linggood (*Lancet*, 1941, ii, 301), A.P.T. shows little variation in purity or in antigenic efficiency from one batch to another. The method of trial precipitation and choice of optimum amount of alum for each batch eliminates the variations in antigenicity met with among toxoids: the variations referred to by Mr. Holt in the quotation from one of us were those which may occur among batches of A.P.T. prepared by different methods in different laboratories.

The idea of variability in A.P.T. largely arose from results obtained during the 1941 immunisation campaign. Some preparations of very low potency were apparently in use at that time. During the war years several thousand litres of A.P.T. were prepared in these laboratories, and none were discarded on account of poor antigenicity. The figures given by us in 1941 showed that there was but little variation between batches, and all our subsequent experience has confirmed it. Some recent figures may be of interest. Seven batches of A.P.T. were tested by an injection of 2 Lf doses into groups of 12–15 guinea-pigs. The animals were bled 28 days later, the serum from each titrated separately for antitoxic content, and the geometric mean of the values calculated for each batch. The lowest figure obtained was 0.14 and the highest 0.24; we have obtained far greater differences than this in testing the same batch of A.P.T. several times. But we would heartily agree that a standard preparation with which A.P.T. from different laboratories could be compared would be a great advantage.

1. Trueta, J., Barclay, A. E., Franklin, K. J., Daniel, P., Pritchard, M. M. L. *Lancet*, 1946, ii, 237.
2. Heggie, J. F. *Ibid.*, p. 436.
3. Cook, G. T., Pearson, R. S. B. *J. Path. Bact.* 1946, 48, 564.
4. Steinach, E. *S.B. Akad. Wiss. Wien. Math.-naturw. Kl.* 1884, 90, 171 (quoted by Shonyo and Mann).
5. Spanner, R. *Verh. anat. Ges. Jena*, 1938, 45, 81.
6. Shonyo, E. S., Mann, F. C. *Arch. Path.* 1944, 38, 287.
7. Oliver, J. *Architecture of the Kidney in Bright's Disease*, New York, 1939.

With regard to the "gain" in antitoxic value—i.e., the ratio of the secondary response to the primary—it appears that the primary response was measured by Mr. Holt as an arithmetic mean by testing one pooled serum from a number of animals. The secondary response, however, was measured as the geometric mean of the values of a number of sera tested individually. The scatter of values after one injection is therefore unknown and may have been relatively great. In our view such a comparison is inadvisable, particularly as the smaller responses are usually subject to a greater scatter, thus providing a considerable divergence between the arithmetic and geometric means. Any conclusions as to so-called gain in antitoxin must take into account the following principles. An animal's response to a secondary stimulus depends on:

- (1) The amount, nature, and antigenic efficiency of the stimulus.
- (2) The degree of potential immunity reached by the animal at the time of injection.
- (3) The amount of circulating antitoxin at the time of injection, in relation to (a) the combining-power and nature of the antigen and (b) the maximum response of which the animal is capable.

The fact that Mr. Holt finds there is an optimum concentration of aluminium for the production of good immunity is of great importance, and confirms and extends the observation of Miss Llewellyn Smith (1932) who found that the addition of Willstätter cream to a sample of A.P.T. increased its antigenic efficiency.

In the early days of A.P.T. the nodule formation and occasional sterile abscess produced by the carrier was much objected to, and on the basis of these objections we concentrated on producing A.P.T. with the minimum concentration of aluminium hydroxide consistent with a good depot effect. As far as can be judged in the absence of a common reference standard we have succeeded in producing A.P.T. of the same order of potency as those with large amounts of aluminium phosphate. It is possible that the "foreign-body" reaction produced by aluminium phosphate is less likely to lead to sterile abscesses than the reaction produced by aluminium hydroxide.

Wellcome Physiological Research
Laboratories, Beckenham, Kent.

MOLLIE BARR
A. T. GLENNY.

THE INTRAVENOUS DRIP

SIR,—Having initiated the popularity of the administration of continuous intravenous fluid by the drip method in this country 13 years ago, I have felt a grave responsibility at its widespread abuse. From almost the commencement, I urged that continuous intravenous fluid should never be given without keeping a properly recorded balance-sheet. Unhappily, I constantly find patients receiving the drips on the least provocation, but the balance-sheets are conspicuous by their absence.

The dangers of overloading the circulation because of well-meaning but unphysiological enthusiasm, short staffing, or forgetfulness, are so great that I am metaphorically hoarse from endeavouring to promulgate the gospel that "it is better to administer too little intravenous fluid than too much."

Professor Bentley's admirable pen-picture (March 15) of the dangers of abuse of a sovereign remedy will, I hope, attract great attention. The administration of parenteral fluid is largely in the hands of resident medical officers and house-surgeons, and I venture to think that if the instructions on p. 45 of the newly issued 15th ed. of *Pye's Surgical Handicraft* were adopted in every hospital, the abuse to which Professor Bentley refers would be reduced to vanishing-point.

Therapeutic pendulums are for ever swinging. Sometimes they swing too far, and become unhitched. The barber-surgeons overdid blood-letting, and a good remedy with definite indications became defunct. I fear that if Professor Bentley's injunctions are not heeded, a future generation may accuse us of having caused many deaths by drowning, and another excellent, nay, life-giving therapeutic procedure will pass into oblivion.

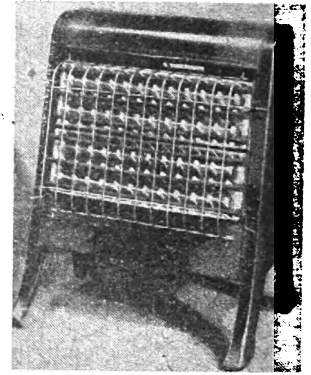
London, W.1.

HAMILTON BAILEY.

DEATH IN THE FIREPLACE

SIR,—In your leading article of Dec. 7, 1946, you urged the need for fireguards on electric and gas fires to protect the public—particularly children and old people—against the risk of clothes-catching fire.

Fresh data have since come to hand which indicate the size of these risks. The Birmingham Accident Prevention Council, to whom the figures were submitted by the Birmingham coroner (Dr. Davison), inform me that during the past five years in Birmingham there have been 14 deaths from burning by electric fires and 6 by gas fires—20 in all. No exact data are yet available for non-fatal accidents of this kind, but such as we have indicate that they are to the fatal accidents about as 4 to 1. Taking the population of Birmingham (1,000,000) as a random sample of the 40 millions of England and Wales, we may conclude then that in the whole country during this five-year period these heating appliances have been associated with something like 800 fatal and 3000 non-fatal accidents. The figures are, admittedly, not large in relation to the total number of such fires in use—and some of the accidents have certainly resulted from gross carelessness. On the other hand, there are grave reasons why we should not accept this accident-rate with complacency. It should be remembered that



Improvised grill guard fitted to standard electric fire.

most of these injuries, even if not fatal (and many more recover now than was the case ten years ago), result in extensive scarring and often in impaired functional efficiency throughout the victims' lives. It is clear, too, that with the present coal shortage and the rapidly growing use of electric and gas fires (particularly of the mobile types) these accidents are likely to become more frequent. There is already evidence of such an increase.

These accidents could be prevented comparatively easily, and "if preventable why not prevented?" The case-histories of our patients show that their clothing usually caught fire because of a momentary contact of inflammable material with the heating elements—it would not have ignited if a suitable light guard had prevented this contact. The man in the street can easily satisfy himself on this point. He has only to hold a piece of inflammable clothing material (flannelette or winceyette) in front of an electric fire to find that at a distance of 1 inch or less it will burst into flame in a few seconds, whereas at 2-3 inches it can be held for more than two minutes and still will usually not ignite. A grill guard which keeps clothing at a distance of at least 2½ inches from the fire will therefore prevent an accident in most circumstances. (With gas fires the grill should stand away somewhat farther—not less than 3½ inches.)

Open coal fires are, it is true, responsible for considerably more accidents than electric and gas fires. (There were 61 deaths from coal-fire accidents in the Birmingham coroner's series for the past five years as compared with 20 for electric and gas fires.) Unfortunately it is much more difficult to secure protection against open fires. An efficient guard for these must be large and usually has to be removed for cooking and for stoking the fire. It also gets in the way in a small crowded room. In spite of legislation in 1908 (Children and Young People's Act) which made it an offence to be without a fireguard where there are young children in the dwelling, the Registrar-General's returns do not indicate that it had any decided effect on deaths from burns, and the Act has now become almost a dead letter. It would not be feasible to make the provision of a fixed guard compulsory on all new open fires, but such a provision could easily be insisted on in respect of electric and gas fires. A well-designed guard need detract little or nothing from the appearance of such fires and the additional cost would be small.

It is simple to improvise a grill guard for existing electric or gas fires. A cake-cooling tray or griller can be bought for a few pence at most ironmongers and easily wired to the bar or bars covering the elements (see figure). Failing this a piece of wire netting will serve, but care must be taken to ensure that the cut ends are turned in so that they cannot catch on clothing.

It has been suggested that such a fixed grill guard would considerably diminish the heating efficiency of electric and gas fires. Experiments suggest that this is not the case. At a distance of 26 inches from the fire illustrated, the rise in air temperature ten minutes after switching on was only 1° F lower with the guard in place, and at twenty minutes was only 2.5° lower. After that time the guard seemed to cause no further reduction.

Birmingham Accident Hospital. LEONARD COLEBROOK.

COMPRESSION OF MEDIAN NERVE IN CARPAL TUNNEL

SIR,—I was greatly interested in the article by Dr. Brain, Mr. Dickson Wright, and Dr. Wilkinson in your issue of March 8, but I am sorry that they do not mention the value of immobilisation of the wrist in both the diagnosis and treatment of this condition. The clinical picture of parasthesia and impairment of sensation in the median-nerve distribution, plus wasting of the thenar eminence, usually following either a single injury or a period of overuse, is not an uncommon one.

The differential diagnosis from such conditions as the costoclavicular syndrome or lesions of the spinal cord may be very hard. A period of 3-4 weeks' immobilisation of the wrist will produce relief of the symptoms if these are due to compression of the median nerve in the carpal tunnel. I mention these points in case the recent article may lead to unjustified surgical onslaughts on the median nerve. If there is any doubt about the diagnosis of any pressure neuritis, it is wise only to operate when there has been relief with immobilisation and recurrence on activity. I have also wondered whether the apparent increase in frequency of the various types of pressure and friction neuritis is only due to one's being more aware of the syndromes, or whether there is a factor such as dietetic deficiency which is making the nerves more sensitive to trauma.

Liverpool.

R. ROAF.

SIR,—I would like to point out an error in the first two illustrations to the article on compression of the median nerve in your issue of March 8. The transverse carpal ligament (flexor retinaculum) is represented as terminating distally at the distal skin crease, whereas this actually is its superior border. In the position represented, the nerve would be compressed, if at all, against the radius.

King's College, London, W.C.2.

DAVID ADDERLEY.

SIR,—The article by Dr. Brain, Mr. Dickson Wright, and Dr. Wilkinson calls for comment.

First, the structure shown in fig. 1 as the anterior carpal ligament does not correspond in site, size, shape, or slope to any structure in the human body. Secondly, every reputable textbook of anatomy for the last 140 years at least describes the median nerve at the wrist as normally possessing those outward appearances of enlargement, pinkish coloration, and surrounding cellular tissue which your contributors regard as abnormal.

Cloquet (1816)—"It passes . . . under the annular ligament of the carpus, adheres to them (the tendons) by a very delicate membranous cellular tissue, becomes thicker and broader than it was before."

Quain (1837)—"Somewhat enlarged, and slightly reddish in colour . . ."

Piersol (1906)—". . . it spreads out into a reddish gangliform swelling."

May I add the following notes?

1. The arteria comes off the median nerve supplies the lower two-thirds of the nerve in the forearm. It is often somewhat enlarged and is regarded by some anatomists as the main primitive artery of the limb.

2. The anterior carpal ligament maintains the transverse arch of the hand, which is exaggerated in flexion,

diminished in extension. The carpal tunnel is more circular and larger in flexion; smaller and more flattened in extension.

3. Wasting of the thenar, hypothenar, and interosseous muscles is a normal feature of old age. The hand tends more and more to assume Hilton's position of rest with slight ulnar adduction.

4. The fibrocartilaginous ligaments of the metacarpophalangeal joints tend to show chronic thickening with limitation of the movements of the joints with (a) old age, (b) the menopause, (c) leucorrhœa, pyorrhœa, and gonorrhœa, and (d) heavy manual work, including domestic work such as scrubbing and ironing.

5. The number of sesamoids which ossify often increases in number and size as part of this general process of ageing.

6. Pins-and-needles and varying degrees of acroparæsthesia are common in working women, for vasomotor disturbances are more common in women than in men (cf. Raynaud's disease).

7. These patients would possibly have done just as well had the hand been tied up loosely over a golf-ball, tangerine, or other rare object with a view to resting the part.

8. Intermittent heavy muscular work, such as in fine-weather gardening, easily produces this "syndrome" in men over middle age, particularly if the handle of the working tool is of the wrong dimensions.

9. The baby does not learn to oppose the thumb until he is about 6 months old. It is not surprising that this movement should be one of the first to be lost in any process of "wear and tear" ageing.

10. Lastly, no clinician should regard anything in the body as abnormal unless it has been submitted to that acid test of anatomical accuracy and precision—Quain's *Textbook of Anatomy*.

Anatomy School, University of Cambridge. H. A. HARRIS.

* * We have shown Professor Harris's letter to Mr. Dickson Wright, who replies as follows: "In our diagram the artist certainly placed the anterior carpal ligament too high; but no-one will suffer from this, because it emphasises the point which was felt important—namely, that the median nerve swelling extended two inches above the ligament. I have now observed in two more recent cases that this neuroma makes a visible and palpable swelling, pinching of which produces parasthesia in the three-and-a-half-finger distribution."

"The idea that the compression was produced in the carpal tunnel was entirely due to Dr. Russell Brain, who asked me to explore the cases we described. The nerves disclosed at operation were quite abnormal and resembled in no way the appearance of the median nerve at the wrist in the living subject, the recently dead, or the pickled specimens with which Professor Harris deals. As he has expressed himself so freely in a clinical matter I feel free to say that here he is anatomically in the wrong. True, most of the anatomy books of the last 140 years say that the median nerve in the palm is flattened, swollen, and pinkish; but the swelling in our cases resembles Professor Harris in that it goes far too far, extending for at least three inches above the ganglionic enlargement described in the textbooks. As Professor Harris seems so interested in clinical matters and advises on treatment it would perhaps repay him to see one of these operations and verify the pathological appearances described in the article."

"The mockery which followed the discovery of the pathology of the herniated disk has now died away leaving Mixer and Barr holding the field with a great discovery and benefaction to their credit. Now Dr. Russell Brain has just as neatly extricated still another nerve attrition with just as clean-cut a syndrome from the numerous forms of palsied, painful, and anæsthetic hands. I think many will have cause to be grateful for this help in the diagnostic and therapeutic field, in spite of Professor Harris's effort to throw the condition back on to the dust-heap of toxic neuritis."

"One final observation. The patients, now increased to 11 in number, were all relieved by dividing the anterior carpal ligament, although they received no treatment for gonorrhœa, leucorrhœa, pyorrhœa, or old age."—ED. L.

ENOUGH TO EAT?

SIR.—Mr. Strachey's statement (quoted in your leader of March 8) that the poorest third of the nation is eating far more than before the war is nonsense. Of the whole population in 1937 some 10% received rather less than present rations and 5% considerably less. This 15%, or many of them, are eating more: but this is not in any way due to rationing but to the abolition of unemployment. The *Sunday Times* on March 9 published the following table comparing the weekly consumption of the working class in 1937 (including a proportion of unemployed) with present rations:

| | Average consumption 1937-38 (a) | Present ration |
|-----------------|---------------------------------|----------------|
| Meat .. | 1/6 (b) | 1/- |
| Bacon, ham .. | 6 oz. | 3 oz. |
| Bread, flour .. | 4 3/4 lb. (c) | 3 lb. |
| Milk .. | 3 pints (d) | 3 pints |
| Butter .. | 7 1/2 oz. | 3 oz. |
| Margarine .. | 3 oz. | 3 oz. |
| Lard .. | 2 oz. | 1 oz. |
| Cheese .. | 3 oz. | 2 oz. |
| Sugar .. | 1 1/2 lb. | 8 oz. |
| Eggs .. | 3 1/2 | 1 |

(a) Ministry of Labour survey.

(b) at present prices.

(c) Plus cakes.

(d) Plus cream 2d.

Note how much less is the *maximum* present ration than the working-class *average* of 1937—meat and bread two-thirds, fats half, sugar and eggs a third. Hard necessity has considerably reduced the standard of living in this country: not merely the wealthy but the majority of the working classes have substantially less to eat than before the war and have to expend enormously more time to get it, although school meals and works canteens do something to close the gap for those who can use them. Not only are our rations near the necessary minimum but they are monotonous, allowing little scope for individual taste or preference. It is time that claptrap about our being as a nation better fed now than formerly ceased: we are *worse* fed and everybody knows it except apparently the Minister of Food.

Bristol.

E. WATSON-WILLIAMS.

DOCTORS' SALARIES

SIR.—Let us all—but let hospital committees in particular—take belated note of Mr. Harold Dodd's strictures upon the scandalously inadequate salaries currently offered to medical men for responsible posts. Although the pound sterling is now no more than half its pre-war value, salaries for registrar appointments requiring higher qualifications remain in the region of £300-400 at best, and other posts are scaled comparably.

Tragically enough, the distinguished members of our profession who are either directly or morally responsible for these rates find plenty of takers in a glutted labour market where the alternative is to emigrate or starve.

Mr. Dodd understates his case, and his specimen budget is pared to the bone. Where is it possible in London for a young doctor to find a flat for less than £5 a week? Or buy food for himself and his wife for much less than another £5?

After five years of war service, and ten years from qualification, I find myself, highly qualified, working twice as long, and probably twice as hard, as any trade-unionist, and daily responsible for life-and-death decisions, for the wages of an incompetent bricklayer. This may have been all very well in an era where my subsequent earnings could possibly have brought some recompense; at least I would have had a sane motive for putting up with it. Today no such thing is true, and a careful study of your advertisements leads me to believe that I may look forward at best to a salary of about £1500 (i.e., £800, 1939) less income-tax. That is the scale the leaders of the profession are not only proffering to their successors, but tacitly (and for all I know, overtly) recommending to the bureaucrats.

I regret bitterly that I was ever so misguided as to enter a profession which rewards both skill and devotion so ill; and if ever I can afford to have a son I will see to it that he is apprenticed to a grocer, and a colonial one at that.

CHIEF ASSISTANT.

THE NATIONAL SITUATION

SIR.—The significance of your correspondent's article last week on Exports and Agriculture is immense. I desire to congratulate THE LANCET most warmly upon its initiative in drawing the attention of a wide circle of professional opinion to this aspect of our affairs. An adequate food-supply is fundamental to all health, and the fact that our food-supply may have to rest for its essentials largely upon our own efforts, within our own shores, is so novel that it will have to be thought over again and again before we can adjust our conceptions to the new conditions of our times.

Food in surplus quantities exists in North America, in Australia and New Zealand, and to a certain extent in South America, but scarcely anywhere else in the whole world. If this food is evenly spread throughout the world's population, the people of this country will find themselves on shorter commons than they have known for many a long day. If we are to have a preferential share of it, we shall have to obtain this by an export effort of absolutely unprecedented extent, directed largely into areas of high industrial productivity which have little room to receive it. Furthermore, we need many other materials, such as metal ores, which are indispensable if our industrial activity is to be maintained. Towards this end our scanty exchange resources will continually need to be realigned.

We need, for example, tungsten, and we need oats. But we can grow oats and we cannot grow tungsten. In such circumstances, the phrase "uneconomic" as applied to cereal production in this country may well be no longer applicable.

All this is taking on a very immediate importance as the dollar loans begin to run out and the floods and the snow force the importance of our own production so painfully to the fore. The fact is that already our own consumption of foodstuffs in this country has fallen as compared with last year. Nor are the levels from which it has declined as high as we had been given to believe. In a recent answer to a question in the House of Commons, Dr. Edith Summerskill stated that the often-quoted figure of 2900 calories per head as a daily British intake was only obtained by dividing the total food moving into civilian consumption by the total number of the civilian population. There is reason to believe that the actual intake, as measured by dietary surveys was, even before the recent decline, no more than 2500 calories per head. The minimum for overall average health and activity is usually taken as about 2400 calories. If these figures are correct, we have reached, and indeed dipped below, the danger-line.

The lesson of all this is terribly clear. It is that a concentration of attention and energy upon home food-production is literally vital, and that a sense of urgency, so far almost completely lacking, must now be the order of the day in tackling this task.

House of Commons.

WALTER ELLIOT.

SIR.—Since when has your distinguished journal made itself responsible for propounding political and economic topics thereby inevitably sliding along the nasty path of Party Politics? I cannot—at all events easily—accept the excuse you put forward by stating the truism that medicine is a part of our whole social framework.

Mundesley, Norfolk.

S. VERE PEARSON.

** Tuberculosis, to which Dr. Vere Pearson has devoted his professional life, sufficiently illustrates how economics can dispose of what medicine proposes. He will agree that doctors are not purely technicians and should hear more than is audible through a stethoscope. The article in question is a sober analysis of the national situation, written without party bias and leading to conclusions on food-supply, food prices, and urbanisation which (if correct) are important to social medicine.

—ED. L.

Mr. J. F. Foster, formerly registrar of the University of Melbourne and secretary of the Australian Vice-Chancellors' Committee, has been appointed secretary of the Universities Bureau of the British Empire.

Public Health

Testing of Milk

MILK testing is not an end in itself. When any new official test is introduced we have to consider not only its objects and method but also the action to be taken on the results. In announcing (circular 17/1947) a new method—or rather the modification of an older one—for testing non-designated milk, the Department of Health for Scotland makes the object and method clear but is less definite about subsequent action.

The object is strictly limited to the discovery of supplies of milk of poor keeping quality (pathogenic contamination is not dealt with), and the method is a variation of the Hiscox modification of the methylene-blue test. To pass the test, milk, to which has been added, within one hour of the arrival of the sample in the laboratory, a small quantity of methylene blue, must not decolorise this dyestuff by 12 NOON on the day after the sample has been taken, the milk and dyestuff being held, meanwhile, at atmospheric shade temperature.

There is little doubt that this procedure gives a much better idea of the keeping quality of the milk—and perhaps also a rather better idea of the cleanliness of production and handling—than the methylene-blue test at 37° as used at present for designated (accredited or tuberculin-tested) milk in England and Wales. It has the same advantages over the resazurin tests now used for both designated and non-designated milk in the National Milk Testing and Advisory (N.M.T. & A.) scheme. Perhaps it is no objection to the new procedure to say that unlike the 10-minute resazurin test of the N.M.T. & A. scheme it cannot in any way be employed as a rejection test—i.e., a test by which a consignment of milk of really poor quality can be spotted *quickly* and prevented from contaminating, and very possibly spoiling, a larger bulk at a collecting depot. The new test will undoubtedly serve as a sound basis for advisory work to the producer, which is its purpose under the new Scottish scheme; but certainly there are advantages in having one which serves both purposes—i.e., as a platform rejection test and as a basis for advising the ignorant, or warning the careless, producer. The 10-minute resazurin test, or a 15-minute methylene-blue test at 37°, meets both requirements fairly well.

If, however, experience in England with the N.M.T. & A. scheme is applicable to Scotland, it may well be found that the factor limiting the usefulness of the test will not be the testing and laboratory end, but the paucity of competent staff available, particularly during the summer months, for speedily giving advice to the farmer whose milk is below standard. It is to be hoped that, with the lower average summer temperature in the northern half of Britain, the difficulties arising from the sheer weight of advisory work in the early days of this scheme will be less acute than those, fortunately now overcome, that impeded the N.M.T. & A. scheme in England in its first two or three years. But if the Scottish scheme is to be successful from the beginning, it may be necessary for the Department of Health, in consultation with the Department of Agriculture, to pay a good deal of attention in the immediate future to the training of those who, with tact and knowledge, are to advise the dairy farmer on hygienic methods of milk-production.

Infectious Disease in England and Wales

WEEK ENDED MARCH 8

Notifications.—Smallpox, 7; scarlet fever, 1217; whooping-cough, 2461; diphtheria, 182; paratyphoid, 4; typhoid, 4; measles (excluding rubella), 12,137; pneumonia (primary or influenzal), 958; cerebrospinal fever, 86; poliomyelitis, 10; polioencephalitis, 0; encephalitis lethargica, 0; dysentery, 69; puerperal pyrexia, 128; ophthalmia neonatorum, 81. No case of cholera, plague, or typhus was notified during the week.

The 7 cases of smallpox were notified at Grimsby.

Deaths.—In 126 great towns there were no deaths from enteric fever, 1 (0) from scarlet fever, 1 (1) from

diphtheria, 37 (6) from measles, 15 (1) from whooping-cough, 89 (9) from diarrhoea and enteritis under two years, and 92 (17) from influenza. The figures in parentheses are those for London itself.

The number of stillbirths notified during the week was 290 (corresponding to a rate of 29 per thousand total births), including 33 in London.

Parliament

FROM THE PRESS GALLERY

New Grants to the Universities

In the House of Commons on March 10, in reply to Sir ERNEST GRAHAM-LITTLE, Mr. H. DALTON, Chancellor of the Exchequer, in the course of a statement on new grants to universities, said he had received and considered a report from the University Grants Committee on the financial needs of the universities for the five years 1947–52. The universities would need Exchequer grants on an increasing scale for some time to come, both to effect improvements and to increase the number of students. Parliament would therefore be asked to provide recurrent grants rising from £9 million for the academic year 1947–48 to £9,970,000 for 1948–49 and thence by annual increments of £650,000 to £11,920,000 for 1951–52. The recurrent grants for the present academic year would amount to between £6 million and £7 million. These figures excluded the grants of £500,000 now made to teaching hospitals, which would continue during the financial year 1947–48 and the amount of which for future years had not yet been determined.

The University Grants Committee estimated that the universities' programmes of development would necessitate during the quinquennium non-recurrent grants amounting to £50 million, of which £40 million would be for new buildings and new equipment. Mr. Dalton accepted this estimate and would do his best to meet it. He was advised, however, by the Minister of Works that, even after allowing for a high degree of priority, the best forecast at present possible did not justify the expectation that universities would be able to undertake more than £20 million worth of new building during the quinquennium. He appreciated that this must retard to some extent the expansion of the universities which the Government earnestly desired to see, but for the present it would only be prudent to plan on this restricted basis. The position, however, would be reviewed from year to year. The sum which Parliament would be asked to vote for the financial year 1947–48 was £11,875,000, which included the grants to the teaching hospitals.

Extra Rations for the Sick

On the motion for the adjournment on March 10, Colonel M. STODDART-SCOTT raised the question of the refusal of the Ministry of Food to grant extra rations which had been recommended by doctors. Since rationing was introduced, he pointed out, there had been no drop in the mortality-rate, and there had been an increase in the number of sufferers from gastric ulcers and other gastric complaints, and in nervous and cardiovascular diseases. The rise in the incidence of tuberculosis had also coincided with the reduced diet; and the Minister of Fuel and Power had stated that increased absenteeism in the pits was connected with minor unnotifiable diseases. The survey by the Oxford University Institute of Statistics¹ showed that the present rations for adults were insufficient for their proper maintenance. Sir John Boyd Orr, speaking last August in Copenhagen, said:

In the United Kingdom it is estimated that the additional food needed to bring the diet of the whole population up to the desired health standard would represent an increase of 25% of meat, and 65% to 75% of other animal products, and fruit and vegetables.

Since then there had been a cut in our bacon ration and the meat ration had been lowered by twopennyworth per week. Therefore, Colonel Stoddart-Scott contended, extra rations were more essential in sickness.

During the last six months of last year 235 cases were refused extra rations by the Ministry of Food. The Special Diets Advisory Committee was composed of ten

1. See *Lancet*, March 15, p. 338.

distinguished physicians and research people. Six of them were consultants, and none was a general practitioner. All had the benefit of age on their side, as the average age was well over 55. This committee, which met only twice during the last six months, drew up a list of diseases with the appropriate diets, but did not deal with the individual cases which were referred to individual members of the committee. That system might have been all right in war-time but it was unnecessary now when the nation was probably worse fed than it was in the war years. Even if the 235 cases had been granted extra rations, it could not have affected the efficiency of our national scheme of rationing. He suggested that if in the administration regions medical advisory committees appointed by the Ministry could be set up, one of whose members would visit border-line cases and make a decision on the spot before a plea was finally turned down, much of the present public anxiety would disappear. Extra rations, he urged, should now be granted not just for the treatment of cases but for the alleviation of discomfort and to help to prolong life.

Mr. SOMERVILLE HASTINGS thought that both the public and the medical profession were satisfied with the arrangements, which seemed to have worked admirably for many years. The position of the doctor in private practice was not easy. If he turned down an application for extra milk he might offend his patient. There was a shortage of certain foods, he admitted, and many patients—the majority perhaps—would benefit by extra food and extra milk. But the doctor was strengthened by being able to point out to his patient that his case did not come within the confidential list of diseases eligible for extra nourishment. Some doctors undoubtedly succumbed to pressure from the patient. How else could one explain the extraordinary figures recently obtained from the Ministry, showing that the proportion of people receiving extra milk was more than three times as great in Hampstead as in Tyneside or South Wales? As to the suggested panel of doctors in each area, Mr. Hastings feared that doctors, unwilling to refuse their patients, would call in specialists in a great number of cases.

Dr. EDITH SUMMERSKILL, parliamentary secretary to the Ministry of Food, declared that Colonel Stoddart-Scott's contention that the incidence of disease had been greater during the last few years was not borne out by the public-health statistics. In granting extra food for invalids it was necessary to distinguish between the medical foods needed for therapeutic reasons and medical comforts. The members of the Special Diets Advisory Committee were men who were highly responsible and authorities in their particular field, with a wealth of clinical experience. The committee did not pass judgment on treatment; it advised the Minister on applications from medical practitioners for additional foodstuffs. It was, in fact, an appeal board, and on the whole she thought it had performed its functions well. It was true that the Ministry relied on one or two members of the committee, but these men were highly qualified, and it would be difficult, and certainly not expeditious, to refer each case to every member. The Minister was considering the proposal to set up committees in various parts of the country, but the chief reason why the proposal was opposed at the moment was that medical comforts were to have a bigger place in the Ministry's allocation scheme than heretofore, and she was therefore reluctant to set up committees of busy people who might never be called on to do any work. Some scheme might be devised whereby another doctor could see the patient, and then report to the committee, but she was afraid that this proposal might in effect prove cumbersome, and that it might impose on an already efficient machine another which might never be called upon to function.

QUESTION TIME

Health Surveys

Mr. JOHN MORRISON asked the Minister of Health how many persons were employed by his department to make house-to-house inquiries about health conditions; what was the total annual cost of this activity; and what were the qualifications of those engaged.—Mr. JOHN EDWARDS replied: I assume that

the hon. member refers to the monthly survey of illness carried out on behalf of my department by the Social Survey of the Central Office of Information. Each month inquiries are made of a sample of the population by 70 part-time investigators, who are members of the trained staff of the survey. The work is directed by one research officer who is a qualified statistician. The approximate annual cost, including salaries, of this regular inquiry is £12,000.

The *Times* (March 13) announces that the Conservative and Liberal Associations of Luton have approached Dr. Charles Hill, secretary of the British Medical Association, to be their prospective Parliamentary candidate. The two associations have joined "to form a common front against Socialism."

Obituary

BRYAN AUSTIN McSWINEY

M.B., SC.D. DUBL., F.R.S.

IN the ten years that Dr. McSwiney spent at St. Thomas's Hospital as professor of physiology and later as dean he became identified to an extraordinary degree with his school of adoption, and his death on March 8 at the age of 52 will be a heavy loss to it.

Born in Chicago, he spent most of his childhood in America, till in 1907 he was sent home to Ireland to finish his schooling at Clongowes Wood College. After a year spent in private study in Germany he entered the University of Dublin in 1912. The outbreak of war interrupted his studies, but in the intervals of serving as a surgeon lieutenant R.N.V.R. (at Gallipoli and elsewhere), as an assistant to the scientific adviser to the Ministry of Food, and as a lieutenant in the R.A.M.C., he took his B.A. in 1916 and his M.B. in 1917. On demobilisation he was appointed assistant to the professor of institutes of medicine at Trinity College, and in 1919 he became lecturer in experimental physiology at the University of Leeds. A year later he moved to Manchester to take up a similar post there, and from 1923 he was also tutor and secretary to the faculty of medicine.

In 1926 McSwiney was nominated for St. Bartholomew's, but in the same week he received a call to Leeds which he accepted on the grounds that there was an honours school and that money had been secured for expansion. "His programme," writes J.K.J., "was a double one—to create an adequate department for a more than doubled entry compared with pre-war days, and to push the honours course as a means of creating a body of interpreters between the clinicians and the pure scientists, who had become rather unintelligible to each other. He had an acute eye for merit, and a gift of encouragement, and he gave an example of ignoring the clock. In result in his short tenure four of his staff passed out to chairs, and several more were dispatched to better themselves. In addition to the number of B.Sc. honours students who are now physicians and surgeons, he gave facilities to several B.A. and B.Sc. graduates employed on his staff to qualify in medicine in order to work with better co-operation with the practising profession. When he had brought his department to a remarkable level of efficiency and productivity, and had done what he had set himself to do, it became evident that his joy was in the doing, not in the prospect of a calmer life in the house he had built. London seemed to offer more chances of collateral adventures and new experiences." In 1936 he moved to St. Thomas's Hospital medical school.

It was not long before his influence began to make itself felt at St. Thomas's. The physiological curriculum was steadily modernised, and where possible the human subject was made to take the place of laboratory animals in the students' practical work; contacts between



physiology and physical medicine were strengthened, and with an increase in staff and equipment an active programme of research was put in hand. In these early years McSwiney's energies were thus largely concentrated upon his own department, but during this time he gained the confidence of his colleagues, and with the coming of war his unique gifts and tireless energy brought him quickly to the fore in the medical school's affairs.

When the bombing in 1940 temporarily reduced the number of beds at St. Thomas's to less than 100 it became essential that the medical school should leave London. This decision was reached in September and McSwiney was asked to act as dean. So well and so energetically did he fill this position that the school reassembled three weeks later in temporary but adequate accommodation at Hydestile and Godalming. During the difficult war years the maintenance of the school and of its standard of efficiency were largely due to his inspiration and energy, and in 1945 his unobtrusive drive ensured uninterrupted in working and smoothness of return.

During the whole of this period the school of physiology had been in no way neglected, and he took an active part in initiating and carrying out research himself and in stimulating younger men to like activity. And his scientific status had been steadily growing. In 1944 he delivered the Oliver-Sharpey lectures to the Royal College of Physicians on afferent fibres of the abdominal viscera, and in 1945 the Purser lecture at Trinity College, Dublin, on visceral sensation. In recognition of his work on the physiology of plain muscle and the circulation the Royal Society elected him to their fellowship in 1944. From 1935 to 1945 he served the Physiological Society as treasurer, and at the time of his death he was one of the editors of the *Journal of Physiology*. His enthusiasm for the application of physiology to clinical medicine was the mainspring of his work on oxygen masks and his interest in physical education. He served on M.R.C. committees on the physiology of muscular work and physical exercise, and on traumatic shock. Shortly before the war he made a tour of Europe studying physical education in the different countries, and in his report of this visit to the physical-medicine section of the Royal Society of Medicine in 1938 he urged that the medical man must be trained so as to be able to direct the physical education and nutrition of the school-child.

But from the time he became dean, though not relinquishing his interest in physiology, he devoted his energies to the advancement of medical education as a whole, and he was lately elected to the senate of London University. In August, 1945, he went to Trinidad to examine and to advise on medical education there. After this preliminary survey he went again in April of last year, this time to Jamaica as well as Trinidad. In July he carried out a similar mission to British East Africa, and in December he left for Cairo, India, and Australia. He flew back to this country from Australia in February, arriving in the midst of the cold spell, and contracted bronchitis and bronchopneumonia. He died suddenly when apparently well on the way to recovery.

"Bryan McSwiney's scientific attainments were well recognised when he joined us," writes J. St.C. E., "but it was the stress of the war and the difficulties of the post-war years that brought into the open his real greatness. He was a born administrator and a man of true vision. His mind was set upon the future and he had a conception of medical education which could only have been held by a sensitive person with a wide knowledge of humanity. Yet his dreams were always controlled by an acute sense of what was possible and by a capacity for intense concentration upon detail. He had remarkable gifts of foresight and great business acumen which his friendly personality made it possible for him to employ where others might well have failed. His keen sense of humour and capacity for making contact with people of widely differing backgrounds enabled him to bring to the service of the school a body of knowledge and interest which could only have been gathered by a man of outstanding character.

"Yet with all his urge for improvement and progress, there was a part of his character which was deeply rooted in the past. He loved old furniture and good wine, good conversation and good manners, and he was a discriminating judge of water-colours and etchings. Slovenliness of body or mind he abhorred, and his standards of conduct

were based upon a strong but unobtrusive sense of religion and a family life of singular happiness and fullness."

Another colleague continues: "A companionable man, McSwiney disliked being alone, and perhaps above all things he liked talking and listening to talk. For this reason he seemed to resent going to bed: if he could get anyone to stay up with him, he preferred to go on talking into the early hours of the morning rather than to ensure a long night after a strenuous day. . . . The Sherrington School of Physiology has lost a stimulating and inspiring chief, the medical school has lost a dean of drive and vision, the almoners of the hospital have lost a forceful counsellor, and everyone who knew McSwiney has lost a friend."

Dr. McSwiney married Miss Mabel Marie Law and they had three sons and two daughters.

LOUIS COBBETT

M.D. CAMB., F.R.C.S.

Dr. Louis Cobbett, who died on March 10 at the age of 85, was the last survivor of the group of pathologists who carried out the researches for the Royal Commission on Tuberculosis, which ended its work shortly before the outbreak of the first world war.

Born at Weybridge, the third son of Arthur Cobbett, he was educated at Lancing College and Trinity College, Cambridge. He took the Conjoint qualification from St. Thomas's Hospital in 1890, and his F.R.C.S. the following year, and graduated M.B. in 1892. After holding a house-appointment under Sir William MacCormac, he was appointed demonstrator to C. S. Roy, Cambridge's first professor of pathology. In 1894 he was awarded the John Lucas Walker studentship, which he held for the next three years. To this period belonged his work on the diphtheria bacillus, and his M.D. thesis of 1899 was on the action of antitoxin. The outbreaks of diphtheria at Cambridge and Colchester at the turn of the century gave him opportunity to apply his theories epidemiologically, and in the first volume of the new *Journal of Hygiene* he described how an outbreak had been checked by the isolation of contacts. With Nuttall and Strange-ways he also discussed the cultural characters of the diphtheria bacillus, based on 950 bacterial examinations.

The Royal Commission on Tuberculosis, set up in 1902, had its origin in the meeting of the British Congress of Tuberculosis the previous year, when Koch, with all the weight of his great authority, dropped a bombshell on the medical world by announcing that human tuberculosis differed from bovine and could not be transmitted to cattle. Lord Lister was in the chair, and Cobbett related how Lister quickly seized the point that though Koch had proved his statement he had not shown that the converse necessarily followed—namely, that bovine tuberculosis could not be transmitted to man. Other Government committees and commissions on tuberculosis had merely taken evidence and "contracted out" the experimental work. But the new commission immediately broke fresh ground by setting up its own experimental farm and research station at Stansted, and there Cobbett, as their scientific investigator, began a series of experiments on animals to explore the pathogenic effects of a large number of strains of tubercle bacillus isolated from human sources, of which lymph-glands formed the majority. This work helped to establish the fact that the bovine strain was pathogenic to man, and the results were published in two large closely documented interim reports in 1907. Cobbett also collaborated with Stanley Griffith in a report in 1913, on tuberculin tests, which was one of the last issued.

When the commission finished its labours Cobbett turned to the production of a textbook embodying the findings of the commission and adding much important matter from the vast store of knowledge he had acquired during these years of work. Unfortunately this book, *The Causes of Tuberculosis*, appeared in 1917 when bacteriologists were thinking more about gas-gangrene and tetanus antitoxin than about the tubercle bacillus, and it did not become as widely known as it deserved. It brought the findings of the commission to bear on seed and soil at a time when the new-founded State tuberculosis dispensaries were beginning to tackle their many problems. Written in a scholarly style, it has become one of the classics of tuberculosis literature. Some years later Cobbett made a further contribution to the subject in a paper on racial immunisation in tuberculosis.

After holding the chair of pathology at Sheffield for a year, Cobbett returned to Cambridge in 1907 on his appointment to the university lectureship in bacteriology, and he held this post till 1929. After his retirement he continued his own research work in the department and gave courses of lectures for part II of the natural sciences tripos. S. R. G., to whom we owe much of this memoir, writes: "Helpful to his juniors, wise, kindly, and courteous, he was always accessible to those who sought information and ready to place his knowledge at their disposal. To me one of the pleasures of visits to Cambridge in the twenties was the opportunity to call upon Cobbett in his laboratory, for he always had something to give out of his wide experience."

Mrs. BEDFORD FENWICK, editor of the *British Journal of Nursing* and founder of the British Nurses' Association, died on March 13 at the age of 90. She was matron of St. Bartholomew's Hospital from 1881 to 1887.

Appointments

BELL, R. B., M.R.C.S.: temporary M.O., Croydon airport.
JONES, E. C. M.R.C.S.: dermatologist, Royal West Sussex Hospital, Chichester.

MACLAUGHLIN, J. H., M.B. Belf., D.P.H.: asst. M.O.H., Rotherham.
MOORE, E. H., B.Sc., M.B. Lpool., D.P.H.: deputy M.O.H., Warrington.
STEVENSON, J. J., M.B. Edin., D.M.R.: asst. radiologist, Royal Cancer Hospital (Free), London.

The Hospital for Sick Children, Great Ormond Street, W.C.1:

BEYNON, D. W., M.B., M.R.C.P.: resident asst. physician.
DEAN, JOHN, M.B., M.R.C.P.: house-physician.
FETTES, EDITH, M.R.C.S.: resident aural registrar.
GRIFFIN, MONA, M.B. Aberd., D.C.H.: asst. resident M.O., Tadworth Court.
MORRISON, ELIZABETH, M.B. Aberd.: resident anaesthetic registrar.

The South Eastern Hospital for Children, Sydenham:

McKEAN, C. W. F., M.B. Camb.: dermatologist.
ROLES, F. C., B.CHIR. Camb., M.R.C.P.: pathologist.

Kent County Council:

Asst. pathologists:
BOWERS, V. H., B.Sc., M.D. Lond.
CLOSE, H. G., M.D. Lond.
GRIFFITHS, L. L., M.B. Dubl., D.P.H.

St. Heller County Hospital, Surrey:

GOODHART, C. E. D. H., M.D. Camb., D.A.: senior anaesthetist.
STEWART, J. D., M.B. Edin., D.P.H.: director of physical medicine.
TRESIDDER, A. G., C.I.E., M.S. Lond., F.R.C.S.: ear, nose, and throat surgeon.

Examining Factory Surgeons:

CLOHESSY, C. J., M.B. N.U.I., D.P.H.: Ramsbottom, Lancs.
CRETNEY, ERIC, M.B. Manc.: Goole, Yorks.
MCGUINNESS, J. A., L.R.C.P.I.: Leigh, Lancs.
NOLAN, J. P., M.B. N.U.I., D.P.H.: St. Blazey, Cornwall.

Colonial Service:

ANDERSON, N. E. W., M.B. St. And., D.P.H., D.T.M. & H.: senior health officer, Nigeria.
BEAN, A. H., M.R.C.S.: specialist, Nigeria.
BELLIG, REBECCA, B.M. Oxid.: lady M.O., Malaya.
CAMERON, D. I., M.B. Edin., D.T.M. & H., D.P.M.: alienist, medical department, Nigeria.
CHEVERTON, R. L., M.R.C.S.: deputy director of medical services, Nigeria.
EVANS, L. W., B.Sc. Wales, M.R.C.S.: deputy director of medical services, Malayan Union.
GALT GAMBLE, MARGARET, L.R.C.P.I.: lady M.O., Gold Coast.
GEMMELL, JAMES, L.R.C.P.E.: M.O., Nigeria.
GILLES, E. C., L.R.C.P.E.: senior health officer, Nigeria.
HALL, R. N., M.R.C.S.: specialist, Nigeria.
HAY, I. K., M.B. Aberd.: M.O., Nigeria.
HOLNESS, MARGARET, M.B. Lond., D.T.M. & H.: lady M.O., Nigeria.
HOWARD, A. C., M.D. Lond.: M.O., Cyprus.
HUNTER, WILLIAM, M.B. Glasg., D.T.M.: senior M.O., Nigeria.
JONES, B. S., M.D. Camb., F.R.C.S. Edin.: specialist, Nigeria.
MCQUADE, H. G., M.B. Camb.: M.O., Nigeria.
MENZIES, G. M. M., M.B. Aberd.: senior M.O., Nigeria.
MOHR, K. T., M.D. Edin., D.T.M., D.T.H.: senior specialist, Nigeria.
MONTGOMERY, T. H. L., M.B. Belf., D.P.H., D.T.M. & H.: senior health officer, Nigeria.
NAUDI, J. P., B.Sc., M.D. Malta: deputy director of medical services, Nigeria.
NELSON, WALLACE, M.B. Edin.: deputy director of medical services, Nigeria.
POONOOSAMY, VALAYDON, L.R.C.P.E.: M.O., grade 2, Mauritius.
SHEARER, GAVIN, M.D. Glasg., D.T.M.: senior M.O., Nigeria.
SHELLEY, H. M., F.R.P.P.S., M.R.C.P., D.T.M. & H.: director of medical and health services, Cyprus.
SIMPSON, THOMAS, L.R.C.P.I., D.T.M. & H., D.M.R.E.: specialist, Nigeria.
SORLEY, J. T., M.B. Aberd., D.T.M. & H.: specialist, Nigeria.
SUAREZ, CARLOS, M.R.C.S.: M.O., British Somaliland.
VAUGHAN, G. W., M.B. Glasg.: asst. director of medical services, Nigeria.
WARD, THELMA, M.B.: lady doctor, Malaya.
WEIR, H. C., M.B. Dubl.: senior M.O., Nigeria.
WILLIAMS, F. G., M.B. Birm.: M.O., Nigeria.
WILSON, CARMICHAEL, M.B. Dubl.: deputy director of medical services, Nigeria.

Notes and News

MEDICAL LIBRARIES

Mr. W. R. Le Fanu, the librarian of the Royal College of Surgeons, has done a useful piece of work in compiling, with the help of ASLIB, particulars of the medical libraries in the British Isles.¹ He has spread his net so wide that he might have added the Eugenics Society, which has a library of three thousand volumes. But the Middlesex county hospitals, which already have libraries for the use of their medical staff, are rightly included. Some county councils still do not provide this service but other local authorities are planning to provide libraries for all members of the hospital staff as well as the patients. In a supplementary list Mr. Le Fanu gives the information bureaux in the London area. Outside London the libraries and information bureaux are combined in one list, completed by an index to all the libraries and subjects.

MORE HERBS

Mrs. Quelch goes on and on—*Herbs for Daily Use* (1941), *Herbal Remedies* (1945), and now *Herbs and How to Know Them* (London: Faber, pp. 280, 8s. 6d.)—and definitely up and up. She is a modern Culpeper, with a winning belief in the virtues of the things that grow in meadow and woodland, almost it would seem purposely for the health and comfort of man. And she ropes in her friends to make little portraits of them, which have some of the charm of John Gerard's woodcuts. It matters not that herbs at the moment are outside the main stream of medical thought and practice—that herbalists would not feel at home in a health service. Better far to stay, with Mrs. Quelch, in the pleasant backwaters with the dragonflies and the lazy sunshine, Chaucer and Shelley and Wordsworth benignly looking on. Where we should all be the better for joining them *si opus sit*.

Mrs. C. F. Leyel, who is chairman of the Society of Herbalists, has now completed the second volume of her series of Herbals. This is entitled *Compassionate Herbs* (Faber, pp. 224, 12s. 6d.) and is limited to herbs used for healing injuries and wounds. Though these have borne the test of centuries of experience they are, she says, entirely neglected in modern surgery—albeit they include cinchona, balsam of Peru, and sphagnum moss. The book has a remarkable index giving the names of the herbs in 10 languages with a high degree of accuracy. There are also 15 attractive line drawings.

REGISTRY OF BONE TUMOURS

A REGISTRY of primary malignant tumours of bones has been set up, with its headquarters at the department of pathology of the Royal College of Surgeons of England, to collect records of cases of primary tumour of bone, including joints and cartilages, especially those in which cure or prolonged alleviation has been attained by treatment. All cases claimed as five-year cures will be considered by the committee, but in future only cases in which histological proof of the nature of the tumour, by biopsy or following amputation, can be obtained will be considered. Where histological diagnosis is in doubt, the consultant panel in morbid histology, set up by the Pathological Society of Great Britain and Ireland in conjunction with the British Empire Cancer Campaign and the National Radium Commission, will be consulted. Those interested are invited to send records, with amputation or biopsy specimens, to Prof. R. A. Willis, at the college, Lincoln's Inn Fields, London, W.C.2. Donors will be sent reports on the pathological investigation of specimens received, and in return will be asked for follow-up information regarding patients.

A NURSING BROCHURE

MANY matrons, when they get inquiries from prospective nurses, are obliged to send out dull and out-of-date prospectuses giving no clear picture of the opportunities which training offers, and indeed often repelling candidates by their official tone. Walthamstow Infectious Diseases Hospital has taken the trouble to publish an encouraging illustrated brochure, pointing out that a two-year course leads to qualification as a fever nurse, and that students will be working a 48-hour week, in agreeable country surroundings within a bus ride of London. Their hours of duty are fairly set out: 7 A.M. to 8 P.M., with four hours' break for meals and leisure on four days a week, one whole day off with breakfast in bed,

1. *Journal of Documentation*, 1946, 2, 120; in booklet form from ASLIB, 52, Bloomsbury Street, London, W.C.1. 5s.

and two free evenings (beginning presumably at 5 P.M.). They get a month's leave yearly. The pictures do not give a false impression of luxury, and it is clear that some trouble has been taken to present a just, as well as a pleasant, picture of what the nurse may expect.

RED BOOKS

For the first time since the war the Postmaster-General has been able to issue new editions of his lists of Post Offices in the United Kingdom (1s. 6d.) and of London Post Offices and Streets (9d.). With the current Post Office Guide, also issued at the end of last year, these scarlet paper-covered volumes set out all that the Post Office is ready to do for us. They may also be used as an informal and inexpensive gazetteer, where the spelling and location of the smallest villages can be found.

HELP FOR EUROPEAN LIBRARIES

THE Central Medical Library Bureau set up by the Royal Society of Medicine to fill the gaps in the medical libraries of our Allies has now been at work for a year, and with the aid of a generous grant from the Rockefeller Foundation it has made good progress. Back numbers of many journals are unobtainable and cannot be reprinted, and with the consent of the publishers the bureau's first task has been to supply microfilms of these missing issues. Although production of the film is slower than could be wished, 5000 pages have been filmed in a day. A camera has been discovered which is specially designed for making microfilm, and it is hoped to have four in operation before the end of the second year of the scheme. A suitable microfilm reader has also been selected and many of these instruments have been sent to the beneficiary libraries. The bureau is in touch with libraries in Belgium, Czechoslovakia, Denmark, Holland, Iceland, Norway, Poland, the U.S.S.R., and Greece.

University of Oxford

Dr. A. G. M. Weddell has been appointed reader in human anatomy.

Dr. Weddell, who is 39 years of age, took his M.B. Lond. at St. Bartholomew's Hospital in 1933, and after holding a house-appointment there was awarded a Commonwealth Fund fellowship in 1935. The next two years he spent in America working at Rochester, New York, with Dr. G. W. Corner, and then at St. Louis University with Dr. Ernest Sachs. On his return to this country he was appointed demonstrator in anatomy at University College, London. His early publications include papers on arterial vascular patterns, pathways transmitting sensation of taste, and cutaneous innervation in relation to cutaneous sensibility. During part of his service with the R.A.M.C. during the war he worked in Oxford at the Military Hospital for Head Injuries, and while there he described in our columns (jointly) the clinical application of electromyography and the costoclavicular compression of the subclavian artery and vein. In 1942 he was elected to a Hunterian professorship of the Royal College of Surgeons, and in the following year he was awarded the John Hunter medal and the triennial prize (1940-42) of the college for his research work on the ultimate distribution of the sensory peripheral nerves. During the latter part of the war Dr. Weddell was disembodied from the R.A.M.C. in order to carry out work for the Royal Naval Personnel Research Committee of the Medical Research Council.

University of Dublin

On March 12 the following degrees were conferred at Trinity College:

M.D.—L. R. S. MacFarlane, J. V. Morris.

M.A.O.—D. V. Latham.

M.B., B.Ch., B.A.O.—J. R. A. Burns, M. H. Daniels, Kathleen M. Ellis, O. S. J. Redman, H. G. Scott, Jack Steinberg, Margaret P. Steiner, C. D. Turpin.

University of Birmingham

Mr. Hugh McLaren has been appointed first assistant to the professor of obstetrics and gynaecology. Mr. J. A. H. Waterhouse, Ph.D., has also been appointed lecturer in human genetics, and Miss Muriel Johnstone, Ph.D., officer in charge of records in the department of human genetics.

Association of Sea and Air Port Health Authorities

The 48th annual meeting of the association will be held at the City Hall, Belfast, from May 13 to 15. The medical speakers will include Dr. Lloyd Hughes, who will read a paper on the Hygiene of Crews' Quarters and Provisions, Dr. Samuel Barron (Sanitary Control of Foreshores of Belfast Lough), Dr. Melville Mackenzie (International Health), and Dr. W. G. Swann (Health Control at an Air Port). Further information may be had from the secretary of the association, Health Department, Civic Centre, Southampton.

Royal College of Surgeons of England

At a meeting of the council, held on March 13, with Sir Alfred Webb-Johnson, the president, in the chair, diplomas of fellowship were granted to the following:

L. E. D. Knights, F. S. Mitchell-Heggs, P. I. Hywel-Davies, M. S. Ambrose, I. F. Rose, P. G. Epps, A. J. Walton, L. L. Whytehead, A. C. Bingold, P. T. Savage, J. D. Cronin, R. L. G. Dawson, G. F. Smart, M. H. M. Ryan, Wallace Black, A. M. Abrahams, Ibrahim Demerdash, E. W. Grahame, R. J. Last, L. P. Le Quesne, A. L. Lomas, J. J. MacHale, A. T. Mansuri, A. J. Marsden, N. E. Stidolph, L. P. Thomas, J. V. Todd, M. F. A. Woodruff.

Diplomas of membership were granted to R. M. Forrester and A. M. McCall. The following diplomas were also granted, jointly with the Royal College of Physicians:

D.Phys.Med.—M. H. L. Desmarais, A. J. Enzer, A. J. Martin, J. R. Preston, Alan Stoddard.

D.O.M.S.—J. R. Actfield, M. H. Adams, R. P. Baird, George Bennett, David Black, C. F. Bowes, Louis Boxer, A. V. Clemmey, J. E. Coates, D. B. H. Dawson, A. L. Dick, G. de L. Fenwick, Malcolm Ferguson, R. G. S. Ferguson, A. B. W. Ferreira, C. F. Garfit, O. M. Haarburger, W. H. C. M. Hamilton, L. B. Hardman, Joan Haythorne, A. C. Higgitt, J. C. Hill, B. L. Hoffman, J. M. L. Howat, H. L. Hughes, H. Johnson, Anna M. Joyce, J. A. Langille, M. N. Laybourne, V. T. Lees, G. D. Lehmann, Gerald Leiman, Robert Leishman, J. A. N. Lock, J. D. Lodge, Helen C. Longmore, J. G. Louw, R. J. H. McMahon, N. L. McNeil, Kathleen F. Matthews, R. A. Megally, A. D. Milne, J. E. Moffett, T. G. S. Murray, W. C. G. Murray, C. T. Newnham, Marjorie E. Pollard, C. E. Powell, R. E. Rees, K. W. B. Rostron, H. B. Smith, Vincent Tabone, M. A. Weaver, J. E. Wolff, M. H. Wright.

The following were recognised as resident surgical posts for the final fellowship examinations: r.s.o. at Highgate Hospital, London; r.s.o. at Archway Hospital, London; junior r.s.o. and h.s. for one year at St. Stephen's Hospital, London.

During April and May courses of lectures in surgery, anaesthesia, oto-laryngology, and orthopaedics will be held at the college. Further particulars will be found in our advertisement columns of March 15.

British Institute of Radiology

Dr. A. E. Barclay, Prof. J. A. Crowther, sc.D., Prof. Sidney Russ, d.sc., and Prof. J. Heyman, m.d., have been elected honorary members of the institute.

The Roentgen award for 1946 has been made jointly to Brigadier D. B. McGrigor and Lieut.-Colonel Eric Samuel for their series of papers on the radiology of war injuries.

Streptomycin in the United States

The price of streptomycin in the United States, which a year ago was about £5 per gramme, is now about 30s. per gramme; government officials, says B.U.P., estimate that it will drop to about 22s. 6d. in July and will settle at about 17s. 6d. in 1948. The demand is expected to reach about 1 million grammes a month—a little more than three times the present rate of production.

Pasteur Exhibition

An exhibition will be held at the Science Museum, South Kensington, from April 10 to May 26, which includes a chronological account of the chemical and biological work of Louis Pasteur. Another section deals with the Pasteur Institutes established throughout the world for the preparation of sera and vaccines for the combating of disease epidemics. The exhibition has been arranged and provided, with the help of the cultural relations department of the French Foreign Office, by the Palais de la Découverte in Paris, where it has recently been on show. The Science Museum is open, admission free, from 10 a.m. to 6 p.m. on weekdays, and from 2.30 p.m. to 6 p.m. on Sundays.

Health and Tuberculosis Conference

A Commonwealth and Empire Health and Tuberculosis Conference is to be held at the Central Hall, Westminster, London, S.W.1, from July 8 to 10. The speakers will include Mr. Aneurin Bevan (Minister of Health), Mr. A. Creech Jones (Secretary of State for the Colonies), Mr. Walter Elliot, m.p., Lieut.-General Sir Bennett Hance (India), Dr. Jean Gregoire (deputy-minister of health, Quebec), Dr. G. J. Wherrett (Canada), Dr. B. A. Dormer (South Africa), Dr. Esmond R. Long (Philadelphia), and Dr. H. Corwin Hinshaw (Mayo Clinic, U.S.A.). Subjects for discussion are: Tuberculosis in the Commonwealth, Sanatorium Design, Aftercare and Rehabilitation, the Human Factor, the National Health Service Act, Colonial Tuberculosis Services, and Prevention and Treatment of Tuberculosis. Further information may be had from the National Association for the Prevention of Tuberculosis, Tavistock House North, London, W.C.1.

Penicillin for Germany

According to a Military Government report, quoted by B.U.P., production of penicillin in the British and U.S. zones of Germany is limited to one factory (at Höchst) which is turning out only 50 mega units a month. Production from a new factory which is to be constructed and operated under Allied supervision will, however, end the zones' dependence for supplies on other countries.

Plan for New York as Medical Centre

A plan to make New York a world centre of medical education by combining the resources of 65 big hospitals in the city has been announced by Dr. George Baehr, president of the New York Academy of Medicine. He is quoted by B.U.P. as advocating a central department within the academy for the better utilisation of postgraduate educational and hospital facilities.

Foreign Awards

The following awards have been made to medical men :

Officer in the Order of Orange Nassau.—Surgeon Lieut.-Commander C. G. ROWORTH, M.D. Lond., R.N.V.R.

King Haakon VII Liberty Cross.—Surgeon Captain J. C. SOUTER, M.B. Aberd., R.N.

King Haakon VII Liberty Medal.—Surgeon Commander J. A. KERR, M.D. Glasg., R.N.V.R., Surgeon Commander WILLIAM FLYNN, M.D. Malta, R.N.

King Haakon VII Freedom Medal.—Air Commodore R. R. MACINTOSH, D.M. Oxf'd, R.A.F.V.R.

Diary of the Week

MARCH 23 TO 29

Monday, 24th

ROYAL COLLEGE OF SURGEONS, Lincoln's Inn Fields, W.C.2

3.45 P.M. Prof. R. J. V. Pulvertaft: Air-borne Infection.

5 P.M. Prof. John Kirk: Posterior Abdominal Wall.

ROYAL SOCIETY OF MEDICINE, 1, Wimpole Street, W.1

5.30 P.M. *Odontology.* Dr. A. B. MacGregor: Local Penicillin in the Mouth. Dr. G. T. Hankey: Multiple Cysts of the Mandible ? osteitis fibrosa.

Tuesday, 25th

ROYAL COLLEGE OF SURGEONS

3.45 P.M. Professor Pulvertaft: Pathology of Diseases of Lymphatic Tissue.

5 P.M. Professor Kirk: Pelvic Wall.

ROYAL SOCIETY OF MEDICINE

8 P.M. *Medicine.* Dr. Adolf Schott: Painful Disability of the Shoulder in Coronary Disease. Dr. Jean Watkinson, Prof. Alexander Haddow, Dr. Edith Paterson, Dr. Inez Ap Thomas: Leukemia Treated with Urothane. Dr. Neville Oswald: Collapse of the Lower Lobes of the Lungs in Children.

LONDON SCHOOL OF DERMATOLOGY, 5, Lisle Street, W.C.2

5 P.M. Dr. G. B. Dowling: Lupus Vulgaris.

Wednesday, 26th

ROYAL SOCIETY OF MEDICINE

5 P.M. *Endocrinology.* Mr. J. E. Piercy, Dr. W. R. Trotter: Toxic Goitre.

ROYAL INSTITUTE OF PUBLIC HEALTH AND HYGIENE, 28, Portland Place, W.1

3.30 P.M. Dr. M. T. Morgan: Health Inspection of Imported Foodstuffs.

CLARKE HALL FELLOWSHIP

4.30 P.M. (New Hall, Lincoln's Inn, W.C.2.) Dr. J. R. Rees: Mental Health and the Offender.

SOCIETY OF CHEMICAL INDUSTRY

6.30 P.M. (Burlington House, Piccadilly, W.1.) *Nutritional Panel.* Mr. Kenneth Mellanby, D.Sc.: Human Water Requirements.

Thursday, 27th

ROYAL SOCIETY OF MEDICINE

8 P.M. *Urology.* Mr. R. A. Mogg: Injuries to the Bladder. Mr. D. S. Poole Wilson: Injuries to the Urethra. Mr. Geoffrey Parker: Battle Casualties Involving the Genito-urinary System.

MEDICO-LEGAL SOCIETY

8.15 P.M. (26, Portland Place, W.1.) Dr. C. E. Newman, Mr. R. H. Graveson, F.H.D.: Education and Status of the Medical and Legal Professions.

LONDON SCHOOL OF DERMATOLOGY

5 P.M. Dr. H. W. Barber: Seborrhoeic Eruptions.

Friday, 28th

ROYAL SOCIETY OF MEDICINE

2.30 P.M. *Epidemiology and State Medicine.* Dr. J. M. Vine: Malaria Control with D.D.T. on a National Basis in Greece.

5 P.M. *Pædiatrics.* Dr. R. W. Cope, Dr. David Asermann: Anaesthesia in Children.

SOCIETY FOR ENDOCRINOLOGY

12 NOON. (Medical School, Hospitals Centre, Birmingham, 15.) Symposium on the Adrenal Cortex.

Saturday, 29th

MEDICAL SOCIETY FOR THE STUDY OF VENEREAL DISEASES

2.30 P.M. (11, Chandos Street, W.1.) Dr. Hamilton Wilkie: Medical Photography—its Application to Venereal Diseases.

Royal Free Hospital Old Students Association

The reunion dinner of the association is to be held at the Café Royal on April 30. Tickets may be had from the hon. secretaries, Dr. Barbara Mitchell, 6, Church Street, Epsom, or Miss Jocelyn Moore, F.R.C.S., 4, Devonshire Place, London, W.1.

Royal Sanitary Institute

The institute will hold its health congress at Torquay from June 2 to 6. Sections of the congress will deal with preventive medicine, engineering and architecture, maternal and child health, veterinary hygiene, food and nutrition, housing and town-planning, and tropical hygiene. There will also be conferences of medical officers of health, engineers and surveyors, sanitary inspectors, and health visitors. Presidents of the sections and conferences will include Sir Allen Daley, Sir Andrew Davidson, Prof. H. D. Kay, D.Sc., Prof. George Macdonald, Prof. R. E. Lane, and Dr. Dorothy Taylor. Further information may be had from the institute, 90, Buckingham Palace Road, London, S.W.1.

Dr. R. R. Race informs us that Prof. Ludwig Hirsfeld is preparing a second edition of his book *Groupes Sanguins* and would be grateful for reprints of English papers on this subject. The address is Wroclaw, Poland, Zakladu Mikrobiologii, Roberta Kocha St. 4. At present up to 4 lb. in weight can be sent, for which a 3d. stamp is required for the first ounce and a 1½d. for each additional ounce. The maximum weight for air-mail is one ounce, for which a 5d. stamp is required.

Births, Marriages, and Deaths**BIRTHS**

BARKER.—On March 12, at Exmouth, the wife of Wing-Commander C. C. Barker, A.F.C., M.B.—a son.

COSIN.—On March 13, in London, the wife of Dr. C. F. Cosin—a son.

DIXON.—On March 10, at Haxby, York, the wife of Dr. D. G. Dixon—a son.

GRAY.—On March 8, at Edinburgh, the wife of Dr. R. F. Gray—a son.

JAMIESON.—On March 11, in London, the wife of Dr. J. G. Jamieson, O.B.E.—a daughter.

JENNER.—On March 12, at Woking, the wife of Dr. Martin Jenner—a son.

JONAS.—On March 8, at Boxmoor, the wife of Dr. Howard Jonas—a son.

KIEFT.—On March 13, at Woking, the wife of Dr. B. T. Kieft—a daughter.

KING.—On March 8, in London, the wife of Dr. E. J. King—a daughter.

MCCRACKEN.—On March 11, at Newcastle-upon-Tyne, the wife of Dr. J. D. W. McCracken—a son.

REID.—On March 12, at Faversham, the wife of Dr. G. O. S. Reid—a son.

SHEP.—On March 12, the wife of Dr. J. C. Shee—a daughter.

STAREY.—On March 8, at Oxford, the wife of Dr. Christopher Starey—a daughter.

STEVENS.—On March 14, at Redhill, Surrey, the wife of Mr. A. Edgar Stevens, F.R.C.S.E.—a son.

STREET.—On March 10, at Lyndhurst, Hants, the wife of Dr. E. W. Street—a daughter.

TAYLOR.—On March 7, at Tunbridge Wells, the wife of Dr. A. W. Taylor—a son.

MARRIAGES

DEWE-FOX.—On March 8, in London, Douglas Dewo, M.R.C.S., major I.M.S., to June Fox.

MACKENZIE-GRENFELL.—On March 5, at Parkgate, Ian Grant MacKenzie, M.B., to Beryl Bruce Grenfell.

DEATHS

ADAMSON.—On March 13, James Weeden Woodhams Adamson, M.D. Durh., of St. Leonards-on-Sea.

BRADLEY.—On March 9, Alwyn Hewett Bradley, M.B. Lond., of Leicester.

COBBETT.—On March 9, Louis Cobbett, M.D. Camb., F.R.C.S., aged 84.

FENTON.—On March 10, at Beaulieu, Hants, Thomas Gerald Fenton, F.R.C.S.

FLEGG.—On March 13, at Cheltenham, Frederick Arthur Martin Flegg, M.R.C.S.

HAWKINS.—On March 9, at Cheltenham, Herbert Cesar Hawkins, L.R.C.P.E., J.P., aged 83.

HAY.—On March 12, in London, Kenneth Robert Hay, O.B.E., M.B. Camb.

HILL.—On March 11, Arthur Croft Hill, M.D. Camb., aged 84.

LANGFORD.—On March 10, at Bristol, Frederick Charles Langford, M.B.E., M.D. Durh.

MCSWINEY.—On March 8, at St. Thomas's Hospital, London, Bryan Austin McSwiney, M.B. Dubl., Sc.D., F.R.S., aged 52.

MORPHEW.—On March 8, at Cromer, Edward Maudsley Morphey, C.M.G., D.S.O., M.R.C.S., colonel, late R.A.M.C.

NICHOLSON.—On March 13, at Louth, Lincs, John Williams Nicholson, M.R.C.S., lieutenant-colonel R.A.M.C. ret'd., aged 91.

ROCK.—On March 10, Cecil Howard Rock, M.R.C.S., late surgeon commander R.N.

TURNLY.—On March 9, at Heathfield, John Edward Litton-Alexander Turnly, M.R.C.S.

REVISION OF THE ANATOMICAL CURRICULUM AT BIRMINGHAM UNIVERSITY *

S. ZUCKERMAN

C.B., M.D. Birm., D.Sc. Lond., F.R.S.

PROFESSOR OF ANATOMY IN THE UNIVERSITY OF BIRMINGHAM

THE general move to raise the scale of university education in Great Britain has provided a new incentive to the reform of the medical curriculum, and one which reinforces the stimulus furnished by the Interdepartmental Committee on Medical Schools in its well-known "Goodenough Report."

The problem of reform is not new, and its ventilation by the Goodenough Committee merely represents the last of a series of reviews which started in 1925 with Abraham Flexner's comparative study of medical education. The trend of most discussion has been a desire to introduce into medical education both the sense of the social needs which such an education should satisfy and the conceptions and methods of the intellectual and critical, as distinct from the informative, side of a university education; more specifically, the desire to depart from vocational instruction, which is largely didactic and descriptive, to an education that has as its basis a general scientific understanding of the mechanisms underlying the processes of health and disease.

To effect such changes it is clearly necessary to revise the curriculum, for one of the objects would be to introduce new "priorities" that will be more in line with present-day trends in knowledge and needs than the old traditional ones, whose effect is to starve important subjects at the expense of topics which continue to be emphasised merely because they always have been.

Anatomists have long been conscious of the fact that they are often regarded by their colleagues in other departments as being among the worst sinners in this respect. Nevertheless they are custodians of a section of medical education which, however much belittled, no-one seems anxious to jettison. Not surprisingly the subject has in some quarters become imbued with a slight sense of inferiority. The result has been bad for anatomists, whose numbers are added to by fewer and fewer scientific recruits, and bad for the subject, since questions of reform have mostly limited themselves to artificial attempts to vitalise the subject by pruning, and by adding to the medical curriculum such matters as genetics, experimental embryology, and so on.

This is clearly not the way which anatomists need follow in contributing to the reform of the curriculum. No useful purpose is necessarily served by uncluttering the subject of unwanted detail merely to create a vacuum which might be filled, according to the taste of the individual teacher, by borrowings from other subjects, or merely to provide more time for another subject to crowd itself with fresh detail, which from both the intellectual and vocational points of view might be no more relevant to the future and immediate needs of the student than were the anatomical details which he would otherwise have been expected to master.

REINTEGRATION OF ANATOMY WITH PHYSIOLOGY

After carefully considering the part anatomy should play in the student's non-clinical education, and in the belief that half-measures were not likely to solve the fundamental difficulties, we have in Birmingham taken the radical step of completely reintegrating the subject with physiology. The term reintegration is used advisedly, for it is only relatively recently that the two disciplines went their separate ways.

It is worth noting this fact carefully, if we are to understand the significance of the change that has been made, and its underlying reasons. Anatomy today is most commonly regarded as the subject which deals with the structure of the body and with the factors concerned in its development and maintenance. Considered as a scientific discipline its domain has become the field of structural organisation. But a hundred, and even fewer, years ago it was being taught and developed as a single subject with physiology. In 1845 William Bowman, whose achievements graced medical science over a large part of the 19th century, and who received his earlier medical education in Birmingham, provided, in collaboration with Robert Todd, one of the first English textbooks of physiology—and it was called not a textbook of physiology but "The Physiological Anatomy and Physiology of Man." At that time anatomy was the basis of most of our beliefs about the function of the organs and tissues of the body. In the preface to his six-volume "Cyclopædia of Anatomy and Physiology," the first part of which appeared in 1835, Todd wrote that it was due to additions to anatomical knowledge that physiology was becoming transformed from "a series of vague and ill-founded hypotheses . . . to a well-arranged science." And if Bowman's (1842) paper on the relation of the micro-anatomy of the kidney to the function of the organ is a sample of what was in mind here, the student of 1946 may well agree that Todd was not exaggerating. It is also worth noting that, two years after the Physiological Society was founded in 1876, an independent *Journal of Physiology* was launched, in spite of the fact that a *Journal of Anatomy and Physiology* had made its appearance some ten years before. It was not until 1916 that the *Journal of Anatomy and Physiology* divested itself of its physiological qualification and became the *Journal of Anatomy*, which is now the organ of the Anatomical Society.

The separation of anatomy as a discipline distinct from physiology appears, so far as the development of medical science in this country is concerned, to have been accidental. It was primarily due to the influence of Sharpey, the first holder of the chair of general anatomy and physiology at University College, London, and his wise maintenance of the need to develop experimental methods in the investigation of biological processes. To this end he initiated a move to separate from anatomy what he termed "practical physiology," and his example was soon followed in Cambridge. The change was a fruitful one so far as the development of biological knowledge was concerned, but the increasing use by physiologists of the experimental method of gaining knowledge, and its sad neglect by anatomists, most of whom remained servants of the old tradition of direct observation of tissues, rapidly created a wide gulf between physiology and its parent subject.

In recent years, however, some anatomists have also taken up the experimental method. The result has been that anatomy departments in this country have become roughly divided into a group in which experimental work of one kind or another is vigorously pursued, and another in which the established morphological tradition is maintained. Not surprisingly, those anatomists who have taught their subject while at the same time pursuing experimental studies have become widely regarded by their anatomical colleagues and physiologists as pseudo-physiologists. The imputation of something wrong in the situation is unwarranted. As G. W. Corner—now head of the department of embryology of the Carnegie Institution of Washington—once put it, the fear that there will soon be no anatomists at all, if every teacher of anatomy becomes a physiologist, is unreal, for the simple reason that anatomists have always been physiologists. One should not, and in fact cannot, separate questions of structure from questions of function. Anatomical

* The substance of a lecture given to preclinical students at the opening of the 1946-47 session of the Birmingham medical school. 6448

knowledge, in the sense of a knowledge of the form and structure of the organs of the body, is essential for the prosecution of physiological studies and for the practice of medicine. Equally, the full investigation of the form of any tissue necessitates a knowledge of its behaviour. As Corner has written :

“At some periods in the hands of certain investigators the study of structure has taken the lead, at other times the study of function. There tends in fact to be a series of alternations in this respect in any given field; for example, the study of cell structure, for a century entirely morphological, is now entering upon a physico-chemical phase, while the physiology of reproduction is at the moment pursued chiefly with the instruments and material of the microscopist. The structure of an organ or tissue is worked at until a new light is thrown upon its action; but afterwards the complexities of its action in turn require a more fundamental investigation of structure. The progress of a science is achieved by such alternations or by an essentially similar process, namely, the fusion of two viewpoints in a single mind. All the sciences converge toward a common point, for all are concerned ultimately with the study of unstable equilibria; and it is when two branches of this study converge that fragments of the great puzzle begin to fit together and knowledge is achieved.”

Further, to add to Corner's analysis, we have to recognise today the implicit fact that, since the separation of anatomy from physiology in the latter half of the last century and their progressive administrative divergence, continued specialisation has led to such diffusion of boundaries that problems which might classically be described as anatomical have become the research interest of physiologists, and vice versa.

TEACHING OF ANATOMY IN BIRMINGHAM

Anatomy, which has undoubtedly suffered most from the individual specialisation of physiology, biochemistry, and biophysics, will be restored to a basically healthy state if we depart from unreal subdivisions of interest. What has therefore been done in Birmingham is to reinstate, administratively, the relationship which existed between structural and functional studies before anatomy and physiology diverged from common ground.

To this end anatomy in future will retain a separate character only in the dissecting-room, and to all intents and purposes no course of lectures will be arranged which is either purely anatomical or purely physiological. Instead, each course which the medical student attends will provide, in as useful a sequence as can be devised, the required anatomical and physiological knowledge and the necessary indications of current developments. When, for example, the student starts to study the structure of the brain or the form of the heart, he will simultaneously become acquainted with what is known of their activities. By concentrating attention on the function and behaviour of the various organs and tissues of the body, we hope to eliminate details of topographical anatomy which have no scientific value and find little or no application in the vocational fields of surgery or medicine.

Further consequences will be the avoidance of unnecessary overlap and discordant timing, which occur in the separate treatment of anatomical and physiological studies, and a fusion of two different approaches to one goal—knowledge of what the body is and how it works.

The lecture courses have been arranged, according to the following plan, in an introductory, a systematic, and a final coördinating series. The total number of lectures for the five terms is about 290, which from the student's point of view represents an average of 1½ lectures a day, and a significant over-all saving in lecture time.

I—INTRODUCTORY AND GENERAL SERIES

| | |
|---|-------------------------------------|
| Structure of body, general histology, cellular physiology, and integrative mechanisms | } <i>First term</i> 70 lectures. |
| Biochemistry and biophysics | |
| General embryology | |

II—SYSTEMATIC SERIES

| | |
|--|--------------------------------------|
| Blood | } <i>Second term</i> 72 lectures. |
| Circulatory system | |
| Lymphatic system, including cerebro-spinal fluid | |
| Respiratory system | |
| Digestive system | |
| Neurology | } <i>Third term</i> 42 lectures. |
| Locomotor system | |
| Metabolism | |
| Neurology | } <i>Fourth term</i> 66 lectures. |
| Special senses | |
| Excretory system | |
| Endocrinology, including reproductive system | |

III—COÖRDINATING SERIES

| | |
|-------------------------------------|--|
| Surface and radiological anatomy | } <i>Fifth term</i> 41 lectures and lecture demonstrations. |
| Growth and developmental physiology | |
| Environmental physiology | |
| Genetics | |

Anatomists and physiologists contribute jointly to each course of lectures, in some of which as many as four different lecturers participate according to an agreed plan of sequence in the development of the subject. Histology and embryology are introduced in the introductory series of lectures and reappear in their relevant positions in each course of the systematic series.

Considerable importance is attached to the final coördinating series of lectures, which represents not only a measure of bringing together in a useful synthesis some of the separate matters considered in the main systematic series, but also an attempt to direct the student's attention to matters which will, or should, be of immediate importance when he begins his clinical studies. To this end a course of lectures on the structural and physiological aspects of postnatal development has been included in this series, as has also a course on genetics.

EXAMINATIONS

In Birmingham, as in most other British medical schools, five terms are set aside for the study of anatomy, physiology, and biochemistry, and hitherto it has been the custom to spread topographical study in the dissecting-room over all five. The practice has also been that students sit separate professional examinations in anatomy and physiology at the end of the fifth non-clinical term.

Henceforth, work in the dissecting-room will be confined to the first three terms only. The first term is given up to the dissection of the limbs and thorax, and the second and third to the abdomen and head and neck. Under these new arrangements students will take their professional examination in topographical anatomy at the end of the third term. An obligatory and running viva-voce examination system has also been introduced into the dissecting-room to check subsequent performance at this first professional examination.

Apart from lectures, the student's time in the fourth and fifth terms, by when he should have adequately covered topography, will be spent in practical work in physiology and biochemistry, and in lecture-demonstrations on surface and radiological anatomy and neurology. A second professional examination will be held at the end of the fifth term, and, though mainly “functional” in character, this will include aspects of structural anatomy. As far as possible it will not be broken up into separate papers representing the existing administrative departments.

FUTURE DEVELOPMENTS

We are fully conscious of the responsibility of having taken the step of rearranging the preclinical curriculum in line with the more advanced proposals that have emerged from recent discussions of possible reforms. We have done so because we are convinced of the need for and rationality of the change in the interests of educational economy. We propose pruning our respective subjects of unnecessary detail and relating them more to the

current vocational and scientific needs of medical education. Essentially, we are breaking away from unreal subdivisions of interest, due to excessive specialisation, so as to bring our research and teaching activities to bear on topics in their entirety.

It is too soon to say how successful the new scheme will prove in practice. In its operation it must necessarily be regarded as experimental and flexible, and subject to such major and minor revision as experience shows to be useful. The character of our professional examinations, and their standard, will necessarily have to be revised in terms of the changes that have been introduced. Further it must be remembered that artificial barriers between subjects in the medical curriculum are not limited to those that have developed between anatomy and physiology; and in time we hope, for example, to reintegrate into our new scheme non-medical biological teaching—particularly when we come to deal with the recombination of our anatomical and physiological Hons. B.Sc. and B.Sc. courses.

There is little to fear if in all these changes an anatomical department appears to have relegated a part of its independence to serve the needs of functional studies. Atchley (1946), professor of clinical medicine at Columbia University, has pointed out, in a most illuminating discourse on the orientation of medical education, that it should be "gratefully remembered that anatomy was the science which rescued medicine from witchcraft." Today it seems a minor sacrifice to break down the walls which the subject has built round itself in recent times in order to make a start in organising the undergraduate medical curriculum, not by traditional compartments, but on what Atchley has called "the framework of dynamic units," the dynamic units that are constituted, for example, by the working of the respiratory or cardiovascular apparatus, and the only units which are relevant to the modern clinician. Breaking down its administrative walls in no way impairs the status or individuality of anatomy regarded as the science concerned with the problems of structural organisation. It remains an essential foundation for advances in biological and medical knowledge, and its admixture with functional interests will only add to the promise that lies in its own progress.

References.—Atchley, D. W. (1946) *Science*, 104, 67. Bowman, W. (1842) *Philos. Trans.* p. 57. Corner, G. W. (1930) *Anatomy*, New York. Flexner, A. (1925) *Medical Education*, New York.

ASCORBIC-ACID METABOLISM OF BANTU SOLDIERS

A. KEKWICK

M.B. Camb., F.R.C.P.

ASSISTANT PHYSICIAN TO THE MIDDLESEX HOSPITAL, LONDON;
LATE LIEUT.-COLONEL R.A.M.C., 1/C MEDICAL DIVISION

R. J. WRIGHT

M.B. Belf.

LATE MAJOR R.A.M.C.,
MEDICAL SPECIALIST

A. B. RAPER

M.D. Leeds, M.R.C.P.

LATE MAJOR R.A.M.C.,
PATHOLOGIST

This paper is part of a comprehensive dietetic survey carried out on African Army personnel. Almost all the subjects studied were Bantu natives drawn from various parts of East Africa.

Our aim was to determine whether the ascorbic-acid intake of the subjects was adequate for their optimum health. This is not a simple matter. Firstly, if direct measurement of the intake shows it to be below that considered adequate in Europeans, it can be argued that the African requires less. The low incidence of scurvy among the subjects has been quoted to substantiate this view; but the non-appearance of scurvy is not good evidence of adequate ascorbic-acid intake. Chronic ill health may appear long before scurvy develops. Secondly, chronic ill health in these subjects is not

necessarily due to a deficient intake of ascorbic acid; it is more likely due to other dietary deficiencies and chronic infections and infestations. Thirdly, even if the ascorbic-acid content of the tissues is measured, it is difficult to determine what levels represent an intake adequate for optimum health.

ASCORBIC-ACID INTAKE

All the subjects studied had been on a standard diet for more than two months, and some for several years. We asked 474 men, detained in hospital for a few days with minor complaints, whether during their service they had had access to any additional foods which might contain ascorbic acid. Only 34 of them had had access to such foods, and even these for short and irregular periods. Additional sources of ascorbic acid can therefore be largely ruled out. The Army diet contains 105 mg. of ascorbic acid per man daily, a figure which compares favourably with the recommendations of most authorities. The sources are mainly oranges and vegetables (Anderson 1943).

The daily orange contains about 49 mg. of ascorbic acid. The supply, however, is seasonal, and the substitutes provided often contained much less. The African does not like oranges much because they are sour, and he eats only part of the fruit. For instance, 20 oranges, which had an average content of 44 mg. of ascorbic acid, a figure very near that stated by Anderson (1943), were given to 20 Africans. After the men had finished eating, the discarded portions were analysed for ascorbic acid. Only about 30% of the ascorbic acid had been consumed (highest figure 42%, lowest 18%). The raw vegetable ration contains 25 mg. of ascorbic acid, but, after cooking, the average amount of ascorbic acid daily reaching the soldier was 3-5 mg. The cooks clean the vegetables carelessly, overboil them, clean their pans with alkalis, and throw away the water in which the vegetables are cooked. Thus the daily intake of ascorbic acid falls far short of the calculated amount, the average intake of these subjects being under 15 mg.

RESPONSE OF ANEMIA TO ASCORBIC ACID

As chronic ill health and low hæmoglobin levels were common in these Africans, it was thought that the low Hb might be related to a low intake of ascorbic acid. Consequently 16 uncomplicated cases of anæmia were investigated. They were selected because they showed no signs of blood destruction, or of blood regeneration such as would occur after an acute illness or a malarial attack. They were subjected to a complete hæmatological investigation, including marrow puncture. All the cases showed the following features:

| | | |
|---|-------|----------------------------|
| Mean corpuscular hæmoglobin concentration | | range 27.6-44, mean 35.5 |
| Mean corpuscular volume | | range 76.6-114, mean 93.3 |
| Colour-index | | range 0.87-1.29, mean 1.07 |

The marrows showed a picture of comparative unresponsiveness to the degree of anæmia.

The subjects were then given for seven to ten days a basal diet which contained almost no vitamins, and little protein, but adequate calories and iron. At the end of the period the hæmatological investigations were repeated, but no change in the picture was found. Next, ascorbic acid 700 mg. daily was added to the diet, and after a further seven days the hæmatological investigations were again repeated. This time 6 cases showed a rise of Hb level of not less than 18% and an increase in number of red cells of not less than a million per c.mm., and 3 cases also showed a reticulocyte response between the seventh and tenth days. Although 9 cases showed a response to ascorbic acid, only 3 of them finally attained a figure of 100% Hb with the sole addition of ascorbic acid to the basal diet.

These results,¹ though derived from a small number of

1. These results are stated here only in brief, because they will be reported later more fully by Lieut.-Colonel O. K. Guyer, R.A.M.C.

TABLE II—SATURATION DATES CALCULATED FROM DATA IN TABLE I

| Case | Daily intake of ascorbic acid (mg.) | Day of saturation according to blood level | Day of saturation according to urinary output |
|------|-------------------------------------|--|---|
| 1 | 700 | 13 | 12 |
| 2 | 700 | 8 | 19 |
| 3 | 700 | 9 | 19 |
| 4 | 700 | 10 | 13 |
| 5 | 700 | 13 | 19 |
| 6 | 700 | 12 | 10 |
| 7 | 700 | 14 | 17 |
| 8 | 700 | 12 | 19 |
| 9 | 700 | 8 | 19 |
| 10 | 1400 | 7 | 14 |
| 11 | 500 | 14 | 3 |
| 12 | 500 | 18 | 8 |
| 13 | 500 | 16 | 3 |
| 14 | 500 | 26 | 6 |
| 15 | 500 | 23 | 4 |
| 16 | 350 | — | 5 |
| 17 | 350 | 28 | 5 |
| 18 | 350 | 24 | 6 |
| 19 | 350 | 26 | 2 |

30 sec. The number of haemorrhages were then counted with the naked eye and gave the following results :

No. of haemorrhages ... 0 .. 1-5 .. 5-10 .. 10-20 .. over 20
 No. of cases .. 284 .. 121 .. 27 .. 31 .. 11 (total 474)

It will be seen that 69 out of the 474 subjects showed more than five haemorrhages in the area. Fox et al. (1940), working with Bantu natives in South Africa, considered that the capillary haemorrhages could be counted against the black skin. With this we do not agree, and our modification of the test probably explains the greater incidence of abnormal readings obtained in our series.

Though the evidence is in some ways unsatisfactory, these results, taken with others, tend to confirm our belief that the low intake of ascorbic acid in the diet had affected the metabolism of the subjects.

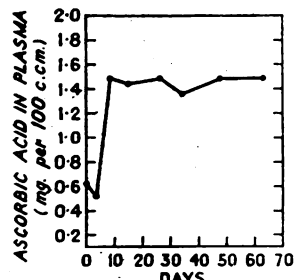


Fig. 1—Ascorbic-acid content of plasma in case 2 when 700 mg. of ascorbic acid daily was added to the diet.

ASCORBIC-ACID CONTENT OF PLASMA

Opinions vary as to whether a single measurement of the ascorbic-acid content of the plasma is an accurate indication of adequate intake. Portnoy and Wilkinson (1938), Ralli et al. (1939), Ralli and Sherry (1941), and others thought that such a measurement was the best criterion of adequate intake, whereas many others hold the opposite view. Prunty and Vass (1943) reviewed the position and concluded that such a measurement was an index of the nutritional state as regards ascorbic acid.

The next question is, what figure represents an intake adequate for optimum health. The following figures have been reported by various workers on normal healthy European subjects :

| | Ascorbic-acid content of plasma (mg. per 100 c.c.m.) | |
|----------------------------------|--|------|
| | Range | Mean |
| Farmer and Abt (1935) .. | 0.69-2.3 | 1.24 |
| Taylor et al. (1936) .. | 0.83-2.43 | 1.61 |
| Greenberg et al. (1936) .. | 0.25-1.48 | 0.72 |
| Wortis et al. (1938) .. | 0.7 or over | — |
| Jetter (1938) .. | 1.10 or over | — |
| Goldsmith and Ellinger (1939) .. | 0.43-1.98 | 1.11 |
| Croft and Snort (1939) .. | 0.60-1.12 | 0.81 |
| Kassan and Roe (1940) .. | 0.13-1.63 | 0.76 |
| PiJoan and Klemperer (1937) ... | 0.65-2.00 | — |

It will be seen that the average plasma values in healthy individuals are about 0.9 mg. per 100 c.c.m., and that the

range of average healthy figures is from 0.13 to 2.43 mg. per 100 c.c.m. Approaching the problem from another angle altogether, Prunty and Vass (1943) regarded a figure of 0.4 mg. per 100 c.c.m. as the lowest which corresponds to a satisfactory index of ascorbic-acid metabolism.

The technique used in the estimations was that of Farmer and Abt (1935) with two slight modifications : 5 c.c.m. of blood filtrate was used instead of 2 c.c.m., and a dye solution of which 100 c.c.m. was equivalent to 4 mg. of ascorbic acid was used. The results obtained with this technique on a random sample of 19 European officers and N.C.O.'s with an adequate ascorbic-acid intake were as follows :

| Case | Mg. per 100 c.c.m. | Case | Mg. per 100 c.c.m. | Case | Mg. per 100 c.c.m. |
|------|--------------------|-------|--------------------|-------|--------------------|
| 1 .. | 1.0 | 7 .. | 1.3 | 14 .. | 1.2 |
| 2 .. | 1.2 | 8 .. | 1.0 | 15 .. | 0.8 |
| 3 .. | 1.2 | 9 .. | 1.3 | 16 .. | 1.3 |
| 4 .. | 1.3 | 10 .. | 0.9 | 17 .. | 1.2 |
| 5 .. | 1.1 | 11 .. | 1.4 | 18 .. | 1.1 |
| 6 .. | 1.3 | 12 .. | 1.0 | 19 .. | 1.2 |
| | | 13 .. | 1.0 | | |
| | Range 0.8-1.4 | | Average 1.1 | | |

These figures are higher than those obtained by other workers cited above, probably because of the generous diet.

Estimations of the ascorbic-acid content of the plasma in 361 of the 474 Africans mentioned above gave a mean content of 0.58 mg. per 100 c.c.m., with a range of 0.1-0.96 mg. The incidence of different values was as follows :

| Content (mg. per 100 c.c.m.) | 0-0.2 | 0.2-0.4 | 0.4-0.6 | 0.6-0.8 | 0.8-1.0 |
|------------------------------|-------|---------|---------|---------|---------|
| No. of cases .. | 2 | 22 | 169 | 134 | 34 |

These figures fall well below those of the other workers cited above. It will also be seen that in 24 of the subjects the ascorbic-acid content of the plasma was less than

0.4 mg. per 100 c.c.m., which by the most stringent standards would be regarded as indicating an unsatisfactory state of ascorbic-acid metabolism. In 193 of the subjects the level was lower than 0.6 mg. per 100 c.c.m. It seems from these figures that about half the subjects had an unsatisfactory ascorbic-acid intake. Bicknell and Prescott (1942) state that plasma values of 0.5-0.7 mg. per 100 c.c.m. indicate a state of ascorbic-acid depletion and those of 0.7-1.0 mild deficiency. By these standards all the subjects had at least a mild ascorbic-acid deficiency.

The figures are in substantial agreement with those of Fox et al. (1940), but they imply that the lower level

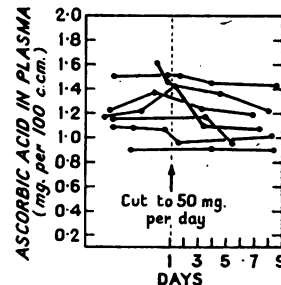


Fig. 2—Ascorbic-acid contents of plasma in 7 subjects who, after saturation with ascorbic acid, were cut down to a maintenance dose of 50 mg. daily.

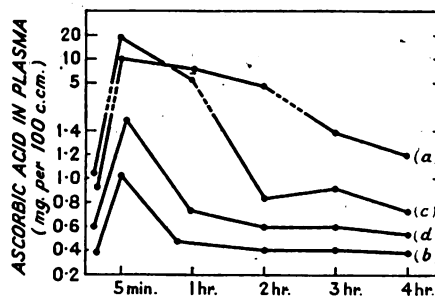


Fig. 3—Ascorbic-acid contents of plasma after administration of 500 mg. of ascorbic acid in (a) normal Europeans; (b) Europeans with ascorbic-acid deficiency (Kastlin et al. 1940); (c) 2 Africans who had had 700 mg. of ascorbic acid by mouth daily for 50 days; (d) 12 Africans on normal Army diet.

of the Bantu native is physiological rather than that the ascorbic-acid intake of their subjects was too low. To clarify this point, ascorbic acid was added to the diets of 19 of our subjects for 24-67 days and the ascorbic-acid levels in the blood observed (fig. 1 represents a typical response from one of the cases). At the end of this period the intake was cut down to 50 mg. per day in 7 cases to find out whether the levels attained would be maintained on doses which might be regarded in Europeans as sufficient for maintenance. The results (fig. 2) seem to show that the low plasma levels can be raised to levels regarded as normal in Europeans and can be maintained there. Our view is that the low ascorbic-acid levels found in the plasma represent a deficiency and are not physiological. This view is derived not only from these findings but also from the finding of other evidence of dietary deficiency during this survey (Kekwick and Wright 1946).

SATURATION TEST

The measurement of the state of saturation was introduced to overcome the errors thought to be inherent in the single estimation of the ascorbic-acid level in the plasma. The rationale of the test is based on the assumption that, when a test dose is given, the tissues of the body and the kidneys compete for the available ascorbic acid. When the tissues are satisfied, more and more of the test dose is poured out in the urine. Prunty and Vass (1943) have pointed out that there is a considerable daily variation in the proportion of the test dose poured out in the urine, even when the subject is saturated. They believe that any figure of over 30% of the test dose may indicate a state of saturation.

Table I gives the results obtained with three series of Africans, of whom 9 were given 700 mg., 5 were given 500 mg., and 4 were given 350 mg. of ascorbic acid daily. The table shows considerable fluctuations in the daily output. These fluctuations make it difficult to estimate when the subjects became saturated. On the basis of both urinary output and plasma content table II shows the days on which, in our opinion, the subjects became saturated. As regards the blood levels the day of saturation has been taken as that on which the ascorbic-acid content ceased to rise and the curve became flat (see fig. 1). As regards the urinary output of ascorbic acid, it has been taken as the day on which the patient started to pour out consistently 30% of the test dose. The table exhibits a very curious feature. With the higher dosage the blood figures rose more sharply than with the lower dosage. On the other hand, with the urines the observation is reversed, a larger percentage of the test dose being poured out more quickly with the lower dosage of ascorbic acid per day. At the same time as the patient is pouring out a significant percentage of the test dose, the ascorbic-acid content of his blood is low and still rising. It seems that with lower doses the tissues do not take up ascorbic acid, whereas they do so with the more rapidly rising blood levels.

In 5 of the subjects the amount of ascorbic acid was cut down at the end of fifty days to 50 mg. daily. In only 1 case was the excretion of ascorbic acid greater than intake on two days, an indication that these subjects were not over-saturated.

The conclusions to be drawn from these results are not clear. If the saturated state is desirable for optimal health, the intake of the subjects must be regarded as too low. On the other hand, it may be argued that the saturated state is unnecessary. Most authors consider that a healthy subject should be saturated within two days. None of our subjects fulfilled this condition. The inference is that the ascorbic-acid intake is too low. So far as can be seen from these tests the African behaves towards ascorbic acid in much the same manner as does the European.

INTRAVENOUS TOLERANCE TEST

This test is a modification of the saturation test. The amount of ascorbic acid recommended to be given has varied considerably. We have used the technique of Kastlin et al. (1940), in which 500 mg. of ascorbic acid is given intravenously and the ascorbic-acid content of the blood estimated five minutes, one hour, two hours, three hours, four hours, and five hours later. Theoretically, if the subject is saturated, the ascorbic-acid content of the blood will rise to high levels and fall slowly, as the tissues do not take it up rapidly. If the subject is not saturated the ascorbic acid will be taken up greedily by the tissues and the blood level will not rise so high but will soon fall to the original figure. This test was used because it was found during the survey that many of the subjects had a deficiency small-intestine pattern (Golden 1941). This small-intestine pattern is accompanied by a very low sugar-tolerance curve, and it was thought that the subjects might appear unsaturated because they could not absorb the ascorbic acid given by mouth.

Fig. 3 shows the mean curves obtained from (a) normal European subjects, (b) deficient European subjects, (c) Africans who had 700 mg. of ascorbic acid for fifty days before the test, and (d) Africans on the normal Army diet. None of the Africans in groups (c) and (d) passed 40% of the test dose in the urine within the four-hour period. The Africans given large doses of ascorbic acid for a long period occupy an intermediate position between the well-saturated European and the average African.

These three curves taken together indicate that lack of absorption of ascorbic acid played little part in the saturation tests and that the findings shown in table I represent an unsaturated state. Whether the testing of saturation states in Africans, of whom over 30% have a deficiency pattern of the small intestine and deficient absorption of glucose (Kekwick and Wright 1946), is satisfactory with a test dose given by mouth is not finally settled.

DISCUSSION

The physical state of the African in East Africa is a vital matter in relation to the future of his race. His chronic ill health, a potent factor in his inability to work and to take responsibility, is increased by an extremely low dietetic intake. On joining the Army he was given, in most instances, a far better diet than he had ever had before, but he brought with him his deep-rooted likes and dislikes in regard to food and his habits of cooking, preparing, and eating it. The evidence which we have collected suggests that these habits have contributed to maintaining a low intake of ascorbic acid.

The view that he needs less ascorbic acid because he has always had less is, in our opinion, untenable. During this study we have tried to keep this possibility in mind. The actual intake of these subjects should lead to low levels of ascorbic acid in the plasma. This was indeed found to be so. These low levels can be raised by the addition of ascorbic acid to the diet, which indicates that the levels represent a deficient intake rather than a physiological normal. Saturation tests on the subjects further show that the tissues have a low ascorbic-acid content but can be saturated in much the same way as the tissues of Europeans, both by mouth and intravenously. In short, the ascorbic-acid metabolism of the Bantu native appears to be comparable to that of a European, and therefore his need for ascorbic acid as great.

We do not agree with Fox et al. (1940), who consider that an increase of ascorbic-acid intake in the African's diet is unlikely to improve the African's health. It is understandable that they could show neither startling results from adding ascorbic acid to the diet nor significant

evidence that health was improved. A similar experiment conducted by us produced similar results. There are so many other causes of chronic ill health: deficiency of other food factors, chronic hypoproteinæmia, malarial infestation, and helminthiasis. The multiplicity of these factors should not, in our view, be a justification for omitting to correct each and every one of them in turn.²

SUMMARY

The ascorbic-acid intake of 474 Bantu natives in the East African Army was estimated to be under 15 mg. daily.

An attempt was made to correlate this low intake with their state of health by investigating the response of cases of anæmia to ascorbic acid and by measuring capillary fragility. Out of 16 cases of anæmia 9 responded to ascorbic acid, and 14% of the 474 subjects had decreased capillary resistance. It appeared as though ascorbic-acid deficiency was related to their ill health.

The ascorbic-acid content of the plasma was estimated in 361 of the subjects. The mean figure was 0.58 mg. per 100 c.c.m., with a range of 0.1–0.96 mg. per 100 c.c.m. The figures are well below those regarded as satisfactory in Europeans. The low levels could be raised by the addition of ascorbic acid to the diet. They therefore probably did not represent a physiological low normal level.

Saturation tests were carried out on 19 of the subjects. Intravenous tolerance tests were carried out on 14. It was found that all these subjects were in an unsaturated condition.

Our thanks are due to Brigadier R. P. Cornack, O.B.E., director of medical services, East Africa Command, and Colonel D. Bell, C.B.E., for advice and permission to publish this paper; to the East African Command medical investigation committee for helpful advice and criticism in the preparation of the figures, and in particular to Brigadier E. R. Cullinan, consulting physician, East Africa Command; to Dr. W. Vint and Dr. D. Harvey, of the medical research department, Kenya, for much advice and encouragement; to Staff-Sergeant S. Ibbotson, R.A.M.C., and his staff for help with the techniques of ascorbic-acid determinations, and to Sister E. A. McEwan, Q.A.I.M.N.S.(R.), and her staff for a great deal of patient work.

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2. After this work was completed steps were taken by the East African Army medical authorities to increase the soldiers' ascorbic-acid intake.

ESTIMATION OF PENICILLIN IN SERUM USE OF GLUCOSE, PHENOL RED, AND SERUM WATER

SIR ALEXANDER FLEMING
M.B. Lond., F.R.C.P., F.R.C.S., F.R.S.

CHARLES SMITH
M.B. Lond.

From the Inoculation Department, St. Mary's Hospital, London

MANY methods have been described for the estimation of penicillin in blood-serum. The amount of penicillin present in the blood is often too low for it to be detected by the agar-cup or cylinder-plate methods which are in common use by the manufacturers in the assay of penicillin. The method used must be capable of detecting penicillin in almost undiluted blood-serum, and it is preferable that it should be a micro method so that only small amounts of serum are required and undue bleeding of the patient is avoided.

Such micro methods have been described. Staphylococcus has been used as the test organism and has been grown in slide cells (Fleming 1943) or in modified slide cells (Garrod and Heatley 1944); in these the staphylococcus grows in separate colonies which can be directly observed. In another method staphylococcus has been similarly used, but incubation has been carried out in capillary tubes (Fleming 1943). One drawback to these methods is the difficulty sometimes of being certain whether the staphylococcus has developed or not.

Fleming (1944) introduced a modification by using in slide cells and capillary tubes a hæmolytic streptococcus as the test organism and human blood as the indicator. If the streptococcus grew, hæmolysis took place. This was more satisfactory than the methods in which staphylococcus was used, but occasionally there was trouble in that hæmolysis was not complete even in the control tubes. We therefore sought for another method which would combine simplicity with accuracy, and we describe here a method which seems to have advantages.

INVESTIGATION

Hiss's Serum Water

Media containing pH indicators have been recommended for the titration of penicillin (Fleming 1942). The possibility of using Hiss's serum water was indicated to us by Dr. J. Fielding while he was working in our E.M.S. public-health laboratory. Fielding (1947) has published an article on the use of Hiss's serum water as issued by the London County Council, and a description of a capillary-tube technique which he found in use in this laboratory a year ago.

Hiss's serum water is a culture medium which has long been used for testing the sugar reactions of streptococci and other organisms. It is made by boiling 1 vol. of serum with 3 vols. of distilled water, a fermentable carbohydrate, and Andrade's indicator. When this is done at a pH of 7–8 there is no precipitate and the medium is colourless. When the carbohydrate is fermented by microbial growth the medium becomes bright red and a heavy precipitate forms.

Following Dr. Fielding's suggestion, we tried serum water as issued by the L.C.C. and though it gave promising results it did not seem perfect; so the various constituents of the medium were further investigated.

Optimal Amount of Serum in the Serum Water

Media were made up containing from 50% to 1% of serum in distilled water containing 1% of glucose and an indicator. There was little difference in the results after overnight incubation so long as there was more than 10% of serum present. Naturally the higher the percentage of serum the heavier the precipitate when acid was produced. For convenience we have used as a routine serum water containing 20% of serum.

"... the psychiatrist has emerged from the isolation of the asylum and now frequents the general wards and consulting room, but many of the evils of immurement linger. The isolation in viewpoint persists. . . Persistence in this attitude can lead only to cultism. Further progress . . . will be delayed until the psychiatrist becomes truly a physician, well versed in all disciplines relevant to the . . . most complex organ of the body, the nervous system."—Dr. G. WILSON and Dr. C. RUFF, *J. Amer. med. Ass.*, Feb. 22, p. 509.

The Indicator

Andrade's indicator, which is present in the L.C.C. serum water, did not seem entirely suitable; so phenol red, cresol red, and brom-thymol blue were tried. Of these, phenol red gave the best results. This indicator gives its maximal colour change between pH 7 and 8. At pH 6.8 it is bright yellow, and at 7.6 cherry red. A very small amount of acid production, therefore, changes the colour from red to yellow. The use of phenol red also enables the pH of the original medium to be observed between 7 and 8, which is the range suitable for growth of the test organisms. The amount of phenol red added is sufficient to give a distinct red colour to the medium in the thin column inside a capillary tube. A good deal more may be added without interfering with the growth of the test organisms.

The Fermentable Carbohydrate

For the most part we have used glucose. This is fermented by a large range of organisms. Various concentrations between 0.5% and 5.0% were tried, and there was not a great deal of difference when streptococcus was the test organism. We decided that 2% was about the optimal strength. Lactose, mannite, and saccharose were also used, but they had no advantage over glucose when streptococcus was the test organism.

The Test Organism

We had previously been using a haemolytic streptococcus as our test organism, with blood as the indicator (Fleming 1944). We found this same organism eminently suitable in the glucose, phenol red, and serum water mediums. It seemed to produce acid more quickly than did staphylococcus, and the results were rather more clear-cut. The inoculum used was 5 c.mm. of a 24-hour broth-culture to 1 c.cm. of the medium, but there was considerable latitude in this direction.

The Glass Capillaries

Good results were invariably obtained when capillaries made from soda glass were used for incubation. When we used capillaries made from hard glass there was some change in the pH of all the fluids towards the acid side, making the results difficult to read.

COMPOSITION OF THE MEDIUM

As a result of the foregoing work we adopted a medium of the following composition:

| | | |
|--------------------------------|---------|------------|
| Serum | | 2.00 c.cm. |
| 10% glucose solution | | 2.00 c.cm. |
| Distilled water | | 6.00 c.cm. |
| Phenol red, saturated solution | | 0.25 c.cm. |

For the most part we have used human serum, but horse, sheep, or ox serum can be used. The medium can be made up in bulk, steamed, and distributed in small volumes, or small quantities of 5-10 c.cm. can be made at a moment's notice and boiled for a minute or two over a Bunsen flame. This is an advantage in a hospital laboratory, where small quantities of human serum are always available. For making small quantities it is convenient to keep 10% glucose solution in sealed 1 c.cm. ampoules which have been autoclaved.

TECHNIQUE OF THE TEST

The test is done in the same manner as previously described (Fleming 1944). A suitable amount of the medium is inoculated with the test organism. Serial dilutions of the serum to be tested (25 c.mm. volumes) are made in the inoculated medium on the surface of a paraffined slide. Each of these drops is touched with the end of a capillary tube, and the fluid runs into the tube, which is sealed* and placed horizontally on a

* Sealing is not necessary. The fluid can be run towards the centre of the capillary tube by tilting the tube, and when placed horizontally on the plasticine-covered slide it remains in position. This saves a good deal of time.

'Plasticine'-covered slide and incubated. By this method the strongest concentration of the test serum is 1 in 2. If it is desired to use almost undiluted serum, 25 c.mm. of undiluted serum can be mixed with 5 c.mm. of 50% serum water containing 5% of glucose and sufficient phenol red and inoculated with five times as many streptococci.

After incubation the tubes in which the streptococci have grown are bright yellow and show a heavy precipitate. There is often an intermediate tube in which there is the colour change but sufficient acid has not been produced to precipitate the serum. The tubes in which growth has been prevented by the penicillin are red or red-violet. The end-point is sharp, and the results are very easily read.

The test can also be done in small test-tubes with the same medium by merely altering the volumes. The results obtained by micro and macro methods are the same.

The results obtained by using a mixture of glucose, phenol red, and serum water as the culture medium and a streptococcus as the test organism have been checked by the methods previously described and have been found to correspond. We have used this method as routine for some months and have found it the most rapid and convenient.

SUMMARY

A rapid, convenient, and accurate micro method of estimating penicillin in blood-serum is described, with a mixture of glucose, phenol red, and serum water as the culture medium and a streptococcus as test organism.

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OBSERVATIONS ON FIBRINOLYSIS EXPERIMENTAL ACTIVITY PRODUCED BY EXERCISE OR ADRENALINE

ROSEMARY BIGGS

M.B. Lond.

GRADUATE ASSISTANT,
DEPARTMENT OF
PATHOLOGY

R. G. MACFARLANE

M.D. Lond.

RADCLIFFE LECTURER IN HÆMA-
TOLOGY, OXFORD UNIVERSITY;
CLINICAL PATHOLOGIST.

J. PILLING

B.Sc. Manc.

RESEARCH ASSISTANT, DEPARTMENT OF PATHOLOGY
RADCLIFFE INFIRMARY, OXFORD

FIBRINOLYTIC activity in the blood of patients with various conditions was described in a previous paper (Macfarlane and Biggs 1946). Though no definite evidence emerged from these observations that might identify the stimulus leading to activation of plasmin, the proteolytic enzyme of the blood that is almost certainly responsible for lysis of fibrin, it seemed that trauma, fear, or possibly allergy and hypersensitivity were somehow concerned. Since it was considered that further information on the nature of a common activating mechanism underlying these conditions was not likely to be derived at that stage from a continued study of naturally occurring cases, attempts were made to find some method of inducing fibrinolysis in human subjects by experimental means.

At first the production of fear or anxiety was considered as an experimental stimulus. It was soon realised, however, that it is technically difficult in a civilised community to frighten or worry normal individuals at will to the extent that was required. The only readily available material consisted of sufferers from stage-fright in different forms, examination candidates, and those

about to engage in various other contests. Some use has been made of them, but opportunities are not frequent, nor are the subjects particularly willing to submit to experiment when in the condition most likely to give good results. Pending the consequently delayed completion of this part of the work, it was decided to explore the possible effects of experimentally produced allergic phenomena, an investigation that led, indirectly, to observations on exercise and adrenaline that are described here.

METHODS

The methods of collecting citrated plasma and demonstrating fibrinolysis were those used previously (Macfarlane and Biggs 1946). A roughly quantitative estimate of fibrinolysis has been attempted here as follows:

If all three dilutions of plasma showed lysis within 24 hours, the result was recorded as +++; if two lysed, as ++; and if only one lysed, as +. In any group of observations the "mean fibrinolytic activity" can be obtained by adding up the number of plus signs and dividing by the number of observations. This mean figure can also be expressed as a percentage of 3, the maximum obtainable.

The subjects for these experiments were young adult volunteers, either students or members of the laboratory staff, except where otherwise stated.

EXPERIMENTAL

The discovery of a student who complained of severe urticaria on taking exercise suggested a possible line of investigation of the apparent association between allergic or hypersensitive states and fibrinolysis. In a series of experiments it was found that urticaria could be produced at will in this subject by a certain amount of exercise, and that well-marked fibrinolytic activity developed in his blood, apparently in proportion to the severity of the urticaria.

Further investigation showed, however, that the two phenomena were not related. The urticaria was conditioned by an increase in skin temperature, whereas the fibrinolysis followed exercise independently of temperature. These conclusions were based on experiments in which the effects of exercise or rest in air were compared with those of swimming in cold water or rest in a hot bath, the results being as follows:

| Stimulus | Urticaria | Fibrinolysis |
|--|-----------|--------------|
| Rest in air | Nil .. | Nil |
| Exercise in air | +++ .. | +++ |
| Exercise in cold water (15 min. at 20° C) .. | Nil .. | +++ |
| Rest in hot water (15 min. at 43° C) .. | +++ .. | Nil |

Attention was therefore directed to the effect of exercise on normal people.

EFFECT OF EXERCISE

Appearance of Fibrinolytic Activity.—A group of 20 normal subjects (16 men, 4 women) took part in a series of experiments that entailed running up and down a spiral stone staircase a stated number of times. The staircase was 39 ft. in vertical height, and the average time for a complete ascent and descent was 50–60 sec. The number of consecutive ascents varied from 2 to 20, the degree of exhaustion of the subject varying not only with the amount of exercise but also with his physical condition. Blood samples were taken before the exercise, immediately after, and after periods of rest. Though blood-pressure, pulse-rate, and mouth temperature were recorded when the blood samples were taken, the results, being variable and apparently not closely related to the other findings, are omitted. The increases in systolic blood-pressure ranged from 15 to 85 mm. Hg.

The results as regards fibrinolytic activity in relation to exercise are given in table I. The control (pre-exercise) observations were all negative except one student in whom a weak positive reaction was obtained, a result

that was referred to in the previous paper.* It will be seen that after exercise there is a high incidence of fibrinolysis in the blood samples examined. Of the 33 observations made after three ascents or more, only 2 were negative. A single negative result was obtained among the 29 observations on five or more ascents, the subject concerned being in very good training and little

TABLE I—EFFECT OF EXERCISE ON THE DEVELOPMENT OF FIBRINOLYTIC ACTIVITY IN NORMAL SUBJECTS

| No. of ascents | No. of observations | No. with fibrinolysis | | | |
|----------------|---------------------|-----------------------|----|----|----|
| | | +++ | ++ | + | 0 |
| 0–2 | 28 | 1 | .. | 1 | 27 |
| 3–4 | 4 | .. | .. | 2 | 1 |
| 5–6 | 12 | 9 | 1 | 2 | .. |
| 7–8 | 5 | 5 | .. | .. | .. |
| 10 | 10 | 8 | 1 | .. | 1 |
| 12–20 | 7 | 5 | .. | 2 | .. |

incommoded by his exercise. It will also be seen that there is some proportionality between the amount of exercise and the degree of fibrinolysis recorded.

In a series of observations on 12 subjects leucocyte and platelet counts were made, besides an estimation of fibrinolysis, before exercise, about half-way through the exercise (8 observations only), and immediately after exercise. The results are given in fig. 1, the values of neutrophils, lymphocytes, and platelets being the means of the percentages of the absolute pre-exercise figures in each subject. There are 4 subjects in each of the exercise groups. Fibrinolytic activity is indicated as a percentage of the maximum that could be recorded in each group. It will be seen from fig. 1 that exercise induces a rise in the absolute number of lymphocytes followed by a later and less definite rise in the neutrophils. The platelets are also increased, but to a lesser extent. Fibrinolytic activity develops early during exercise, showing a significant rise after two or three ascents, or, since these occupy about 1 min. each, after 2 or 3 min. of exercise, and apparently precedes any significant change in the blood picture.

Disappearance of Fibrinolytic Activity.—Three subjects exercised on the staircase for about 7 min., blood samples being taken from each immediately before, immediately after, and at 5-min. intervals during the next 15 min. of rest. Fibrinolytic activity was estimated and leucocyte and platelet counts were made on each blood sample. The results are indicated in fig. 2 by the same method as that used in the previous figure. The results in the 40-min. period, included for completeness, were obtained on 6 subjects who formed part of the group dealt with in fig. 1. It appears from these findings that fibrinolytic activity declines rapidly in the circulating blood after exercise. In no instance was a positive result obtained after 30 min. rest, and even after 10 min. there was a reduction in activity. The blood picture is also restored rapidly towards normal.

Temperature.—To control the possible effect of the increased skin temperature that results from ordinary exercise, observations were made on subjects exercising in cold water. Six volunteers (5 men, 1 woman) swam vigorously for about 15 min. in water at 20° C. At the end of this time all were very cold, and all except the woman, who is an exceptionally strong swimmer, were tired. Blood samples taken before the exercise showed no fibrinolysis, whereas those taken after showed maximal activity in the 5 men and a negative result in the woman. As a control of the effect of cold, 4 volunteers stood for 10 min. in about 4 ft. of water at 20° C. Blood

* A member of the laboratory staff who, though anxious to take part in the experiment, was nervous and had fainted during the proceedings also gave positive control results and was therefore excluded from the series.

samples taken before and after this procedure were all negative as regards fibrinolysis.

EFFECT OF ADRENALINE

The foregoing results, coupled with the probable effect of fear and anxiety as potentiators of fibrinolytic activity, suggest that adrenaline may be involved in the reaction. Experiments were therefore carried out in which injections of adrenaline were given to normal volunteers and to patients in whom its administration was required for diagnosis or therapy. Also in the experimental group were 3 patients in whom splenectomy had been performed in the past for traumatic rupture of

TABLE II—EFFECT OF INJECTION OF ADRENALINE ON THE DEVELOPMENT OF FIBRINOLYTIC ACTIVITY IN MAN

| Time after injection (min.) | No. of observations | No. with fibrinolysis | | | |
|-----------------------------|---------------------|-----------------------|----|---|----|
| | | +++ | ++ | + | 0 |
| 0 | 22 | .. | .. | 1 | 21 |
| 10 | 8 | 6 | 1 | 1 | .. |
| 20 | 19 | 14 | 3 | 2 | .. |
| 30 | 10 | 3 | 4 | 2 | 1 |
| 40 | 3 | .. | 1 | 1 | 1 |
| 90 and over | 3 | .. | .. | 2 | 1 |

the spleen, and 3 cases of hæmophilia, these being included for reasons mentioned below. In all, 22 experiments were made, 8 of them being on 3 normal volunteers.

A solution of 1 in 1000 adrenaline was used in all cases, two preparations being used: adrenaline chloride, prepared by Oxo Ltd., London; and epinephrine hydrochloride, made by Premo Pharmaceutical Laboratories Inc., New York. No significant difference in the results obtained by the different preparations was observed. The solution was given by subcutaneous injection into the upper arm, at the rate of about 0.25 c.cm. per min. The dose varied with the subject, the injection being stopped when symptoms began to appear or when the maximum of 2 c.cm. had been administered. The least amount given was 1 c.cm.

Blood samples were taken for white-cell and platelet counts and estimation of fibrinolytic activity, and the pulse-rate and blood-pressure were recorded in each subject before the injection and at intervals after it had been given. A maximal effect on the blood-pressure was observed 10–15 min. after the start of the injection in most cases, the systolic pressure rising by 20–60 mm. Hg. In all 22 cases the blood samples taken 10–20 min. after the injection showed positive fibrinolysis. The results in relation to time are given in table II, which shows that the effect is more lasting than that of exercise, positive results being obtained up to 1½ hours after the injection.

The changes in the neutrophil, lymphocyte, and platelet counts in relation to time after injection are shown in fig. 3. The same method of representation is used as in fig. 1, fibrinolytic activity being recorded as a percentage of the maximum obtainable in each group. The number of subjects in each time group ranged from 4 to 11. Fig. 3 illustrates the rapid and extensive rise in the lymphocyte count after the injection. The neutrophils rise more slowly, and the platelets are less affected than the other elements. As is the case with the results of exercise, the period of maximal fibrinolysis precedes by a short time that of the maximal change in the blood picture.

Three patients who had been splenectomised were included in the series because it was expected that such patients might show a lesser leucocyte and platelet response to adrenaline than normal. All 3 showed maximal fibrinolysis, and a rise in lymphocytes equal to or greater than the average, but the injection produced little change in the neutrophil and platelet counts. Three patients with hæmophilia were included because it has been observed that the effect of chloroform as an acti-

vator of fibrinolytic activity in hæmophilic plasma is less than normal (Lewis et al. 1946). The response to adrenaline in the cases observed here, however, was substantially the same as regards both fibrinolysis and the changes in the blood picture as that of the "normal" subjects. The "normal" subjects consisted of the 3 volunteers and 6 male patients in whom malaria was suspected, adrenaline being given to assist the diagnosis; in addition 2 observations were made on a patient receiving adrenaline for angioneurotic oedema. The one positive fibrinolysis result obtained in the 22 pre-injection blood samples was in a man suspected of having malaria, later thought to be suffering from lead-poisoning.

FURTHER OBSERVATIONS

In the previous experiments adrenaline had either been injected or had its natural secretion possibly stimulated by exercise, and both procedures were followed by an increase in the cellular elements of the blood and in fibrinolytic activity. Experiments were therefore carried out to determine if the mere addition of adrenaline or an increased number of platelets or leucocytes to blood or plasma in vitro led to fibrinolysis.

Adrenaline.—Adrenaline was added to fibrinogen subsequently clotted by thrombin, and to samples of fresh plasma and of whole blood, these mixtures after short periods of incubation being diluted and clotted as in the usual estimation of fibrinolysis. The adrenaline concentrations used in the blood or plasma ranged from that which might be expected in the blood of the experimental subjects up to a final figure of 1 in 10,000. No fibrinolysis took place in any instance.

Leucocytes.—All formed elements were removed from a fresh sample of "active" (post-exercise) blood by spinning at 20,000 r.p.m. for 30 min. in the cold. The clear supernatant plasma, after dilution and coagulation, showed undiminished fibrinolytic activity. Conversely, the leucocyte and platelet content of a sample of normal citrated blood was artificially raised by adding to it a fresh "buffy-coat" suspension derived from a larger sample of the same blood. Though a general increase of about 300% in formed elements was produced, no fibrinolytic activity could be demonstrated in plasma samples treated in the usual way. The lymphocytosis which occurred in the experimental conditions was also artificially reproduced by adding suspensions of fresh

lymphocytes derived from a large volume of blood to a small sample of the same blood. No fibrinolysis was observed to develop.

Adrenaline, Leucocytes, and Platelets Together.—Adrenaline was added to citrated blood with an artificially increased content of leucocytes and platelets, and the mixture incubated. Adrenaline was also incubated with

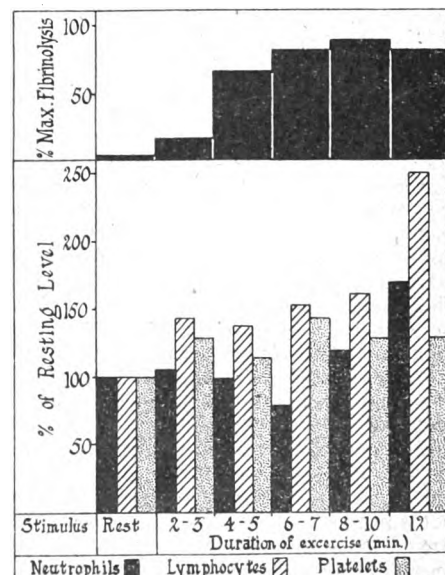


Fig. 1.—Effect of various amounts of exercise on development of fibrinolytic activity, and on numbers of leucocytes and platelets, in blood of normal persons.

a "buffy-coat" suspension, and with lymphocytes alone, and extracts made of these mixtures were added to citrated blood. In no case was fibrinolysis induced.

DISCUSSION

Strenuous exercise and the injection of adrenaline are stimuli that produce a series of similar effects on the blood of normal persons. Garrey and Bryan (1935) have observed a lymphocytosis that follows short periods of exercise, and Lucia et al. (1937) have recorded a similar change following the administration of adrenaline. A slower rise in neutrophils is also a characteristic result of both stimuli. Our own observations accord with these, and it is now clear that activation of the proteolytic system of the blood is also a common effect. The most reasonable explanation appears to be that the effects observed in exercise are the effects of an increased secretion of adrenaline.

The fibrinolytic activity that has been reported in pathological conditions has usually been associated with states in which increased adrenaline activity might be expected (Macfarlane and Biggs 1946). It therefore seems that adrenaline may be a link in the chain of physiological events that leads to proteolytic activity

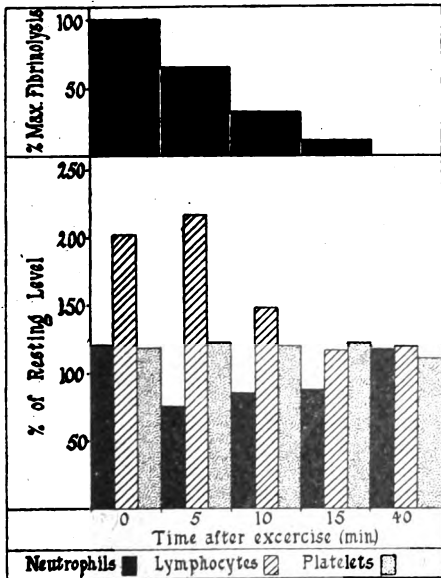


Fig. 2.—Changes in fibrinolytic activity, and numbers of leucocytes and platelets, during rest immediately after exercise.

as the production of a lymphocytosis, neutrophilia, and thrombocytosis, have already been studied. Again, these are changes that do not seem to be directly responsible for fibrinolysis, since the addition or removal of these elements from the blood outside the body has no effect on activity that we have been able to demonstrate.

Neither splenectomy nor hæmophilia alters the fibrinolytic response to adrenaline. Ungar (1945) has produced evidence suggesting that the spleen is concerned in the activity of "serum antitrypsin," a substance or factor possibly identical with antiplasmin. Lewis et al. (1946) have found that the development of proteolytic activity after treatment of plasma fractions with chloroform is less than the normal in hæmophilia. We ourselves have some evidence of greater activity of antiplasmin in hæmophilic blood than normal and expected a reduced reaction to adrenaline. The response, however, was normal, and it is clear that further investigation of the abnormalities of hæmophilic plasma is required.

In general, it can be said that fibrinolysis occurs in those conditions in which the subject is exposed to

unusual stress. The recognition that there is a definite pattern of response to all such abnormal or excessive stimuli has led to the concept of the "alarm reaction"

of Selye (1946). The reaction involves an initial shock phase in which the deleterious effects of the alarming stimulus predominate, and a phase of counter-shock in which these phenomena are reversed. The reaction is accompanied by hypertrophy of the adrenal cortex and involution of lymphoid tissue, and is followed by an increased resistance to a repetition of the same stimulus. Selye included severe exercise, emotional states, and trauma among stimuli producing the alarm reaction, and has observed a rise in non-protein nitrogen during the shock phase. The observation that fibrinolysis occurs almost immediately during exercise or after the injection of adrenaline suggests that it is a feature of the initial phase of the alarm reaction and may be related to the increased nitrogen excretion observed. This and other possible effects of proteolysis occurring as a physiological response to unusual stress must be determined by further experiment.

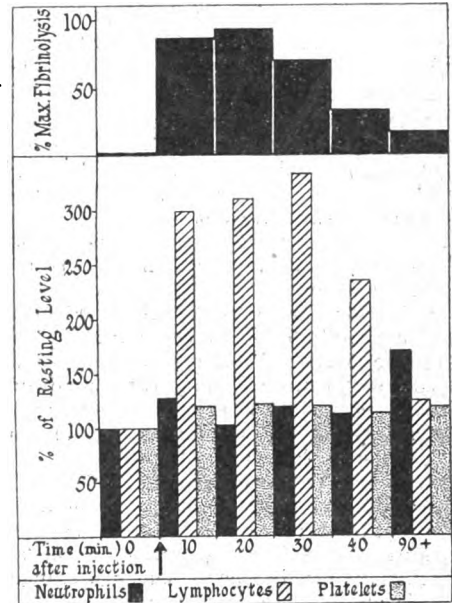


Fig. 3.—Effect of injection of adrenaline on development of fibrinolytic activity, and on numbers of leucocytes and platelets, in blood of human subjects.

SUMMARY

Both strenuous exercise and the injection of adrenaline produce fibrinolytic activity in the blood of normal persons.

Both procedures have a similar effect on the blood picture, producing a lymphocytosis, a less marked thrombocytosis, and, later, a neutrophilia.

The addition of adrenaline, leucocytes, and platelets, separately or in combination, to normal blood in vitro does not produce fibrinolysis.

It seems probable that the fibrinolysis associated with exercise, fear, trauma, and some pathological states follows indirectly the stimulation of adrenaline secretion.

Fibrinolysis, indicating the activation of the proteolytic system of the blood, appears to be a component of the initial phase of the alarm reaction of Selye.

We wish to thank the willing and long-suffering volunteers who have submitted to many discomforts during these experiments. We are grateful to Dr. A. J. Shillitoe for help in collecting and examining blood samples. The general investigation of fibrinolysis is financed by the Medical Research Council.

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ANKYLOSING SPONDYLITIS

REVIEW OF 25 CASES

A. M. G. CAMPBELL

D.M. Oxf'd, M.R.C.P.

PHYSICIAN, BRISTOL ROYAL AND CITY HOSPITALS; ASSISTANT
PHYSICIAN, COSSEHAM HOSPITAL

ANKYLOSING spondylitis may come within the scope of the orthopaedic surgeon, the neurologist, or the general physician, and, being on the borderline of so many departments, is important in the differential diagnosis of many other diseases.

The disease is older than man himself, and there is evidence of it in mummified human skeletons and in bears and apes.

Von Bechterew (1893) discussed 5 cases which began with symptoms in the cervical spine and showed paresis of the limbs. Probably these neurological symptoms were really due to some other condition, such as pachymeningitis, since it is known that several of his patients were syphilitic. Strumpell (1897) and Marie (1898) described the better-known form of the disease starting in the lumbar spine. There is no justification for regarding the two types as being in any way distinct except in their site of onset. Since these classic accounts many papers have appeared on the subject, the most exhaustive review being that of Geilinger (1918).

Accounts of the pathology of the disease are very rare owing to the difficulty of obtaining necropsy material, but Freund (1942) has described his findings in a patient who died from another cause. He found connective tissue had spread from both the bone-marrow and the capsule into the joint space and attacked the cartilage by lacunar erosion. This replacement of cartilage might affect one or both articular surfaces. Fibrous or bony union ultimately took place, and the joint space disappeared. Within the joints various stages of inflammation were seen, the connective-tissue showing a round-cell infiltration and congested blood-vessels. Cartilage was replaced by fibrous tissue in the intervertebral disks, which ultimately ossified. This ossification was both protective and adapted to the more static function which the spine undertook as the inflammatory phase passed. No true degeneration of cartilage took place. The change from cartilage to fibrous tissue may be reversible, and bone, fibrous tissue, and cartilage may all be present together.

INCIDENCE

Fletcher (1944) considered this disease to be increasing. This has been my impression also, but it is difficult to prove, as the military Services contain a high proportion of the susceptible age-groups. Junghanns (1932) found, in 10,000 necropsies, 8 cases of ankylosing spondylitis. Hare (1940) found 6 cases in 1179 cases of rheumatic disease. In 1000 cases of rheumatic disease seen by me at a spa there were 12 cases, and among 1000 general medical outpatients there were 2 cases. The orthopaedic surgeon should see the highest percentage.

The following remarks refer to 25 cases seen by me: 7 in civilians and 18 in the Royal Air Force.

Sex-incidence.—In this series there are 24 male cases to 1 female, and this may be due to the much lower incidence of W.A.A.F. personnel. Buckley (1931) reports an incidence of 10 males to 1 female, and Swaim (1939) 4 males to 1 female. The sex-incidence is therefore predominantly male.

Age-incidence.—The third decade was the commonest age of incidence, but the first symptom is often manifested some years before the disease forces the patient to seek medical advice. The average age-incidence of this series is 22 years. Fletcher (1944) gives an age-incidence of 38.4 years in a civilian series, and this discrepancy is probably explained by the difference between civilian

and Service incidence. In this group the 7 civilians show a higher age-incidence by 8 years.

Familial Incidence.—Geilinger (1918) recorded three families in which more than one blood relation had contracted the disease, and Ray (1932) recorded the disease in identical twins. Two of my patients were identical twins who developed the disease in different countries at the same time. Another two were brothers. A fifth patient had a brother who had died from ankylosing spondylitis, and a sixth patient had an uncle and a brother with the disease. Payling Wright told me in 1945 that he knew of a father and son similarly affected. This family history is significant and is inadequately emphasised in the English literature.

There is no evidence of any *occupational incidence*.

REMOTE AND RECENT PRECEDING DISEASES AND HISTORY OF IRITIS

Iritis has long been associated with ankylosing spondylitis and other rheumatic diseases, but it is often overlooked. Teschendorf (1935) recorded 9 cases and suggested that all cases of iritis should have spine and pelvis radiographed. Fritz (1937) claims the association of iritis with spondylitis is found in 20% of cases, and the figure for my series is 24%. Blair (1942) suggested that a deficiency of sulphur might be a factor in this association, and cited as evidence the fact that cartilage, and ocular tissues contain a much higher content of chondroitin sulphuric acid than does any other tissue. The present view of iritis is that it is an inflammatory reaction to many non-specific infections. In my series, association was recorded with other diseases in a similar category: purpura, chronic lupus erythematosus, psoriasis, and nephritis. Edström (1940) had noted nephritis in his cases. More striking was the history of asthma and erythema nodosum in 2 of my cases (one of the two pairs of brothers).

Numerous infective conditions were found to precede more directly the spondylitic process—e.g., gonorrhœa, non-specific urethritis, tuberculosis, tonsillitis, and lung abscess. Some patients had a history of a fall, but these were too few to emphasise.

SIGNS AND SYMPTOMS

The onset of ankylosing spondylitis is insidious and in the early stages difficult to diagnose.

Stiffness of the Back.—The first symptom in most cases is stiffness of the back, with lack of mobility. The patient may notice that, where previously he was able to perform certain actions, he now finds increasing difficulty. An example of this was a medical student who noticed that his ability to play tennis was becoming impaired but only reported this symptom after seeing a case of ankylosing spondylitis demonstrated in the wards. Stiffness of the spine seriously interferes with any bending movements and sometimes with rotation and lateral movements of the neck. Cases show lack of mobility and spasm of the muscles of the back.

Joint Pains.—The second most important symptom is pain, which is later than limitation of movement. Usually as a result of involvement of the sacro-iliac joints, pain begins low in the back and is apt to pass down the back of both legs later; the pains may gradually spread up the entire spinal column. Rarely the disease may begin in the cervical spine.

Root Pains.—As the disease begins to involve the vertebræ, root pains begin to develop and are characteristic, radiating from the back round the abdomen and thorax. In the thoracic region these pains radiate along the intercostal nerves and are made worse by deep breathing and coughing. The patient finds that he has pain, limitation of movement, and a tight feeling in his chest, particularly when waking in the morning. On locomotion the spinal muscles often go into spasm; more rarely there are local tenderness and atrophy.

The head is usually carried forward and the chin depressed. No rheumatic nodules are found. Pains of this type in the lumbar region may be severe and will simulate chronic abdominal conditions, such as biliary and renal disease.

These are the three classic symptoms of ankylosing spondylitis; but, before passing on to the more general symptoms, it is perhaps best to mention the differential diagnosis of these symptoms. Taken together the stiffness and pain may be confused with: (1) conditions of the soft tissues, such as panniculitis and fibrositis, which arise in the lumbar region but are far less limiting of mobility, more easily treated by massage, and less chronic and insidious; (2) strains of the sacro-iliac joint, which usually follow trauma; and (3) sciatic neuritis.

Many cases of ankylosing spondylitis are thought to be suffering from sciatic neuritis because the pains due to the involvement of the sacro-iliac joints have led to the erroneous assumption that the sciatic nerve is involved. The differential diagnosis is made by careful neurological examination. Ankylosing spondylitis reveals no abnormal neurological physical signs, nor does stretching of the sciatic nerve cause pain. Other causes of low-back pain due to pelvic disease should rarely be mistaken for ankylosing spondylitis if an adequate urinary, rectal, and gynaecological examination is made. The root pains characteristic of this disease are accompanied by a great loss of mobility of the thorax, and this alone should be sufficient clue to the diagnosis. The chest expansion may be nil, and other diseases producing radicular pain, such as spinal-cord tumours and tabes dorsalis, can be excluded by neurological examination.

Finally, pain and immobility of the spine may be secondary to disease of the vertebral column, of which by far the most important to exclude are Pott's disease and osteomyelitis of the vertebrae. Pott's disease of the spine can simulate ankylosing spondylitis very closely, and the diagnosis can only be made more certain by early radiography and by finding tuberculous foci elsewhere. Osteomyelitis is usually much more acute and only rarely takes the form of a chronic abscess of the vertebrae. Paget's disease of the spine is diagnosed by radiography, and secondary carcinomatosis of bone should always be considered.

These three symptoms—stiffness, joint pains, and root pains—taken together are important in this disease, but other more general symptoms must be enumerated. Pyrexia and anorexia may be present, and ankylosing spondylitis must be considered in the diagnosis of pyrexia of unknown origin, particularly in tuberculosis, whether general or local, and in infective endocarditis. In neither of these diseases does one usually find the three main symptoms enumerated above. Lastly, other joints, apart from the sacro-iliac and spine, may be involved; the commonest of these are the shoulder and clavicular joints, the right shoulder being more commonly affected than the left.

When other joints become involved, the differential diagnosis from rheumatoid arthritis becomes important. In rheumatoid arthritis the peripheral joints are most involved; this is never so in ankylosing spondylitis. Rheumatic nodules are never found in ankylosing spondylitis but are present in rheumatoid disease. The older textbooks still associate spondylitis with gonorrhoea, an entirely erroneous generalisation, although gonorrhoea may precede the onset of spondylitis in a few cases. Gonococcal arthritis is an acute pyogenic arthritis, with acute inflammation of joints unlike the more chronic involvement in ankylosing spondylitis. Lastly, osteoarthritis of the spine in elderly persons is a degenerative disease which is easily differentiated by radiological evidence of osteophytic outgrowth and lipping of the vertebrae.

LABORATORY AND RADIOLOGICAL AIDS TO DIAGNOSIS

The most important investigation in suspected ankylosing spondylitis is *radiography* of the spine and pelvis. If radiography reveals obliteration of the sacro-iliac joints, or sclerotic change round these joints, an early case of the disease must be considered. As the disease progresses, the spinal ligaments begin to show patchy or complete ossification. Radiological changes in the hips and shoulder-joints arise very much later.

The *blood-sedimentation rate* is much raised during the active phase of the disease, and in one case an average of these readings over six weeks was 105 mm. in an hour (Westergren).

The *blood acid phosphatase* is also raised in certain cases, though in this series it was never more than twice the normal and never reached the high figures recorded in carcinomatosis of bone.

Robinson (1940) found that *tuberculin-sensitivity* tests were 30% higher in ankylosing spondylitis than in rheumatoid arthritis. Perry (1940a) showed that the antistreptolysin titre was normal.

The *blood picture* in this series showed a mild microcytic anaemia. In two cases an eosinophilia of over 5% was found, but one patient had been on service in India.

PROGNOSIS

The prognosis is surprisingly good, so long as longevity is concerned. Most patients die in the fifth decade. Death is usually from intercurrent infection, but the handicaps of immobility and pain make life a burden to the sufferer from ankylosing spondylitis. Much depends on the patient's psychological adaptation to his condition and the limitation it involves. The disease waxes and wanes for no reason and may suddenly flare into activity with over-exertion; realisation of this is most important in treatment.

TREATMENT

The treatment is unsatisfactory. We must, if possible, treat any antecedent disease or infection and clear any sepsis. Treatment of the disease is largely symptomatic. During the acute stages the patient must be completely rested in bed, and sometimes a plaster bed is useful. After the acute phase has subsided, re-education and moderate mobility must be attempted. Probably the most valuable treatment is that of deep X-ray therapy to the spine. This relieves the pain very satisfactorily, local irradiation appearing to be better than a general spread. Gold therapy is disappointing. Protein-shock treatment relieves the symptoms in the acute stages, and autogenous whole blood and intravenous T.A.B. have both been successful in certain cases. In conjunction with Wing-Commander A. G. Cross it was found in one case that whole-blood injections up to 15 c.cm. intramuscularly helped to improve both the iritis and the pain of the ankylosing spondylitis. Penicillin and sulphonamides are of no value. The patient is often under weight and debilitated and should receive a liberal and balanced diet.

These patients should be helped psychologically; the rigidity and peculiar carriage of the head make them very conscious of their disease and, like people with facial burns, they may tend to avoid society. Every effort must be made to make them forget their disability and lead a normal life. Too much sympathy and dependence must be avoided, and limited exercise in the quiescent phase encouraged. It has been suggested that patients who develop spondylitis are of an abnormal mental make-up. It is not fully realised that chronic illness of this type produces psychological reaction in the most stable temperament, and spondylitic patients are no exception. Breathing exercises are most important to counteract the fixation of the thorax. In the quiescent phase many patients continue active work, and one R.A.F. officer,

despite limited head movements, flew a Spitfire in the Battle of Britain.

Swimming and cycling are the most suitable exercises, and hydrotherapy is of use in re-education of the limbs.

DISCUSSION

The incidence of this disease in more than one member of a family is emphasised in this series, and this suggests there may be an inherent susceptibility to develop ankylosing spondylitis. The occurrence in identical twins suggests this, and, in the words of Perry (1940b) describing the incidence of acute rheumatism in identical twins, "there may be genetically determined differences in susceptibility but needing an environmental stress or strain for the disease to become manifest." It is considered that in ankylosing spondylitis the position is the same. The environmental stress is not specific, and there is a parallel in the development of thought about the aetiology of polyarteritis nodosa. The aetiology of the latter long remained obscure, and many infections were blamed in turn, such as gonorrhoea, syphilis, and rheumatic fever, but the work of Spiegel (1936) and Rich (1942) has proved that polyarteritis nodosa is due in some cases to an inherent or acquired local tissue hypersensitivity precipitated by widely differing antigens. There is also some parallel to the association between preceding infections and the onset of rheumatic fever and nephritis. An attempt has been made in this paper to link the association of such diseases with cases of ankylosing spondylitis. It is believed that many of these diseases are closely related.

It has been suggested that ankylosing spondylitis bears some relation to the metastasis of carcinoma of the prostate in the similar distribution of the lesions and the rise in the acid phosphatase. The dramatic effect of stilbestrol on the carcinomatous prostate suggests its trial in spondylitis.

In this series the acid phosphatase was never raised so high as in prostatic cancer, and this agrees with Buckley's (1945) suggestion that the rise is merely an index of osteoblastic activity. A similar rise is found in rickets. It cannot yet be said that no endocrine disturbance is present, but there is no satisfactory evidence of any imbalance. The predominance in males and the onset of the disease after puberty may be of significance. Ssamarin (1928) removed the parathyroids in one case, but without benefit to the patient.

SUMMARY

Twenty-five cases of ankylosing spondylitis are reviewed.

The aetiological factors of inheritance and environmental influences are discussed.

The incidence of other conditions of possible allergic aetiology, especially iritis, is emphasised.

In diagnosis the essential features are spinal stiffness, joint pain, and root pains. The differential diagnosis is discussed.

Methods of treatment are outlined, particularly the psychological management of the case.

It is considered that the most likely cause is an inherent susceptibility precipitated by some environmental stress. The evidence of possible endocrine factors is discussed.

My thanks are due to the D.G.M.S., R.A.F., for permission to publish this paper, and to orthopaedic specialists in the R.A.F. for referring cases to me.

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STABILISATION OF PENICILLIN SOLUTIONS WITH SODIUM CITRATE

L. HAHN

M.D. Prague

MEDICAL SUPERINTENDENT, U.N.R.R.A. GLYN HUGHES HOSPITAL, BELSEN, B.A.O.R.; LATE MEDICAL REGISTRAR, NUNEATON E.M.S. HOSPITAL

AQUEOUS solutions of penicillin retain their potency at room temperature for a limited period, the stability varying according to the constituents of the different manufactures. Hughes,¹ testing samples supplied by the Therapeutic Research Corporation (T.R.C.), found that the penicillin solution in distilled water remained stable for about seven days. Assays carried out with the same manufacture in our laboratory (T.R.C.330; 4 units per c.cm.) gave the following results: diameter of inhibition rings with the agar-cup method immediately 16 mm.; after twenty-four hours 13 mm.; after forty-eight hours 13 mm.; and after seventy-two hours 13 mm.

Pulvertaft and Yudkin² have shown that phosphate has a stabilising effect on the rate of destruction of penicillin by heat, and that the effect is not due to control of pH but to a specific action of the phosphate ion.

I here describe the stabilising effect on sodium penicillin of sodium citrate dissolved in physiological NaCl solution. This property was accidentally discovered when sodium citrate in 0.9% NaCl solution was used as control in experiments with penicillin and citrated blood and produced a remarkable stabilising effect on sodium penicillin. The stabilising effect is not due to any changes of pH. Sodium citrate proved to be less effective than the combination of sodium citrate and sodium chloride.

METHOD

Two batches of sodium penicillin—T.R.C.392 (containing 615 units per mg.) and 330 (units per mg. not specified)—were tested. One tablet containing sodium penicillin—10,000 units was dissolved in sterile distilled water to give a solution of "40" units per c.cm. This was dissolved 1:10 in the solution under test, thus providing "4" units per c.cm. For the individual assay 0.1 c.cm.—i.e., sodium penicillin 0.4 unit—was used.

The agar-cup method (Fleming) was applied with petri dishes of 11 and 17 cm. diameter and 27 and 50 c.cm. of nutrient agar respectively. The suspension of a 24-hour standard³ *Staph. aureus* agar culture, 0.1 c.cm. and 0.2 c.cm. respectively, was spread over the whole surface of the agar plate and, after 15 min. drying in the incubator, holes 9 mm. in diameter were punched. These cups were filled with 0.1 c.cm. of the penicillin solution under test, and the plates then incubated for fifteen hours. After incubation the diameters of the

- Hughes, K. E. A. Penicillin Therapy and Control in 21 Army Group, 1945, p. 327.
- Pulvertaft, R. J. V., Yudkin, J. *Lancet*, 1946, **ii**, 265.
- Characteristics of our *Staph. aureus* strain—(1) liquefaction of gelatin: after 3 days at 17°C; (2) haemolysis: after 24 hours at 37°C; (3) coagulation of plasma: positive; (4) agar colony: circular, orange, glistening; (5) mannitol: acid.

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rings of inhibition, minus 9 mm. representing the diameter of the cup, were compared. The solutions to be heated were kept in ampoules.

RESULTS

Destruction of Penicillin at 100° C in Citrate and Phosphate.—4 units of sodium penicillin dissolved in 1 c.cm. of a solution consisting of 1 part of M/5 sodium citrate and 4 parts of 0.9% NaCl solution, and 4 units of sodium penicillin dissolved in 1 c.cm. of M/15 phosphate were tested (1) immediately; (2) after heating at 100° C for 15 min.; and (3) after an hour's heating at 100° C in the water-bath. The rates of destruction of the penicillin solutions were as follows:

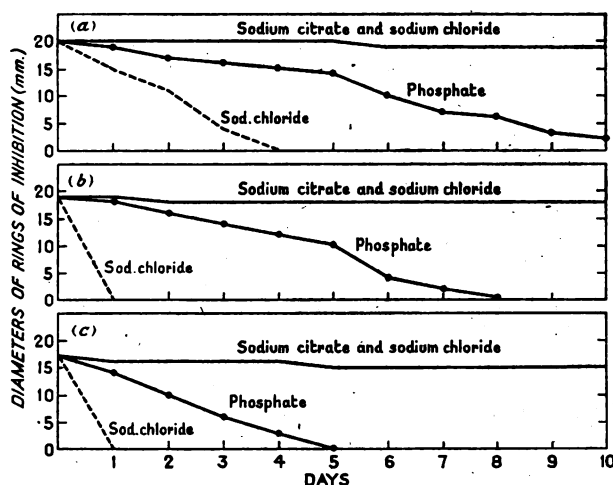
| | Diameter of Inhibition Ring (av. of 3 assays) in mm. | |
|-------------------------------|--|-----------|
| | Citrate-NaCl | Phosphate |
| Immediate.. .. | 19 | 19 |
| After heating for 15 min. . . | 18 | 16 |
| After heating for 1 hr. . . | 16 | 0 |

It will be seen that under the conditions used in this assay the stabilising effect of citrate-NaCl is greater than that of phosphate.

Rate of Destruction of Penicillin in Salt and Blood Mixtures at 37° C.—Samples of various penicillin-salt mixtures, each containing 4 units per c.cm., were kept in test-tubes at 37° C in the incubator for various periods. Complete sterility was assured in all experiments as proved by controls. The results for (1) a solution of 1 part of M/5 sodium citrate and 4 parts of 0.9% NaCl; (2) 0.9% NaCl; (3) M/15 phosphate; and (4) blood 4 parts and sodium citrate 1 part were as follows:

| Hours | Diameter of Inhibition Ring (av. of 3 assays) in mm. | | | |
|-------|--|------|-----------|---------------|
| | Citrate-NaCl | NaCl | Phosphate | Blood+citrate |
| 0 | 18 | 19 | 18 | 18 |
| 12 | 18 | 7 | 14 | 10 |
| 24 | 18 | 6 | 14 | 10 |
| 48 | 18 | 0 | 12 | 6 |
| 72 | 18 | 0 | 12 | 5 |

It will be noted that the loss of potency of the penicillin solutions after three days was 0 for the citrate-NaCl



Rates of destruction of penicillin in different concentrations at body temperature: (a) 3 units per c.cm.; (b) 2 units per c.cm.; (c) 1 unit per c.cm.

Assays with Various Penicillin Concentrations.—To ascertain whether changes of penicillin concentration influenced the results, assays were carried out with 1, 2, and 3 units of sodium penicillin per c.cm. of the salt mixtures. T.R.C.330 was used. The mixtures tested were (1) sodium citrate M/5 1 part, 0.9% NaCl solution 4 parts, pH 7.0; (2) 0.9% NaCl solution, pH 6.2; and (3) M/15 phosphate, pH 7.0; 1, 2, and 3 units of sodium penicillin were tested separately in each solution. The accompanying figure illustrates the rate of destruction of the penicillin solutions at 37° C.

Effects of Citrate Concentration on Stability of Penicillin.—In an attempt to find the optimal concentration of citrate effecting stabilisation of penicillin, various fractions of molar citrate solutions were tested. The following table gives the results obtained with M/1, M/5, M/10, M/20, M/50, and M/100 citrate solutions combined with 0.9% NaCl solution.

DIAMETERS OF INHIBITION RINGS (MM.) OBTAINED AFTER STORAGE FOR 0-10 DAYS AT ROOM TEMPERATURE

| Days | 1 unit of penicillin sodium dissolved in 0.9% NaCl solution with sodium citrate in concentrations of: | | | | | | |
|------|---|-----|------|------|------|-------|------|
| | M/1 | M/5 | M/10 | M/20 | M/50 | M/100 | None |
| 0 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| 1 | 15 | 15 | 15 | 15 | 15 | 15 | 0 |
| 2 | 15 | 15 | 15 | 15 | 15 | 15 | 0 |
| 5 | 13 | 14 | 14 | 14 | 14 | 14 | 0 |
| 10 | 12 | 13 | 13 | 13 | 13 | 13 | 0 |

mixture, whereas in saline the bacteriostatic level of the penicillin rapidly declined.

Stability of Penicillin-salt Mixtures after Heating at 100° C.—Samples containing 4 units of sodium penicillin T.R.C.330 per c.cm. dissolved in citrate-NaCl and phosphate M/15 were filled in ampoules and sterilised at 100° C for 10 min. The effect on the stability, the ampoules then having been kept at room temperature, was as follows:

| Days | Diameter of Inhibition Ring (av. of 3 assays) in mm. | |
|------|--|-----------|
| | Citrate-NaCl | Phosphate |
| 0 | 20 | 21 |
| 4 | 20 | 19 |
| 8 | 19 | 17 |
| 13 | 18 | 15 |
| 23 | 18 | 14 |

It will be seen that, in accordance with the findings of Pulvertaft and Yudkin,² penicillin-phosphate solutions tolerated sterilisation without a considerable loss of potency. In citrate-NaCl solution the loss of activity was very small, even after twenty-three days.

The table shows that there was no correlation between the concentration of the citrate ion and its stabilising effect on sodium penicillin within the limits of this experiment. But further observations using 0.9% NaCl and sodium-citrate concentrations ranging from M/200 to M/1000 showed that an optimal stabilising effect was produced by concentrations of M/300 to M/400. After heating at 100° C for 30 minutes, solutions of sodium penicillin containing 5 units per c.cm. were then found to have retained 84% of their potency. The effect of such lower molar concentrations on the stability of penicillin solutions at room temperature is being followed up. It would be tempting to correlate the effect with the Ca or Mg ion; but only one manufacture could be used for the experiments, and the impurities and their amounts are unknown, so any such attempt would be futile.

PRACTICAL APPLICATIONS

It appears that sodium citrate combined with 0.9% NaCl solution has a considerable stabilising effect on sodium-penicillin solutions, and this effect is much greater than that of phosphate as described by Pulvertaft and Yudkin.² It is thus possible, by using sodium citrate in saline as solvent, to preserve penicillin solutions at room temperature for long periods. Such solutions can be sterilised by boiling them for 10 min. and kept stable at room temperature in ampoules so prepared.

SUMMARY

A mixture of sodium citrate in concentrations of M/1 to M/100 and sodium chloride 0.9% in the proportion of 1 : 4 stabilises sodium-penicillin solutions at 100° C and

at room temperature. Preliminary work suggests that, with penicillin-sodium solutions up to 5 units per c.cm., an optimal stabilising effect is produced with sodium-citrate concentrations of $M/300$ to $M/400$.

The stabilising effect of this saline-citrate mixture exceeds that of phosphate.

I am indebted to Mr. W. Kaufmann, technical assistant to the Glyn Hughes Hospital, for his coöperation and practical help.

GENERALISED SKIN SENSITIVITY FOLLOWING LOCAL APPLICATION OF ACRIFLAVINE

REPORT OF A CASE

J. MARTIN BEARE
M.D. Belf.

LATE SURGEON-LIEUTENANT R.N.V.R.

GENERALISED dermatitis following local application of acriflavine is not common; and, since the acridine group of drugs* is among those most commonly used for surface antiseptics, it is of interest to record a case. The subject is of topical interest, too, because within the past year attention has been drawn to local sensitisation to acriflavine. According to MacKenna (1946): "Acriflavine seems no longer to be the innocuous remedy which it was generally supposed to be."

A Royal Naval rating, aged 39, reported on Sept. 14, 1945, with a small superficial ulcer, about the size of a shilling, on the anterior aspect of the lower third of the left leg, which had been knocked a few days previously. He had had no previous skin disease and no previous sulphonamide or flavine therapy. There were no varicose veins present. He was treated twice daily with sulphanylamide powder and gauze soaked in 1/1000 acriflavine in arachis oil over the powder until Oct. 1.

Sept. 24: he had a fleeting, roseolar, and very irritating rash on the trunk and upper parts of the arms and legs. This rash faded within a few hours, but its significance was not appreciated at the time.

Oct. 1: daily application of Castellani's paint was prescribed.

Oct. 8: there being no change in the ulcer, it was decided to try sterile lint under an elastic plaster dressing and leave undisturbed for four days.

Oct. 12: there being still no change in the ulcer patient was put to bed, with the leg raised and splinted, and the ulcer was cleaned with soap and water, and penicillin cream was applied every four hours.

Oct. 21: pus was forming, and dressing was changed to gauze soaked in 1/1000 aqueous solution of acriflavine.

Oct. 26: still no change; dressing changed to sulphathiazole paste.

Oct. 27: signs of acute local sensitisation dermatitis, with vesiculation, redness, and swelling, which was thought to be due to the sulphathiazole paste. Treatment was immediately changed to 1/1000 acriflavine in arachis oil. Next day patient had acute eczematous dermatitis of the whole of the left lower leg. Acriflavine was discontinued, and soft paraffin on sterile gauze was applied.

Nov. 6: suddenly, within a few hours, patient developed a temperature of 102° F, with much constitutional disturbance and a generalised roseolar erythema, affecting the whole body but most marked on the trunk.

Nov. 9: generalised desquamation took place, and the temperature dropped to normal, but a weeping dermatitis remained on both legs and the sides of the head.

Apart from a few relapses, which were less severe than the original eruption, patient gradually improved with various local applications, such as calamine lotion, calamine cream, &c., until Dec. 13, when the skin was normal, except on the left leg, which was still very red below the knee. The ulcer had healed. Throughout the illness the nails and hair remained unaffected.

Nov. 25: skin tests were made with sulphanylamide, sulphapyridine, sulphathiazole, and sulphadiazine powders, each suspended in a small amount of water, sulphathiazole

paste, and arachis oil, since it was thought that the condition was probably a sensitisation reaction to a sulphonamide.

Nov. 27: there being still no reaction, the skin tests were repeated, with, additionally, gauze soaked in 1/1000 acriflavine from the stock bottle included among the test substances. Through each of the test drugs a small scratch was made. Next day there was a vesicular eruption where the acriflavine had been applied. This subsided within two days. There were no reactions to any of the other test substances.

Nov. 28: white-cell counts, including differential counts, were within normal limits. There was no suggestion of eosinophilia.

The rating was last seen on Jan 9, 1946, feeling fit, and with no sign of abnormality of the skin.

DISCUSSION

Most of the published work relating to the toxic effects of the acridine drugs refers only to liver damage following intravenous administration in the treatment of gonorrhoea 15–20 years ago (Cullinan 1931, Birch 1931, Heathcote and Urquhart 1930, Davis 1924, Davis and Sharpe 1932, Melaney and Zau 1925). The liver damage was of the same type as that which arises after the parenteral administration of other drugs, such as arsenic and insulin. Other authors have, however, claimed that acriflavine does not commonly cause liver damage when given intravenously (Hanschell 1931, Simpson 1931). The explanation of this difference of opinion probably lies in the now widely accepted theory that infective hepatitis, developing in patients receiving injections of any kind, is due to contamination of the syringe and/or needles, transmission of the organisms responsible for the disease from patient to patient taking place in this way (Bigger 1943, Beattie and Marshall 1944, Salaman et al. 1944, Sheehan 1944, Witts 1945).

Dermatitis of parts of the body exposed to sunlight, after intravenous acriflavine, has been recorded (Assinder 1936, Fessler 1942), but there seem to be few reports of dermatitis following the local application of the acridine drugs—the only example I could find was that of Young and Hawking (1938), who described local acriflavine dermatitis in an Indian patient. These writers said they could find no other reference to such sensitivity, and Browning (1943) remarks that "toxic damage in man from acriflavine or proflavine absorbed from wounds has not occurred. Skin idiosyncrasy has been met with, though very rarely."

In the present case a fleeting rash appeared after ten days' local acriflavine therapy, and the rash disappeared in a few hours, though treatment was unaltered. At that time the rash was considered irrelevant. When, however, acriflavine was applied for the second time, the local lesion slowly improved, but after seven days signs of sensitivity suddenly appeared on the leg. Then, though the acriflavine dressings were changed to sterile dressings of soft paraffin on gauze, generalised dermatitis developed ten days later.

I wish to thank Dr. I. H. McCaw, Dr. F. F. Kane, and Dr. R. Hall for their interest and help in the preparation of these notes; Miss M. Hislop for her skilled typing; and the Medical Director General of the Royal Navy for permission to publish.

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* Mepacrine, which is the dehydrochloride of a synthetic acridine derivative, is not considered in this report.

Medical Societies

ROYAL MEDICO-PSYCHOLOGICAL ASSOCIATION

THE paper-reading session of the association's quarterly meeting was held on Feb. 21, with Prof. D. K. HENDERSON, the president, in the chair.

Psychiatry and the Population Problem

Dr. C. P. BLACKER indicated the importance of adequate records; it was not difficult, he said, to secure accurate demographic data, such as numbers of brothers, sisters, and children, duration of marriage, and consanguinity of parents. This information would provide material for research and could also be used administratively, for example in forecasting probable requirements for institutional beds, allowance being made for the effect of the ageing of the population. He considered that statistical records should not be too rigidly centralised, but should be available in the various regions, where they would stimulate research.

SURVEY OF SUBNORMAL TYPES

Mr. R. CARADOC JONES discussed a survey carried out some years ago in the Merseyside area. The numbers studied were large, and a control sample of normal working-class families was also investigated; so thoroughly was the social work done that 93% of the sample cooperated. The striking finding was the regular association of higher fertility with every kind of social inefficiency observed. Thus while the average number of living children in the normal working-class families was 3.38, the average number amongst families containing a mentally defective child was 4.69. The difference would have been even greater but for the effect of differential mortality, for while in the normal families an average of 0.74 children had died, in those containing a mentally defective child the mean number of deaths was 2.47. While families containing a socially inefficient child had a higher fertility than the controls, the highest fertility of any group investigated was in the families containing a delinquent child. The data revealed clearly the difference between high-grade and low-grade mental deficiency, the former tending to come from lower social classes; and although few of the parents were classified as mentally defective many of the parents were mentally "subnormal." Another comparison showed that while 39% of the heads of normal families were graded as unskilled labourers, 63% of fathers of children attending special schools fell into this category. Amongst those unemployed for 2 years or more, and among the chronically destitute, 90% were married, compared with 74% in the normal working-class sample. Mr. Caradoc Jones concluded that, broadly speaking, low intelligence of parents is associated with high fertility and defects of all kinds amongst the children.

HIGH-GRADE DEFICIENCY AND DIFFERENTIAL FERTILITY

Dr. J. A. FRASER ROBERTS described the distinction between high-grade and low-grade defectives. The latter are the dwarfs of mental stature owing their condition to a variety of special causes, some genetic, some environmental, while the former are no more than the tail-end of the normal curve. The dividing line between mental deficiency and dullness is purely arbitrary. Mental deficiency cannot be equated to the Binet intelligence quotient (I.Q.), though of course the relationship is close. There is a level below which care and control are practically inevitable; above this is a wide band in which the need for care depends on social maladjustment coupled with intellectual retardation; of these two factors, the I.Q. level can be studied the more easily. In a survey of school-children carried out at Bath before the war it was found that the brightest 4% had an average of 1.70 living sibs, the median 4% had 2.78, and the dullest 8% had 3.72; when allowance was made for uncompleted families the figures became respectively 1.95, 3.54, and 5.03. These results illustrate the typical linear relation between intelligence and number of sibs, the latter falling steadily as the former increases. Although on the average the lower the parents' intelligence the lower is that of their children, actually the bulk of children with I.Q.'s below 70 come from the dull and

backward since these are so much more numerous than those with I.Q.'s below this level. Such observations permit an indirect estimate of the expected fall in the mean intelligence of the population; on the data quoted, after allowance for additional factors, this amounts to nearly 3 points of Binet I.Q. per generation. This estimate is, as Sir Cyril Burt lately suggested, too high; but even a fall of 1.5 points would mean an increase in the frequency of those with I.Q.'s below 70 from 2.1% in 1950 to 3.3% in the year 2000, with a corresponding loss of the very gifted. The discrepancy between the indirect estimate of the decline and what Professor Burt has called the direct evidence may be due to several factors, which may also affect in other ways the estimates of very low I.Q.'s in future years. First of these factors is the influence on intelligence of the mother's age or the order in the family; if this influence were large it would account for a considerable exaggeration of the estimated decline. Secondly, greater mobility has meant that people marry those less closely related to them. If genes making for higher intelligence happened to be more usually dominant, then the average intelligence of the population would rise; this would not represent a real gain of good genes but simply their arrangement in a more useful order. Thirdly, mobility helps people to find mates more like themselves, particularly in regard to intelligence. The result is to increase variability; while the average for the population is not changed, there are more very bright and more very dull, so that the expected numbers of I.Q.'s below 70 will be increased, though there will be compensation at the other extreme. Finally, a relatively low intelligence, if coupled with emotional and temperamental stability, may be compatible with a useful place in society. Although the frequency of low intelligence is likely to increase substantially, there may, owing to advances in knowledge, be no such corresponding increase in those requiring care, supervision, and control.

DISCUSSION

Several speakers, while admitting that it was difficult to advance precise arguments for optimism, expressed confidence that counterbalancing forces would avert the threatened decline. Dr. E. O. LEWIS felt that it might be the cultural component in test-results which was specially concerned. Dr. T. A. H. MUNRO, however, held that if it was admitted that the dull were more fertile and intelligence was to some extent inherited, then at least some decline was inevitable; he reinforced Dr. Blacker's plea for better statistics of mental disease. Dr. W. G. MASEFIELD asked whether differential fertility had not been operating for a long time; if so, must not all the Elizabethans have been geniuses?

In reply, Dr. ROBERTS said that while it was probable that differential fertility had operated for a long time, until the decline in the European birth-rate about 1870 it was on a much smaller scale and might have been more than neutralised by differential mortality amongst the young. It was probably only since family limitation became so widely practised by the more intelligent that the process had assumed its present alarming proportions.

"... The maintenance of intellectual integrity, the defence of intellectual liberty, the cultivation of strict veracity and methods of precision, the sharing of new knowledge, the obligation to publish important findings and to include essential references, and the recognition of priority where priority is due—all these are a part of the discipline, in an ethical regard, which men of science observe. . . . In common with other men of science, doctors must shortly decide whether they are willing to comply with Governmental insistence on secrecy in fundamental researches . . . [and] whether they are willing to accept a similar demand for secrecy . . . by industrialists engaged in the production of things necessary to medicine and human welfare. Of intellectual standards, the Hippocratic injunction states succinctly: 'One must occupy oneself with facts persistently' (*Precepts*), and 'There are, in fact, two things, science and opinion; the former begets knowledge, the latter ignorance' (*Law*). As a reminder for the teaching of the clinical schools the latter sentence might suitably be inscribed above the portals of each ward and lecture-room."—Prof. J. A. RYLE, *Brit. med. Stud. J.* Spring Term, 1947, p. 3.

Reviews of Books

Child Treatment and the Therapy of Play

LYDIA JACKSON, B.Sc.; KATHLEEN M. TODD, M.B.,
D.F.M. Introduction by Emanuel Miller, F.R.C.P. London:
Methuen. Pp. 110. 8s. 6d.

A BOOK on play therapy has long been overdue, but here is one describing the rôle of play in the treatment of problem children, rather than a work on the technique of play therapy. The authors plead for a wider use of common-sense ways of adjusting family life; and the connexion between maladjusted parents and unhappy children is clearly shown. Play in children can serve as an outlet for the "reactive-personality" produced in the child—reactive, that is, to environmental difficulties and to emotional strain, whether applied from without or developing within. Regressive play, obsessional behaviour, and the typical hyperactive and scattered play of the unstable child are signs of conflict. Play as treatment may be a cathartic for disturbed emotions; or the child may relive, with the therapist, earlier experiences which have lacked a sense of fulfilment. The rôle of the therapist is indicated, but no clear directions are given on methods of dealing with some of the situations; and though to use description rather than interpretation is to avoid dogma, it makes the book a little dull in places.

Le bacille de Koch dans la lésion tuberculeuse du poumon

G. CANETTI, chef de laboratoire à l'Hôpital Cochin; assistant à l'Institut Pasteur. Orleans: Flammarion. Pp. 168.

L'allergie tuberculeuse chez l'homme

G. CANETTI. Orleans: Flammarion. Pp. 338.

THESE two works together form a treatise on the pathogenesis of the tuberculous lesion, one volume dealing with the lesion, the other with the immunological reaction. Dr. Canetti has not had access to some of the new work published since 1940, and this has deprived him of the help of Prof. Arnold Rich's monumental work which appeared in America in 1944 and covers much of the ground in greater detail. Nevertheless, he is well read in his subject, and has studied primitive tuberculosis extensively in Cochin, where he was head of the hospital laboratory service. He makes a valuable contribution to this neglected aspect of the subject.

In the first book he sets out to study the *Mycobacterium tuberculosis* in its setting in the pulmonary lesions, claiming with justice that much of the work on the pathology of tuberculosis in the past has been one-sided—a study either of the bacillus or of the lesion. His work is based on the investigation of 1500 necropsies on cases of pulmonary tuberculosis, supported by sections of the experimental lesion; and he sets out the therapeutic implications of these studies. He appears to regard caseation as the key to the evolution of the tuberculous lesion, following Huebschmann in placing it early in development, immediately after exudation and before the cellular phase or follicular reaction; but he does not deny that caseation may also follow the latter, as postulated by most pathologists.

He uses an interesting new technique, estimating the number of bacilli per field of the microscope in stained sections—the method which Gaffky first applied to the direct film examination of sputum. By means of a large series of such bacterial section counts he has determined the relative number of bacilli in the different types of lesion. In sclerotic areas the number was extremely small, while in liquefying caseous areas the bacilli were uncountable; in areas of solid caseation, however, they were relatively scarce. A series of cultures were also made to compare the number of viable bacilli with the total of acid-fast organisms counted in the sections with this technique. There are, of course, obvious difficulties in an investigation of this nature and a generous allowance must be made for unavoidable errors, but they are probably of the same order in most instances.

The differences noted in the various types of lesion—follicular, caseous, fibrocaceous, sclerotic, and cavernous—lead on to a discussion on the relative immunological value of these lesions. The caseous lesion is the critical one, and this is discussed at some length. Whatever the biochemical factors which enter into its production, it is regarded as an outward and visible sign of hypersensitivity.

In the second book he follows accepted views in recognising that allergy and anaphylaxis constitute different reactions; and he is concerned, of course, with the former. More than half the work is devoted to an account of allergy as seen in the tuberculin reactions obtained in 4600 patients tested.

The results are classified to show the differences of age, sex, and nutritional state. In latent tuberculosis, graphs are reproduced to show that the percentage of negative reactors steadily declines from the 15–20 to the 40–50 age-groups, and then rises again to the 70–80 group. Strongly positive reactions are more common in women than in men at all ages. Poorly nourished subjects tend also to give stronger reactions. An interesting comparison is also made between the positive reactions of different clinical types of tuberculosis, and the results are classified in three groups. The strongest positive reactions are found in the cases of cutaneous, lymph-gland, and osseous tuberculosis, and the feeblest in peritoneal, pleural, and genito-urinary types of the disease. Between these two groups is an intermediate one comprising the various stages of pulmonary tuberculosis.

A section on the relatively new Von Groer technique of allergometry with tuberculin shows that pleoergy is the general rule in cases with good resistance and pleoesthesia in patients with advancing disease. The last three chapters of the book deal with the mechanism of tuberculous allergy and its relation to the clinical progress of the disease and to immunity, and here Dr. Canetti's long and critical analysis of Ranke's three stages is telling. That theory was always too facile, and the author sets forth its defects in full.

Anesthesia in General Practice

STUART C. CULLEN, M.D., head of division of anesthesiology, department of surgery, State University of Iowa Hospitals. Chicago: Year Book Publishers. London: H. K. Lewis. Pp. 260. 19s. 6d.

THERE are now many textbooks on anaesthetics. Some cater for the D.A. candidate: material well systematised, text comprehensive, facts stated concisely. Others are written for the undergraduate, giving him a grounding in the simple fundamentals of the subject. Dr. Cullen's book will appeal to both: it is accurate and scholarly, if not comprehensive, and it deals with fundamentals, if perhaps not very simply. In his choice of topics he has the needs of the occasional anaesthetist in view. He writes well on airway, inhalation agents and technique, spinal anaesthesia, shock, pre- and post-operative treatment, regional anaesthesia, oxygen therapy, and explosions. He also discusses the use of curare, in which he has a great personal interest. This drug, though at present beyond the scope of the general practitioner, is now in the spotlight of publicity, and its inclusion in the book is welcome.

Diseases of Blood-forming Organs

in the light of Biopsies of Marrow, Spleen and Lymph-nodes. Dr. JULIAN ALEKSANDROWICZ. Cracow: Friedlein. Pp. 265.

IN this Polish monograph are set out the author's views on the anatomically connected but functionally separate myeloid, lymphoid, and reticular tissues. He studied them, in health and disease, by simultaneous biopsies of marrow, spleen, and lymph-glands, and he has heterodox and interesting ideas on the classification of the various blood and tissue cells belonging to these three groups. He places plasma cells with monocytes in the reticular group, and myeloma he classifies as "plasmocytic reticulosis." Ferrata cells he regards as matured reticulum cells. He has some experiments to show that the production of megalocytic red cells depends on physicochemical plasma factors like heparin concentration and carbon-dioxide partial pressure, and not only on the presence of megaloblastic erythropoiesis. The illustrations, both coloured and monochrome, are not very clear and sometimes inaccurate. This book was produced under difficulties during the German occupation, and we hope that, now conditions are easier, the author will publish a summary of his ideas in French or English.

Messrs. Kegan Paul inform us that the price of O. Fenichel's *PSYCHO-ANALYTIC THEORY OF THE NEUROSES* (*Lancet*, March 22, p. 372) has been altered to 40s.

THE LANCET

LONDON: SATURDAY, MARCH 29, 1947

Social Pathology

To the universities it must be both flattering and frightening that in an unstable society so many of the pioneers and the planners turn to them for help. The help asked is seldom just guidance or information: more often the universities are desired to do a job themselves or train the workers for it; and always the implication is that they are more competent or more disinterested than anyone else.

In his address on March 6, as principal guest at the centenary meeting of the New York Academy of Medicine, Prof. J. A. RYLE, of Oxford, put the case for the academic status of social medicine. He drew a pattern of analogies between individual medicine and individual pathology on the one hand, and social medicine and social pathology on the other—meaning by social pathology the study of the relation between social conditions and individual disease. Tracing the development of social pathology, from FARR and CHADWICK forward through the achievements of public health and sanitary science, he showed that its methods are observational and latterly in some degree experimental: in observation it uses statistics and planned sociomedical surveys; in experiment it can sometimes study comparable groups of people in partially controlled conditions, as when half a slum population is rehoused on an estate and its health deteriorates because the food it can afford is less. "Individual pathology deals with the quality and effects of diseases, and, in practice, assists diagnosis and treatment, while social pathology deals with the quantity and cause of diseases, and, in practice, assists prevention." Individual pathology is well ensconced within the four walls of the medical school-cum-hospital, but social pathology has hitherto been pursued by the public-health departments or by special institutes, remote in space and often in spirit from university and hospital life.

For two sets of reasons it is now desirable, in RYLE's opinion, that social pathology should come into the university group. In the first place, its own outlook is changing. Its interest is expanding beyond the old concern with infectious diseases and the mechanical environment of man. It now considers all the effects of community life on the health of the individual—nutrition in its various aspects, economic circumstance, educational influences, and the whole psychological pattern of human relationships. These, it finds, act very differently on different individuals; they show much less uniformity of effect than do contaminated water-supplies or epidemics of small-pox. Social pathology can no longer treat its human material as all of a kind; simple arithmetic gives place to complicated statistics, and even these are inadequate. Social pathology must therefore sit down alongside the physicians who study individual patients, the almoners and social workers who study their homes and families, and the psychologists who have some faint clue to the complex of emotional relationships involved.

In the second place, the outlook of social pathology is needed within the medical school as a corrective to the narrowing tendency of hospital medicine. Wards full of patients admitted because their diseases are dangerous to life, difficult to diagnose, or merely interesting through their rarity: these are the stuff of medicine to the student and the teaching physician. Superimpose that selection on the mass of handicapping disease in the community: the peptic ulcers, the rheumatic diseases, the upper respiratory infections—and they scarcely overlap. What too does the ward know of the domestic upset that has resulted from, or has brought about, the illnesses that it does study? How little the specialist physicians, in contrast with the general practitioners, are acquainted with the lives their patients lead and the places where they lead them! The student's perspective is distorted in the ward atmosphere of intensive, largely mechanical, investigation, in which the minutiae and the rarities of disease receive so much attention, and its human significance so little. True, the latter is all too evident when the student reaches practice; but by that time his mind is cast in the mould his teachers have given it, and a cardiac murmur will always seem to him more important than an over-possessive mother. RYLE sees the hope that the organised study of social pathology, introduced into the curriculum and into the teaching hospitals, will give a broader and more humanistic outlook to the emerging doctors, and fit them better for their important rôle in a changing society.

That is, in outline, his main thesis; and with his aim we are in full sympathy. The importance of the opportunity that the new era offers to medicine cannot be exaggerated; and "new era" is not too big a term, for the whole structure and working of society is changing under our eyes with bewildering speed. Yet our faith is that the new society must still serve, not rule, the development of the individual—his health in the fullest sense. The doctor is his adviser in this matter, and the doctor must also become society's adviser in the same matter. Hence the need for an altered emphasis in the doctor's training. Of the method of securing the alteration, however, we are less sure. RYLE seems to picture public health, with a new inspiration, entering and reforming the medical school. But, if we read him aright, it is still the health of the individual which is paramount, though now to be studied against a wider background; and if so the task is surely for those to whom the individual has always been the focus of interest. Should not social "pathology" and social medicine grow out of hospital medicine rather than from traditional public health? They will no doubt require some of the public-health techniques, such as field studies and the application of statistics; but, unless the new development is based on the physician's training and the physician's prime concern for the individual patient, it will be in danger of serving a wrong philosophy, of becoming a science of herd management. Here we set store by RYLE's own example. His friends rebuked him for leaving the clinical fold. He replied, "I have merely taken the necessary steps to enlarge my field of vision and to increase my opportunities of ætiological study. My allegiance to human medicine is no whit broken." There must be many younger physicians willing to

follow that lead, especially in the freer atmosphere which they can hope to find in the new health service. To them we look, in collaboration with their expert colleagues in public-health departments and in laboratories, to play a major part in adapting the study and teaching of medicine to the needs of an industrial society.

Source of the Red Cells

PRESENT ideas on the origin of the red blood cells are still based on the work of DOAN, CUNNINGHAM, and SABIN¹ published twenty-two years ago. They depleted the bone-marrow of pigeons by feeding them on a poor diet, and of rabbits by injecting emulsions of typhoid bacilli, and then watched the regeneration process. They found that the first phase of the red cell arises by division from the endothelium of the intersinusoidal capillaries—the small blood-vessels connecting the larger sinuses that make up the vascular system of the marrow in birds and mammals. From this first generation, hæmoglobinated erythroblasts arise by mitosis and development of hæmoglobin in the cytoplasm; and these cells, pushing into the capillary cavity, dilate its lumen and stretch its wall. The capillary all this time remains closed, and DOAN did not think that it normally opens to the circulation until the nuclei of the erythroblasts have disappeared and the red cells are mature; NIZET,² however, has recently produced evidence that red cells are discharged from the marrow in the reticulocyte stage and finally ripen in the circulating blood. In hyperplastic marrows, when there is an exceptional demand for red cells, the capillaries open before the red cells reach the reticulocyte stage, and then erythroblasts at various stages of development are swept into the blood-stream. Unfortunately, DOAN and his co-workers used a technique that was not really adapted for the differentiation of stages of erythropoiesis, since this depends on nuclear rather than cytoplasmic changes. Worse still, they used the name "megaloblast" for the first phase of normal red-cell development, forgetting that this name had been used in Europe since EHRLICH's time for a pathological cell found in pernicious anæmia; so when DOAN's ideas were applied to human pathology they led to a serious confusion which affects some American writings to this day. This confusion has obscured the fundamental value of DOAN's observations on the intravascular development of the red cells.

Since 1925 others have entered the field and proposed other modes of development. Some say that the lymphocyte can transform itself into an erythrocyte. DURAN-JORDA³ maintains that the red cell is a product of cellular secretion; at first he thought that the plasma cell disintegrates to form a red cell, and the nuclear remnant, with a halo of cytoplasm, becomes the normoblast. Later⁴ he propounded an alternative theory that red cells are formed from the granules of the polymorphonuclear eosinophil leucocyte; the cell increases in size, develops about 200 red corpuscles in the cytoplasm, expels them, and ends up as a lymphocyte. These views have

not so far been confirmed, and the last is open to the objection that degenerating cell forms were being observed. WADJA⁵ has described changes in muscle fibres degenerating after injury which suggest that in the injured fibre the sarcomeres become transformed into erythrocytes; the fibre is changed, in effect, into a red-cell-containing capillary. WADJA does not suggest that this is the sole source of the red cells, but proposes muscle as an additional source, and quotes some interesting parallels from comparative anatomy. These observations are purely cytological, but, since injured muscle is involved, it should be possible to devise a means of obtaining and counting the red cells formed in this way. Both DURAN-JORDA and WADJA lay stress on the difficulty of explaining the fate of the nucleus of the normoblast; FIESCHI and ASTALDI,⁶ watching the process in vitro, have shown that it is got rid of by expulsion, fragmentation, or lysis, expulsion being the usual method.

It cannot be said that any of these theories offers a serious challenge to the accepted view that the bone-marrow throughout the body is the source of the red cells. No-one who reads the history of medicine would denounce them off-hand because they seem bizarre, but they clearly need more confirmation—why, for instance, does muscle-tissue hæmopoiesis not appear when the bone-marrow fails, and why does extramedullary hæmopoiesis, when it occurs, favour other tissues? Still, they remind us that the subject, like many others in medicine, is still open. We hope that new information will be sought along physiological lines, or by studying cytological changes paralleled by changes of function; no-one wants to see a return to the sterile morphological controversy that makes up so much of the German writings on this subject.

German Drugs

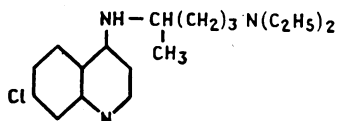
UP to about 1936 most of the new synthetic drugs were a product of German chemical skill and pharmacological enterprise. For many years it seemed hopeless for British science or industry to compete in this field. But since 1936 the tables have been turned and the chief advances have come from Britain or America. The military occupation of Germany has enabled us to examine the inner working of the once admired and feared German pharmaceutical industry and to study its methods and secrets; the results of these investigations have been published in a series of reports by the British and Combined Intelligence Objectives Subcommittees (BIOS and CIOS).⁷ The picture gained from these reports is somewhat unexpected. German chemotherapy, which once led the world, is now lagging behind in some important respects. Speaking generally, the work of the synthetic organic chemists has been of a very high order, but their new compounds have been much fewer than propaganda had led us to believe; the biological testing of these new compounds in the laboratory has been adequate, though it has not kept up with recent advances in Britain and the United States; the clinical testing of products found active

1. Doan, C. A.; Cunningham, R. S., Sabin, F. R. *Contr. Embryol. Carnegie, Instn.*, 1925, 16, 163.
2. Nizet, A. *Quart. J. exp. Physiol.* 1947, 34, 43.
3. Duran-Jorda, F. *Lancet*, 1943, i, 514.
4. *Ibid.*, 1943, ii, 186; *Nature, Lond.* March 1, 1947, p. 293.

5. Wadja, S. H. *Nature, Lond.*, Feb. 22, 1947, p. 254.
6. Fieschi, A., Astaldi, G. *La Cultura in Vitro del Midollo Osseo*, Pavia, 1946.
7. *CIOS* xx—1; xxiii—13, 17, and 23; xxv—54. *BIOS* 116. Obtainable from H.M. Stationery Office.

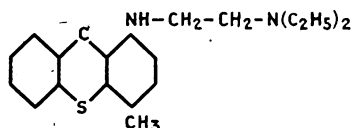
in the laboratory has often been surprisingly bad, and promising new compounds, such as antimalarials, have been unprotestingly dropped because of an unfavourable clinical test conducted in haphazard fashion on two or three patients. Moreover the initial successes of the German workers, assisted by skilful propaganda, had produced an exaggerated conception of the scale on which these researches were done. About two-thirds of the new products come from a single centre, the research laboratories of the I.G. Farbenindustrie at Elberfeld, and the graduate staff employed there in the search for new remedies numbered only 26 chemists and 11 medical or biological workers.

War-time German research has produced nothing to compete with penicillin, streptomycin, 'Paludrine,' and the numerous sulphonamides introduced by Anglo-American work. The best-established German compound of the war years is the sulphonamide, 'Marfanil,' $\text{NH}_2\text{CH}_2\text{C}_6\text{H}_4\text{SO}_2\text{NH}_2$, supplies of which were captured in North Africa and submitted to in-vitro and clinical tests⁸; these showed it to be useful as a local application to wounds but largely inactivated in the blood-stream. In the antimalarial field, which had long received much attention from German workers, the showing is better. They had discovered a variety of compounds which were highly active in bird malaria, including phenyl-substituted dialkyl amino-alkyls ('Dimeplasmin'), sulphonamides ('Bemural'), and 3-alkyl quinolines ('Endochin'). Unfortunately (as with many compounds discovered in the U.S.A. and Britain), this activity was not confirmed in human malaria. With one series, the 4-amino quinolines, they were more fortunate; and during the early part of the war one of these compounds, 'Sontoquin,' was given small-scale clinical trials at Hamburg and elsewhere. A batch of this preparation was sent to North Africa in 1942 for field trials and was captured by the Allied forces in Algeria and Tunis. The whole series was exhaustively explored on a much larger scale by American workers, who finally selected one member—'Resochin,' 'Chloroquine,' 'SN 7618'—as the best for general



purposes. This seems to be superior to quinine or mepacrine, but it is doubtful whether it will prove as good as paludrine, and it will certainly be less cheap.

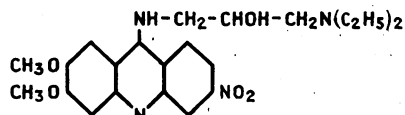
The Elberfeld staff showed particular enterprise in the search for new remedies against schistosomiasis, and W. KIKUTH and his colleagues developed a new technique of testing compounds on infections



of *S. mansoni* in mice. Therapeutic activity was discovered in an entirely new class of synthetic

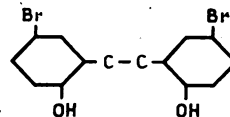
compounds, synthesised by MAUSS, and the best member of the series, 'Miracil,' is very effective against experimental infections in mice and monkeys. It is hoped to give this compound a clinical trial under British auspices.

In view of the importance of typhus in Eastern Europe, great efforts were made to discover an effective chemotherapeutic remedy for rickettsial infections. The most promising compound discovered was 'Rutenol,' a chemical salt of three parts arsenic trioxide with two parts of a nitro-acridine derivative. This



compound is effective in the treatment of mice infected with *R. mooseri*. Its discoverer, FUSSGÄNGER, also claimed that it was effective in human cases of epidemic typhus or Wolhynian fever, but the tests lacked proper controls, and in the two years since the German claims became known to Anglo-American workers there has been no confirmation of its clinical efficacy. It is unlikely to be as valuable as *p*-aminobenzoic acid in rickettsial infections.

Another substance for which the Germans made big claims is dibromsalicyl, developed by RICHARD



KUHN, a former Nobel prizewinner, at Heidelberg. This and other salicyl derivatives prevent the growth of bacteria in vitro and have had some success as local applications to infected wounds. But there has been no confirmation of their value outside Germany and it seems improbable that they will compete with penicillin and streptomycin.

A Great Physiologist

PHYSIOLOGY is not so much a subject as a point of view; and Sir JOSEPH BARCROFT, if he did not explicitly preach this text, lived it. The genius of simplicity brought him to the heart of the most complex problem, and the use of this gift earned him a place among the great physiologists. Whatever he touched fell into perspective and was illuminated—illuminated so clearly and with such a delightful play of wit and simile as to reawaken the fascination of discovery in the most disillusioned. He was not a specialist, but brought his zest for scientific adventure to the exploration of many fields—the physiology of the blood, the spleen, the kidney, the foetus, and the processes of ruminant digestion. He was not a hacker of the jungle, but made rather for the peaks; he seemed to delight in showing others the view, and to be on the lookout for those who could see it as he did. He did not pretend to know what was in each valley, but his recruits were there and rarely failed to find something worth while. His *Architecture of Physiological Function* was an attempt to find for physiology as a whole that coordinating central idea which he had revealed in so many of its parts. His interest latterly in the physiology of the foetus represented, perhaps, a final effort to come to closer grips with the fundamental mystery. With his passing, a spiritual link with the great period of English physiology has dissolved.

8. Mitchell, G. A. G., Rees, W. S., Robinson, C. N. *Lancet*, 1944, i. 627. Leading article, *Ibid.* p. 635.

Annotations

FUTURE OF GENERAL PRACTICE

"How can we modify this Act to preserve more of the past of general practice?" has been the loudest question lately in medical gatherings. It is refreshing to turn to Prof. Robert Platt's remarks on the future of general practice, made in a recent address.¹ He looks to the Act, and to the profession operating it, to make possible great improvements. He has the courage to say "there is a great deal wrong with general practice," and to list its faults. The doctor has insufficient time to do his job well. He works too much in professional isolation. There is no recognised standard in general practice; that is to say, a practitioner's work is so screened from the eyes of his colleagues that he lacks the stimulus of knowing that it will be judged. He complains of an inferior status vis-à-vis the specialist. Finally, he has not been trained on proper lines.

The Act is capable of adjusting the numbers of doctors to the amount of work that is to be done in a way that "private enterprise" never did. Platt sees no harm in basic salary combined with tapered capitation fee as a means to that end. In the health centres there is a remedy for professional isolation; a doctor will talk shop, with mutual advantage, to another doctor in the same health centre, where he would, for prestige's sake, have remained silent in the presence of a competitor, and he will know that at any time his case-records may have to be made available to his colleagues. These are powerful and unbureaucratic encouragements to maintaining a high standard of work.

The status difficulty has its roots in the bias of medical education. Platt holds it ridiculous that the practitioner of the future is trained wholly by the specialist. Surely he is right. Even if the content of this training were altogether appropriate, the respectful student could not help emerging from it with the impression that specialists are a superior order of beings. So they are, in some respects; but mostly they are not, in others. If the teaching staff included some competent general practitioners, broad in their outlook and wise in their experience of men, able to look the specialists in the face and prick their bubbles on occasion, the student's perspective would be truer, and the short-sighted stampede of the young into specialism would cease. To this end Platt offers the same suggestion as we did²—namely, that one or more health centres should be established as an integral part of every teaching school. The members of their staffs should be chosen for their ability to conduct general practice well, and for their capacity to teach the students who (singly for preference) would accompany them throughout their working day. We can think of no single innovation which could do more than this to raise the standard and realise the true function of general practice in the next generation.

BLOOD-FLOW IN BONE

THE failure of their many attempts at obtaining arteriograms of bone vessels in living subjects led Lamas and his colleagues³ to investigate the intra-osseous circulation. They argued that a relatively slow blood-stream would be expected because none of the three physiological functions of the long bones—mechanical support of the body, storage of calcium salts, and hæmopoiesis—need a rapid circulation; hæmopoiesis and calcium storage are in fact facilitated by a slow blood-stream. Nor does movement of a bone, unlike that of muscle, require an extra supply of blood. When a dye was injected into the external iliac arteries of dogs they

found that it took four seconds to reach a wound in the foot, seven seconds to reach the skin, and a whole minute to reach the bone-marrow (none reached compact bone). On the other hand, the dye was removed much more quickly from the marrow than the soft tissues; in less than three minutes it disappeared from the marrow, whereas it was visible for ten minutes in the skin. Studying the minute anatomy of the long bones they found that the nutrient artery describes many curves before entering the bone, and, after dividing into ascending and descending branches which run through the marrow, it ends in wide blood-spaces close to the epiphyses; these blood-spaces are in close contact with veins of wide calibre and very thin walls. This arrangement of blood-vessels reduces the pressure and speed of circulation in the arteries, and enables the veins to carry substances quickly away from the blood-spaces—hence the efficacy of therapeutic injections into the marrow. The slowness of the flow through the nutrient arteries is supported by the plethysmograph measurements of blood-flow in the normal humerus made by Edholm et al.⁴ From their figures it is estimated that the amount of blood normally flowing through the whole skeleton probably does not exceed 100 c.cm. a minute, though it may be vastly more in Paget's disease.

Though all the long bones have a highly efficient venous drainage, the sternum is the bone of choice for transfusions and infusions because of its convenient situation, because it has excellent short venous connexions, through the internal mammary and innominate veins, with the superior vena cava, and because the compact part of the bone is very thin and easily pierced with the needle, the site of election being the upper part of the manubrium. The firm anchorage that the sternum gives for the needle was found useful in North Africa, where wounded were transported long distances with an intrasternal drip-transfusion running. It can also be made use of in the continuous administration of penicillin. Thus Giraud and Desmonts⁵ injected 20,000 units of penicillin, in 250 c.cm. of serum, in two hours by this route, and two days later gave 40,000 units in 250 c.cm. of serum in five hours without encountering any difficulties.

ADSORPTION OF ENDOGENOUS TOXINS

Few now believe that the various toxic chemicals, such as indole, skatole, tyramine, guanidine, putrescine, &c., formed by the decomposition of protein in the large bowel cause systemic disease or even the symptoms associated with constipation, though it has lately been suggested that their action may be partly responsible for the degenerative changes of old age. Most prefer to think that the barrier offered by the bowel wall and the detoxicating action of the liver together form an efficient protection against intoxication.⁶ Nevertheless, since the substances are responsible for the unpleasant odour of faeces, their removal would be a great blessing to patients who are incontinent or have an artificial anus. Kaolin and activated charcoal have been much used for the purpose, but neither has provided the complete answer.

The ideal adsorbent should be completely effective in removing odour but should not interfere with intestinal synthesis of vitamins or with the absorption of food-stuffs and drugs. Martin and Wilkinson⁷ tried to find a suitable adsorbent which will adsorb the toxic chemicals in the pH range of the gut. They found that 'Amberlite IR-4,' a synthetic resin, was very effective against indole and skatole, while all the amines tested (putrescine, cadaverine, tyramine, histamine, and guanidine)

1. *Publ. Hlth, Lond.* January, 1947, p. 99.

2. *Lancet*, Feb. 8, p. 228.

3. Lamas, A., Amado, D., Da Costa, J. G. *Amatus lusitanus*, 1946, 5, 241.

4. Edholm, O. G., Howarth, S., McMichael, J. *Clin. Sci.* 1945, 5, 249; see *Lancet*, 1946, ii, 568.

5. Giraud, G., Desmonts, T. *Pr. méd.* 1946, 54, 51.

6. Best, C. H., Taylor, N. B. *Physiological Basis of Medical Practice*, London, 1943, p. 851.

7. Martin, G. J., Wilkinson, J. *Arch. Biochem.* 1947, 12, 95.

were strongly adsorbed by activated permutite. Kaolin, in their opinion, "cannot compare with permutite as an adsorbing agent for amines"; they also found that it adsorbed no skatole. These in-vitro results were supported by toxicity experiments on mice, in which the toxic compound was given alone to one group and also to a group which received the adsorbent at 10% of the basic diet. The results clearly showed the effectiveness of the adsorbing agents in counteracting the toxicity of these putrefactive chemicals. Thus the death-rate resulting from a dose of 0.4 g./kg. of indole was reduced from 50% to 20% by the inclusion of 10% amberlite IR-4 in the diet and from 50% to 10% when another 5% of amberlite IR-4 was given in suspension. Permutite given in the same amounts reduced the death-rate caused by 0.5 g./kg. of guanidine acetate from 50% to 20%.

The possibility of interference with vitamin absorption from the gut was clearly borne in mind by these investigators. They reported in another paper⁸ that amberlite IR-4 does not adsorb aneurine or riboflavine at the pH of the human stomach or intestine and that vitamin C, though strongly adsorbed at an acid pH, is again completely desorbed at the higher pH of the intestine. In addition, rats showed no signs of nutritional deficiency when amberlite IR-4 or permutite were fed at 5% levels. In this connexion Melnick et al.⁹ have shown that fuller's earth reduces the availability of vitamin B₁, while kaolin does not.

Whether amberlite IR-4 or permutite is superior to activated charcoal remains to be seen, but it seems likely from these experiments that a multiple adsorbing agent could be devised which would prove more effective in the adsorption of putrefactive substances from the intestinal tract than those now in clinical use.¹⁰

MANUAL REMOVAL OF THE PLACENTA

The cautious attitude of British obstetricians to manual removal of the placenta has been based on a lively fear of "obstetrical shock" and intra-uterine sepsis. There was good reason for this attitude two decades ago, when there was no chemotherapy and blood or plasma for transfusion was not immediately obtainable. Even with these safeguards, however, the risks of manual removal have not disappeared. According to Sewall and Coulton,¹¹ this is because manual removal has only been employed when the patient is already shocked and anæmic; and they attribute the bad results of the operation to the bad timing of its performance. They support their view by recording 45 consecutive manual removals under their own or their residents' care in which the mortality was zero and only one patient, already suffering from bronchitis and pyelonephritis, gave rise to anxiety. No special technique was used, and the indications for the operation were blood-loss in 15 cases, expected blood-loss in 22 cases, and retention of the placenta in 8 cases. Chemotherapy was employed in 22 cases. Shock was absent in the whole series, though what is described as subclinical shock was noted in 3 cases.

The average time from the beginning of the third stage until manual removal was performed was 8 minutes in the cases undergoing manual removal for blood-loss, and 14 minutes where the removal was done prophylactically for fear of blood-loss. In other words, these workers waste no time in manually removing the placenta. They urge that Crèdè's expression should not be persisted with too long. Protracted and vigorous attempts at Crèdè's expression are extremely liable to cause shock, and Sewall and Coulton think they also make subsequent manual removal hazardous. They therefore use a trial expression once. If this is not successful, they wait for

20 minutes and repeat it; and if the second attempt fails the placenta is removed manually. When there is bleeding, manual removal is used much more quickly. In 5 cases the uterus was packed; and it is claimed that packing does not increase morbidity—with prophylactic sulphonamides, of course.

Forty-five swallows do not make a summer, and the enthusiasm of these Massachusetts workers is not likely to change our more conservative attitude; but their experience does strongly support their view that if manual removal is going to be employed it should be resorted to more quickly than it has been in the past. In a fit woman not yet suffering from the effects of blood-loss it is a relatively simple operation. In a shocked and anæmic woman it is hazardous and possibly lethal, and its morbidity may well be attributed to the poor state of the patient rather than to the inherent vice of the operation.

"HOME" OR HOME?

NOBODY would wish to deny that many homes managed by voluntary societies achieve a high standard in the care of children deprived of a normal home life. A memorandum submitted by the National Council of Associated Children's Homes¹ reminds us that some 40,000 children—nearly half the homeless children in the country—are in the care of voluntary homes and hospitals, and that many approved schools, foster-homes, and remand probation homes are also administered by the voluntary societies.

In discussing the several methods of caring for such children, the council's opinions are noticeably at variance with the Curtis report. They agree that each child's case must be considered on its merits, but think it dangerous to assume that adoption is in the main better than boarding-out, or boarding-out than community residence, or that community residence is better than either. About adoption they hold highly cautious views, hinting at "unforeseen developments arising later from unwise upbringing or incompatibilities of temperament." In their opinion "adoption will not prove an adequate solution of the problem of the homeless child." They are equally dubious about the advantages of boarding-out: "at its best boarding-out for the homeless child is but a partial solution of the problem. Some of the responsibilities of child care are inescapable and cannot be contracted out." They believe that there will always be a "large residuum for which some other arrangements must be made." The section on the voluntary homes, however, presents this method of dealing with children in its most favourable light: the drawbacks emphasised by the Curtis Committee—the lack of a strong personal relationship with an adult, for individual children, and the depression of responsibility and initiative associated with institutional life—are not mentioned. Light is focused strongly on the admitted advantages of the homes: the good food, comfortable quarters, the devoted staff.

These opinions, of course, must carry weight since they are so well sponsored; and it is easy to realise how strongly the sight of groups of happy well-nourished secure children must affect the judgment of those who wrote it. Nevertheless, material nourishment does not make up to the child for the absence of personal love, and even security may be bought too dearly if it hinders development of initiative. The alarm the council express at the risks of adoption are surely far-fetched: even in happy families, born to each other's society, unforeseen developments arise from unwise upbringing; nor are incompatibilities unknown. But what the family gives is something few people would willingly surrender for the care offered by even the best voluntary home.

8. *Gastroenterology*, 1946, 6, 315.

9. Melnick, D., Hochberg, M., Oser, B. L. *J. Nutrit.* 1943, 30, 233.

10. See *Lancet*, 1941, 1, 215.

11. Sewall, C. W., Coulton, D. *Amer. J. Obstet. Gynec.* 1946, 52, 564.

1. The council's office is at the National Children's Home, High-bury Park, London, N.5.

Boarding-out too has its dangers, as everyone knows; but in some cases it leads to happy adoption. Yet some voluntary societies (as Lady Allen of Hurtwood has pointed out²) discourage adoption, and one at least insists on a boarded-out child returning to the home at 16 for trade or occupational training, even though the foster-parents have come to regard him as their own child and wish to have a hand in settling his future. This is carrying responsibility almost into the realm of officiousness. Certainly adoption needs to be arranged with the greatest care, and foster-parents for boarded-out children must be chosen scrupulously; and certainly the sight of a houseful of sleek and happy children is more impressive to the casual visitor than a page of figures showing children successfully boarded-out. But the well-being of children is a subtle thing, not to be assessed easily from appearances. It would be unfortunate if this memorandum shook confidence in the Curtis Committee's findings.

GLOBIN OR PROTAMINE INSULIN ?

GLOBIN insulin was originally introduced as a delayed-action insulin intermediate in time of action between soluble insulin and protamine zinc insulin. There was the further advantage that globin was cheaper and more readily obtainable than protamine. In spite of these claims it has not yet been widely adopted in Great Britain, though our American colleagues have been more enthusiastic. In a renewed attempt to clarify the issue, two American workers³ have compared the action of these two insulins in 84 diabetics, several of whom were studied on more than one admission, thus giving a total of 97 hospital admissions. During the investigation the patients were kept in hospital and received a constant diet. Frequent blood-sugar estimations, were made. When all the relevant data were assessed—blood-sugar curves, hypoglycæmia, and the patient's general state—it was found that, on the same doses, 65 were controlled better with globin, 25 with protamine zinc, and 7 equally well with the two insulins. Composite curves drawn from the average blood-sugar levels at different times of the day showed that the fasting blood-sugar was the same with the two insulins, but at every other time (i.e., 9 and 11 A.M., 1, 4, 7, and 11 P.M.) the blood-sugar was higher in patients receiving protamine zinc insulin than in those receiving globin insulin. With globin insulin the blood-sugar returned to normal limits before lunch, supper, and midnight, which it never did with protamine zinc insulin. Glycosuria was significantly less with globin than with protamine zinc insulin; and, though the incidence of hypoglycæmic reactions was low with both insulins, only one mild reaction was recorded with globin, compared with three mild and two moderate reactions with protamine zinc.

It is often said that globin insulin is unsatisfactory because, if given in the morning, it does not control the blood-sugar during the following night. Roberts and Yater do not bear this out, for the fasting blood-sugar was the same in patients receiving the same number of units of globin and of protamine zinc insulin. In this country a combination of soluble insulin and protamine zinc insulin is often prescribed, on the principle that the rapidly acting soluble insulin will control the blood-sugar until the protamine zinc insulin comes into action. This combination often works in practice, but many patients find it more difficult to give themselves a single injection consisting of different volumes of two insulins than two separate injections of soluble insulin, morning and evening. Another disadvantage of protamine zinc insulin is that when given in the morning it may induce hypoglycæmia during the following night, when it may not be discovered until the patient has been in coma for

several hours. With globin insulin this risk is minimised since hypoglycæmia is most likely to occur during the afternoon. There will always be diabetics who cannot be satisfactorily controlled with single daily injections of either globin or protamine zinc insulin. For these Roberts and Yater suggest two injections daily of globin insulin—one (70%) in the morning and the other (30%) about 3 P.M.

MANAGEMENT OF EMPYEMA

THE treatment of empyema has suffered from the failure to distinguish the various forms of pleural infection. This was clearly brought out in a discussion at the Royal Society of Medicine opened by Mr. R. C. Brock and Mr. T. Holmes Sellors on Feb. 5. It should be obvious that an acute and diffuse inflammation in the early stages requires different handling from a long-standing localised purulent collection, but since the introduction of chemotherapy there has been a tendency to concentrate on the sterilising effect and ignore the final healing processes.

The influenza pandemic of 1918 brought out very clearly the dangers of ordinary drainage in the early stages of empyema, and Graham's work showed that the patient already suffering from an acute pulmonary inflammation could ill support the addition of an open pneumothorax. The lessons then learnt resulted in delayed drainage being employed after preliminary and repeated aspiration had reduced the volume of the original pleural infection. An intercostal tube and closed drainage had a considerable vogue along with various methods of tidal irrigation and drainage, but the basic principles of treatment were not always fulfilled and results were often poor. Failure to remove the products of inflammation completely or to establish adequate and continued drainage were—and still are—responsible for chronic empyemata and consequent grave disability. The healing process or obliteration of the cavity has been greatly helped by physical treatment which by stimulating inspiratory efforts encourages lung expansion. Breathing exercises can play a very valuable part in chest work, but the most assiduous attention and concentration are required if they are to achieve their aim—the restoration of complete respiratory function.

The sulphonamides and penicillin have had a dramatic influence on the primary cause of empyema—pneumonia—but how far they have affected the incidence of empyema is still doubtful. In most cases penicillin will control the virulence of the pleural infection, and it is here that the drug is most valuable. The pleural fluid can often be sterilised by the injection of penicillin in suitable concentration after aspiration. Repeated aspiration and injection, persisted with along the lines suggested by Fatti and his co-workers,¹ can produce good results, but in the later and more localised forms of empyema the value of penicillin therapy is more doubtful, unless it is supplemented by orthodox drainage methods. Neither penicillin nor any other known drug will close an empyema cavity, though it may sterilise the contents. Established abscesses contain masses of debris and fibrin which cannot be removed through an aspirating needle or even an intercostal tube. Here it is more satisfactory in the long run to follow the standard principles of surgical drainage. In draining a localised pleural abscess the actual rib-resection should afford room not only for a wide-bore tube but for removing all fibrin masses and inspecting the interior—in short, for an efficient pleural toilet. The drainage-tube must be carefully sited to permit of gravity drainage and kept in position until the empyema cavity has been completely obliterated. During closure pleurograms enable the surgeon to visualise the shape and size of the cavity and make adjustments as required.

2. *Times*, Oct. 21, 1946.

3. Roberts, J. T., Yater, W. M. *Ann. intern. Med.* 1947, 26, 41.

1. Fatti, L., Flory, M. E., Joules, H., Humphrey, J. H., Sakula, J. *Lancet*, 1946, i, 257, 295.

During the whole treatment physical therapy must be in constant use. Patients need not be confined to bed for more than a few days after rib-resection, but at no time must observation or attention to detail be relaxed. Treatment must be active the whole time under the direct care of the surgeon.

THE NURSE AND THE SISTER

THE duties of the nurse, we are often reminded, have never been analysed: there is no clear answer to the question "what is a nurse?" If the principle of the two-year basic course in nursing, followed by a course for a senior qualification, is accepted it also becomes necessary to distinguish between the duties of the nurse and the duties of the sister. Some help in this is afforded by a recent analysis from America.

Dr. J. J. Golub,¹ director of the Hospital for Joint Diseases, New York City, plans to train what he calls "practical nurses" in a course lasting only a year, and to use such girls when trained to supplement registered nurses—the equivalent of our sisters—on the wards. The registered nurse, he says,

"must continue to occupy the position of leadership in the profession. She may do bedside nursing. . . . She may be a hospital floor supervisor, or the head nurse of a nursing unit or a wing of a hospital, supervising the work of several other nurses; she may be director of a department of nursing or of a hospital's school of nursing; she may become a teacher of nursing; she may undertake special studies with the object of specialising in public health, anaesthesia, industrial nursing, medical social service, or hospital administration."

There are many nursing procedures, however, which need not be performed by a registered nurse, and he goes on to analyse 150 nursing practices which he assesses as suitable only for the registered nurse, or else as capable of being done by the practical nurse. All which fall under the heading of "control and supervision" are assigned to the registered nurse; they include supervision of all nursing services and ward staff, charting, preparation of patients for surgery, postoperative care and care of patients during recovery from anaesthesia, preparation of emergency trays, care of poison cupboard and medicines, supervision of linen and supplies, the serving of special diets, isolation technique, and reports on accidents and unusual occurrences. Under the heading of administration, however, only 2 out of 15 duties are assigned to the registered nurse: these are the writing of reports on staff shifts, and the task of reporting a patient's condition to the doctor. The practical nurse is given the jobs of receiving new patients, disposing of their clothes and valuables, looking after them at the time of discharge, preparing accounting reports on ward charges, answering telephone calls, taking messages, answering patients' signals, receiving visitors, delivering mail, arranging flowers, requisitioning supplies, drugs, and linen, and filling in routine slips for the examination of specimens. The practical nurse also undertakes the entire 24 duties listed under the headings of housekeeping and transport, which include regulation of heat and light for patients, supervising porters and ward maids, the lifting, turning, and carrying of patients, and the transfer of patients to the theatre and back. All the duties of assisting the physician—with dressings, transfusions, bladder irrigations, and other ward operations—fall to the registered nurse, the practical nurse only being required to furnish equipment and supplies.

The section of most interest is that headed "care of the patient": here, out of 64 procedures, 46 fall to the practical nurse and only 18 to the registered nurse. Those reserved for the registered nurse include preparation of fracture, traction, and cradle beds; nasal and rectal feeding; preparation of instrument trays; hot packs; cupping; the dressing of bedsores; eye, ear, and nose irrigations; the care of drips; and the giving of medicines and injections. The practical nurse, however,

can undertake bathing and bedmaking, the serving of food, the feeding of infants and preparation of their food, the giving of bedpans and simple enemas, temperature-taking, poulticing, the care of the head, and routine treatment for scabies and the exanthems. Dr. Golub also suggests that the practical nurse could assist in other hospital departments, such as the nurseries for newborn infants, the special-diet kitchen, the occupational therapy department, and the theatre.

His analysis does not of course apply fully to British hospitals, because the nursing techniques differ a little. But in general the picture is the same; and it is enlightening to be told that of 150 common nursing practices 97, or 65%, do not need the attention of a highly qualified sister, but can be safely undertaken by girls with a much simpler practical training.

PSYCHO-ANALYSIS ILLUSTRATED

NOR only the general public but many doctors are curious to know what goes on in the psycho-analyst's consulting-room; for here is a branch of medicine which cannot be demonstrated to a class of eager students, or even to the solitary clinical assistant. Dr. Berg¹ has therefore done many of us a service by ringing up the curtain on those secret sessions and telling us exactly what one patient said and—which is more to the point—what he replied, or didn't reply. He does it cheerfully and competently, cleverly postponing his revelations, and presenting his tale with the skill of the natural storyteller. What the reader thinks about psycho-analysis at the end of it will no doubt depend on the bent of—or bends in—his own personality. In the case discussed, analysis was successful; and the situations revealed were of the kind which Freud has taught us to expect. Yet even Dr. Berg finds analysis puzzling at times. In theory, a man should benefit from an honest attempt at self-knowledge, from peeling off his layers as Peer Gynt peeled the onion; in practice, some do but some don't. Even if current interpretations of mental mechanisms are accepted fully, it is clear that an understanding of them will not, in itself, put the mind at ease. As Dr. Berg says, "insight alone is rarely sufficient to bring about more than very slight amelioration, and sometimes with the fullest insight amelioration of symptoms is the slightest." He attaches much importance to the emotional release which in this successful case accompanied the growth of insight; and the reader is tempted to wonder whether the emotional release without the insight might not be equally effective; or at least whether the same favourable result could somehow be achieved with less trouble and expense.

ROYAL SOCIETY

IN the list of 24 new Fellows of the Royal Society we are glad to see the names of several members of the medical profession and several others closely concerned in its work. Surgery is represented by Mr. Geoffrey Jefferson, F.R.C.S., professor of neurosurgery at Manchester, whose election will give much pleasure to his fellow clinicians. There are two biochemists (Prof. E. J. Conway, M.B., of Dublin, and Prof. H. A. Krebs, M.D., of Leeds), a member of the staff of the Imperial Cancer Research Fund (Dr. James Craigie), a physiologist (Dr. W. S. Feldberg, of Cambridge), and a geneticist (Prof. C. H. Waddington, SC.D., of Edinburgh). Among the three women now elected we are particularly happy to find Miss Muriel Robertson, D.Sc., head of the department of protozoology at the Lister Institute.

THE Minister of Labour and National Service has nominated Mr. G. P. BARNETT, one of H.M. deputy chief inspectors of factories, to be chief inspector in succession to Mr. H. E. Chasteney, whose death was announced in our issue of March 8.

1. Deep Analysis. By Charles Berg, M.D. Lond., D.P.M., physician to the British Hospital for Functional Mental and Nervous Disorders. London: Allen and Unwin. Pp. 261. 12s. 6d.

1. *Hospitals, Chicago*, January, 1947.

Special Articles

A GROUP PRACTICE

S. C. ALCOCK
M.B. Edin.

PRESIDENT, BERKS PUBLIC MEDICAL SERVICE

THE new health service will mean vast changes in the administration of medicine, but the doctor's work will remain precisely the same. After some years' experience there may be alterations in the nature of the work performed by individual doctors, but at the moment we are only concerned with the commencement of the scheme.

Doctors can be divided into three classes: (1) specialists, (2) general practitioners, and (3) whole-timers. Under the new scheme the whole-timers will continue to do the same work in the same places as at present and the specialist will be based on a hospital. It will be left to the general practitioner to staff the new health centres, and these places will in fact become the new doctors' surgeries. The main change in the new scheme therefore will be to separate the doctor's residence and his place of work.

General practice has altered in the last 25 years so as to provide a group-practice service which has largely replaced the single-handed practitioner. In some smaller towns the group or partnership comprises all the practitioners in the town. This change in the manner of general practice has led to another important change. With the widening field of medicine a stage has been reached when it is beyond one man to cover the whole field. The larger partnerships have thus become partnerships of minor specialists as well as general practitioners; indeed the general practitioner coming into a large partnership often starts his life with extra qualifications or diplomas, or special experience in one of the branches of medicine.

This general trend will determine the type of work and the nature of the staff of the new health centre.

ADDITIONS TO THE ORDINARY G.P. WORK

It is to be hoped that a national service will bring closer together the three main sections of the profession—the consultant, the G.P., and the M.O.H. This being so, the scope of the G.P. will be widened. The obstetricians who are to attend labours will be able to do their own antenatal examinations, while child welfare will be passed to the pædiatrician. Those surgically inclined will require a theatre for minor operations and a rest-room. Doubtful fractures and malpositions of the fœtus should be confirmed by radiography on the spot, without in any way attempting to replace the function of the specialist radiologist. Facilities for simple blood chemistry and microscopy must be provided too. There will be a place for the dental surgeon and the physiotherapist at the health centre. The dental surgeon will need to share the operating-theatre and the radiographic facilities, besides having his own department.

SIZE AND TYPE OF UNIT

The size of the unit will depend solely on the number of G.P.'s employed there. There will be no provision for outside specialists, because there will not be enough of them to visit all health centres, nor the apparatus they require for their detailed investigations.

In the less populous areas the size of the unit will vary from one doctor upwards to the ideal number of about six. In the compact areas of the great cities this number may conveniently be exceeded considerably, but I believe six to be the best number to start with in the towns and usually in the cities. Where fewer than six doctors are working, there would have to be a corresponding reduction in staff and accommodation, but the centre

here described should be regarded as a model to be approximated as nearly as facilities permit.

Minor differences in the type of centre will occur in the great cities. I cannot imagine that the same type of building or furnishings will succeed equally in Mayfair and Whitechapel. The day is rapidly approaching when they will, but it is not here yet, and planners must keep in mind that the primary object of a health centre is to get people to go to it.

PERSONNEL

Where six doctors are to work together, and where the medical interest of each differs to some extent, it is impossible to imagine that they can work as individual practitioners. The health centre must therefore be a large partnership where patients are accepted by the centre and not by the individual doctor. This would not in any way preclude a patient attending the doctor of his choice whenever that doctor is available. For the organisation to succeed there must be a chief doctor who will assume responsibility for the working of the entire unit and everyone in it. Even with the other doctors there should be some system of gradation of seniority, especially in respect of the mature doctor and the newcomer straight from hospital. These considerations would entail differences in remuneration.

Though the special interests of the doctors need not be similar in each health centre, I suggest a suitable arrangement would be:

| | |
|------------------------------|-----------------|
| 1 surgeon. | 1 pædiatrician. |
| 1 physician. | 1 anæsthetist. |
| 1 gynæcologist-obstetrician. | 1 oculist. |

One or two of them will undertake the minor radiology or minor pathology.

It must be remembered that all these doctors are essentially G.P.'s. The surgeon would not undertake major surgery; the gynæcologist-obstetrician would not do his own cæsareans; nor would the oculist do much more than refraction work. I believe, however, that all these doctors should have an opportunity to work as registrars or clinical assistants at the hospitals. Dispensing would be undertaken at the centre and thus the personnel can be determined as:

| | |
|-------------------------|--------------------------|
| 6 doctors. | } one to act as manager. |
| 1 physiotherapist. | |
| 1 dental surgeon. | |
| 3 dispensers | |
| 2 receptionists | |
| 2 secretaries | |
| 2 nurses | |
| Cleaners and caretaker. | |

ORGANISATION OF THE WORK

The main purpose of the health centre is to provide a place where patients are able to see their G.P. This means the arrangement of consulting hours. After 25 years I have found that 2 consulting hours a day for 3 days a week is convenient for patients and gives the doctor ample time to see special cases—i.e., those referred by other members of the centre—and to visit his patients too. With six doctors working in pairs, consulting hours would be thrice daily as follows:

| | Morning | Afternoon | Evening |
|----------------|---------|-----------|---------|
| Monday | A.C. | A.E. | C.E. |
| Tuesday | B.D. | B.F. | D.F. |
| Wednesday .. | A.C. | A.E. | C.E. |
| Thursday | B.D. | B.F. | D.F. |
| Friday | A.C. | A.E. | C.E. |
| Saturday | B.D. | B.F. | D.F. |

The obstetrician and pædiatrician should have afternoon sessions, since these are most convenient for women and children and most inconvenient for workers. Arrangements for the others must fit in with their other commitments—e.g., at hospital. There must be a rota for one

doctor and one dispenser to work on Sunday. The hour after lunch is most convenient because the dispenser can make up medicines brought in by other doctors having morning visits.

Apart from the ordinary surgery hours, each doctor would have one or more special sessions each week to which others at the centre may refer cases. Each case would be seen by appointment, the appointment book being left open for any of the doctors to make an entry.

The dental surgeon would have his own department, but would share the waiting-room and minor surgical department (for extractions), and share the staff, one member giving her whole time to him.

The physiotherapist would have his own department and share waiting-room and staff. Dispensers would be organised so that two were on duty from 9 A.M. to 7 or 8 P.M., meal-times being staggered so that one was always on duty. Receptionists and nurses would have staggered hours too, so that one at least was on duty each day for the six weekdays. Secretaries and cleaners would work the hours usual for offices.

Arrangements must be made for a rota of duty hours for doctors for emergency calls out of hours. As an anaesthetic is occasionally required, or the doctor on duty is busy with a case when another urgent call comes, two doctors should be on duty at a time, the second acting as deputy or assistant to the first. Illness, epidemic, and holidays must be covered by drawing on the locum pool. If doctors are to be adequately employed it is quite unfair to expect them to do another's work.

Communication with the doctor on duty should be by telephone, with facilities granted by the Post Office telephones. The doctor's telephone should be that of the health centre only. Calls out of hours should be taken by the Post Office and connected to the doctor on duty. The Post Office would be supplied with the lists from each centre. This arrangement is used in America and could easily be adopted here.

Monthly meetings of the doctors, at which the senior would preside, would undertake the ordinary business of the centre. Other workers at the centre would be able to bring any business which concerns them.

THE CENTRE

Two waiting-rooms will be needed (*a*) for ordinary surgery hours, and (*b*) for special consultations, dentist and physiotherapist. Each will require lavatories. During children's sessions one room should be used for children and one for adults.

The waiting-rooms should be large and airy. Patients don't look at pictures and hardly ever read notices. They abhor the wireless. There should be plenty of chairs and a small table with pen, ink, and blotter. The name of the two doctors at surgery should be on their respective doors of waiting-room (*a*). The patient should show his card to the receptionist and receive a numbered disk in return so that his turn is assured. The disks for the two doctors should be coloured differently, the colour being indicated under his name on the door. The receptionist takes out the record card of each patient and carries a batch to the doctor when signalled to do so.

In waiting-room (*b*) the other receptionist—or secretary or dispenser when only one is on duty—admits the patient, takes the name, confirms the appointment, finds the record card, and in due course notifies the doctor or dentist concerned. The patient is then shown into the appropriate room. There should be a telephone in each room for intercommunication.

Four consulting-rooms will be needed—two opening on to waiting-room (*a*) and two convenient for waiting-room (*b*). An examination-room should be placed between each pair of consulting-rooms, with access to both. There should be an X-ray and physiotherapy room, three rooms for the dental surgeon, one minor-surgery

theatre, one rest-room with two beds, one pathological laboratory, and a large office.

The staff and the doctors would each have a room, with lavatory attached. A caretaker's flat should be incorporated, while outside should be a car-park and an under-cover bicycle park.

Health centres should be no farther than two miles apart in the large towns and should be placed where there are good transport facilities.

A PLANNED PSYCHIATRIC SERVICE

"PSYCHIATRY is the personal aspect of medicine." The regional medical advisory committee of the Nuffield Provincial Hospitals Trust have lately received a report from their subcommittee on psychological medicine in which this personal aspect is considered in its three manifestations—somatic, psychological, and social. Regional planning of psychiatry, the subcommittee suggest, can be considered under the heads of day-to-day practice, preventive psychiatry, and treatment.

In day-to-day practice there are five main types of case, needing different types of building and equipment. The serious mental disorders need mental hospitals; the neuroses need outpatient clinics, neurosis centres, psychiatric units, and wards or beds in general hospitals; defectives need colonies; difficult or delinquent children need children's departments staffed with social workers and educational psychologists as well as psychiatrists; and, finally, cases of psychopathic personality—habitual offenders, drunkards, and other social misfits—may need all these services for themselves or their children, as well as the help of well-trained social workers to maintain links between the psychiatric service and other social organisations.

These services can be dispensed mainly from three types of centre—the mental hospital, the associated psychiatric department in a neighbouring general hospital (offering both inpatient and outpatient care to adults and children), and the neurosis centre. The report, taking the incidence of serious mental disorder as 3.9 per 1000, and the optimum size of a mental hospital as 1000, suggests that 250,000 is a convenient body of population to be dealt with by such a triad. In the Berks, Bucks, and Oxford region there are three triads of the kind, at Oxford, Reading, and Aylesbury. Some 1100 new mental-hospital beds, it is estimated, are needed, and the subcommittee suggest that these should be provided in a new mental hospital in the Windsor-Slough-Maidenhead area; this, in conjunction with established general hospitals and a small new neurosis centre, would provide a new triad for this heavily populated area. The existing triads would also need completing in some respects: Oxford and Reading need psychiatric units in general hospitals, and Reading still lacks a neurosis centre. Proposals for a colony for neurotics have been studied with sympathy, but the subcommittee do not at this stage recommend that such a colony should be set up. For mental defectives, however, they feel a new colony, admitting some 2000, should meet the needs of the region.

The difficulties of providing psychiatric treatment for children are more complex. They suggest that a child-guidance centre, mainly educational, under a psychologist, and controlled by the education authority, can act as a filter for children who, though referred for poor school work, are in fact psychiatrically ill; these could be sent on to a child psychiatric clinic under the health authority. Psychiatrists from the clinic should attend as consultants but not as administrative officers at the child-guidance centre, and educational psychologists could be exchanged on the same terms with the psychiatric clinic. Each would thus have a share in the work of the others, and maintain close personal touch. The

subcommittee advise against psychiatric organisations exclusively for children, because they lead to specialism within a speciality and perhaps to loss of a balanced view of children's disorders and difficulties.

They wish to see departments of preventive psychiatry set up, analogous to the present local-authority departments of health—that is, primarily administrative, statistical, and social, but not clinical. They touch on the possible appointment of a medical officer of mental health, but without enthusiasm. If appointed, they say, he should not hold a position of authority in hospital administration. Psychiatry should be taught, they consider, in a psychiatric teaching unit in the university, on the same footing as internal and social medicine. The unit should be concerned mainly with postgraduate teaching and research, but should also teach undergraduates in the hospitals which provide the psychiatric service.

The subcommittee rightly insist that there must be no watertight compartments: though the units in the service should be largely autonomous, their policy and the broad general lines of their form should be discussed and decided at the regional level. A single group of doctors should serve the component hospitals of each triad, and should interchange work with each other and with the doctors of the mental-deficiency colony. Their common meeting-ground would be the psychiatric department of the general hospital. The plan is essentially simple, but it provides for that close nexus between the component parts of a regional psychiatric service which so far has been lacking—and not only in Berks, Bucks, and Oxon.

Public Health

AGE AND SEX DISTRIBUTION OF DIPHTHERIA

IN OLDENBURG, GERMANY

J. V. WALKER

M.D. Birm., M.R.C.P., D.P.H.

LIEUT.-COLONEL R.A.M.C.

BETWEEN Oct. 1, 1945, and Feb. 28, 1946, 3538 cases of diphtheria were notified in Land Oldenburg, an area somewhat larger than Lincolnshire, with a population of about 750,000, and for the most part flat and low-lying, mainly given over to agriculture and dairy farming, with two cities of about 100,000 inhabitants, one of them severely damaged by war operations. It may be taken as a typical region of the North German plain, and the age- and sex-distribution of diphtheria described below are shared by the adjacent area administered from Aurich.

The distribution according to age and sex was as follows:

| Age (yr.) | 0-5 | 6-15 | 16-25 | 26-35 | 36-45 | 46-65 | Over 65 |
|-----------|-----|------|-------|-------|-------|-------|---------|
| Males | 392 | 276 | 319 | 121 | 71 | 52 | 11 |
| Females | 353 | 363 | 881 | 376 | 171 | 143 | 9 |
| Total | 745 | 639 | 1200 | 497 | 242 | 195 | 20 |

Of the total number of notified cases, 2154 (60.9%) were 15 years of age and over, as compared with 30.9% in 1945 in U.K.¹ At all ages over 5 years until the latest age-group, females were more numerous than males, giving the following percentages:

| Age (yr.) | 0-5 | 6-15 | 16-25 | 26-35 | 36-45 | 46-65 | Over 65 |
|-------------|------|------|-------|-------|-------|-------|---------|
| Percentages | 47.4 | 56.8 | 73.4 | 75.7 | 70.7 | 73.3 | 45.0 |

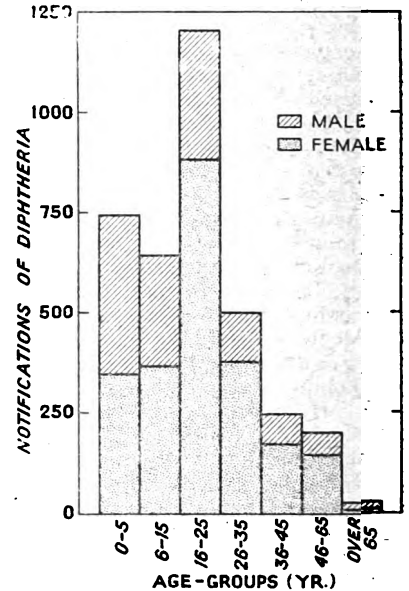
The relative distribution according to age and sex may be better appreciated from the accompanying figure.

The fatality-rate presented no unusual features; it was higher for the most part than in U.K. in 1945¹;

| Age (yr.) | 0-5 | 6-15 | 16-25 | 26-35 | 36-45 | 46-65 | Over 65 |
|-----------------------------|------|------|-------|-------|-------|-------|---------|
| Fatality-rate in Oldenburg | 14.2 | 2.3 | 2.1 | 2.2 | 4.6 | 5.6 | 35.0 |
| Fatality-rate in U.K., 1945 | 7.7 | 3.5 | 1.4 | | | 3.8 | |

The fatality-rate showed no significant features between the two sexes (6.4 males, 4.6 females).

During the period concerned diphtheria was common and was evenly distributed throughout the Land, at no place reaching epidemic proportions. The weekly notification-rate reached a maximum of 28.5 per 100,000 of population for the week ended Nov. 10 and again rose to 27.3 per 100,000 for the week ended Jan. 5. Between these periods it averaged about 20 per 100,000, and since January the rate has steadily fallen.



Age- and sex-distribution of diphtheria cases in Land Oldenburg.

Though living conditions in

north-west Germany were, throughout the period under discussion, highly abnormal, there is no evidence that the epidemiology of diphtheria was particularly influenced by any factor, and the age- and sex-distribution described above have been, according to the medical officers of health of the area, observed during the last few years. Until the later thirties diphtheria was uncommon in Oldenburg and did not until its recent recrudescence show its present features. Hitherto it had been much more frequent among children under the age of 15 years than among adults.

DISCUSSION

Two matters of epidemiological interest arise: the high incidence of diphtheria among adults relative to children, and the preponderance of female cases. The German medical officers of health explain both by reference to artificial immunisation of children. This has been introduced in recent years and is fairly widespread, 60% of children under the age of 15 years in Land Oldenburg having been immunised. It is argued that this has led to a higher incidence of virulent carriers among insusceptible children, with consequent greater risk to non-immune adults. Since during the earlier part of the century the disease was uncommon, immunising subinfection was uncommon also, and so the adult population is less naturally immune than in U.K. Moreover, since women have more to do with children than have men, the differential sex-incidence is explicable by the same cause.

Whether this can be accepted as a wholly satisfactory explanation is open to question. In some parts of the Land the proportion of immunised children is as low as 25%, but the age- and sex-distribution is the same everywhere. In England artificial immunisation has been practised since the early thirties and intensively since 1940, but no similar age-distribution is apparent in the

1. Lancet, 1946, i, 754.

latest statistics. Nor do I recall any evidence of, or reference to, a higher incidence among females over 15 years of age in any way comparable with the figures quoted above.

It may be that, among the strains of *C. diphtheriae* now prevalent in Germany, there are some towards which the population has had little chance of gaining immunity and to which adults are as susceptible as children. The protection conferred by artificial immunisation gives a relative immunity to younger members of the community, so leading to the abnormal age-distribution. It may not be altogether far-fetched to postulate a higher degree of female susceptibility, as there are undoubtedly diseases, not all of them infectious, where a differential incidence between the sexes is well marked.

Unfortunately the present difficult circumstances preclude the typing of *C. diphtheriae*. The director of the local bacteriological laboratory, Dr. K. Schlirf, of the Landes Hygiene Institute, is familiar with the work of MacLeod and his colleagues but, through lack of time and materials, cannot carry out the necessary investigations. He believes the common strain to be *gravis*, but his opinion cannot be based upon up-to-date work.

If the foregoing suggestions are true, a similar situation in respect of age- and sex-distribution is likely to develop in England. This raises the question how often artificial immunisation should be repeated to maintain reasonable protection of the population at all ages.

SUMMARY

Notified cases of diphtheria in Land Oldenburg during the autumn and winter 1945-46, grouped according to age and sex, showed a higher incidence over than under 15 years of age and among women than men.

These findings were not due to abnormal external conditions but had been observed for some years in Germany.

The question is discussed whether this is due to artificial immunisation of children, increasing the number of carriers and so affecting a rather susceptible adult population, or to the presence of a strain of *C. diphtheriae* readily attacking all age-groups, against which artificial immunisation had protected the younger members of the community.

The possibility of special susceptibility of females is also discussed.

Similar findings may be reported later in the United Kingdom.

INFECTIOUS DISEASE IN ENGLAND AND WALES

WEEK ENDED MARCH 15

Notifications.—Smallpox, 2; scarlet fever, 1336; whooping-cough, 2407; diphtheria, 184; paratyphoid, 5; typhoid, 6; measles (excluding rubella), 11,269; pneumonia (primary or influenzal), 1076; cerebrospinal fever, 107; poliomyelitis, 5; polioencephalitis, 0; encephalitis lethargica, 1; dysentery, 73; puerperal pyrexia, 148; ophthalmia neonatorum, 78. No case of cholera, plague, or typhus was notified during the week.

Smallpox.—Of the 2 cases of smallpox, 1 was notified at Grimsby, and the other in London.

Deaths.—In 126 great towns there were no deaths from enteric fever, 2 (0) from scarlet fever, 3 (1) from diphtheria, 19 (0) from measles, 22 (1) from whooping-cough, 97 (9) from diarrhoea and enteritis under two years, and 80, (10) from influenza. The figures in parentheses are those for London itself.

The number of stillbirths notified during the week was 317 (corresponding to a rate of 30 per thousand total births), including 40 in London.

Smallpox

Up to March 24 1 further case was notified. This was in a man under observation as a ward contact with the earlier London case. The patient was revaccinated on March 9. On March 20 a sparse eruption developed. On March 21 he was transferred to the Surrey County Isolation Hospital.

In England Now

A Running Commentary by Peripatetic Correspondents

WITH the recent ministerial pronouncement that a thatched roof has as many virtues as one of slate or tile, no-one will be surprised if we are asked to forgo damp-proof courses to save impervious materials, have mud floors to ease the timber scarcity, and make candles the normal source of lighting to reduce the call on electric fittings and power. Indeed, we may be persuaded to return to the old conservancy system of the privy or the family pail, particularly so if the Ministry of Agriculture joins forces with the Ministry of Health in a combined operation to enliven the compost heaps of England. Here, by one enactment, would be brought about a greater garden fertility and an increased vegetable production, so leaving our cramped shipping space for the importation of peaches, grapes, and nectarines, which seem to have replaced potatoes, turnips, and carrots in the greengrocery shops of this topsy-turvy world.

The elderly farm-worker shook his red-tasselled night-cap at the predicted thaw. I took his cue and prepared a lengthy visiting-list for the morrow. The day came cold and dull, and over a chilly picnic lunch snow was seen falling on the hills. By the time the weekly country surgery for the upland villagers was over the snow was driving and drifting. Within a mile I had to call six P.O.W.'s to clear an ever-increasing drift. Seven miles home, but a fifteen-mile round still to be done. The blizzard was now a fine horizontal hail which stung the face between car and farmstead. As darkness fell the headlamps showed only a fast-moving wall of snow, which called for halts to find the roadway.

Wednesday revealed a heavy fall steadily increasing. An early message to the only garage with a jeep quickly brought the proprietor and the chariot to the door with his assurance that he was glad to help a medical man. A parturient mother five miles away proved that the night's fall had blocked all four possible roads, and after two hours spent exploring either bank of the river I did the ten miles in four hours with spades and willing helpers, in spite of blizzard conditions. An evening hospital call—a strangulated hernia—coincided with the last of the snowfall.

A market-day round of the town on foot next morning proved that all transport was at a standstill. But a call from a man with a shoulder injury brought the jeep out again and four miles of drifts were negotiated to the rendezvous—a crossroad inn—where eight weary bread-carriers who had somehow been stowed behind were disgorged. The return was uneventful, though my sitting casualty looked rather white, and he revived on hot sweet tea from the halfway village store.

A sunny Friday called for a journey with the midwife to a hypertensive multigravida. Five miles through a snowbound countryside beside the half-frozen river teeming with duck, with the sun frigidly outlining the distant Welsh hills; then a mile and a half plodding over the deeply covered field-paths. After deliberation the mother agreed to the proposed journey, which no ambulance could attempt. A slow undulating tramp for an 11-gravida who had not passed her doorway since the January fall of snow.

The week closed with a call from an unknown Northern tertigravida, who was at term, with a bad history. No nurse could reach her. The forest lane to her new home had been snowbound for six weeks. A visit to the road-surveyor brought the promise of a bulldozer. By tea-time the three-mile up-hill job was done and my jeep reached the door. As I write she is in labour, having been collected by more orthodox means down the snow-cleared lanes.

This brilliant Sunday morning brought some thaw, and a failing heart was reached after three miles of highway and five of gated field, stockyards, and orchards. In the 100-acre field the jeep was in her element. Reconnaissance was good—my gardener was born in the parish.

This afternoon a post mortem for the coroner, on a body brought seven miles by bearers and twelve by military lorry (a climatic casualty), was interrupted by three calls from an April-due primigravida—a journey of eight miles, four by tractor-marked surfaces followed by

four of virgin snow. A fully dilated os, with no midwife, and the patient staying with friends, proves necessity the mother of invention.

So I turn another page of my B.-W. diary only to carry forward the unvisited mother of the mid-week. A message that the infant has a cold brings a fresh problem. The four roads are still closed, but the railway has been cleared, so I propose the midday train. By telephone a farmer has promised a tractor at the siding and the railway company a goods engine if I miss the return train. As I doze in the warm corner seat I wonder what the red-tasselled head will think of a visit by jeep tomorrow.

In thinking of the details of a national health service one sees that what is lacking is a comprehensive body of agreement as to what we want—in short, a philosophy. Without this we are but tinkering at various and differing parts of a system, dealing with a loose brick here, adding a cornice there, like a pack of jobbing builders. Our aim, as I see it, is to make it safe to live; but ultimately happiness and peace in living is more important than mere physical integrity. In our efforts to produce a healthy body do we think enough of the man within it? If he will, he can make hay of all our planning. Perhaps we had better take counsel with him.

From earliest Childhood, Albert South
Was given to Placing in his Mouth
Whatever Objects, square or round,
He saw reposing on the Ground.
His mother wept, his father said,
(Sending him, in Disgrace, to Bed)
"Don't pick up candy from the floor—
You don't know *where* it's been before."
His kind relations, each in turn
Bawled in his ear and beat his stern
But made no progress, even so,
Against his Oral Libido.
I cannot tell that Albert paid
The slightest heed to what they said;
He scavenged still, grew rude and wild,
More like a Pig Bin than a Child,
Turning from wholesome Bread and Butter
To Toffee Apples from the Gutter;
Until at last he chanced to meet
A Box of Tablets in the street.

The pills went down, the pulse went up:
He did not come to dine or sup—
And when his Relatives arose
They found him lying Comatose.
The great Consultants held out hopes
And squinted down Ophthalmoscopes,
Owning that Albert had them beaten
Unless 'twas something that he'd eaten—
Until that night, before the News,
They heard a Notice from the screws
That Mrs. B, the fast old witch,
Had dropped some pills in Putney, which,
Consumed unbid by medicos,
Might dorsiflex the taker's toes,
And persons having Information
Should Telephone the Nearest Station.
The Great Consultants all looked grim,
And each in turn remarked "That's him!"
And tried to resurrect young Bert
With Picrotoxin, and a Squirt.

MORAL

Learn from the Fate of Albert South
Not to put Salvage in your Mouth
(For Wholesome Children make no bones
About their Erogenic Zones)
But place it in the Bin close by—
And, should you ever Qualify,
When treating folk like Mrs. B
Don't let the Chemist make too free;
Don't dish out tablets by the Gross,
But stick her on a Weekly Dose,
For Doctors who their Powers abuse
May be Announced before the News.
(I wouldn't write this Sort of Stuff
If my Stipendium were Enough.)

Letters to the Editor

THE STUDENT NURSE

SIR,—The General Nursing Council's efforts to decide what is "proper training" are hampered because hospital authorities have never decided what is the work of a nurse and how many nurses are required to do it. This is not to whitewash the G.N.C., for they should long ago have realised the difficulty and acquired the necessary powers to deal with it, or as you put it matched power with responsibility. In consequence we are faced with a muddled situation whose dominating feature is that "student" nurses must undertake to perform the routine work of the hospital in return for teaching which may be quite inadequate and has never been properly planned on sound modern educational lines. The result is that a high proportion leave (up to 60% in many hospitals), and it looks as if we shall never know what a paradise for patients (and staff) a hospital run with fully trained personnel might be.

These methods date from 1860. All we have done since is to call the probationer a student nurse and pile upon her a more and more detailed study of anatomy and physiology and other things, without any reconsideration of what she wants it for or whether she wants it at all. On the one hand we have the dismal pronouncements of those who want nurses to be devoted and dutiful (and dull), and would cut out from their training everything thrilling in modern medical science—at a time when it is more exciting than at any time in its history. On the other hand we have the nurse educationists, who, feeling the limitations of their own anatomical education, would load the nurse with every facet of the vertebræ and the functions of the obscure thymus in the vain hope that thereby professional status will be advanced.

It is obviously impossible to change the present state of affairs overnight, but the time has surely come when the question of a curriculum and training programme for nurses belongs to national educational policy. It has become too large a matter for the General Nursing Council. I suggest that the Interdepartmental Committee (whose report is eagerly awaited), now sitting under the chairmanship of Sir Robert Wood, of the Ministry of Education, should form the nucleus of a commission entrusted with the task of preparing a training programme and curriculum for nurses. In this connexion the report on practical nursing of a working committee appointed by the United States Office of Education¹ and recently published is well worth study. Such a commission would have to take into account the fact that if patients are to get the attention they need there is room within the nursing profession for women of both simple and advanced educational attainments. Also that the hospital community, like a hotel or a household, requires much personal and domestic service which should be skilled but is not specifically nursing. These and many other considerations, still imperfectly understood, would influence the content of the curriculum and the manner of training.

In my judgment the curriculum and training programme, whatever the type of candidate, should have the following features:—

1. It should be intrinsically interesting and satisfying, even exciting to those who study it; therefore it must be flexible.

2. It should be possible, especially in the basic course, to make a distinction between teaching given to excite interest and stimulate further observation and study in those capable of it, and fundamental facts and skills on which the safety of the patient and the efficiency of his treatment depend.

3. Only the fundamental facts and skills should be the subject of compulsory examinations; these should be devised in the simplest possible manner but should demand high marking for pass.

1. Practical Nursing. An Analysis of the Practical Nurse Occupation with Suggestions for the Organization of Training Programs. (Misc. No. 8) Federal Security Agency, Vocational Educational Division, Office of Education. Published by the United States Government Printing Office. 55 cents.

4. The significance of nursing and the importance of the nurse's part as a citizen and as a key person in the National Health Service and in her own hospital should be stressed, so that the nurse in training has a sense of pioneering, of adventure, and of social importance.

5. A diversity of post-certificate courses up to university level should be planned to succeed the basic course, and these would precede promotion and specialisation.

As to anatomy, physiology, and psychology, these terms should disappear from the basic course (if only because they lose their meaning unaccompanied by the experimental studies which nurses cannot undertake). In their place the structure and function of the living body and mind should be studied, and should be taught in non-technical language by experts (not necessarily doctors or nurses, unless they are in fact experts) willing to give the very large amount of time and energy necessary for this type of teaching. The best illustration I know is Sir Arthur Keith's *Engines of the Human Body*, lectures given to a juvenile audience at the Royal Society; and what a lot of trouble he must have taken over them!

The application of this knowledge should be at the bedside. It should include recognition of surface markings necessary for treatment: e.g., location of orifices; recognition of failure of function due to structural defect and damage (the mouth no longer self-cleansing, the skin unable to maintain its resistance against pressure, the heart no longer an efficient pump, the blood depleted of its oxygen); recognition of behaviour influenced by fear, suspicion, and pain (the patient operated upon for cataract suddenly plunged into outer darkness).

All these are matters for an expert educational body, which could draw upon the special knowledge possessed by members of the General Nursing Council. Most nurses would probably agree that the time has come to link up the education of nurses with the general educational system of the country.

G. B. CARTER.

SIR,—You put forth a proposition which opens up an important question:

"Education, alike for medicine and for nursing, should, we suggest, be directed towards the good of the sick—not towards advancing the status of nurse or doctor."

But the status of the nurse is in fact in danger at present. The tendency is to regard her from the industrial standpoint and to concentrate attention on such matters as hours, wages, and what is virtually output, as though she were a producer; and to limit her education at the same time to just what is necessary to carry out bedside nursing.

But a nurse is not a producer; she belongs in a very good sense to the class of the guardians of the people. Accordingly she herself and all connected with her welfare should resist the attempt to lower her status to that of the artisan. On this view the broadest life, the widest outlook, and the best education should be hers; nothing but good should flow into eye and ear; and the aim of her teachers should be to produce first a good nurse and next a good woman.

If the difficulty in recruiting nurses were approached from the standpoint, "What can I put into her?" instead of "What can I get out of her?" then the difficulty would most likely dwindle and disappear. If the worst thing in the past were to treat her as a nun, the worst thing at present is to look upon her as an artisan.

The complaint cited in your page, sir, that the nurse of today is not being trained primarily to care for the sick, comes, one notes, from an American source. To the best of my knowledge and belief there is no deterioration in the nurse's care of the sick in this country. It might be maintained that if nursing were raised to the highest status there would still not be enough nurses. In that case two classes of nurse would be necessary, one with the equivalent of an honours and one with a pass degree; but one hopes that this would not occur.

Oxford.

H. ST. H. VERTUE.

TYPHOID-PARATYPHOID (Vi) VACCINE

SIR,—It was interesting to read in the *Bulletin of Hygiene* last September (p. 615) the résumé of an article by Ruiz Merino¹ on a new typhoid-paratyphoid vaccine with brilliant green, for which better results are claimed both in animals and in humans than with alcoholised, phenolised, or other types of vaccine. If this and other advantages are confirmed the vaccine will undoubtedly be a great help in the fight against enteric fever, particularly in the tropics.

Some time ago, in an attempt to find out if an effective typhoid vaccine with potent Vi antigen could be produced without alcohol, which was very expensive at that time, I tried several chemical and physical methods to kill the organism without affecting the Vi antigen. The simplest and most effective method found (brilliant green was not tried) was to sterilise the bacterial suspension with merthiolate, which was subsequently used in weaker concentration to maintain sterility—the principle used by Felix in his alcoholised vaccine. The effective concentration for killing the bacterium was found to be 1 in 10,000, and the preservative strength 1 in 20,000 to 1 in 30,000. Rainsford tried higher concentrations and discarded the vaccine as unsuitable.

The vaccine was stored in the cold, and at intervals of about a fortnight it was agglutinated against pure Vi-agglutinating sera and was found to keep its Vi-agglutinability undiminished up to 4 months, with only a slight drop during the next 3 months. It compared very favourably with alcoholised vaccine prepared by Felix's method and stored under identical conditions. Its protective and agglutinogenic properties have, however, not yet been fully determined. A small number of people were inoculated with it, and its Vi-agglutinin response appeared to compare favourably with that following the injection of alcoholised vaccine.

No claim can yet be made that this vaccine is superior to others, except on the grounds that it is simple to prepare and reactions to injection are few, and only mild and transient.

Under post-war conditions it is not now possible to carry out any extensive investigation with this vaccine here, and we hope that workers more favourably situated may be interested in it.

Department of Bacteriology, College of
Medicine, Singapore.

N. K. SEN.

TREATMENT OF TUBERCULOSIS

SIR,—Your correspondent, Dr. J. V. Hurford (Feb. 15), is concerned lest undue emphasis be put upon my statement respecting the recovery of many patients from tuberculosis, who before radiography had been unaware of its presence and had not received any institutional treatment. He suggests that I base my opinion on the radiographic evidence of primary tuberculous infection rather than on post-primary progressive tuberculosis.

From a serial radiography of patients with tuberculosis I have learnt that we cannot assess the gravity of past disease from the present radiographic appearances. Though we can be amazed at the spectacular spread of the progressive disease, we can be perhaps even more amazed at the disappearance, or almost complete disappearance, of spectacular radiographic "lesions." We can see "minimal" calcified foci in the lungs of most patients who are suffering from acute bone tuberculosis. We have seen patients with such "healed" lesions develop progressive and even fatal tuberculosis. For these reasons I opposed the opinion of the advocates of mass radiography that such lesions should be ignored as if they indicated established immunity: they should call for advice and added care against any influence which might lower the resistance.

I fully support the views on the "old-fashioned" sanatoria so ably expressed by Dr. J. H. Crawford (Feb. 8) and Dr. Temple Clive (Jan. 25). The claim put forward, that with increased surgical and other interference the five-year survival-rate has increased, has little to support it. The number of deaths from pulmonary tuberculosis has been progressively declining with improvement in social conditions; it fell from 53,858 in 1916 to 27,176 in 1928—i.e., before these "heroic" measures were adopted. With the increased

1. Ruiz Merino, J. *Rev. Sanid. Hig. publ., Matr.* 1946, 20, 460.

use of sanatoria for so-called "minimal" lesions, particularly those not associated with symptoms, we shall see an even greater survival-rate of patients treated. True, in the sanatorium, which is concerned essentially with mental and physical rest, we can expect this; but we know that the lesions in some of these patients would have healed without any treatment, and (through ignorance) without the stigma of tuberculosis.

The mere detection by mass radiography of more cases of gross disease will contribute little to preventive medicine, since we already know of more such cases than we can do anything for. It is amazing what massive infection the person with a good resistance can withstand, and it is the contributions to the latter which will give us a reduction in the death-rate. We are assured by Dr. R. R. Trail (March 15) that even after discharge from a well-run modern sanatorium "the average patient has a bleak outlook. . . . Lessened function and ostracism soon undo the benefits of the sanatorium."

I believe that great mischief is done in the dictation of treatment by radiography; for the film is often interpreted by chest experts who have had no basic training in radiology and who often shun the co-operation of their colleagues. The radiographic appearances are treated instead of the patient; and because of the doctrine of "symptomless tuberculosis" the patient stands the risk of treatment for adventitious radiographic effects.

The more radiographs I see, the more I value the clinical evidence. Within the past month I have seen an induced paralysis of the right diaphragm in a patient who on admission had no symptoms, no cough, no sputum, no tubercle bacilli but a good appetite, and whose radiograph before the operation showed the right apex obscured by a ringlet of hair which produced a pseudo-cavity with much reaction around. Such events may be rare, but they are not without significance when evaluating the passages quoted in my letter of Dec. 28, though Dr. L. E. Houghton (March 8), "hoist with his own petard," now seeks retreat. The answer to the question put to me by Dr. F. A. H. Simmonds (Jan. 11) will be found in the quotations I have given.

Birmingham.

JAMES F. BRAILSFORD.

ATELECTASIS FOLLOWING OPERATION

SIR,—I read with great interest Mr. Stringer's article of March 8. The investigation he describes was like one that I had begun myself on somewhat similar lines, but my investigation was interrupted by military call-up.

I have always felt that the seeds of postoperative pulmonary collapse are sown, so to speak, in the first few hours following operation, as Mr. Stringer has demonstrated. The clinical diagnosis of collapse cannot be made at all for at least 24 hours after operation, and often not for 48 hours. It is during this period that so much can be done, if the possibility of collapse is realised, to help the patient and prevent the unpleasant effects of atelectasis. In my opinion every patient who has had an anaesthetic lasting for more than a short time should be considered a candidate for collapse and should be watched carefully. I heartily agree with the suggestion of routine radiography 12 hours after operation, though it might possibly be somewhat troublesome to carry out; immediate treatment will usually relieve the collapse at once.

I do not agree that bronchoscopy need be considered in these cases, a much simpler treatment being to hand. A recent case illustrates what I mean.

I was attending, as a physician, a diabetic patient who was being operated upon for repair of a hernia. By 48 hours after operation the temperature had risen to 100° F. The man was intelligent and co-operative; he said he felt perfectly well, and in particular emphasised that he had no cough. On examination of the lungs, however, there was definite dullness with poor air-entry at one base. I then performed the manoeuvre which I have used several times in these cases, laying the patient on his sound side, pressing hard on the affected side, and instructing him to cough vigorously. He at once coughed up a teaspoonful of purulent material, much to his surprise. I repeated the manoeuvre two or three times and then examined the lung bases. The dullness had almost disappeared, and there was now air-entry; the patient admitted that he felt distinctly clearer in the chest. The temperature was normal next day and never rose again.

I instructed the nurse to repeat the manoeuvre 4-hourly for 24 hours, as is my custom in this type of case. The dullness had by this time completely disappeared, and the air-entry was normal. There is nothing new in this procedure, though I have been surprised how little it seems to be known.

Finally, I would like to emphasise again that patients with pulmonary atelectasis do not have a cough in the early stages; and it is waiting for the patient either to cough or to say he has a cough that causes delay in diagnosis.

Liverpool.

RONALD ELLIS.

NURSING AND THE DOCTORS

SIR,—As I am myself a ward sister in just such an institution as your correspondent, "Sister-tutor," I would like to say something in defence of the E.M.S. hospital. Sister-tutor is indeed unlucky in hers. The nursing staff here are extremely happy in their country surroundings, and many of them are sorry when they have to return to their parent hospital and town life. They certainly share cubicles here, but are comfortably housed, and the sanitary arrangements are quite adequate. Living conditions everywhere in this country are just as difficult as they were during the war—in many cases more so. We in hospital are fortunate in many ways: the incident of the night nurse, here, who returned in the middle of her "nights off" to get warm during this cold spell, proves this I think. Again, our medical staff here, both senior and junior, are always helpful and considerate towards the nursing staff. Is not the case of the surgeon who failed to turn up to the lecture perhaps rather an isolated one?

WARD SISTER.

PROTEIN NEEDS

SIR,—In their article on the treatment of infantile pellagra T. and J. Gillman,¹ say:

"The recent literature contains reports of the ineffectiveness of the majority of protein hydrolysates in the treatment of hypoproteinæmia in dogs (Madden et al. 1945). Severe hypoproteinæmia with œdema and anæmia has even been produced in pigs by feeding casein digests in a particular dietary setting (Cartwright et al. 1945). In the light of these findings the 60% case-mortality in our series of cases treated with protein digests is not difficult to understand."

It is a pity that such sweeping statements should be made without proper reference to the earlier work cited. Madden and co-workers² used a large variety of protein digests in their experiments and concluded that "certain protein digests given by vein may favor good production of plasma protein, as well as nitrogen and weight equilibrium over long periods in dogs subjected to plasmapheresis. These digests may be equally effective when given subcutaneously or intraperitoneally and more effective orally. Certain other digests may not be well utilized." What was evident from this and other investigations was that for optimum plasma protein formation the most important factor is the amino-acid make-up of the preparation, which in turn depends upon the nature of the protein and the methods employed for digestion and subsequent processing. An inadequate protein like gelatin or zein or an acid hydrolysate of casein as the sole source of protein can neither support growth nor promote plasma-protein production. Even if two proteins or amino-acid mixtures are equally effective for growth, one of them may be superior to the other as far as plasma-protein production is concerned. Madden and his associates have been trying to elucidate the specific amino-acid requirements of plasma-protein formation.

In the other paper referred to, Cartwright and his colleagues³ were mostly concerned with a comparison of the anæmia produced in swine by feeding them a protein deficient in tryptophane and the anæmia caused by pyridoxine deficiency. For producing tryptophane deficiency they used zein and an acid hydrolysate of casein. Although casein is rich in tryptophane this is mostly destroyed during acid hydrolysis. Using such a hydrolysate and zein, they were able to produce severe anæmia, hypoproteinæmia, and œdema in experimental animals.

1. *Lancet*, 1946, ii, 446.2. *J. exp. Med.* 1945, 82, 181.3. *J. clin. Invest.* 1945, 24, 268.

But the usual protein hydrolysates intended for therapeutic purposes are prepared from proteins of high biological value, such as casein, lactalbumin, and meat, by enzymic digestion with which there is no destruction of any essential amino-acid. If an acid hydrolysate is used (mostly for parenteral use) it is fortified with tryptophane and cystine to make up for that lost during hydrolysis.

In the light of these facts the remarks of the Gillmans about protein hydrolysates in general are hardly justifiable. It is likely that in infantile pellagra the primary requisite is something contained in 'Ventriculin,' in the absence of which the administration of large amounts of protein or protein hydrolysates may further tax the already damaged liver. It would have been interesting to try ventriculin together with a good pancreatic digest of casein or papaic digest of meat.

Bombay.

G. B. RAMASARMA.

OF NOT SMOKING

SIR,—Your annotation of March 15 ran: "It is not easy to gauge the priority which tobacco may justifiably be given. . . . Unfortunately, there is no yardstick for the measurement of tobacco's virtues." You clearly did not consider it necessary to indicate what are tobacco's virtues.

In my view, based on 12 years as a cigarette-inhalee followed by 20 as a non-smoker, there is no virtue in tobacco-smoking, just as there is none in opium-smoking. Addicts of drugs, including tobacco, delude themselves that their drug possesses unique psychological virtues—e.g., the sustaining of morale. What the drug really does is to appease temporarily their craving; and craving for a drug is a psychopathic urge generated as a late action of certain drugs. As it is appeased, so also is it generated.

The facts that tobacco is a toxic and comparatively powerful drug of addiction¹ and that it is therapeutically useless warrant the conclusion that there is no justification for any expenditure on it whatsoever; also that it is our duty, as keepers of the nation's health, to abolish tobacco-smoking, on health as well as on economic grounds.

Wallasey.

LENNOX M. JOHNSTON.

HAIR-BEARING SINUS

SIR,—In their article on the pathology of postanal pilonidal sinus (1946, ii, 484) Mr. Patey and Professor Scarff described a hair-bearing sinus found in a barber's hand. I recently encountered a somewhat similar case.

A man, aged 52, for many years a barber, came to hospital complaining of a painful swelling between the middle and ring fingers of the right hand. About six weeks previously he had noticed some hair-clippings lodged in a depression or fissure in the skin of the web, and had tried to remove them, using forceps, with apparent success. A week or so later he developed a painful swelling in this area, which had since varied a little in size. There was a red and tender swelling on the dorsum just short of the distal edge of the web between the 3rd and 4th fingers, surmounted by a small yellow area where a collection of pus was threatening to discharge. Extending proximally from it for about $\frac{1}{2}$ in. in the subcutaneous tissues was a firm and slightly tender track, which felt exactly like the tissue reaction around a retained wood splinter.

The hand was explored under general anaesthesia; using a tourniquet, the track was excised without much difficulty. During the dissection, however, it seems likely that the track was opened, for three fragments of hair, each about 3 mm. long, were discovered. Section showed a typical foreign-body granuloma with aggregations of giant-cells. No hair was found and (contrary to the findings of Patey and Scarff) there was no track lined with squamous epithelium or containing hair-follicles.

The patient had no hesitation in attributing his trouble to penetration of the skin by hair clippings, probably during the finger manipulations employed in shampooing, and he had known at least one of his fellow barbers to have an exactly similar lesion.

I am not convinced, however, that postanal pilonidal sinus results from penetration of the skin by hair from without.

Glasgow,

M. R. EWING.

STEVENS-JOHNSON SYNDROME

SIR,—The articles of Dr. Nellen and Dr. Murray in your issue of March 15, and your annotation of March 22, prompt me to record two other cases of Stevens-Johnson syndrome, one of which supports your remarks on the possible confusion with smallpox.

CASE 1.—A boy, aged 10 years, admitted to Mile End Hospital on Oct. 23 and discharged on Dec. 3, 1930. The rash was of the target variety, described as erythema iris, containing a central vesicle or bulla. There was an outer bluish-red area encircling a paler zone, the central bulla again being surrounded by a ring of erythema. The lesions were most numerous on the legs, arms, and hands, being particularly plentiful over the anterior aspects of the knee-joints. Some lesions were present on the face and scrotum and there was severe involvement of the mouth and eyes. The trunk was only slightly affected. Recovery was gradual and uneventful, and as far as I can recollect there was no evidence of pneumonia.

An interesting feature was his readmission just over a year later (Dec. 18, 1931, to Jan. 5, 1932) with a recurrence of the condition. On this occasion the disease was much less severe and the rash was limited to a few spots on the limbs and face without much involvement of the mouth and eyes.

A number of investigations were carried out but no significant results were obtained. Unfortunately the notes have been destroyed but I have some photographs which recall the appearance and distribution of the lesions.

CASE 2.—A boy, aged 14 years, admitted on Nov. 24, 1946, and discharged on Jan. 9, 1947, whom I was called to see in the receiving ward because the medical officers had considered the diagnosis of smallpox. The skin lesions were, however, identical with those which I had seen in the other case sixteen years before. He gave a history of coryza a week previously. For two days he had complained of soreness of the mouth and eyes. The previous day his mother first noticed spots on his face and others on the body later in the day.

He appeared very ill and toxic. Temperature 102° F, pulse-rate 130, respirations 28 per min. There were many lesions showing superficial ulceration on the lips and in the mouth. The skin lesions were circular and of the erythema iris-bullosa type, ranging in size from a large pin-head to an inch in diameter. Some bullae contained pus; others were replaced by scabs. The distribution was on the lower part of the face, the neck, arms, and legs. The rash was copious on the lower abdomen and on the penis. There were no lesions on the palms or soles. Many rhonchi were audible in the lungs. Intense conjunctivitis and blepharitis were present and a severe balanitis with some urethritis developed in the course of a few days.

He was treated with injections of penicillin in oil, 125,000 units twice daily for eight days after an initial dose of 250,000 units. Penicillin cream was applied locally and 'Albucid' drops instilled into the eyes. Physical signs in the lungs persisted and suggested some basal pneumonia, which was confirmed by X ray but had completely cleared by Jan. 2. The pyrexia persisted for two weeks and during this period the pulse-rate was rapid (100 to 120 per min.). All the lesions subsided gradually and the patient was fully recovered on his discharge. In neither case was there any residual damage to the eyes.

Blood-count on Nov. 24, 1946: red cells 6,750,000 per c.mm., haemoglobin 108%, white cells 8200 per c.mm., differential count normal.

Penicillin did not seem to have any specific effect, but I thought it of some value in limiting secondary sepsis and in preventing the development of incipient pneumonia.

In both cases the diagnosis of erythema multiforme (iris bullosa type) was made, and the appearance of the lesions was identical with that illustrated in Jacobi's *Atlas of Dermochromes* by Henry MacCormac (London, 1927, plate 1, fig. 1). Dr. G. B. Dowling, in a letter in THE LANCET of Dec. 14, 1940 (p. 759), describes what must surely have been cases of this syndrome; he refers to the resemblance of the lesions to erythema multiforme or erythema iris, and the impression remains, in the absence of any known aetiology, that Stevens-Johnson syndrome is a severe manifestation of that condition.

Mile End Hospital, London, E.1.

W. GORDON SEARS.

1. Johnston, L. M. *Lancet*, 1942, ii, 742.

COMPRESSION OF MEDIAN NERVE IN CARPAL TUNNEL

SIR,—Both Professor Harris and Mr. Roaf advocate immobilisation for compression of the median nerve in the carpal tunnel, and Professor Harris adds to the treatment the additional compression of a hard object in the palm. Experience shows, however, that when nerve-compression reaches the point of causing muscular wasting it cannot be cured by rest alone, for rest does not permanently remove the cause. Pressure neuritis of the slipping ulnar nerve does not recover unless the nerve is transposed, nor will either rest or exercises relieve the muscular wasting due to a costoclavicular syndrome. Indeed, in both these instances motor recovery is often incomplete after operation because operation has been undertaken too late. Similarly the swollen and fibrosing median nerve will not recover if after rest it is to be exposed to the same compression and the same traumatising movements as before—and working women cannot give up manual work for the rest of their lives. The danger of immobilisation is delay, for the longer the lesion is allowed to continue the less complete will be recovery of sensation and movement.

London, W.1.

W. RUSSELL BRAIN.

DOCTORS' SALARIES

SIR,—As final-year medical students we naturally hope to receive a decent rate of pay for our work on qualification, but we strongly deprecate the attitude of those who suggest that being a doctor, per se, entitles one to about ten times the total wage of the majority of workers.

Many a man has to provide all that his family needs on £5 a week—how dare your correspondents consider themselves entitled to spend this much on food alone for two people?

Chief Assistant's wife must surely regard his letter as a slight on her competence as a housekeeper. We have catered for ourselves for four years, and therefore have a real knowledge of the cost of food. Now that one of us is married, she is able to feed herself and her husband on £2 10s. a week without undue difficulty; and this sum includes the cost of canteen meals.

London, N.1.

ELIZABETH GORST

KATHLEEN CORBISHLEY.

THE PERIODICALS

SIR,—I am sorry to see your defence (March 15, p. 348) of the Periodical Proprietors Association's high-handed action in depriving the public of even those periodicals which would have escaped Mr. Shinwell's ban. This action seems to have been taken solely in the publishers' interests, and without any regard for those of readers.

One would like to have thought that THE LANCET at least would have considered its readers and its services to science in general as more important than its allegiance to the P.P.A., and would have defied the latter's ban, resigning membership if necessary. Certainly Thomas Wackley would not have submitted so meekly.

Witham, Essex.

J. W. NICHOLAS.

* * Dr. Nicholas seems to misunderstand the sequence of events. The Government, faced with an indubitably dangerous situation, decided that industrial use of electricity must be virtually suspended for the time being. Exception was made for hospitals, catering establishments, and "newspapers," all of which were held to provide essential services; but no exception was thought necessary for periodical journals. The Government's instructions on the subject had no legal sanction, but were obeyed by all the many industries affected, including all printers. No journal therefore could continue its usual service to its readers. The possibility remained of publishing token issues produced without the use of electric power; but the Periodical Proprietors Association thought that if there must be a ban it should apply in the same way to all, and therefore approved the Government's instruction that hand-produced issues were not permitted. So far as we know, neither the association nor anyone else was acting "in the publishers' interests": for almost all journals the saving in costs

of printing and distribution during the fortnight's suspension was far outweighed by the corresponding loss of advertisement revenue. As to the propriety of ignoring the instructions by way of protest, opinions will continue to differ. The fact that all ordinary newspapers were appearing as usual made it clear that the Government did not really intend or wish to muzzle the press; and at a time when the country as a whole was suffering so much damage we felt that complaints about the relatively small loss and inconvenience to our readers and ourselves would be out of proportion. If ever we are persuaded that the liberty of the press is seriously threatened we shall not be backward in its defence.—
ED. L.

THE MEDICAL SCHOOL

SIR,—Your leader of Jan. 4 says that "the medical schools of Britain are capable of attaining and maintaining the highest technical standards." As a war-time student at one of London's most illustrious schools I certainly do not want to under-estimate the severe stresses under which our teachers have manfully been labouring. But I venture to ask why the vast potentialities of our medical schools, with their top-line specialists, first-rate laboratories and lecture-theatres, and hand-picked cases, are still so far from being realised.

I would point first, to the indifference of teachers to our individual presence or (understandable) absence at ward-round or lecture, and to our early difficulties in approaching the patient in his bed; secondly, to the fact that we have no systematic instruction in medicine or surgery (I can remember being hurriedly initiated by sister into the devious arts of scrubbing-up, five minutes before the beginning of the first operation at which I was due to assist); and thirdly, to the system whereby gold-medallist applicants for house-appointments are turned down in favour of rigger blues (by the simple expedient of asking one candidate how he would prepare a turpentine stupe, and the other which drug he prefers in penicillin-sensitive pneumococcal pneumonia). The idealism which uplifted so many of us at the inception of our careers becomes now a bitter relic of its former self.

We are not asking to be spoon-fed. We know we must go out and get knowledge for ourselves before it will stick. But it is a fallacy to believe that, now we have left school, we fare better if left to our own devices, and no longer need frequent signposts to the founts of wisdom. Spoon-feeding for the infant is admirable. A help-yourself service for the adult is economical. But neither is suitable for the adolescent. And it is the immature and the faltering among us who stand in most need of guidance.

May I put forward a few tentative suggestions?

(1) Let us have a say, however small, in decisions affecting our curriculum.

(2) Let us have smaller firms as soon as possible, with more frequent tutorials of the "fireside-chat" category by the registrar, houseman, or honorary, so as to approach the ideal of individual tuition, with which no other professional course is more inadequately provided. In this way will students feel themselves part of a cognate group working at a common task.

(3) Let us have system in our lectures, and, more important still, in outpatients. If full-time courses can be arranged in fevers, midwifery, and psychiatry at specialised institutions, why not in ear, nose, and throat, in ophthalmology, and in dermatology, reserving the parent hospital perhaps for more general work?

(4) Let us have more student house-appointments—a taste of responsibility to give us some idea of the difficulties of the staff, to turn our present parasitic apathy into symbiotic satisfaction, and possibly to turn out something useful. Aimlessly loafing through the hospital, vaguely drinking soul-destroying cups of coffee, tolerated at best by those around us who are fortunate enough to be employed, we would welcome with enthusiasm such opportunities to justify ourselves.

(5) Please, can we sit down somewhere in medical rounds of more than three hours' duration?

AMOS.

* * It has been suggested that shooting-sticks with rubber crutch shoes would make an ideal seat for students in ward rounds.—ED. L.

Parliament

ON THE FLOOR OF THE HOUSE

THE Budget is looming ahead. The House has therefore been considering the main bills and estimates concerned with the Services, and there have been debates on man-power and defence problems as a whole. In a world of military uncertainties the need for strong defence forces needs little argument, and we have big commitments not only in the United Kingdom and Western Europe but also in the Middle East and the Far East; yet we, and many countries of the world, are suffering from a man-power famine even though since the end of the war there has been a run-down of 3½ million workers in the munition industries and over 4½ million men and women have returned from the Forces to civilian life. A crucial item which allows for no diminution is our contribution to forces in the United Nations Organisation. Mr. Alexander, speaking as Minister of Defence, told the House that our Government are pressing, in the Security Council, for "swift and decisive" action to organise the forces which, under article 43 of the charter, are to be put at its disposal to prevent aggression. When National Service is the law of the land we shall have a stable force at our disposal to be our contribution to the United Nations Force. The Labour rebels who are against conscription thus find themselves refusing aid in setting up the international police force which is the essential guarantee of world peace and security. The defence of Great Britain and the Commonwealth will become, when countries of the Security Council and other nations are joined with it, the defence of the world.

But inside the framework of these great needs there are possibilities of economy of man-power in the work of new committees, partly military and partly civilian, which the Services have set up. Civil experts and military experts must look at Service questions from outside the four-square rules and regulations of Service procedure. Warfare now is total, so consideration of Service economy must be total also, and the civilian may have to muscle-in—sometimes in regions to which he has been unaccustomed.

MEDICUS, M.P.

FROM THE PRESS GALLERY
Control of Penicillin Bill

In moving the second reading of the Penicillin Bill, in the House of Lords on March 18, the Earl of LISTOWEL briefly outlined the powers of the Bill.¹

The controls to be imposed, he pointed out, were limited to the supply of the drug to the public and there would be no interference with the wholesale trade or the supply to doctors, hospitals, nursing-homes, organisations for medical research, or Government departments.

Lord STRABOLGI read a letter from Dr. E. W. Fish, which ran:

"There is one danger which this Bill does not cover. If penicillin lozenges for the mouth may be prescribed in any quantity the practitioner thinks fit, there may be a large number of people who will give prescriptions for perhaps 100 at a time, and if their patients use them, possibly spasmodically, for some chronic complaint such as tonsillitis, or even a tendency to dental caries, the mouth and throat of such a person would be an ideal breeding ground for the resistant strain of streptococcus which might infect somebody else and prove fatal. I do not see how this could be prevented, except through the medical press pointing out the danger. One could, of course, limit the permitted sale of lozenges to some two dozen at any one time, or on any one prescription, but it would be difficult in factories where the nurse hands them out, I believe, under the doctor's orders, and Fleming felt, perhaps more strongly than I did, that no attempt should be made to go further than the present Bill provides."

Lord Strabolgi asked the Government if it would be possible to strengthen the Bill in these terms.

Lord AMULREE was satisfied that the medical profession would welcome the Bill but raised two points.

Some firms were charging a greatly enhanced price for cosmetics which contained quantities of penicillin so minute as to be valueless. This was likely to bring the drug into disrepute. Again, penicillin snuff was good for the after-effects of colds and catarrh, and similar maladies. If this snuff was safe, Lord Amulree did not think there was the same reason for restricting its sale to a limited amount on each prescription. Penicillin snuff tended in a short time to lose its properties, and it was therefore hard to make a patient go back to his doctor for a fresh prescription each time he caught a cold. Surely it should be possible to get a repeat supply on the original prescription?

The Earl of MUNSTER drew attention to the words at the beginning of clause 2:

"The substances to which this Act applies are penicillin and such other anti-microbial organic substances produced by living organisms as may be prescribed by regulations. . . ."

What, he asked, were those other organic substances which could be prescribed by regulations of four Government departments?

The Earl of LISTOWEL agreed that the point raised by Lord Amulree about the sale of what might be called "pseudo-penicillin" preparations by chemists was an additional argument in support of the Bill. In reply to Lord Strabolgi's point, he suggested that the responsibility for not prescribing too large a quantity of penicillin tablets at one time must fall upon the medical profession and was not one for the Government to enforce by statute. Lord Munster had also raised an important point. The Bill dealt with substances which were still largely in an experimental stage. The most advanced of these preparations, apart from penicillin, was streptomycin, on which the Medical Research Council were now conducting tests. The Government had come to the conclusion that too little was known about the properties of streptomycin to mention it specifically in the Bill. But provision was made for the making of regulations under the Bill when it was proved in accordance with laboratory tests that a certain substance had properties similar to penicillin and therefore should be subject to control.

QUESTION TIME

Production of Streptomycin

Dr. BARNETT STROSS asked the Minister of Health what weight of streptomycin was being manufactured each month in Britain; and what type of clinical trials were now being carried out by the Medical Research Council on the treatment of tuberculosis.—Mr. JOHN EDWARDS replied: The present production is very small but the Minister of Supply hopes that by June it will be about 250 grammes per month. The Medical Research Council has organised clinical trials at selected hospitals in certain types of tuberculosis cases.

Penicillin for British Zone

Mr. SOMERVILLE HASTINGS asked the Chancellor of the Duchy of Lancaster whether he was satisfied that the amount of penicillin supplied from official sources to the British zone of Germany, namely, 95 mega units a month, enough for 50 or 60 cases only, was sufficient for all needs apart from the treatment of venereal disease; and how many applications for supplies of this drug had been received by the public-health branch of the Control Commission from the German Public Health Advisory Committee which had not been acceded to.—Mr. J. HYND replied: No applications for penicillin have been made to the British authorities by the German Public Health Advisory Committee for some months past. I am advised that supplies made available by the relief societies alone have been sufficient to meet recent demands. It is likely, however, that the widening experience now being acquired by German doctors in the application of the drug will lead to a demand for larger quantities and it is planned to increase substantially the present monthly official allocation for non-v.d. cases.

Mr. HASTINGS: Will the Minister make it clear to the German doctors that more penicillin is available if it is required?—Mr. HYND: We are taking steps to encourage German doctors in the use of this drug and to obtain knowledge of its proper use. We anticipate that we will be able to meet any commitments likely to be made.

1. See *Lancet*, March 22, p. 379.

Obituary

JOSEPH BARCROFT

KT., C.B.E., M.A. CAMB., D.SC., HON. M.D.,
HON. F.R.C.O.G., F.R.S.

Sir Joseph Barcroft, the Cambridge physiologist, died suddenly on March 21 while returning home from his laboratory. He will be warmly remembered and widely missed, not least in the medical profession. Though his medical degrees were honorary, they were very properly bestowed on a man who gave so much of his mind and heart to clinical problems and did so much to inform and assist doctors. His scientific reputation is one that will endure and grow.

He was born on July 26, 1872, the son of Henry Barcroft, D.L., of Newry, Co. Down. The family were Quakers, and he was sent first to Bootham, the Friends' school at York. Thence he went to the Leys School, Cambridge, where he was one of a group of prefects almost all of whom attained distinction later: they included Henry Dale and John Clapham (simultaneously presidents of the Royal Society and the British Academy), F. A. Bainbridge the pathologist, H. C. Gutteridge the authority on international law, and Gibberd one of the last senior wranglers. At King's College, Cambridge, Barcroft took a first in both parts of the natural sciences tripos and was elected to a fellowship in 1900. For several years he worked as a master at the Leys School, but thereafter devoted himself entirely to physiology as university reader under J. N. Langley. He was elected F.R.S. in 1910, and succeeded in 1925 to Langley's chair, which he held till 1937. From 1941 until his death he was director of the Agricultural Research Council's unit of animal physiology.

As a physiologist Barcroft had three or four research careers, each enough to assure him fame. They began with his classical work on the oxygen carriage of the blood; and every student now learns about his blood-gas apparatus, his oxygen-dissociation curves, his classification of the varieties of anoxia, and his experiments disproving oxygen secretion in the lungs. Opposing J. S. Haldane in a long controversy, he maintained that the passage of gases through the alveolar epithelium is a simple physical process, and that even under adverse conditions the lungs cannot take up oxygen unless the oxygen pressure in the air is higher than that in the blood. In support of this conclusion he exposed himself to low oxygen pressures for long periods inside a glass box at Cambridge and made experimental observations with a team which he took to the Andes for the purpose. His *Lessons from High Altitudes* is a study of acclimatization.

During the war of 1914-18 he was asked to advise on poison-gas. Ready as ever to immolate himself if need be, he walked with his dog through a gas chamber filled with KCN in a concentration known to be lethal to dogs. The dog died, but Barcroft cycled home to advise against the manufacture of cyanide gas-shells. His association with the War Office, begun in 1917 as a member of its chemical warfare committee, continued as a member of the Army Medical Directorate consultative committee from 1928 to 1943.

Meanwhile his studies on altitude, had attracted his attention to the spleen, and in a series of beautifully planned researches, with H. W. Florey, J. G. Stephens, and others, including observation of the spleen through celluloid windows, he demonstrated, *inter alia*, its storage function. From 1921 onwards he had been developing the concept of a blood-volume divided, in proportions fluctuating from moment to moment, between circulating and depot blood; and though the earlier literature contains some suggestions of this idea, and also some evidence for it, it was he who proved and published it adequately and made it a part of current doctrine. The concept was a major contribution to physiology.

It was probably this work on the blood-volume that led, via the blood-supply of the pregnant uterus, to Barcroft's studies of the foetus, which in turn have done much to persuade others of the importance of prenatal physiology. Physiology begins with conception, but until recently nobody seemed to be much interested in what happens in utero, though the study of that period of life provides clues which can help to resolve many postnatal mysteries.

In biological research the main difficulty is to reduce the variables, and this difficulty is to some extent surmounted in intra-uterine studies, because one can select stages of development in which the organism has not yet acquired its postnatal complexity. For example, the effects of carbon-dioxide excess can be determined before various centres in the brain are properly developed, or one can note the reactions of the circulatory system when it is not yet under the control of a nerve-supply. A generation hence, physiology textbooks are likely to begin with a long section on embryonic and foetal function, and it is to be hoped they will give due credit here to the greatest figure among the pioneers.

Last October Barcroft published the first volume of his *Researches on Pre-natal Life* (Blackwell Scientific Publications), and in its preface he wrote:

"This work partakes very much of the nature of a will—I hope not my last. . . . The general aim . . . of this book is to trace the development of function in the mammalian foetus, never losing sight of the fact that one day the call will come and the foetus will be born. Not only has the foetus to develop a fundamental life which will suffice for intra-uterine conditions, but at the same time it has to develop an economy which will withstand the shock of birth, and will suffice, nay more than suffice, for its new environment."

From 1937 to 1939 Barcroft and D. H. Barron at Cambridge had cooperated with A. E. Barclay and K. J. Franklin at Oxford in cineradiographic studies of the foetal circulation, and their joint efforts secured objective records where hypothesis had been dominant for three centuries. In *The Brain and its Environment* (1938) he had built on Claude Bernard's conception of the "milieu interieur," the book being largely based on the effects of environmental changes on the foetal nervous system. More directly addressed to the practising doctor were his Sharpey Schafer lecture at Edinburgh in 1941 on Four Phases of Birth, and his Linacre lecture at Cambridge in 1942 on the Onset of Respiration at Birth, with comments on resuscitation.

As a lecturer Barcroft had early proved his skill, and his many addresses to many audiences were not least among his services. He had the gift of explanation; he spoke to an audience in the interesting way in which he would speak to a friend; and he used an imaginative humour. "I have no wish," he remarked, "to deny that the spleen is an important cemetery for red blood corpuscles any more than I have to tilt against anyone expressing the view that London is the largest cemetery in England." Again, on Physical Unfitness in relation to Density of Population: "Something is wanted comparable to 'hunger' which impels people to take exercise. Probably in some obscure form it is there, but it needs cultivation in a sense which hunger does not. Probably the healthier the youth of this country the more anxious they will be to be out and about, so that you start with the advantage of a benign circle." One of many brilliant addresses published in these columns was his Stephen Paget lecture of 1934, discussing Experiments on Man—a subject on which he had ample right to speak.

Sherrington in his *Man on his Nature* remarks that "we dismiss wonder commonly with childhood. Much later when life's pace has slackened, wonder may return. The mind then may find so much inviting wonder, the whole world becomes wonderful." Perhaps Barcroft's outstanding characteristic was that he never lost this childhood's wonder, and thus he secured a constant driving force for many grown-up thoughts. He always seemed to be able to step out of the ruts of contemporary ideas and research and roam freely, alone or with some chosen companions, seeing wonders that were invisible to others. Then he would return to report on what he had seen and done—talking in that simple, exciting, slightly breathless way he had, making all he had discovered seem so self-evident, poking fun at himself, and generously paying tribute to his collaborators. Like other people, he was not omniscient; indeed his reputation occasionally suffered because he was not afraid, in discussions, to put forward some idea which others knew to be unfounded. Yet he had the knack of seeing the "story" in a problem, and his terrifying disregard for details—some details—was justified by his proving so often right. He seemed to back his intuition against

the perverseness of nature, but his success was really due to his ability to see the problem in its simplest elements where others saw only a mass of work to be done.

As an experimenter he was imperturbable, and he followed the principle that each experiment should attempt to answer only one question: he was content with a small plus provided it was permanent, and in this he showed his patience, his thoroughness, and also his vision. He had his long-distance plan and achieved it gradually but with certainty. When, at nearly 70, he took over his new appointment with the Agricultural Research Council he began planning investigation of the digestion and metabolism of ruminants. He would say, "Of course I know nothing about it"; but somehow he seemed to know enough to launch work which has already yielded many important results. With his death a vital spark has gone out of British physiology.

He treated everyone with a courtesy and understanding which seemed to be based on an inner conviction that the good in them was the only thing worth bothering about, and this made him a fine collaborator. "He seemed," says a colleague, "to be searching for something fundamental, both in his work and in people, which he felt ought to be there. Something certainly kept him fresh and enthusiastic to the end."

Prof. A. V. Hill writes: "By the death of Sir Joseph Barcroft the world has lost one of its really great men. Viewed from a single aspect, the greatness of his stature may not be so apparent; but taking his whole life together, his outstanding contributions, practical and fundamental, to science and medicine, his services to Britain and her allies in two wars, his deep influence on all who knew and loved him, and the harmony of all his adjustments (befitting a good physiologist!) make no lesser estimate possible.

"The integrity and loyalty, the courage and humility, the wisdom and simplicity of 'J. B.'s' character; his thoughtfulness for others combined with inflexibility of aim and principle; his seriousness of purpose adorned with the grace of gaiety and laughter; his intuitive understanding of men and affairs; his experimental skill and persistence; the enchantment of his home, the romantic qualities of his speech and writing, the magic which set people at once to profitable jobs around him; the charm and steadfastness of his friendship, the generosity of his helpfulness: these all, and one could say much more, gave him a unique position among physiologists and an exceptional place in general affection and esteem. Workers in physiology, nutrition, and agriculture, and in human and veterinary medicine, soldiers and airmen, mountaineers, and sailors whether in big or little ships, all are in debt to J. B. 'After all,' he wrote in 1913 in the preface of *The Respiratory Function of the Blood*, 'the pleasantest memories of a cruise are those of the men with whom one has sailed. The debt which I owe to my colleagues . . . will be evident enough to any reader of this book. It leaves me well-nigh bankrupt—a condition well known to most sailors.' That kind of bankruptcy is indeed well known reciprocally to all who have sailed with J. B.

"In the same preface he wrote: 'At one time . . . most of my leisure was spent in boats. In them I learnt what little I know of research, not of technique or of physiology but of the qualities essential to those who would venture beyond the visible horizon.' Those qualities, call them intuition or what you like, were evident in all he did; but they were backed by splendid patience, by fine judgment, and indomitable hard work. The same imaginative qualities and the same capacity for new work lasted unabated to the end. Nearly ten years after formal retirement he was chairman of the Food Investigation Board, head of a unit of the Agricultural Research Council for research in animal physiology, chairman of the sectional committee of physiology and medical science of the Royal Society—and active in many other ways. He died suddenly, aged 74, going home from his work: happy in his ending, except for the sorrow he has left behind.

"It is impossible to think of J. B. apart from his home. Lady Barcroft, the daughter of Sir Robert Ball the astronomer, inherited her father's sense of fun, and the laughter which, like a nosegay, decorated their joint lives made them the most perfect partners and the most perfect hosts. They realised that the most serious

things can often be better said and done gaily—and they said and did them so. They provided, for many years, a centre for the physiologists of Cambridge and (on occasion) of a wider circle. Lady Barcroft is a joint creditor with J. B. in what we owe.

"I do not know how many pupils J. B. had, but it must be hundreds, from most of the countries in the world. Their careers generally show more than a sign of his handiwork. He was regarded with the same esteem in the United States and many other countries as in England. He loved, and was loved in, King's. He was a great ambassador for the fellowship of scientific men everywhere: he will be mourned throughout that fellowship and throughout the world.

Sir Joseph Barcroft was appointed C.B.E. in 1918 and knighted in 1935. He received honorary degrees in science from Harvard, from Queen's University, Belfast, from the National University of Ireland, and from Trinity College, Dublin, and in medicine from Sofia and Louvain universities. The Royal Society bestowed on him its Royal, Baly, and Copley medals, and he was Fullerian professor of physiology at the Royal Institution from 1923 to 1926.

Of his two sons, one is Dr. Henry Barcroft, professor of physiology at Queen's University, Belfast.

GEOFFREY DUCKWORTH

M.R.C.P.

Dr. Geoffrey Duckworth, physician in charge of the skin department of the Bolingbroke Hospital, and physician to the St. John's Hospital for Diseases of the Skin, died at his home at Wimbledon on March 18. In 1929 he qualified from St. George's Hospital and he took his M.R.C.P. three years later. After serving as registrar to both the inpatient and outpatient departments of St. John's Hospital he was appointed to the staff ten years ago. In all the affairs of the hospital he showed great interest, and he will be missed from its committee meetings, which he regularly attended. He was also a member of the staff of the Royal Hospital and Home for Incurables at Putney, and an assistant editor of the *British Journal of Dermatology and Syphilis*. During the war he acted as a physician dermatologist in the E.M.S.

A keen investigator, Duckworth often brought difficult cases to one of his colleagues for discussion; and, writes R.T.B., "This was made easy by his natural humility, a quality which greatly added to his charm. New aspects of therapy and all possible advantages for the comfort and progress of his patients were certain to stimulate his enthusiasm. He never sought the limelight, and was often too diffident to enter the discussions at society meetings, but we who knew him held him in great respect and friendship."

Dr. Duckworth leaves his wife with two daughters and a son. He was 46 years of age.

WILLIAM THOMSON MUNRO

M.D., LL.D. ST. AND., F.R.C.P.E.

William Munro was medical superintendent of Glenlomond Sanatorium, Kinross, for 25 years. Yet his position in tuberculosis is difficult to define. He always claimed to be a clinician and he studied the disease from that angle. It was thus that he saw its problems, and the value of his contributions to the subject lay primarily in the fact that they were deliberate investigations of problems seen in the course of his daily work. But despite his own claim to clinical interest his happiest hours were spent in his laboratory—a small room containing the minimum of equipment. Here work was done in the best tradition by a man who wanted to know why; and when he retired owing to ill health in 1945 he had in mind several inquiries to which he knew no satisfactory answer.

He graduated M.B. with distinction at St. Andrews in 1908 and M.D. four years later. After holding house-appointments at the Royal Infirmary, Dundee, he took his D.P.H. in 1914. A period of war service followed, and in 1920, after his demobilisation, he was appointed to Glenlomond Sanatorium.

One of the original members of the Tuberculosis Society of Scotland, Munro probably contributed more to that society than any other member, and he served as president from 1935 to 1938. In 1929 he was elected

F.R.C.P.E. and he was surprised and delighted when his own university in 1945 conferred upon him the degree of LL.D.

"Essentially an individualist, Munro tackled his own problems," writes C. C., "but he acknowledged the help and work of others and he was undoubtedly influenced by Robert Philip, Stanley Griffith, Bruno Lange, and Calmette. His investigations covered a wide field, but his best-known work is that on phthisis of bovine origin and on tubercle bacilluria. He had faith in his own views, which he expressed with conviction, and although in debate he often disagreed strongly with the views of others a spark of pawky humour illumined his remarks and no sting remained.

Sometimes he had the appearance of being aggressive, but he was a kindly man, shy at heart, and generous in his estimate of those whose work was more to them than a mere job. The lazy and garrulous were anathema to him, and there were no humbugs among his friends."

Dr. Munro's brief retirement was spent at Kinross, where his wife died 18 months ago. They had no children.

FREderICO NITTI

Dr. Nitti was the son of Signor Francesco Saverio Nitti, prime minister of Italy before the advent of Mussolini. For many years he was in charge of the bacteriological side of the chemotherapy investigations at the Pasteur Institute in Paris, and he was one of the team who first found the activity of sulphanilamide in streptococcal infections.

After Domagk's discovery of the activity of 'Prontosil,' which was published in 1935, Prof. J. Tréfouël, Mme. Tréfouël, Nitti, and Bovet immediately started to assay a series of similar diazo compounds in mice infected with streptococci. After nine months' work they noticed that all of the diazo compounds which included the residue of the sulphanilamide group were active, whereas those without this grouping had no activity; further it was seen that no great change of activity resulted from changes in the other primary amine forming the diazo compound. They then tried sulphanilamide itself and found it to be active. This finding, following Domagk's discovery of prontosil, pointed the way to the great development of the chemotherapy of bacterial infections during the last decade. Nitti continued his chemotherapeutic research both with the antibiotics and with synthetic chemical substances, and took part in the very wide clinical trials at the Pasteur Hospital. His enthusiasm for this work was a most valuable asset to the Pasteur team.

He was a charming and delightful colleague, and his early death on March 1 is a loss to medical science. He had been suffering from tuberculosis for the past two years, but was only recently persuaded to give up his work.

Dr. RICHARD RICE died on March 7 at his home at Harwell, where he was in practice from 1882 till his retirement in 1945. A keen follower of the Old Berks Hunt, in the early days many of his rounds were done on horseback or by dogcart. On his 80th birthday 250 of his friends and patients presented him with an album of autographs.

Appointments

EVANS, W. J. M., M.B. Lond., D.P.H.: M.O., Tanganyika, Colonial Service.

HAMILTON, WINSTON, M.B. Belf., D.P.H.: asst. tuberculosis officer, West Riding, Yorks.

JONES, MAXWELL, M.B. Edin., M.R.C.P.E., D.P.M.: consultant in medical psychology, British Postgraduate Medical School, London.

STUNGO, ELLIS, L.R.C.P.E.: clinical asst., department of psychological medicine, University College Hospital, London.

WHALLEY, G. H., M.B., B.HY. Durh., D.P.H.: T.O. and deputy M.O.H., Great Yarmouth.

WALSH, W. M., M.B. N.U.I., D.P.H.: medical superintendent, Maiden Law Central Isolation Hospital, Lanchester, Durham.

Examining Factory Surgeons:

FRANKS, SAMUEL, M.B. Manc.: Tyldesley, Lanes.

HARRISON, D. G., M.B. Dubl.: Shanklin, Isle of Wight.

HUNT, J. G., M.B. Lond.: Arundel, Sussex.

MACDONALD, DUNCAN, M.B.E., M.B. Glasg.: South Ulst no. 1 district.

MACKINNON, GEORGE, M.B. Glasg.: South Ulst no. 2 district.

ROSE, J. V., B.Sc. St. And., M.R.C.S.: Newton Abbot, Devon.

WRIGHT, WINIFRED, M.B. Lond.: Shepton Mallet, Som.

Notes and News

FEES PAYABLE BY LOCAL AUTHORITIES

LAST year the representative body of the British Medical Association proposed a scale of fees for sessional or occasional work undertaken by doctors for local authorities. This has now been considered by a conference held under the chairmanship of Sir William Douglas, secretary of the Ministry of Health, at which an amended version was accepted by representatives of the B.M.A., the County Councils Association, the Association of Municipal Corporations, the Urban District Councils Association, the Rural District Councils Association, the London County Council, the Association of Education Committees, the Mental Hospitals Association, and the Metropolitan Boroughs Standing Joint Committee. The scale now approved, which is published in detail in the Supplement of the *British Medical Journal* of March 22, is as follows:

For sessions at hospitals and clinics of, normally, 1½-2½ hours, the fee should be £4 4s. for consultants and £2 5s. for general practitioners; and for sessions not normally exceeding 1 hour, £2 12s. 6d. and £1 10s. respectively. "Higher remuneration should be paid where senior consultants are required for work carrying special responsibilities." Where payment is made on the basis of single cases the fee for a surgeon should be not less than £5 5s. for a minor and £10 10s. for a major operation, his fee for a consultation being £4 4s. The minimum fee for the administration of an anesthetic should be £1 10s. To consultants' fees should be added an allowance of 1s. a mile each way for every mile beyond two miles from the doctor's home or the centre where he practises (whichever is less).

General practitioners should receive 7s. 6d. for each antenatal or postnatal examination, or 12s. 6d. if a report is required by the local authority. For diphtheria immunisation 3s. 6d. should be paid per injection at surgery, or 6s. 6d. at the child's home, the material to be supplied by the local authority.

The rate of remuneration for other services should be arranged after consultation between the local authority and the local division of the B.M.A., and differences can be referred to the advisory committee set up under the Askwith agreement. It is also pointed out that nothing in these recommendations prevents a doctor from continuing his present contract with a local authority.

The revised scales operate retrospectively from Nov. 1, 1946. The agreement is "of an interim character," without prejudice to any future negotiations.

A CAUSE OF TALIPES

Hippocrates suggested that congenital malformations were due to intra-uterine pressure, but it was left to Browne¹ to work out the details of this mechanism for congenital talipes and some other deformities. Now Rebaudi and Iannuzzi,² of Addis Ababa, suggest that in some cases talipes may be caused by a foot getting caught in a loop of the cord. They support their argument with photographs of three seven-month fetuses in each of which the cord is looped round the ankles. Unfortunately it is not possible to make out the exact condition of the feet. The report mentions six such cases studied in fetuses delivered at the sixth to eighth month.

SOCIAL MEDICINE AT OXFORD

THE Institute of Social Medicine in its second annual report records that with co-operation of town and gown useful progress has been made during 1946. Investigations relating to the beginnings of life have included statistical studies of stillbirths, and clinical, radiographical, and social studies of the pre-school child and adolescents. Studies into occupational mortality, morbidity, and accidents have also been undertaken and research has been carried out into the epidemiology and aetiology of social diseases, such as tuberculosis, rheumatic fever, peptic ulcer, and cancer. This work continues, and a new project which has been started is a long-term study of student health at a men's and a women's college, with which is linked a health advisory service for the students. At the beginning of the 1946-47 session Prof. John Ryle, the director of the institute, was asked to organise all teaching in social medicine and public health for students during their clinical period. A course has been arranged

1. Browne, D. *Lancet*, 1934, ii, 969.

2. Rebaudi, F., Iannuzzi, V. *Boll. Soc. ital. Med. Igiene trop. (Ser. Eritrea)*, 1946, 6, 217.

which pays close attention to social factors in aetiology, and the lecturers besides the staff of the institute will include members of the city and county public-health departments.

CUT IN ALCOHOL SUPPLIES

THE production of drugs is likely to be seriously interrupted by a cut in the April allocation of alcohol to the manufacturers. The February allocation was reduced to 75% of the normal. In March this was made up by an allocation of 125%, but the drug firms were warned that this might have to cover April also. The Board of Trade has now informed them that there will be no April allocation. The reason given is the fuel cut to 33 $\frac{1}{3}$ %, which the alcohol industry is suffering in common with other industries. Like smelting, alcohol distillation is a process in which there is a close relation between fuel and output.

University of Oxford

A Betty Brookes fellowship for research into brain metabolism in relation to nervous and mental disease is shortly to be awarded. The fellowship will be tenable in the first instance for three years, and the stipend will be between £500 and £850 per annum. Application should be sent to the Whitley professor of biochemistry, University Museum, Oxford, not later than May 31.

Subject to the approval of convocation, the honorary degree of D.Sc. will on May 1 be conferred on Dr. J. Tréfouël, director of the Pasteur Institute, Paris.

University of Cambridge

On March 15 the following degrees were conferred :

M.D.—J. W. Crofton. * F. S. Maclean.

M.Chir.—A. S. Till.

M.B., B.Chir.—* W. B. Webb.

* By proxy.

University of London

Dr. E. T. C. Spooner has been appointed to the university chair of bacteriology and immunology, tenable at the London School of Hygiene and Tropical Medicine, as from Oct. 1, 1947.

Dr. Spooner studied medicine at Cambridge and St. Bartholomew's Hospital, where, after qualifying in 1927, he was house-physician. Since 1931 he has been demonstrator and subsequently lecturer in pathology at Cambridge, where he is a fellow and tutor at Clare College. From 1940 to 1943 he worked for the Medical Research Council, becoming in 1942 member of a research section in the R.A.M.C. He graduated M.D. in 1942. From 1943 to 1944 he was director of the E.P.H.L.S. laboratory at Cambridge.

Dr. R. H. S. Thompson has been appointed to the university chair of chemical pathology, tenable at Guy's Hospital medical school, as from Oct. 1, 1947.

Dr. Thompson was trained at Oxford and Guy's Hospital, graduating M.A., B.Sc., and B.M. in 1937. He held an Adrian Stokes travelling fellowship at the Rockefeller Institute of Medical Research, New York. In 1938 he was elected to the Gillson research scholarship in pathology by the Society of Apothecaries, and since then has been fellow and tutor of University College, Oxford, and demonstrator in biochemistry at Oxford. During the war years he was attached to the Chemical Defence Research Department of the Ministry of Supply, from 1939 to 1944, and from 1944 to 1946 he served in the R.A.M.C. with the rank of major. Since his return last year he has been dean of the medical school at Oxford.

Dr. H. Grüneberg has been appointed to the university readership in genetics, tenable at University College, as from Oct. 1, 1946.

From 1932 to 1933 Dr. Grüneberg was demonstrator in anatomy in the University of Freiburg. From 1933 to 1936 he was research student and since 1936 honorary research assistant at University College. Since 1938 he has held the Moseley research studentship of the Royal Society. He served in the R.A.M.C. from 1942 to 1946.

University of Sheffield

Dr. D. O. Stevenson has been appointed honorary lecturer in venereal diseases: Dr. Cynthia Redhead, tutor in child health; and Dr. S. J. Barr, assistant tutor in obstetrics.

University of Leeds

Dr. H. G. Garland has been appointed honorary demonstrator in neuropathology.

University of Edinburgh

On Tuesday, April 22, at 5 P.M., Dr. C. H. Kellaway, F.R.S., director-in-chief of the Wellcome Research Institution, London, is to deliver the 7th Sharpey Schafer lecture in the University New Buildings, Teviot Place. He will speak on the Perfusion Experiment in the Study of Tissue Injury.

University of Manchester

Among those who will receive honorary degrees on founder's day, May 21, will be Prof. E. D. Adrian, O.M., on whom the D.Sc. will be conferred.

Auxiliary Royal Army Medical Corps Funds

The annual general meeting will be held at 11, Chandos Street, London, W.1, on Monday, April 14, at 5.30 P.M.

Westminster Hospital

The medical school of the hospital holds a clinico-pathological demonstration on the first Monday of each month, at 5 P.M. Owing to Easter the April meeting will take place on Monday the 14th.

Royal Medical Benevolent Fund

Messrs. Burroughs Wellcome and Co. Ltd. have handed over to the fund all proceeds of the sale of their medical diary for 1946. The gift, amounting to £650, will provide extra comforts for the fund's beneficiaries.

Charing Cross Hospital

Since 1911 students of Charing Cross Hospital medical school have attended King's College in the Strand for their anatomy and physiology. But next October, when it is hoped that repairs for bomb damage will be completed, the school will reopen its preclinical department, and this will enable it to take an additional 45 students each year. The preclinical school will be open to women as well as men, and opportunity is being taken at the same time to admit women to the clinical course. All vacancies for men for next session have already been filled, but applications from women may now be submitted. Further particulars will be found in our advertisement columns.

Epsom College

The council of the college will shortly award St. Ann'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 5 years. The value of each scholarship is dependent upon the means of the applicant and the locality and fees of the school selected.

Pensions are also available from the fund of the Royal Medical Foundation for impecunious medical men or their widows, and foundation scholarships, providing education, clothing, and maintenance free of cost for the sons of necessitous medical practitioners. Application forms are available from the secretary, Epsom College, Surrey.

North London Hospitals

Negotiations have now been completed for a scheme of close cooperation between the Prince of Wales's General Hospital and the Bearsted Memorial Hospital. The Prince of Wales's, with 260 beds, is the largest voluntary hospital in North-East London and is scheduled as a district hospital in the Ministry of Health Hospital survey. The new buildings of the Bearsted Hospital, to be opened in July, will have 100 maternity beds, and it is proposed that in addition to the general medical and surgical services already provided by the Prince of Wales's the two hospitals will offer a complete obstetrical and gynaecological service for the district. Both hospitals will also become part of the North London Postgraduate Medical Institute which also includes the North Middlesex County Hospital, the Chase Farm Hospital, and the North-Eastern Fever Hospital.

Centenary of the Chemical Society

The celebrations of the centenary of this society, which but for the war would have been held in 1941, will take place this year in London from July 15 to 17. Prof. C. N. Hinshelwood, F.R.S., the president, will open the centenary exhibition at the Science Museum, South Kensington, S.W.7, on Monday the 14th. The exhibition, which will remain open until the end of September, is to illustrate the development of chemistry in Great Britain and its place in the everyday life of the community. On Tuesday the 15th the visitors from overseas will be entertained to luncheon by the Government, and in the afternoon the president will deliver the centenary address. On the following day lectures will be given by Prof. E. K. Rideal, F.R.S., and Sir Robert Robinson, F.R.S. Further information may be had from the secretary of the society, Burlington House, Piccadilly, W.1.

Register of Orthoptists

The 1946-47 edition of this register has now been published, and doctors may obtain a copy free on application to the registrar of the Board of Registration of Medical Auxiliaries, Tavistock House North, Tavistock Square, London, W.C.1.

Allowance of Bacon to Tuberculous

On the advice of the Food Rationing (Special Diets) Advisory Committee, the Minister of Food has decided that persons suffering from active tuberculosis and actinomycosis, who are granted a priority supply of milk, shall also be granted an additional allowance of 1 oz. of bacon weekly in order to restore to them the recent cut in the ordinary consumer's bacon ration from 3 oz. to 2 oz. a week. These invalids are being invited at present to apply at local food offices for the additional allowance. In future the medical certificate of classification will provide the necessary authority for issue.

Fellowships in Plastic Surgery

Sir Simon Marks has established three fellowships, each to the value of £740 per annum, tenable for two years at the Queen Victoria Hospital, East Grinstead, Sussex. During the war with gifts from Canada, Australia, New Zealand, and South Africa, the buildings and equipment of the hospital have been modernised, while a new surgical wing has been given by the British War Relief Society of America. The "Simon and Matilda Marks fellowships in plastic surgery" will ensure that these facilities will be used for postgraduate education. Further particulars will be found in our advertisement columns.

Mackenzie Mackinnon Research Fellowship

Applications are invited from doctors for this fellowship which will be awarded in the form of grants to assist research in medicine or surgery and may be whole-time or part-time. The honorarium will be at the discretion of the joint committee of the Royal College of Physicians of London and the Royal College of Surgeons of England, and will be from £500 per annum according to experience and the amount of time available for research. A grant for expenses may be paid to the institution where the research is carried out. Applications must be submitted through a medical school by April 18. Application forms may be had from the secretary, Royal College of Surgeons, Lincoln's Inn Fields, London, W.C.2.

Hostel for Sanatorium Nurses

The British Legion has bought St. Alban's Guest-house in Colchester for use as a home for the nurses employed at Nayland Sanatorium, which lies 9 miles outside the town. Each nurse will have a separate room and there will also be a lounge, games room, and dining-room. Those responsible feel that they are taking a stage further the Rushcliffe Committee's recommendation that nurses should be able to go into town for recreational trips. The Nayland nurses are to live in the town and be transported to and from their work at the sanatorium.

Conference on the Family

A conference on Education for Family Life will be held in Manchester on April 21 and 22 by the extramural department of the university, assisted by the British Social Hygiene Council. The course is intended mainly for teachers and welfare workers, but will also be open to members of the public. Lectures will be given by Dr. Ethel Dukes, of the Marriage Guidance Council, Mr. Cyril Bibby, and Mr. R. Weatherall, educational secretary of the council. Further particulars may be had from the director of extramural studies, The University, Manchester, 13, or from the secretary of the council, Tavistock House North, Tavistock Square, London, W.C.1.

Nuffield Rheumatism Fellowships

The Nuffield Foundation is prepared to receive applications for these fellowships from medical men and women who wish to obtain advanced training to enable them to specialise "in the diagnosis, treatment and study of chronic rheumatism." The annual value of a fellowship will be between £500 and £800, with an additional grant for travelling expenses abroad where necessary. Candidates should have spent at least one year since qualification in the general medical practice of a hospital and should preferably hold the M.R.C.P. Service officers may apply for fellowships to be tenable on their release from the Forces. Further particulars will be found in our advertisement columns.

Cancer Research Congress

The programme of the fourth International Cancer Research Congress, which is to be held at St. Louis, Missouri, from Sept. 2 to 7, will cover the general biology of cancer, aetiology (viruses, chemical carcinogens, hormones, and environmental factors), biochemistry, radiotherapy, and the development of nuclear physics, chemotherapy, and various clinical aspects. Further information may be had from Prof. Alexander Haddow, Chester Beatty Research Institute, The Royal Cancer Hospital (Free), Fulham Road, London, S.W.3.

THE Spanish review *Psicotecnica*, of Madrid, is to cease publication under that title, its place being taken by two new periodicals: *Revista de Psicologia General y Aplicada* and *Boletin de Psicotecnica*.

Diary of the Week

MARCH 30 TO APRIL 5

Monday, 31st

ROYAL COLLEGE OF SURGEONS, Lincoln's Inn Fields, W.C.2
5 P.M. Sir Cecil Wakeley: Surgery of the Thyroid Gland.

Tuesday, 1st

ROYAL COLLEGE OF SURGEONS
5 P.M. Dr. J. F. Brailsford: Bone Tumours.

Wednesday, 2nd

ROYAL COLLEGE OF SURGEONS
5 P.M. Dr. Brailsford: Bone Tumours.
ROYAL SOCIETY OF MEDICINE, 1, Wimpole Street, W.1
2.30 P.M. *History of Medicine*. Mr. N. M. Matheson, Mr. W. J. Bishop: Exhibition of Medical History in Postage Stamps.
Dr. W. H. McMenemey: James Johnstone the Elder and James Johnstone the Younger of Galabank and Worcestershire.
8 P.M. *Surgery*. Mr. A. H. McIndoe: Dupuytren's Contracture. Mr. Richard Battle: Plastic Surgery in the Treatment of Chronic Ulcer of the Leg. Mr. D. N. Matthews: Tattooing in Plastic Repair.

Births and Deaths**BIRTHS**

BATTLE.—On March 19, at Woking, the wife of Mr. Richard Battle, F.R.C.S.—a son.
DUDGEON.—On March 16, in London, the wife of Dr. Alastair Dudgeon—a son.
FLOYER.—On March 12, in London, the wife of Squadron-Leader M. A. Floyer, M.B.—a son.
GODBER.—On Feb. 10, at Kuala Lumpur, Malaya, the wife of Dr. Greville Godber—a daughter.
HAMBLING.—On March 12, at Woking, the wife of Dr. John Hambling—a son.
JENNINGS.—On March 12, in Dublin, the wife of Dr. C. B. Jennings, Colonial Medical Service—a daughter.
LISTER.—On March 18, at Newcastle-on-Tyne, the wife of Surgeon Lieutenant James Lister—a daughter.
RIDLEY.—On March 18, the wife of Mr. Frederick Ridley, F.R.C.S.—a daughter.
RONALD.—On March 15, the wife of Dr. James Ronald, of Stirling—a daughter.
SHAW.—On March 15, at Colchester, the wife of Dr. J. P. Shaw—a son.
SHEERS.—On March 16, at Tunbridge Wells, the wife of Dr. Geoffrey Sheers—a son.
VULLIAMY.—On March 18, in London, the wife of Dr. D. G. Vulliamy—a son.
WILDE.—On Feb. 24, the wife of Dr. J. F. Wilde—a son.
WINNER.—On March 18, in London, the wife of Dr. H. I. Winner—a son.

DEATHS

BARBER.—On March 15, in London, Frederic Samuel Barber, M.R.C.S., aged 86.
CRICHTON.—On March 19, at Fordwich, Kent, Arthur John Moncrieffe Crichton, M.B. St. And.
DUCKWORTH.—On March 18, in London, Geoffrey Duckworth, M.R.C.P., aged 46.
GREG.—On March 17, at Carnforth, Arthur Hyde Greg, O.B.E., M.B. Camb., F.R.C.S., aged 75.
GROSVENOR.—On March 17, at Arnside, Westmorland, William Clayton Grosvenor, M.A. Glasg., M.D. Edin., F.R.C.S.E., aged 80.
MACKENZIE.—On March 13, at Virginia Water, Stephen Morton Mackenzie, M.A., M.B. Camb., aged 66.
MORTON.—On March 21, in London, James Livingstone Morton, M.B. Belf., aged 47.
MOXON.—On March 8, at St. Jacques, France, Herbert William Moxon, B.A. Camb., M.R.C.S., aged 65.
NEILAN.—On March 16, at Scarborough, John Alexander Neilan, L.R.C.P.I., D.P.H.
PARRY.—On March 20, in London, Herbert Lloyd Parry, M.R.C.S., aged 86.
SHARPE.—On March 15, at West Keal, Lincs, William Salisbury Sharpe, M.D. Durh., F.R.C.S.I., M.R.C.P.
TUDOR.—On March 14, at Leamington Spa, Dorothea Mary Tudor, M.B. Durh.

CLINICAL APPROACH TO PREVENTIVE MEDICINE*

PERRIN H. LONG

M.D. Ann Arbor, F.R.C.P.

From the Department of Preventive Medicine, Johns Hopkins University School of Medicine

LAST spring, when I read the report on the U.S.A. medical curriculum, prepared by the Association of Interns and Medical Students from the returns of a widely disseminated questionnaire, I was amazed to find that instruction in public health (preventive medicine) stood third in the list of subjects which, in the opinion of the respondents, should be de-emphasised. This surprised me, not only because it ran counter to current social, economic, legislative, and educational trends, but also because it was derived from that segment of our profession which ordinarily is advanced in its social and educational consciousness.

This report should not be lightly dismissed. We cannot ignore it by remarking that the sample was probably inadequate, that it reflects the intellectual immaturity of the students and the undesirable educational features of the accelerated programme, or that it is symptomatic of either the disorganisation or the over-organisation which has existed in the teaching of preventive medicine during the past few years. Rather, it seems to me, this report must make us all stop and think about the general approach we are making to preventive medicine, the content and placing of our courses, and the philosophies with which we are attempting to inculcate our students. We should approach the subject with a spirit of inquiry and in a mood for self-criticism. Let us do this individually and collectively since the philosophies and methods of instruction in preventive medicine—because of the lack of a clear definition of the subject (which is so well shown by our various titles), and because of the nature of our individual training—vary more in medical schools in U.S.A. than do those of practically any other subjects included in the medical curriculum.

WHAT PREVENTIVE MEDICINE IS

A review of the current philosophies and trends in the teaching and practice of preventive medicine is necessary for an appraisal of the various methods of instruction used in presenting this subject to the students. As Ryle (1943) has so ably pointed out, "three great historical epochs exist in preventive medicine." During the first epoch the initial approaches to sanitation, proper working conditions, adequate housing, &c., were made, and empirical methods for the control of infectious diseases, such as typhus, yellow fever, smallpox, typhoid fever, and cholera, were put into effect. These measures were continued and extended in the second epoch under the influence of the development of microbiology and sanitary science to a point which, at least in certain parts of the world, has brought many infectious diseases under control and reduced their ravages to a minimum. At present we are living in the end of the second and in the beginning of a third epoch, in which prominence will be given to the prevention of non-infective diseases, the rehabilitation of the sick, and the mitigation of chronic or degenerative disease, and physicians, if they wish to survive either professionally or economically, will become increasingly conscious of the necessity for maintaining a primary interest in the promotion of health rather than the alleviation of illness.

Sir George Newman (1932) conceived of medicine as having three aims: the cure of disease (curative medicine); the prevention of disease and the modification of the course of established disease (preventive medicine);

and the conservation of the natural defences of individuals and communities through favourable environmental and other factors to produce a way of life favourable to health (conservative medicine, constructive medicine, or hygiene). In his opinion, when efforts in the prevention or the modification of disease are directed towards the protection of the community and the improvement of its external environment, they fall within the realm of public health.

Leathers (1938) defined the subject as follows: "Preventive medicine constitutes a part of clinical medicine, obstetrics, pædiatrics, and psychiatry, and even much of surgery. Its purpose is to avert those disorders for which there are specific preventive measures, to detect early by accurate and thorough methods of diagnosis the beginnings of illness for which remedial therapy may be applied. Its objective is to aid in the solution of social, economic, and welfare problems of the community in relation to disease. It involves the uses of a specific technique in dealing with the public. The application of the principles of preventive medicine through organised administrative procedure in relation to local, state, or national needs constitutes public health."

Perkins (1942) has written: "Preventive medicine is not a specialty. . . . It is not public health. . . . It is not hygiene or sanitation. It is a philosophy and a science having practical application in every phase of clinical medicine. . . . Preventive medicine must maintain contact with clinical medicine at all points" and "should be a clinical branch."

Smillie (1943) states that preventive medicine "comprises those activities that are the direct responsibility of the individual in the prevention of disease, and in the promotion of the health of himself and his family. . . . The person who is most responsible (for these activities) is the private practitioner of medicine, who serves as health adviser to each family in the community." Public health, on the contrary, "encompasses those activities that are undertaken for the prevention of disease and the promotion of health that are a community-wide responsibility." They are not carried out by a practitioner of medicine.

Barnes (1943) and Anderson (1943) believe that public health is a specialty which should not be taught as such in medical schools, because it is beyond the needs and scope of the average medical student. Both emphasise the epidemiological approach to the study of disease, and Anderson feels there is a definite need for coördinating the instruction regarding communicable diseases (epidemiology) with the clinical instruction in these diseases.

Hitchens (1943) has emphasised the importance of instruction in environmental sanitation to provide the student with the proper appreciation for public health.

Wampler (1943) feels that, as "the most important function of the physician is to keep his patients well," and as this concept is the keystone to the intelligent practice of industrial medicine, an approach to preventive medicine through industrial medicine offers much hope in teaching.

Grant (1943) has concluded, after almost twenty-five years' experience, that environmental case-studies offer a valuable approach in the teaching of preventive medicine.

Probably Ryle (1943) has summed up the implications of the latest British concepts in this broad field when he says that social medicine is not just another name for preventive medicine, and that social medicine and socialised (State) medicine are not synonymous. It is his belief that social medicine is a direct development in and expansion from clinical medicine, and that it concerns the group as well as the individuals comprising the group in regard to sickness in the family and in the community:

"It embodies the idea of medicine applied in the service of man as *socius*, as fellow or comrade, with a view to a better understanding and more durable assistance of all of his main and contributory troubles which are inimical to active health, and not merely to removing or alleviating present pathology. It also embodies the idea of medicine applied in the service of *societas*, or the community of men, with a view towards lowering the incidence of all preventable disease and raising the general level of human fitness."

In concluding this review of concepts of the content and teaching of preventive medicine, I wish to dwell at some length on the views set forth by Smith and Evans (1944):

"Preventive medicine might be logically defined as all medicine that seeks to alter the course of disease or to better

* Read before the Conference of Professors of Preventive Medicine on Sept. 30, 1946.

the patient's physiological status. Practically it means intervention in a limited range of situations in which specific disease can be warded off or a specific deterioration of a patient's condition can be forestalled."

The authors believe that this can be done at several levels, "the prevention of the consequences of non-preventable and non-curable diseases." To them "the core of preventive medicine" is "the adjustment of the individual patient to his physiological equipment and status."

This, they believe, "can hardly be taught successfully in didactic courses. The student needs to see his instructor handling patients in the clinic and at the bedside in a way that makes full use of the resources of medicine for bringing about such an adjustment—resources which are still all too meagre for the infinite variety of the task. The department of preventive medicine cannot hold itself aloof from other clinical departments if it is to do and promote such teaching."

One can deduce from the views just presented that a difference of opinion exists between the authors cited concerning many of the aspects of what they term preventive medicine. Some take a fairly restricted view which is limited in essence to an epidemiological or environmental sanitary approach. On the other hand, Ryle (1943), through his definition of social medicine in terms of *socius* and *societas*, presents a point of view of medicine applied in the service of both the individual and the community. Public health is declared to be a specialty in the strict sense of the word by two authorities, while a third infers that it is not a specialty at all but that it "connotes a methodology." Several writers differentiate sharply between preventive medicine and public health, and several are of the opinion that public health should not be taught as such, because it is beyond the needs and scope of the average medical student. One writer believes that a satisfactory approach is through teaching in industrial medicine, while another is satisfied with instruction in environmental sanitation. Fairly general agreement exists about the value of the clinical approach to preventive medicine; this is best summed up in the words of Smith and Evans (1944), when they say of a department of preventive medicine: "its members must take their places on the clinical team of the teaching hospital and do their part to enrich general medicine rather than attempt to build up a separate discipline."

AND IS NOT

I shall not attempt to define preventive medicine except in the negative. To me it is not public health in the general educational or practical sense. The average courses in U.S.A. which lead to a degree of Master of Public Health are technical and methodical in their content and designed to teach physicians interested in public health the intelligent use of certain specialised knowledge which necessarily must be used in their vocation. Knowledge of the techniques used in protecting the public health are often beyond the needs and intellectual interests of medical students in U.S.A. When such instruction is provided in the guise of preventive medicine in undergraduate courses, it often is so alien to the remainder of the curriculum that the students often, and I believe rightly, wonder what it has to do with their medical education.

Instruction in tropical medicine is also not preventive medicine, though instruction in the techniques of the control of certain tropical diseases does lie within the realm of public health. Tropical medicine has an exotic sound and conjures up visions of expeditions to far places. It is not a difficult subject, and, as was demonstrated in the war 1941-45, competence in this branch of medicine can be acquired rapidly by average American physicians, provided that adequate clinical material is made available for their instruction. Tropical medicine and clinical parasitology and helminthology rightly should be taught in the department of medicine.

Industrial medicine is another branch of clinical medicine which, in my opinion, has unfortunately fallen by default into the lap of preventive medicine. This has happened primarily because industrial medicine in its inception was concerned with accidents and hence came within the province of the surgeon. When a growing social consciousness and the development of compensation systems for reimbursing the victims of accidents and poisonings led to the development of safety engineering, then, because of the preventive aspects involved, preventive medicine and public health claimed their share of the field. Recently, clinical medicine has reawakened to the importance of the interplay of the social, physiological, psychological, and environmental factors in the production or modification of disease in industry. For this reason industrial medicine, so far as its clinical aspect is involved, should be a primary educational concern of departments of medicine and psychiatry. Safety engineering and the technical aspects of the practice of medicine in industry are specialised subjects which may be given as postgraduate courses to those physicians who, already proficient in clinical medicine, desire to enter the field of industrial medicine.

I do not believe that preventive medicine is a science. It is also not a specialty in the true sense of the word, because, with minor exceptions, it often has either borrowed unblushingly or, like a poor relative, been content to receive the "cast-offs" from the older and better-established branches of medicine.

Preventive medicine is a philosophy, a way of thought and life, a subject which should permeate a large part of the medical curriculum and the whole of the practice of medicine.

CLINICAL BASIS

I have often been asked why I favour so strongly the clinical approach to teaching in preventive medicine. One's actions and one's thoughts are conditioned by training and experience. Twenty-five years ago, when I was a second-year medical student, I received my first exposure to preventive medicine in hygiene, as the course was called. I have recently reviewed my notes in this course, and I find that twice a week in the second semester I attended lectures which dealt superficially with toxicology, first-aid, public-health education, personal hygiene, programmes of physical fitness, the epidemiology of communicable disease, environmental sanitation, and a little of medical history. All these subjects were essentially unrelated to each other or to the other instruction which we were receiving at that time, and were didactic in type.

In our fourth year another exposure took place, this time in a course entitled public health. Again, twice a week, didactic instruction covering everything from the Broad Street pump to the Framingham experiment was presented to us in outline, with special emphasis on sanitation. Other subjects, such as public-health administration, community planning for health, mental-hygiene programmes, control of communicable disease, &c., were touched in these talks. In my notes from the lecture entitled "Adventures Extensive and Intensive in Community Health" presented to us on Nov. 16, 1923, my summary of the talk was as follows: "Public-health nurse versus physician: ten rounds, no decision." I cite this, not in a spirit of levity, but simply to demonstrate the difficulties which arise when the basic philosophy of instruction in preventive medicine stems from what Ryle has designated the first epoch or early second epoch in preventive medicine.

When, after sixteen years' training and experience in internal medicine, I was asked to accept the chair of the newly created department of preventive medicine at the Johns Hopkins University School of Medicine, I decided that our departmental approach to preventive medicine would be developed along clinical lines. This decision

was based on the following observations. Nine out of ten of the graduates of the Johns Hopkins University School of Medicine enter into the practice of medicine or surgery or the specialties. As has been pointed out by Smillie (1943), the mission of undergraduate instruction in preventive medicine is not "to prepare students to become grade-B health officers" but rather "to meet their obligations as private practitioners of medicine." If most of one's students become practitioners it seems logical to attempt by the clinical approach to inculcate the philosophy, besides assisting other clinical departments to provide a knowledge of the practical aspects, of the prevention or modification of disease, especially the promotion of health.

A further consideration of teaching in preventive medicine brought me to the problem of the present curricula in our medical schools. From the day a student enters medical school practically his total outlook is focused on diagnosis and treatment. Anatomy, bacteriology, biochemistry, physiology, pharmacology, and pathology are more or less exciting and at times completely isolated milestones along the road to the clinic. All of us can remember the excitement and the intense satisfaction which pervaded us when at last we had worked up our first "case." We had a feeling that we had arrived.

The philosophy of clinical teaching at the bedside, so laudable in its inception, because it took medical students from lecture halls into hospital wards, has become restricted in its concept. The interest of the medical student is focused on the sick man recumbent in a hospital bed. But slight attention is paid to what brought the patient to the hospital, and when, owing to his own natural resistance or to the administration of one of the few "specifics" in modern medicine, he becomes ambulatory, interest in him rapidly wanes. Little consideration is given to his problems of convalescence or to his physical and mental rehabilitation.

Medicine today has become more specialised and more technical, with the result that its students are required to assimilate vast quantities of precise and intricate information. This is the result of the remarkable progress which has characterised medicine during the last quarter of a century. With the continuous increase in the definition of our knowledge, medicine and the teaching of medicine have tended to be compartmentalised in our medical schools. Disease has become a jigsaw puzzle whose integral parts are scarcely ever put together by one person to obtain the whole. Specialists and corps of technicians are required for its solution. Research is "directed and coördinated," because it is thought that many fields have become too broad for the individual endeavour. Is it any wonder, then, that the instructor and the student, staggering together under the impact of the increasing and continuous flow of new medical knowledge, have little time, as Ryle (1943) has said, for "the old ætiological interest and humanism of our fathers"? It is beginning to appear that the more they learn the less they understand. The eminent specialist, the great worker in research, and the expert and dexterous surgeon have become the gods of the students, and specialisation their goal. It is in such a milieu that preventive medicine must compete for the students' attention and contemplation, and it seemed to me that as a subject it would fail in its aims unless presented upon an equal and integrated basis in all of the school years by instructors who were well grounded in the various fields of general medicine, besides being imbued with the philosophy of preventive medicine.

Health economics and the social, environmental, and religious aspects of illness are directly concerned with, and stem from, the patient or groups of patients. It is therefore obvious that, for a proper understanding of the economy of health and the cost of illness, and for the

proper appreciation of the rôle played by social and environmental factors in disease, a broad knowledge of clinical medicine is needed. In the approach to teaching in these fields, it has therefore seemed to me that the clinical approach is logical, because only through such an avenue can a proper appreciation of the many problems be achieved. I do not mean to infer by this statement that use should not be made, in teaching preventive medicine, of the material which can best be collected, analysed, and presented by trained non-medical observers; nor do I feel that the contributions made to medicine by the newer sociology should be neglected. The assistance of all branches related to medicine should be enlisted and the experts in the various fields employed in teaching programmes—but always under the supervision and guidance of one who, through training and experience in the natural history of disease, can leave the presentation with the clinical aspects of the problem under discussion.

Finally, it is my belief that, from the point of view of pedagogy in preventive medicine, the clinical approach is preferable. One of the dangers in all types of education is for the instructor to present material which is either beyond the intellectual comprehension of his auditors or sharply limited in its subject interest by the instructor's own training and interests. The great teacher is easily understood. Instructors who have had a broad training in general medicine, with the daily multiple contacts with patients which such a training requires, generally have the ability to explain things medical in relatively simple terms. If this simplicity can be coupled with a sympathetic enthusiasm (but not emotional instability) and an ability to present the facts logically, the unrelated subjects which often make up the content of preventive medicine can be brought into a perspective which is proper in its relation to the remainder of the medical curriculum.

TEACHING

When preventive medicine stems from the clinical approach, biostatistics becomes "quantitative methods in medicine," with instruction in vital statistics reduced to the necessary minimum and the accent placed on the mathematical approach to diagnosis and prognosis, the quantitative testing of alleged "data," and the development of a logical rather than an impressionistic approach to the problems of illness. Patients can and should be used in this teaching, and the terminology of biostatistics, at present tending to become a jargon, can be reduced to English.

Epidemiology, shorn of much of its methodology and technology, becomes the natural history of disease when approached from clinical medicine. The discussion of the origin, spread, and course of disease, of those natural or artificial factors which tend to alter its spread, of its patterns and of the effect of political, social, religious, economic, and environmental factors which affect such patterns, is a basic requirement if a proper philosophy of preventive medicine is to be inculcated in the students. Indeed, this course, if not restricted and narrowly limited by the thinking of the first and second epochs of preventive medicine, could be termed the foundation course of general medicine. It is obvious that teaching, dealing with the social, economic, and environmental aspects of illness, must stem from the patient and his record. The economy of health and problems of medical care of the ill originate from the patient and lose much of their reality when presented in the abstract from masses of cold and often lifeless statistics. Their interpretation and elucidation gain much from clinical understanding. The same is also true in so far as the teaching in the communal aspects of medicine is concerned. Who can really understand or appreciate deeply the problems of the group unless he has a thorough knowledge of the problems and reactions of the individual?

It might be asked at this point now the type of teaching just described can be put into effect, and how preventive medicine can be established as a clinical subject. To begin with, departments of preventive medicine should be staffed with members who by training will not only be acceptable for appointment on clinical staffs of teaching hospitals but also can hold their own in clinical and research fields. Secondly, teaching in preventive medicine should be integrated with instruction in all departments of a medical school. Every effort should be made to have the various phases of its philosophy presented to students, interns, and staff in discussions of all clinical problems. Other departments should be encouraged to utilise the student's knowledge of quantitative methods in medicine to further the development of a logical, rather than an impressionistic, type of thinking in medicine. Too often in clinical instruction the quantitative approach to the preparation or analysis of data is ignored or even disparaged by those who are unfamiliar with the proper rôle of statistical methods in medicine. Thirdly, representation should be sought on all professional boards of teaching hospitals for members of the department of preventive medicine to provide the necessary leaven of humanism. Fourthly, separate clinical facilities are unnecessary if the staff of the department has been properly integrated with other staffs of the hospital. In those university medical centres in which the supervision of the health and the medical care of students, nurses, interns, employees, &c., is a responsibility of the department of preventive medicine the infirmary for the minor sick should be under its direct charge. A medical-centre health clinic provides a direct approach for instruction in and the practice of preventive medicine. Its value cannot be overestimated.

TRENDS

I have stated previously that I would not attempt to define preventive medicine, because I felt that it was not a science but rather a philosophy of the teaching and practice of medicine. However, I do believe that it is possible to outline certain of the important trends in this subject and to formulate its aims. I cannot agree wholly with Ryle when he says that social medicine is "a logical development from [italics mine] and a direct expansion of clinical medicine." If he had only said "in" instead of "from" clinical medicine, we would be in complete agreement. "Preventive medicine," "social medicine," "eubiotic medicine," or whatever one desires to call that branch of medical teaching and practice in which we are interested, can no more be separated from general clinical medicine than can the stethoscope from the clinician, or the scalpel from the surgeon. All attempts at such a separation are artificial in their conception and create a confusion rather than a clarity of purpose and mission. The fruits of our best efforts towards the promotion of health, the prevention or alteration of the ravages and effects of disease, the better understanding of the economic, social, and environmental factors in health and disease, indeed the whole of our philosophy in medicine, will be reflected primarily in the attitudes which we create in our colleagues and students.

We are living in an age which has produced and will continue to produce great changes in the social and scientific structure of our profession. Today, while the fruits of medical progress are being enjoyed in some parts of the world, in other parts medical care has been reduced to a minimum. It is a time of simultaneous sunrise and twilight in medicine. We have entered a period in which more than ever before it is the duty of our profession to maintain its historical perspective. We must not fear bold experimentation in the promotion of health, but at the same time we must not confuse hypothesis or theory with the truth. We must be prepared to present the facts which will permit an informed electorate through its representatives to exercise its proper opinion in respect

to medical care. It is a time in which logical and orderly thinking and intellectual honesty concerning problems of medical care should displace superficial emotionalism, cant, or *laissez-faire* reactionism. We must free ourselves from the traditions created by the spirit of the guild in a time when disease was the normal state of mankind, and lead the way in perpetuating health rather than sedulously occupying ourselves with the problems of disease. It is the time when the practice of preventive medicine should become the preoccupation of every physician and surgeon.

TOWARDS SELF-EXTINCTION

Despite the broad advances which have been made in most fields of medicine during the last century, there is still ample time, both in the teaching and practice of medicine and its specialties, to proclaim and practise those humanistic principles which have been lost sight of in the process of learning more and understanding less. It should be our purpose by precept and by example to advance in the teaching and practice of general medicine those principles in the promotion and protection of human health and welfare which have always pertained and still pertain to the broad field of medicine and are not bound down by narrow specialisations. We exist because others have either forgotten or neglected certain basic precepts of medicine.

With this philosophy in mind, what should be the aim of a department of preventive medicine? It should be one of gradual self-extinction in every medical school. Its course should be carefully charted, and its success should only be considered complete when, owing to its efforts and its endeavours, the level of the instruction in and practice of humanistic medicine has been raised to such a point in all departments in a medical school that the continued presence of a department of preventive medicine is unnecessary.

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CALCIFEROL IN TUBERCULOSIS

REVIEW OF 150 CASES OF LUPUS VULGARIS

P. J. FEENY

M.B. N.U.I.

FIRST ASSISTANT, SKIN DEPARTMENT, LONDON HOSPITAL;
 E.M.S. DERMATOLOGIST, OLDCHURCH COUNTY HOSPITAL,
 ROMFORD, AND ST. JOHN'S HOSPITAL, CHELMSFORD

REVIEW OF 21 CASES OF PULMONARY TUBERCULOSIS

E. L. SANDILAND

M.B. Lond., D.P.H.

L. M. FRANKLIN

M.R.C.S., D.P.H.

MEDICAL SUPERINTENDENT,
 KETTLEWELL HOSPITAL,
 SWANLEY, KENT

ASSISTANT TUBERCULOSIS
 OFFICER, KENT COUNTY
 COUNCIL

A YEAR'S experience (1945-46) in the treatment of lupus vulgaris at the London Hospital with massive doses of calciferol (vitamin D₂) is recorded here. At the same time its therapeutic effect in pulmonary tuberculosis was investigated at the Kettlewell Hospital, and a report of the findings is included.

Lupus Vulgaris

(P. J. F.)

The story of how calciferol came to be used at Dijon in the treatment of lupus is told by Charpy (1946), the original user. It had been known for a long time that the administration of cod-liver oil was beneficial in tuberculosis, and Emery in 1848 recorded 74 cases of

lupus cured with the enormous dosage of 1000 g. of cod-liver oil daily. Evidently this treatment was too heroic, for the dose was reduced by his successors to something more palatable but ineffective, and Emery was forgotten. The next advance in lupus therapy was the introduction of heliotherapy and of concentrated ultraviolet light as local treatment by Finsen in 1897. In 1927 Sequeira and O'Donovan showed that the addition of daily general artificial light baths enhanced the effect of local light.

The next stage was the isolation of vitamin D from cod-liver oil and the preparation of vitamin D₂ by exposing ergosterol to ultraviolet light, culminating with the isolation of pure calciferol in 1931. Credit for this goes to many biochemists, starting with Mellanby in 1919. At first it was feared to give calciferol in massive doses because of possible toxic effects, such as had occurred with 'Vigantol' (*Lancet* 1946). It was used in small experimental doses in rickets, until in 1936 a child being treated for spasmodophilia (Harnapp 1936) inadvertently swallowed a dose of 15 mg. (600,000 units). Not only did the child survive but the rickets was rapidly cured, and the way was open for Charpy to start treatment of lupus by this means in 1941.

The claim of a cure by Charpy (1943) was supported during the next two years by many French dermatologists. These were listed by Bureau (1946) in order as follows: Gougerot and Gaullier, Clement Simon, Touraine, Degos, Michel and Pellerat, Thiers, Huriez, Garric, and Bureau and Barrière. The earlier reports claimed 100% cure; but, later, less success was claimed. A cure in 70-100% of cases is now claimed in France, according to a referendum recently conducted among the French dermatologists by Charpy (1946). There was, however, one much less favourable reply from Meyer (1946), whose experience, much larger than that of the others, is mentioned below.

As part of the treatment Charpy emphasises that the addition of calcium is necessary, though in 1944 he favoured a fractionated or more intensive method of giving the calciferol. Also, in the Charpy method, local treatment of residual lesions is used occasionally.

Bureau and Barrière (1945) reported one case cured without the addition of calcium. Meanwhile, in England, Dowling and Prosser Thomas (1945) had been treating lupus with massive doses of calciferol independently for two years, also without calcium and usually with less associated local treatment: their results were equally good.

Histological cure was reported by Charpy (1945), Peyrie (1945), and Bureau (1946), in one case with negative serial sections of the residual scar and in another with negative biopsy of the scar and negative result from guineapig inoculation. Vachon (1944), however, found histological evidence of lupus still present in a series of 4 cases treated with calciferol without local treatment. Vachon and Feroldi (1945) did not find histological cure in any of 7 cases treated by the Charpy method, but the biopsies may have been made too soon (Charpy 1946). Vachon and Feroldi also found no calcium deposits in any of their sections. This finding contrasted sharply with those of Levaditi and Li Yuan Po (1930) in experimental tuberculosis in rabbits treated with irradiated ergosterol (two years before pure calciferol became available) where completely calcified follicles in tuberculous orchitic tissue were found.

Clinical reports on the effects of calciferol in other forms of systemic and cutaneous tuberculosis have been made by Bell (1946), Lapiere et al. (1946), Thiers et al. (1946), Wallace (1946), Macrae (1946), Jones (1946), and Wilkinson (1946). A complete bibliography of the preceding references is given in *Ann. Derm. Syph., Paris*, for May-June, 1946.

Toxic effects, as distinct from symptoms of intolerance, have been reported from the use of calciferol in lupus

TABLE I—RESULTS OF TREATMENT OF LUPUS WITH CALCIFEROL

| Months under observation | No. of cases | No. in which D ₂ alone had no apparent effect | Associated general light baths | Associated local treatment | Worse | Relapsed | No change | Improved but not healed | Healed | Healed lupus cases: D ₂ substituted for general light without relapsing | % of active cases either improved or healed | % healed |
|--------------------------|--------------|--|--------------------------------|----------------------------|-------|----------|-----------|-------------------------|--------|--|---|----------|
| 11-12 | 12 | 4 | 0 | 11 | 0 | 0 | 1 | 9 | 2 | — | 92 | 17 |
| 10-11 | 30 | 6 | 3 | 15 | 2 | 0 | 1 | 17 | 9 | 1 | 90 | 31 |
| 9-10 | 30 | 6 | 4 | 20 | 0 | 2 | 4 | 15 | 9 | — | 80 | 30 |
| 8-9 | 9 | 1 | 1 | 3 | 0 | 0 | 0 | 6 | 3 | — | 100 | 33 |
| 7-8 | 19 | 3 | 3 | 11 | 0 | 0 | 3 | 10 | 6 | — | 84 | 32 |
| 6-7 | 12 | 4 | 1 | 6 | 0 | 2 | 1 | 6 | 1 | 2 | 70 | 10 |
| 5-6 | 12 | 5 | 1 | 8 | 0 | 0 | 5 | 6 | 1 | — | 58 | 8 |
| 4-5 | 26 | 14 | 1 | 13 | 1 | 0 | 12 | 6 | 5 | 2 | 46 | 21 |
| Totals | 150 | 43 | 14 | 87 | 3 | 4 | 27 | 75 | 36 | 5 | 77 | 25 |

dosage by Merklen (1945), Bureau and Gougerot (1945), Bureau (1945), and, in a case of hypoparathyroidism, by Eaton (1946).

Findings in serial estimations of the blood-calcium level have been reported by Dowling and Prosser Thomas (1946) and Meyer et al. (1946). Findings in serial estimations of the blood-sedimentation rate have been published by Vachon (1944), Meyer et al. (1946), and Feeny (1946).

RESULTS

None of the 150 cases in the present series has been under observation for less than four months, as it was thought that a shorter period would not allow sufficient time for continued improvement or relapses to be noted. The dose of calciferol used was 100,000 units daily, and this was increased to 150,000 units if it was thought that the patient could tolerate the larger dose or was not improving satisfactorily on the smaller one. Occasionally the dose was temporarily reduced to 50,000 units daily, or the initial dose was 50,000 units, and this was raised, if well tolerated, to the larger doses.

Table I shows the progress of the cases in month groups, the degree of success or failure obtained, and the extent to which the therapy formerly in use was retained. These results should be compared with those of Meyer et al. (1946), who observed a similar number of cases for two years (1944-45). Of their 148 cases, 31 (21%) were cured and remained so, 25 relapsed after apparent cure, 72 were improved but not cured, and the remaining 20 (13%) were failures. The degree of success or failure obtained is very similar in these two investigations, the only large-scale ones hitherto reported. The smaller number of relapses in the London Hospital group may possibly be explained by the conservatism in the use, without histological confirmation, of the word "cure," which has long been customary at this lupus clinic. For example, O'Donovan (1944) indicates the large experience necessary to give a positive clinical opinion on this point, and Burrows (1938) draws attention to the periods of quiescence which alternate with periods of spread in lupus. A striking example of what can happen in a "sound" lupus scar occurred while this investigation was in progress:

A middle-aged woman, whose lupus had developed in childhood and had been "cured" or "sound" for a considerable time, attended for periodic examination. It was noted that since her previous attendance she had developed a granulomatous-looking nodule in the middle of her solitary lupus scar. Biopsy of the complete nodule and repeated blood examinations showed that this was a nodule of lymphatic

TABLE II—RESULTS OF CALCIFEROL THERAPY IN CASES TREATED IN THE PAST WITH RADIATIONS

| Nature of radiation | No. of weeks treated | General light or local treatment | Clinical effect of calciferol | Nature of radiation | No. of weeks treated | General light or local treatment | Clinical effect of calciferol |
|---------------------|----------------------|----------------------------------|---|---------------------|----------------------|----------------------------------|---------------------------------------|
| X rays | 21 | Loc. | None* | X rays | 23 | .. | None |
| Radium | 32 | Loc. | Improved* | " | 26 | Loc. | Improved |
| X rays | 34 | .. | Improved* | " | 17 | .. | Improved |
| " | 19 | .. | None | " | 17 | Loc. | Deteriorated |
| " | 20 | Loc. | None | " | 22 | .. | Improved* |
| " | 44 | Loc. | Improved | " | 22 | .. | Sound lupus case which remained sound |
| " | 42 | Loc. | Initial improvement, then relapsed | " | 22 | Loc. | None |
| " | 46 | .. | Improved* | " | 46 | Loc. | Improved |
| " | 40 | .. | Improved* | " | 45 | Loc. | Improved |
| " | 41 | Gen. | Improved (? due to oral D, ? due to carbon arc baths) | " | 44 | .. | None |
| " | 20 | .. | Improved | Grenz rays | 45 | .. | Improved |

* = Apparent cure (6 out of 22 cases).

leukæmia. There were no other signs or symptoms, and this patient still does not complain of anything several months later.

Before the advent of calciferol therapy there was 20% failure in treating lupus with general and Finsen light (Sequeira and O'Donovan 1927, Lomholt 1934). With the addition of calciferol there is little or no alteration in this percentage. The great advance has been the time saved (half to two-thirds) and the greater ease in treatment. The third and last two columns of table I indicate that treatment is increasingly efficacious for nine months. The third column shows that, though in 43 cases (29% of the 145 active cases) there was no apparent effect from the use of calciferol alone, nearly a third of these were in the group observed for only four to five months.

The response to treatment in the 14 cases which also had general light baths was the same as that in the 130 cases which did not have general light, and it is impossible to say whether any improvement was obtained more rapidly. But in the vast majority of cases the patient was now independent of general light, and this is a great advantage. Most patients have general light treatment in their home districts, but it has always been difficult for many of them to get it more than two or three times a week. There were, however, two cases in the present series which relapsed when calciferol was substituted for general light baths. These patients had always relapsed in the past whenever general light had been discontinued. Charpy (1944) suggests that less success is obtained when there is liver insufficiency.

Figures do not do justice to the outstanding improvement noted in many cases or to the consequent moral uplift of a class of "untouchables."

Illustrative Cases.—In 6 cases long-standing mucosal lesions were healed within several weeks, but 1 of them relapsed while still on calciferol. The accompanying lesions on the skin improved much more slowly.

One case had relief in a fortnight from pruritus ani due to perianal lupus. Previously all treatment for two years had failed to relieve this symptom.

Another case, where no reactions could be obtained with Finsen light, was apparently cured with calciferol.

The incidence of cases with signs of old pulmonary tuberculosis was 1 in 15, and the incidence of cases where the development of lupus followed tuberculous adenitis in childhood was 1 in 11. Only 1 case now had active pulmonary tuberculosis. While awaiting admission to another hospital this patient was given 100,000 units of calciferol daily for six weeks. On admission there were also signs of renal tuberculosis. It was learned that this patient then preferred to go home, where she died fifteen weeks after the administration of calciferol had been discontinued.

In 3 women who became pregnant the lupus improved: 1 of them, who had already improved before calciferol was given, became apparently sound after two months; another developed acute iritis for the first time in the seventh month of pregnancy. Wilkinson (1946) cites the case of a woman, not on calciferol, in whom the lupus cleared when she became pregnant.

A case in which moderate hyperthyroidism had also been present for twenty years did not improve during an observed period of twenty weeks.

An unusual case was in a man, aged 19, with lupus of the chin. On calciferol alone there was rapid though incomplete healing for two months, but with keloidal scars. Finsen light was then added to the therapy, with the formation of much pigmentation locally, but there was no further improvement during the next four months. There had been no history of other keloidal formation in this case.

Cases Previously Treated with X rays, Radium, or Grenz rays.—In the past, for those who had access to Finsen light, it had always been the aim to complete local treatment as soon as possible, lest old fibrous tissue should interfere with the absorption of the ultra-violet rays. X-ray treatment, which often was excessive, caused a similar difficulty, besides causing an added carcinoma in some instances. The clinical effect of calciferol therapy on all the cases in this survey who had ever been treated with X rays, radium, or Grenz rays is shown in table II.

Many of these patients had been subjected to prolonged X-ray treatment in various clinics very many years ago before the dangers of this procedure had been appreciated. But the results summarised in this table do not greatly differ from those in table I. One would like to have a better understanding of the mode of action of calciferol on lupus, and an opinion, based on histopathological examination of many serial biopsies, before reaching any conclusion about these findings.

Cases of Lupus Carcinoma and Premalignancy.—In 3 cases there was lupus carcinoma, and in 9 others an active lupus with healed or potentially malignant accompaniments. The clinical effect of calciferol therapy in these cases is shown in table III. Of the 7 patients who had at any time developed lupus carcinoma 3 had previously been given X-ray treatment.

In this series calciferol had no clinical effect on established lupus carcinoma, but suspected premalignancy was dispersed in at least 3 cases (marked with an asterisk in table III). The development of granuloma annulare in one case after thirty weeks' calciferol therapy is noteworthy.

OTHER OBSERVATIONS

Intolerance.—Symptoms of intolerance were present in 35 cases (23%) and took the form of nausea and anorexia with, very rarely, vomiting. The drug was dispensed either in a tablet or in a muclage. Dowling and Prosser Thomas (1945) noted 21% intolerance in 38 cases, but Charpy (1946) had not observed this complication in any of his cases—probably because the vehicle was alcoholic.

The addition of vitamin B₁ (1 mg. t.i.d.) or yeast was without effect on tolerance in 24 out of 25 cases. In the remaining patient nausea, which had been present for three weeks, was relieved.

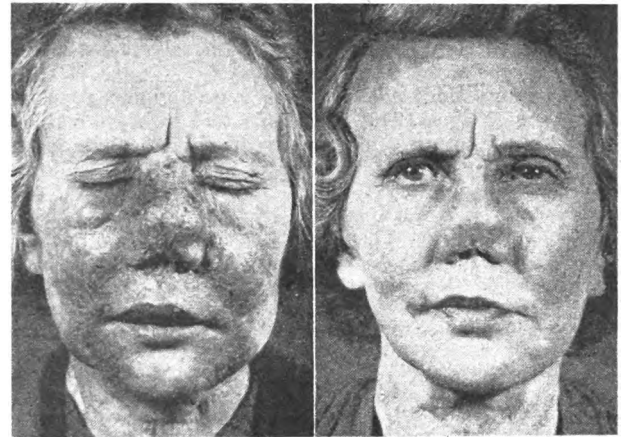
Addition of Calcium.—Calcium phosphate gr. 20 t.d.s.p.c. was given in 42 cases, and in 10 of them at the start of calciferol treatment. The clinical response in these 42 cases during a period of observation of 17–27 weeks was: 7 cases apparently healed; 21 improved but not healed; 11 unchanged; 2 relapsed; and 1 got worse. In 3 of these cases calciferol was better tolerated when calcium phosphate was added. One patient complained of flatulence, one of diarrhoea, one of constipation, one could take only half the dose of calcium, and another could take none.

It is now well established that the addition of calcium is not essential. According to McLaren (1946) it is dangerous to give one of the usually recommended preparations, calcium gluconate, by intramuscular injection. The amount of calcium given daily in the above cases was double the normal requirement, and there was no additional clinical benefit. Holmes (1945), who extensively reviews the literature and quotes many authors, states that seldom in his lifetime does the average person utilise even half the amount of calcium he consumes. But in France additional calcium is regarded as necessary, and one has only to study the statistics of Debré (1945) to see why this conception arose. These statistics concern food conditions in France during and after the German occupation, and it is certain that from 1941 until 1945 lupus patients in France, at least in the towns, were suffering from lack of calcium, even if they did get extra milk.

TABLE III—RESULTS OF CALCIFEROL THERAPY IN MALIGNANT OR PREMALIGNANT CASES

| Previous radiation therapy | Weeks under observation | Weeks before signs appeared | Description | Clinical effect of calciferol at end of observation period |
|----------------------------|-------------------------|-----------------------------|--|--|
| None | 50 | 18 | Lupus carcinoma | Lupus and carcinoma both healed 20 weeks after treatment of carcinoma with radon seeds |
| " | 47 | Present initially | Lupus carcinoma healed for 9 years; active lupus | Lupus improved ++ |
| X rays | 46 | 36 | Cutaneous horn in lupus area | Lupus improved+; cutaneous horn unaffected |
| * Grenz rays | 46 | Present initially | Ulcerated lupus | Lupus improved+; potential malignancy dispersed |
| None | 47 | 13 | Healed lupus carcinoma; lupus still active | Improved + |
| * X rays | 22 | 22 | Septic erosion at site of healed lupus carcinoma | Improved ++, no development of malignancy |
| " | 28 | Present initially | Lupus in X-ray skin with healed lupus carcinoma | None |
| None | 40 | 29 | Papilloma in lupus area | Lupus improved++, no sign of malignancy in papilloma |
| " | 39 | 34 | Recurrence of lupus carcinoma | None; after 15 weeks malignant area needed treatment with radon |
| " | 30 | Present initially | Keratosis in lupus area | Improved++ with reduction in size of keratosis |
| X rays | 44 | Present initially | Severe X-ray atrophy with active lupus | Lupus improved+; no development of malignancy; after 30 weeks granuloma annulare developed |
| " | 42 | 25 | 3rd recurrence of lupus carcinoma | None on lupus; this recurrence more malignant; regional glands enlarged after 17 weeks |

* Suspected pre malignancy dispersed in these cases.



Lupus vulgaris treated with calciferol: (a) Jan. 10, 1946, at start of treatment; (b) 14 days later.

Toxicity.—Apart from the frequent minor features of mental depression, giddiness, and abnormal tiredness, there were 6 cases of frequency of micturition, 2 of them with albuminuria, in the series. In each case the frequency and albuminuria ceased within two or three weeks when the calciferol was discontinued. There were also 2 cases of arterial calcification, the ages of the patients being 73 and 77. One of these, after six and a half months, showed calcification of the abdominal aorta and a single calculus in one kidney; the other, after four months, had calcification of the arteries of the pelvis. Calciferol was suspended for two weeks and four months respectively. In each case the lupus continued to improve on resumption of the drug and the patient felt no ill effects. The dose on resumption was reduced to 50,000 units daily.

Dosage.—The successful further use, after a rest interval, of a smaller dose of calciferol in the 2 cases where arterial calcification had occurred should be correlated with the parallel experience of Eaton (1946), whose case of hypoparathyroidism, showing peripheral arterial calcification after sixty-four days on 90,000–200,000 units of vitamin D₂ daily, had attained complete freedom from tetanic attacks of fifteen years' duration. Calciferol was then discontinued, and the attacks recurred. A smaller dose (max. 30,000 units daily) was then given for a year and though calcification increased slightly the patient was almost free of tetany. Meyer et al. (1946) thought that the size of the dose, so long as it was massive, did not matter in their 148 cases. Krestin (1945), who used massive doses in treating 83 infants with rickets, states that pure calciferol will not produce toxic signs until over 2,000,000 units has been given, but he found that his smaller massive dose (300,000 units) was less efficacious than his larger one (600,000 units). Another relevant finding is that of Heymann (1937), that storage of large doses takes place in the liver and other organs for so long as twelve weeks. The optimum dose in lupus has still to be decided, and there seems to be a large factor of personal idiosyncrasy to calciferol. Compare the spectacular response in a fortnight to a dose of 50,000 units daily (see figure) with those cases in table I where treatment with larger doses for many months was without clinical effect.

LABORATORY FINDINGS

Sedimentation-rate.—Vachon (1944) reported that with calciferol therapy the erythrocyte-sedimentation rate (E.S.R.), always raised in lupus, was reduced by 10–15% without however returning to normal. Meyer et al. (1946) maintain that the rate does not vary with the

therapeutic results; when high, it remains high in spite of cure; and, when low, it is not modified accordingly. In general, they say, an initial high rate leads to hope of greater efficacy in treatment.

My impression, mentioned in a preliminary report on 32 cases (Feeny 1946), that this test is of no value in judging the progress of lupus treated with calciferol, was confirmed in a larger number of cases, as the following observations show.

The E.S.R. was recorded in 55 patients with active lupus to whom no calciferol had been given. Wintrobe's technique was used, the result being corrected for anaemia by determination of the haematocrit reading. In 80% of these cases the readings were within normal limits. Serial estimations of the E.S.R. were then made in 72 active cases during the first seven months of treatment with calciferol. In 30 of these cases (23 of which were improving clinically, 6 showing no change, and 1 getting worse) the readings remained within normal limits. In 15 cases readings above normal remained so, while clinically 13 of them were improving and 2 showing no change. In 20 cases readings rose to above normal, while clinically 14 of them were improving, 5 showing no change, and 1 deteriorating. The 7 remaining cases—i.e., those in which the readings returned to normal—all improved clinically.

The plasma fibrinogen was recorded in 12 cases, because an increased E.S.R. is found when the fibrinogen is raised. The method used was that of Cullen and Van Slyke with micro-Kjeldhal determination of the fibrin precipitate (Peters and Van Slyke 1932). The readings ranged from 280 to 418 mg. per 100 c.cm. and were therefore within the range of normal—i.e., 250–450 mg. per 100 c.cm. (Panton and Marrack 1945).

It may therefore be said that in lupus, a chronic and localised form of tuberculosis, the E.S.R. is usually normal; the exhibition of calciferol often causes an increase in the E.S.R.; and the E.S.R. is of no use as a test of the efficacy of lupus therapy.

Lymphocyte-counts.—The possibility that serial lymphocyte-counts might be of use as an index of progress in lupus therapy was also explored. Of 53 cases to which calciferol had not been given, the readings were within normal limits in 14, above normal in 29, and below normal in the other 10 cases. Serial estimations were made in 73 cases treated for four to seven months with calciferol. Readings within, above, or below normal limits remained so in 43 of these cases, 34 of which were improving clinically, 8 showing no change, and there being 1 relapse. Similarly with the other 30 cases, where variations took place up or down the scale without relationship to the clinical progress. This test also is of no use as a "sensitive index" in lupus therapy.

Analysis of Plasma Proteins.—In a case which had been treated with calciferol for six weeks an electrophoretic analysis by Dr. A. Hoch (lecturer in chemical pathology at the London Hospital Medical College) gave the following distribution of the plasma proteins in g. per 100 c.cm., the normal electrophoretically determined range (Lewis and McCullagh 1944) being given in parentheses in each case immediately after the reading: total protein 7.5 (5.94–7.82), albumin 4.7 (3.72–5.11), alpha globulin 0.3 (0.39–0.66), beta globulin 1.2 (0.65–1.07), gamma globulin 0.8 (0.60–0.91), fibrinogen 0.45 (0.16–0.48). The alpha globulin is below normal in this case, the beta globulin is above normal, and the gamma globulin (currently regarded as the likely holder of antibodies) is within normal limits.

AIDS FOR THE CLINICIAN

On what aids, besides serial biopsies, may the clinician rely to assess progress or to warn him of danger in the treatment of lupus? Dowling (1946) points out that hypercalcaemia occurs erratically and is not related to the clinical progress of the case, and Meyer et al. (1946) are of the same opinion, but Ingram et al. (1946), in a preliminary report, state that in cases of intoxication the diffusible calcium is invariably raised. Also, Wigley (1946)

mentions preliminary work which suggests that estimations of the blood-phosphatase may be found to be a reliable index.

In the present series useful aids were serial photographs by a technique evolved in the photographic department, and routine radiography of the kidneys and arteries for signs of calcification.

SUMMARY

The history of how calciferol (vitamin D₂) came to be used in the treatment of lupus vulgaris is summarised, and the clinical results of this treatment in 150 cases observed for four to twelve months are reviewed. Local treatment was also given in 87 of the cases, and general light baths in 14 cases.

The success attained during this time would have taken twice or three times as long before the introduction of calciferol therapy but in almost all cases the patient was now independent of general light treatment. The treatment appears to be increasingly efficacious for the first nine months. The proportion of resistant cases was virtually the same as it had been before the advent of calciferol.

The response of cases which had at any time been subjected to X-ray, radium, or Grenz-ray treatment was the same as that in cases not so treated. Calciferol had no effect on lupus carcinoma, but clinically potential malignancy was dispersed in at least 3 cases.

The incidence of intolerance was 23%, and when calciferol is given by mouth an alcoholic vehicle should be used. The addition of vitamin B was without effect on tolerance in 24 out of 25 cases. The addition of calcium increased tolerance of calciferol in 3 out of 42 cases, but was without additional clinical benefit. It is shown that the addition of calcium is not necessary.

There were signs of toxicity in 8 cases, but in the 2 cases where arterial calcification occurred it was possible to resume treatment with calciferol after an interval. It is suggested that the optimum dose has still to be determined, and that idiosyncrasy plays a part.

Estimations of the erythrocyte-sedimentation rate and lymphocyte-counts were of no value in assessing progress in lupus therapy. Clinical aids found useful were serial photographs and routine radiography of the kidneys and arteries for signs of calcification. Analysis of the plasma proteins in one case showed that the level of gamma globulin, regarded as the likely holder of antibodies, was average.

I wish to thank Dr. A. Burrows, Dr. W. J. O'Donovan, and Dr. H. B. May for all the necessary facilities, and Prof. J. R. Marrack and Dr. F. Prescott for suggestions in the preparation of this article. Sister Hall, of the lupus clinic, gave valued assistance in charting the data.

Pulmonary Tuberculosis

(E. L. S. and L. M. F.)

With a view to making certain that any changes noted in pulmonary tuberculosis were due solely to the calciferol, cases in the following categories were chosen:

- (1) Chronic open cases not considered suitable for collapse therapy other than phrenic crush, and which had been treated by rest in bed for some time.
- (2) Cases in which effective collapse therapy had been maintained for more than three months, and in which the sputum remained positive.
- (3) Open cases awaiting thoracoplasty, since they might have to wait a long time for operation.

It did not seem desirable to try this treatment on cases with rapidly spreading disease, those with much toxæmia, or those clearly in the terminal stages of pulmonary tuberculosis. Two of the patients had lupus vulgaris also. A total and differential white-cell count was made on all cases; but since no well-marked improvement occurred in any cases a subsequent count was not done.

TREATMENT

The length of treatment varied from 20 to 50 days (average 41·8). The total dosage varied from 500,000 to over 3,000,000 units (average 1,844,500). The treatment was begun with 25,000 units of calciferol and 3 mg. of vitamin B₁ daily. If no complications developed, the dose of calciferol was then raised to 50,000 units a day, with vitamin B₁ as before. After a period on this dosage, if there were still no complications, the dose was raised to 100,000 units a day. The urine was examined before treatment was begun, and afterwards at weekly intervals.

RESULTS

The E.S.R. rose in 12 cases, in some patients considerably, and fell in 5 cases. In only 1 case did the temperature, when elevated before treatment, fall during treatment. Of the 10 patients who were up for a few hours during treatment, 3 gained weight, 5 lost weight, and 2 remained the same.

Sputum.—In 2 patients who had a negative sputum before treatment it remained so after treatment. In 16 cases the sputum was positive before and after treatment. In 2 cases with a positive sputum treatment produced a negative or no sputum. In 1 case there was no sputum before and after treatment.

Complications.—Headache was complained of by 7 patients during treatment. Nausea was a common complication, occurring in 16 cases, and the vitamin B₁, which was given with a view to mitigating this, appeared to have no effect. Anorexia was common; and in 4 patients vomiting made it necessary to stop the treatment. Albuminuria developed in 3 cases.

Most of these complications appeared when the dose was increased and the patient had been under treatment for some weeks. Drowsiness was noted in 1 patient, but most of the patients during the first few days of treatment reported that they felt distinctly stimulated.

CONCLUSIONS

No clinical improvement in the lung condition was noted in any patient.

The 2 patients who had lupus in addition to pulmonary tuberculosis both showed immediate improvement in the skin condition; 1 patient, however, who had lupus of the mucosa of the nares besides on the face, showed no improvement of the mucosa, and treatment had to be discontinued quite soon because of vomiting.

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SAND-FLY FEVER
REVIEW OF 664 CASES

JOHN FLEMING

M.D. Glasg., F.R.F.P.S.

HON. COLONEL R.A.M.C.; PHYSICIAN, GREENOCK ROYAL INFIRMARY

J. R. BIGNALL

M.B. Camb.

MAJOR R.A.M.C., MEDICAL SPECIALIST

A. N. BLADES

M.B. Lond.

CAPTAIN R.A.M.C., GRADED PATHOLOGIST

In Italy, during the autumns of 1943 and 1944, short-term fevers became increasingly frequent, until a major outbreak developed at the end of the war and in the autumn of 1945. Many of these fevers were probably abortive attacks of well-known febrile illnesses overcome by the reaction of the host before characteristic signs developed; we were probably dealing with many frustrated attacks of infective hepatitis, dysentery, atypical pneumonia, glandular fever, &c. This assumption gives reasonable sanction for the label "pyrexia of unknown origin" in the case of fevers lasting one or two days, but a very large group of these short-term fevers satisfied the rather ill-defined criteria for the diagnosis of sand-fly fever. This group, observed in a military hospital in Rome and another in Naples, is here reviewed.

THE VECTOR

There is no doubt that the case against the sand-fly *Phlebotomus papatasi* is complete, as numerous experiments have shown—e.g., Sabin et al. (1944), who studied 100 cases, many artificially infected by sand-flies. We doubt, however, whether the sand-fly is the only vector. In North Africa, where sand-flies were numerous enough to be readily visible, we saw in eighteen months very few cases of short-term fever of the sand-fly type, whereas they were numerous in Italy. There are undoubtedly sand-flies in the Naples area; but, even when this fever was epidemic, great difficulty was found in collecting sand-flies, though a large team of ex-patients was encouraged to look for them. In the Rome area the local physicians were emphatic that sand-flies were rare, though one of us (J. F.) saw more sand-flies in Rome than in the Naples area. On the other hand, culicine mosquitoes and *Stomoxys calcitrans* were in constant attendance during the whole epidemic period.

The fever is readily transmitted from an infected person to an experimental host by simple inoculation of blood-serum, as we demonstrated during the epidemic, and it seems possible that any blood-sucking insect may act as a minute hypodermic syringe, and larger insects are likely to be no less effective than the minute sand-fly.

Elkerton (1944), discussing oriental sore, has evidence that *stomoxys* may double the part of the sand-fly as infecting agent.

Gontaeva (1943), in an extensive investigation of 154 cases of sand-fly fever, could not find sand-flies in the area, but culicine mosquitoes were present.

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Sabin et al. (1944) carried out control tests with the mosquito *Aedes aegypti*, the gnat *Culex pipiens*, and the flea *Pulex irritans* with negative results.

Doerr et al. (1909) found that the bedbug *Cimex lectularius* could not pass the infection.

It has been estimated (Sabin et al. 1944) that 1000 infective doses per c.cm. of blood are required if this possibility of mechanical transmission is admitted. Our observations suggest that individual susceptibility may admit of considerable variation of infective dosage. Thus, though the present weight of evidence does not incriminate insect vectors other than *Phlebotomus papatasi*, such a possibility cannot be ruled out.

EPIDEMIOLOGY

During the two summers when short-term fevers were prevalent, the numbers in one hospital were as follows:

| Period | 1-5 days' P.U.O. | Sand-fly fever |
|---------------------|------------------|----------------|
| Jan.-March, 1944 .. | 68 .. | 0 |
| April-June, .. | 61 .. | 8 |
| July-Sept., .. | 221 .. | 311 |
| Oct.-Dec., .. | 68 .. | 9 |
| Jan.-March, 1945 .. | 23 .. | 0 |
| April-June .. | 266 .. | 576 |
| July-Sept. .. | 120 .. | 606 |

During the Italian summer of 1944 there was an epidemic of short-term fever, including cases which could confidently be labelled sand-fly fever. The epidemic began in July and was maximal in August. In the summer of 1945, however, the epidemic was well under way in May and involved three times as many cases as in 1944. It is remarkable that sand-fly fever was so prevalent in the post-hostilities period, when living amenities were much improved and there was no observed increase in insect vectors. This raises the question whether the infective period may not in some cases be prolonged.

Immunity and Second Attacks.—Cullinan and Whitaker (1943), writing of an area of high infectivity, report second attacks 2-12 weeks after the first in 15% of cases. Livshitz (1937), from a study of experimental and natural cases, concludes that a single infection gives protection for 1-3 months, and that about 20% of patients could be reinfected during the same epidemic. He believes that there is a high degree of immunity in persons resident in endemic areas. This may explain the absence of sand-fly fever among the native population in Rome and Naples during the outbreak among British and American troops. In this series there were no cases of second infection; hence the above-mentioned conclusions about postinfective immunity cannot be checked.

Infectivity.—It may be fallacious to assume that the evidence for a short immunity period precludes the possibility that some cases may remain infective for many months. Sabin et al. (1944) found in their experimental cases that the blood did not remain infective later than forty-eight hours after the onset, but a convincing answer to this query seems to require transmission experiments in natural cases at various periods after recovery. Modhkovski et al. (1937), on the other hand, have demonstrated the transovular transmission of the virus of sand-fly fever to the next generation of insects, and that the females of the second generation can infect immediately after hatching. The large increase in the number of cases in 1945, as compared with 1944 and preceding years, may therefore be due to (1) a long period of infectivity following recovery in a number of cases, and/or (2) the facts that a large insect population was infected in 1944, and that increased battalions were waiting to begin operations in 1945.

BITES AND WEALS

It was notable that, among all the cases seen in two widely separated areas, there were very few exhibiting insect bites or giving a history of having been bitten. In the whole series of 664 cases only 7 had definite insect bites; all of these were profusely bitten, but none showed weals. It is well known that many people suffer little or no inconvenience from insect bites and do not develop itching or weals. It was impossible to make an extensive survey, but among 500 soldiers who gave a history of irritation and weal formation to culicine mosquitoes and *Stomoxys calcitrans* there was no one who had been treated for a short-term fever. This suggests that those who develop a local reaction to the bites of insects may have special protection from the sand-fly and its infection. Possible factors are: (1) persons who react locally are likely to take more precautions against bites for their own comfort, if not for safety; and (2) the rapid development of a weal may localise the injected virus and neutralise it, unless the protective mechanism is overwhelmed by multiple bites. This may explain the only failure to infect a susceptible case in the series of Sabin et al. (1944) even after repeated bites. One of us (J. F.), though frequently bitten by sand-flies, did not develop the fever; but, as with other insect bites, the skin responded to each sand-fly attack with a large weal.

SYMPTOMS

Out of 664 cases considered in this report, in 624 the onset was sudden, with a rapid rise of temperature during the first twenty-four hours to its highest point. The distribution of symptoms was as follows: headache 638, retro-orbital pain 364, body pains 410, vomiting 116, photophobia 55, giddiness 20. The headache was usually severe and was often accompanied by pain on moving the eyes and behind the eyes. When photophobia was an added symptom, there was a close resemblance to early meningitis. Neck stiffness was noted in 121, and a definite Kernig's sign in 3. The body pains were localised to muscles in most cases, but 7 had chest pain resembling pleurodynia, and 3 had colicky abdominal pains. In 30 pain was localised in the larger joints, but there were no physical signs. Though vomiting occurred in 116, the great majority had no notable gastro-intestinal upset.

PHYSICAL SIGNS

Conjunctival injection was noted in 240 of the 664 cases, and this number included most of the cases showing palatal congestion; 100 had small vesicles on the palate. Rashes developed on the first day of illness in 95 cases: macular 30, urticarial 5, petechial 20, herpes labialis 40. Fine crepitations were noted in 9 cases, usually in the mid-zone of the chest, and 4 had cough but no sputum; radiography showed no evidence of pneumonitis. The spleen was enlarged in 10 cases; this sign was specially looked for owing to the frequency of malaria, but in view of the highly malarious state of the troops this number of enlarged spleens was not considered significant with regard to sand-fly fever.

The fever was typical; pyrexia lasted 2-5 days in 89%, and three days in 83% (550 cases). The onset of symptoms and fever was so rapid that the patients were first seen when the fever was at its height. There was no characteristic shape of the curves. The fever rose quickly to its highest point in a steady curve, but defervescence was invariably a staggered descent with every variety of peaks. In this series secondary fever did not develop.

At the height of the epidemic 1 c.cm. of blood-serum taken from a typical case was injected intravenously into a healthy recipient. From the latter, when his fever was established, 1 c.cm. of serum was injected into a second recipient. In both cases typical three-day

fever with the usual symptoms developed two and a half days after the injection. In both cases the temperature followed a steady rising and falling curve, in sharp contrast to the irregular fall in the natural cases.

BLOOD FINDINGS

In a small series of 138 cases we were able in general to confirm the findings of Sabin et al. (1944). In most cases there was a leucopenia on the first day of illness, so the fall in white cells began during the incubation period. The white-cell count regained normal figures by the eighth or ninth day. During the fever there was a continued fall in the percentage of neutrophils, accompanied by a rise in the percentage of lymphocytes, producing a relative lymphocytosis. After the fever had subsided, the relative percentages rapidly regained normal proportions.

CENTRAL NERVOUS SYSTEM

In common with other virus diseases, sand-fly fever often produces some reaction in the central nervous system. Of the 664 cases, 80 had some indication of cerebral irritation severe enough to call for lumbar puncture. All the major symptoms of sand-fly fever can be related to cerebral irritation, and the cases which called for examination of the cerebrospinal fluid (c.s.f.) had similar but more acute symptoms: intolerable frontal headache, nuchal stiffness, and, in 3 cases, Kernig's sign, photophobia, and vomiting. In 70 cases the total protein in the c.s.f. was increased, the lowest amount being 20 mg. and the highest 130 mg. per 100 c.cm. There was a leucocytosis in 35 and a lymphocytosis in 30 cases. The average cell-count was 90, and the highest 360 per c.mm. Sabin et al. (1944), in the 5 cases of their experimental series which underwent lumbar puncture, report normal c.s.f. In our series 15 had normal cell-counts, but either the protein or the cell-count was high in every case. In 15 cases with severe headache the fluid pressure averaged 140 mm. H₂O, with extremes of 130 mm. and 210 mm. In 10 other cases the pressure was normal.

Pearson (1941) reports 15 cases of short-term fever with pronounced cerebral symptoms. He divides them into two groups—sand-fly fever and benign lymphocytic meningitis—but concludes that the latter is a syndrome common to "a group of diseases," of which sand-fly fever is one. We agree that the diagnosis of benign lymphocytic meningitis is, in any case, only provisional. Shee (1942) found, in 27 out of 30 severe cases of sand-fly fever, papilloedema to the degree of 2-2.5 dioptres.

There is, therefore, evidence that the sand-fly virus has a special affinity for the cerebral meninges, and should be considered in the differential diagnosis of meningitis in areas where the sand-fly is prevalent. Cases with pronounced cerebral symptoms all had protracted debility, and about half of these had some mental depression.

DIFFERENTIAL DIAGNOSIS

When met with in epidemic form, sand-fly fever presents no difficulty in diagnosis, but isolated cases or small numbers are a considerable problem. In such cases the diagnosis can only be presumptive when the fever subsides in one or two days, but in the average case there is time for investigation.

Malaria must be excluded by repeated blood smears; a malarial attack similar in intensity to the average case of sand-fly fever usually has easily demonstrable parasites in the peripheral blood.

Cases with signs of cerebral irritation call for immediate lumbar puncture to exclude *cerebrospinal meningitis*. The cell-count is lower than is usual in the febrile stage of *poliomyelitis*. *Atypical pneumonia* is unlikely if the

temperature is normal on the third or fourth day and there are no physical signs in the chest.

The pre-icteric fever of *infective hepatitis* may be indistinguishable from sand-fly fever (Havens 1944, Dixon 1944), since gastro-intestinal symptoms may develop in both. Since the average sand-fly case will have recovered sufficiently to be discharged well within fourteen days, a mistake in diagnosis may mean that the supposed sand-fly case will develop jaundice after being discharged, to the discomfiture of the medical officer. The blood changes in sand-fly fever do not alone suffice to differentiate it from other virus and protozoal fevers causing leucopenia and relative lymphocytosis. In circumstances which justify it, a transmission experiment goes far to confirm the diagnosis by the precision of incubation period, fever, and symptoms. When both diseases are prevalent, this possibility must always be borne in mind. During the interval between fever and the onset of jaundice in infective hepatitis there is usually some indigestion, and the subcostal area is usually tender even if the liver is not already palpable.

SUMMARY

The clinical findings in 664 cases of sand-fly fever, treated in two military hospitals in Italy, are reviewed.

The epidemiology is discussed, and it is suggested that other biting flies besides *Phlebotomus papatasi* may be vectors, and that the possibility of protracted infectivity should be examined.

Evidence is adduced that persons who develop local skin reactions to the bites may have special protection against the infection.

The differential diagnosis is discussed; the blood findings were found to be of little help in differentiating sand-fly fever from other virus infections.

The virus of sand-fly fever has a special predilection for the meninges and should be considered in the differential diagnosis of meningitis in areas where the sand-fly is prevalent.

The fever is usually short and without sequelæ, but it had a high nuisance value and could cause a serious shortage of man-power and dislocation of services.

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"... Britain has reason to be proud of its organisation for the treatment and social care of persons suffering from infantile paralysis and other crippling conditions. But these are the branches and leaves of the service; we must pay more attention to the roots. The work of the National Foundation in the United States should inspire us to devote more time and effort to research, to the study and the elimination of the causes of crippling disease. It would be short-sighted to confine attention to infantile paralysis alone, for there is a vast undiscovered country for research into allied conditions. Only recently an association has been formed for the care of children suffering from spastic conditions... and St. Margaret's School, Croydon, has been opened as a research centre for the study of all aspects of this disability. What we need is a National Foundation for Research—to lead, direct, and unify the study of crippling conditions from the point of view of prevention. An organisation of this kind would be closely linked with the Medical Research Council, and its expert advisers would be drawn from universities, hospitals, and research institutions."—Special Correspondent, *Times*, March 24, p. 7.

PARAHÆMOPHILIA

HÆMORRHAGIC DIATHESIS DUE TO ABSENCE OF A PREVIOUSLY UNKNOWN CLOTTING FACTOR

PAUL A. OWREN

M.D. Oslo

From the University Hospital, Medical Department A, Oslo, Norway

UNDER the term parahæmophilia a form of hæmorrhagic diathesis previously unknown is described here. The condition is characterised by a greatly reduced coagulability due to the absence of a hitherto unknown clotting factor necessary for normal coagulation.

A woman, aged 29, was admitted to the University Hospital, Oslo, in 1943 with an abnormal tendency to hæmorrhage.

Her parents and eight brothers and sisters were alive and in good health. No hæmophilia in the family. She was healthy the first three years of life, and grew and thrived normally. At the age of 3½ years she had severe nose-bleeding without any known provocation. It ceased spontaneously in some hours. On the third and fourth days afterwards she had further bleedings, the latter so severe as to cause loss of consciousness. The hæmorrhage was stopped by plugging. Five days after the last epistaxis the parents noted that the child had greatly reduced vision, and next day she was blind. Two days later (11 days after the first hæmorrhage) she was referred to the University Hospital ophthalmological department. Amaurosis was demonstrated, with dilated reactionless pupils and choked disks, of 4-5 D. Hæmoglobin 28%. Otherwise normal findings on routine physical and neurological examination. Wassermann reaction negative. In 6 weeks the choked disks became atrophied. She was blind for 6 months, but later she recovered central vision in the right eye. The left eye was permanently blind. The bleeding-time and clotting-time were not determined.

At the age of 4½ years she again had a severe nose-bleeding and was readmitted to the University Hospital. The hæmorrhage was again stopped by plugging. Hb 38%; thrombocytes 1,000,000 per c.mm.; bleeding-time normal; clotting-time of whole blood at room temperature 70 min.

Later on in childhood she had frequent nose-bleedings, sometimes severe. She constantly developed bluish "contusion marks" and large extravasations of blood followed small injuries. At the age of 12 years she received a blow on the right elbow, causing an enormous effusion, with swelling of the entire arm from shoulder to fingers.

Menstruation began at the age of 14 years. During the first few years it was usually profuse and of long duration, with the result that she had to stay in bed during these periods up to the age of 20. On one occasion she had to enter a hospital because of severe menorrhagia. She was given blood-transfusions, which had a rapid hæmostatic effect.

TABLE I—COAGULATION-TIME FOR PATIENT'S PLASMA AFTER ADDITION OF VARIOUS AMOUNTS OF FACTOR V

| Oxalated plasma (ml.) | Thrombokinase (ml.) | Factor v in buffer (ml.) | Veronal buffer (ml.) | CaCl ₂ (25 mM.) (ml.) | Coagulation-time (sec.) |
|-----------------------|---------------------|--------------------------|----------------------|----------------------------------|-------------------------|
| 0.20 | 0.20 | — | 0.20 | 0.20 | 67.5 |
| " | " | 0.0025 | 0.1975 | " | 38.0 |
| " | " | 0.005 | 0.195 | " | 31.8 |
| " | " | 0.01 | 0.19 | " | 27.5 |
| " | " | 0.05 | 0.15 | " | 20.6 |
| " | " | 0.10 | 0.10 | " | 18.1 |
| " | " | 0.20 | — | " | 15.5 |
| " | " | — | 0.40 | " | 350.0 |
| " | " | 0.0125 | 0.3875 | " | 170.0 |
| " | " | 0.025 | 0.375 | " | 140.0 |
| " | " | 0.05 | 0.35 | " | 115.0 |
| " | " | 0.10 | 0.30 | " | 90.0 |
| " | " | 0.20 | 0.20 | " | 85.0 |

In November, 1942, she had an attack of intense pain in the right side of the abdomen, accompanied by dysuria and dark urine. She cannot say with certainty whether the urine was hæmorrhagic, and it was not analysed. Otherwise she has felt well on the whole. She has never had a hæmarthrosis.

On examination in April, 1943, she was of small stature, but had no developmental anomaly. Bluish "contusions" were found on various parts of the body. Routine physical examination gave negative results. There were no petechiæ or telangiectases on skin or mucosæ, and no enlargement of spleen or liver. Blood-pressure and urine normal.

Blood Examination.—Hb 98%. Red cells 4,500,000 and white cells 7000 per c.mm. The red and white cells gave normal values on differential counts. Thrombocytes 400,000 per c.mm. (Nygård's method). Normal thrombocyte morphology.

Bleeding-time (Duke) 4½-5 min. Clotting-time: whole blood, by capillary method, 15 min. (normal for the method 2-5 min.); whole blood in dwarf test-tubes at 37° C 25 min. (normal time 6-10 min.).

Clotting-time of oxalated plasma with optimal recalcification in dilution 1:4 at 37° C 350 sec. (normal time 80-120 sec.). Clot retraction normal. Prothrombin-time (Quick) 70-80 sec. (normal 15-20 sec.).

Fibrinogen 0.3%. Albumin 4.3%. Globulin 2.9%. Calcium 9.7 mg. per 100 c.cm. and phosphorus 3.6 mg. per 100 c.cm. in serum. Ascorbic acid 0.50 mg. per 100 c.cm.

In this case a hæmorrhagic diathesis was present, which had lasted since childhood. Clinically it manifested

TABLE II—CORRELATION BETWEEN MAXIMAL THROMBOKINASE ACTIVITY OF VARIOUS TISSUE EXTRACTS ON CLOTTING-TIME BY OPTIMAL RECALCIFICATION OF OXALATED PLASMA

| Thrombokinasæ | Coagulation-time (sec.) | | |
|----------------------------------|-------------------------|------------|----------------|
| | Normal plasma | Hæmophilia | Parahæmophilia |
| Rabbit brain | 14 | 13 | 58 |
| Human brain | 21 | 21 | 78 |
| Placenta | 12 | 13 | 53 |
| Lung | 16 | 16 | 68 |
| Platelet emulsion: normal .. | 78 | 92 | 222 |
| Platelet emulsion: patient's .. | 72 | 94 | 190 |
| Physiological saline solution .. | 120 | 480 | 365 |

itself as skin-bleeding, nose-bleeding, menorrhagia, and possibly a minor renal bleeding. Examination demonstrated prolonged coagulation-time and prolonged prothrombin-time by Quick's method. It seems natural to conclude that the hæmorrhagic diathesis was due to a prothrombin deficiency, as the prothrombin-time recorded should correspond to a prothrombin concentration below 10% of the normal, a value which according to experience is accompanied by a tendency to bleeding.

So high a degree of hypoprothrombinæmia is known only in hypovitaminosis K and in severe hepatic damage. A thorough clinical examination, comprising liver-function tests, and investigation of the stomach, intestinal tract, and bile-ducts, revealed no sign of any such lesion; and the condition did not respond to large doses of vitamin K.

In view of these findings it was natural to doubt the correctness of Quick's method of prothrombin determination.

EXPERIMENTAL INVESTIGATIONS

Quick's method is based, according to the classical theory of coagulation, on the assumption that the speed of coagulation is proportional to the speed of formation of thrombin, which again depends on the concentrations of prothrombin, thrombokinasæ, and calcium. If an excess of thrombokinasæ is added to oxalated plasma,

and this is recalcified with an optimal amount of calcium, the concentrations of thrombokinase and calcium are effectively constant. The prothrombin then becomes the only variable component, and consequently determines the speed of coagulation.

In fibrinogen deficiency and in the presence of coagulation-inhibiting substances Quick's method fails. The fibrinogen concentration in this patient was normal (0.3%), and the reactivity of the fibrinogen to the thrombin was normal. The presence of substances inhibiting coagulation could also be ruled out, since the coagulation-time for normal plasma was not prolonged by addition of plasma from the patient.

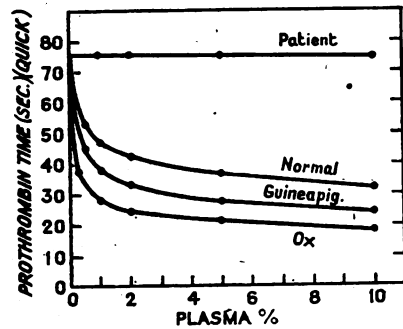


Fig. 1—Coagulation-stimulating effect on patient's plasma of small amounts of prothrombin-free plasmas examined by Quick's method for prothrombin determination.

To check the reliability of Quick's method, small amounts of plasma from normal persons were added to the patient's plasma, and the prothrombin concentration was determined by this method in the various mixtures. From the results it appeared that the prothrombin concentration increased more quickly than was anticipated from the amount of plasma added.

Prothrombin was then removed from various samples of normal plasma (two adsorptions with $Al(OH)_3$ followed by Seitz filtration), and variable quantities of this entirely prothrombin-free plasma were added to that of the patient. (Absolute freedom from prothrombin was proved by the absence of coagulation after addition of optimal amounts of thrombokinase and calcium.) The results (fig. 1) show that addition of prothrombin-free plasma caused diminution of the patient's "prothrombin-time" and consequently an apparent increase in the prothrombin concentration determined by Quick's method. Ox plasma and guineapig plasma had a greater effect than had human plasma, and prothrombin-free plasma from the patient was without effect, as anticipated.

Estimation of prothrombin by Quick's method failed, therefore, since the coagulation-time varied independently of the prothrombin concentration and depended on one or more additional factors in the prothrombin-free plasmas.

Normal conditions of coagulation in the patient's plasma could be restored by addition of 20% of prothrombin-free ox plasma. This effect of prothrombin-free plasma was unchanged after removal of fibrinogen (thrombin coagulation with subsequent inactivation of the excess thrombin by leaving for 30 min. at 37° C) and thrombokinase (Chamberland's filtration). The active factor which restored normal conditions of coagulation in the patient's plasma, therefore, could not be prothrombin, thrombokinase, calcium, or fibrinogen.

On the basis of these and other confirmatory tests it was concluded that the patient's blood lacked a substance found in normal blood and necessary to normal coagulation. This substance is not included in the classical theory of coagulation or in later theories of coagulation. This factor I have termed the fifth clotting factor—factor v. I have isolated this factor entirely free from the previously known factors of coagulation.¹

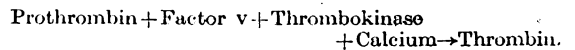
Table 1 shows how addition of the isolated factor v produced normal coagulation in this patient after recalcification of the oxalated plasma, and after recalcification following the addition of thrombokinase by Quick's method. This latter test illustrates how Quick's so-called "prothrombin-time" may vary independently of the prothrombin concentration and depends on factor v.

In another test factor v was isolated from 100 c.cm. of normal plasma, sterilised by filtration, and injected into the patient intravenously. She experienced a slight shivering fit but no other reaction. One hour after the injection the coagulation-time after optimal recalcification of oxalated plasma was reduced from 340 sec. to 170 sec., and Quick's "prothrombin-time" had decreased from 65 sec. to 28 sec. The effect decreased gradually and entirely disappeared after 3 days.

The isolation of factor v and its function in the coagulation process are discussed in detail elsewhere,¹ evidence being adduced that pure prothrombin is not converted into thrombin by addition of thrombokinase and calcium alone. The formation of thrombin requires the presence of factor v, and the velocity of this reaction increases with increasing amounts of factor v up to a certain limit (fig. 2).

CONCLUSIONS

To summarise, thrombin formation may be expressed as follows:



I have demonstrated¹ that this reaction falls into two stages: (1) the formation of the actual prothrombin-converting enzyme, termed factor vi; and (2) the conversion of prothrombin to thrombin under the influence of factor vi in the presence of calcium. Factor v acts as a pro-enzyme for factor vi.

Parahæmophilia is caused by failure of the formation of factor vi owing to the lack of factor v. In hæmophilia the reaction is delayed because of the lack of free or active thrombokinase. In both cases the result is identical: a deficient formation of thrombin and consequent delayed and incomplete coagulation. This similarity in the pathogenic mechanism, together with the similarity in the clinical picture, justifies the designation parahæmophilia.

Factor v deficiency is a more adequate description of this lesion, but such a designation should be postponed until factor v has been given a more suitable name.

The differential diagnosis between parahæmophilia and hæmophilia is easy, as the faulty coagulation of parahæmophilia is not returned to normal by addition of thrombokinase as in the case of hæmophilia. Table II illustrates this relation by the use of various thrombokinase preparations.

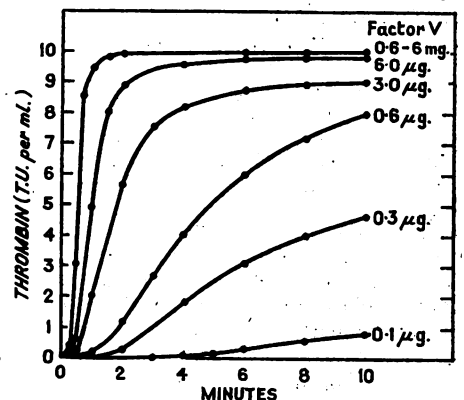


Fig. 2—Speed of thrombin formation by optimal concentration of thrombokinase and calcium and various amounts of factor v: prothrombin, 10 prothrombin units per c.cm. of mixture; thrombokinase, human brain (treated with acetone) in optimal concentration; calcium, 2.5 mM.; temperature, 37° C; pH, 7.3.

1. Owren, P. A. *Proc. Norwegian Acad. Sci.* 1944, p. 21; *Acta med. scand.* (in the press.)

Parahæmophilia is rare, but the faulty coagulation demands considerable attention. This new knowledge of the coagulation process shows, among other things, that the usual methods of quantitative prothrombin determination are based on a dubious foundation, and it will influence our ideas about the pathology of prothrombin. The rôle played by factor v in clinical pathology will be the subject of further investigations.

SUMMARY

An account is given of a woman with a hæmorrhagic diathesis which had lasted since childhood, and had manifested itself by skin-bleedings, nose-bleedings, menorrhagia, and probably an isolated renal bleeding.

Prolonged coagulation-time and prolonged prothrombin-time by Quick's method were demonstrated.

The causal factor was not prothrombin deficiency but lack of a previously unknown coagulation factor named factor v.

The lesion has been termed parahæmophilia. It is probably not hereditary.

EFFECT OF WATER ON GASTRIC MOTILITY

A TEST FOR DUODENAL ULCER

ANDREW W. KAY

M.D. Glasg., F.R.C.S.E.

From the Peptic Ulcer Clinic, Western Infirmary, Glasgow

WHEN a recording balloon on the end of a Ryle's tube is introduced into the fasting stomach of normal man, the gastrogram obtained shows four types of waves. Two of these, respiratory and cardiac oscillations, are superimposed on the intrinsic waves resulting from changes in the intragastric pressure. The true gastric contraction is represented by a sharp-topped wave lasting 30 sec.; a less abrupt regular wave depicts a slow rise and fall of intragastric pressure caused by tonic contractions of the fundus—tonus rhythm (fig. 1).

Carlson (1916) observed that the ingestion of cold water inhibited gastric contractions for about 5 min. Anderson (1943) confirmed this inhibition, lasting 10–35 min., in normal subjects but not in patients with peptic ulceration, in some of whom the ingestion of cold water even stimulated gastric contractions. This abnormal response he called the "water reversal phenomenon."

This paper presents the results of an investigation on the effect of water on gastric motor function. The aims have been to investigate the physiological basis for the water response and to explore the possibility of its application to the diagnosis of duodenal ulcer.

METHODS

Gastric motility has been recorded by a modification of Carlson's technique, with the patient fasting, the swallowed balloon inflated to a standard pressure of 10 cm. H₂O, and a tambour-kymograph unit used for recording (fig. 2). Patients find this investigation less tedious and no more unpleasant than a fractional test-meal. To test the effect of water on gastric motility, the patient is given a small draught of tap water, or, if a double tube has been swallowed, 20 c.cm. of water is injected through the stomach-tube, and the test is signalled on the tracing.

RESULTS

The effect of water on gastric motor function was observed in normal subjects and in patients with active duodenal ulcer. In the normal group gastric motility was inhibited for about 5 min. (normal response); in the ulcer group either activity was increased (reversed response type I) or, where contractions were already well developed, existing activity persisted (reversed response type II) (fig. 3). In both groups the latent period was 45–60 sec.

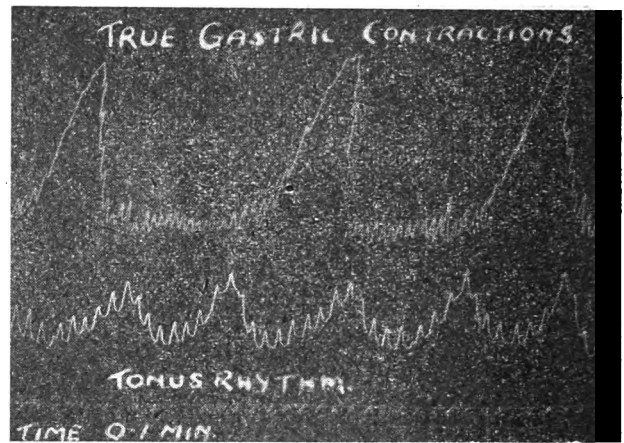


Fig. 1.—Tracings of true gastric contractions and of tonus rhythm.

This confirmation of the observations of Carlson and Anderson seemed to justify a study of the physiological basis and possible diagnostic application of the gastric motor response to water.

PHYSIOLOGICAL BASIS

Site of Action.—Carlson believed that the inhibitory effect of cold water on gastric motility was due to afferent stimuli arising in the gastric mucosa. The modification of this response observed in patients with duodenal ulcer has led me to the view that the receptor for this reflex is in the duodenum. In support of this hypothesis, the following observations are offered:

I found that water, coloured with azorubrum, could be aspirated from the duodenum within 45 sec. of ingestion. Since the time taken by water to pass the pylorus corresponds to the delay in the development of the subsequent gastric motor response, it seems probable that the receptor point for the response is in the duodenum. This is supported by the results of a further experiment.

In 4 patients with gastric and duodenal tubes in situ 20 c.cm. of water at room temperature was introduced first into the duodenum and secondly into the stomach. After duodenal injection the latent periods for the water response were 18, 15, 20, and 22 sec.; after gastric injection the corresponding latent periods were 50, 45, 50, and 55 sec.

The fact that the water stimulates gastric contractions when the ulcer is duodenal but not when it is gastric (see below) also suggests that the receptor point is in the duodenum. When the duodenal ulcer has completely healed, the reversed response to water gives way to a normal response (see below).

Effect of Solution Tonicity.—The introduction of hypertonic solutions into the stomach is known to cause protracted inhibition of gastric motility in normal subjects. It therefore seemed useful to investigate the effect of solutions of different tonicity in cases of duodenal ulcer. In 15 patients with duodenal ulcer 20 c.cm. each of water, normal (0.9%) saline, 2% saline, 5% saline, and 10% saline, again at room temperature, was introduced into the stomach, and the gastric motor responses were recorded. As the test solution became more hypertonic an increasing number of patients gave a normal response (inhibition); in 14 patients 10% saline effected inhibition (fig. 4).

It therefore seems that, though water abolishes gastric activity in normal subjects, the stronger stimulus of hypertonic solutions is required in patients with duodenal ulcer.

Effect of Temperature.—The temperature of the water does not influence the type of gastric motor response but merely alters the duration of the response. In normal subjects I found that cold water (10° C) had a slightly longer inhibitory effect than hot water (50° C). Similarly,

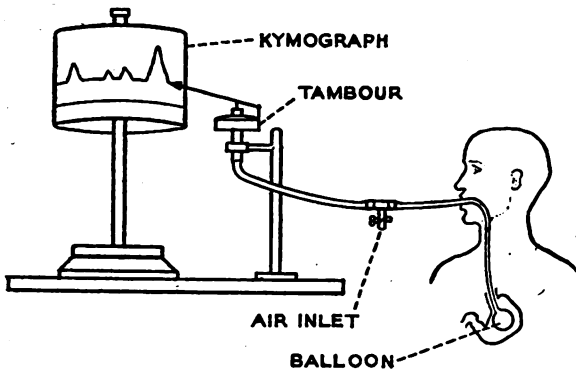


Fig. 2—Method of recording gastric contractions.

in duodenal-ulcer patients cold water had a longer excitatory effect than hot water. The type of response was always recognised without difficulty.

CLINICAL APPLICATION

To be of value in diagnosis (1) the water reversal response must be given consistently in patients with active duodenal ulcer; (2) it must be replaced by a normal response when the ulcer has healed; (3) it must not be given by other common causes of dyspepsia, such as gastric ulcer and gastric carcinoma; and (4) its inherent fallacies must be defined. The extent to which these criteria are fulfilled has been investigated:

(1) In 30 normal subjects the ingestion of water inhibited gastric contractions. In 90 patients with symptoms of duodenal ulcer and showing a crater on X-ray examination the water excited gastric contractions, gastric motility being increased in 68 and well-developed activity maintained in 22:

| Condition | Cases | GASTRIC CONTRACTIONS | | |
|-------------|-------|----------------------|-----------|------------|
| | | Inhibited | Increased | Maintained |
| Normal | 30 | 30 | 0 | 0 |
| Active D.U. | 90 | 0 | 68 | 22 |

(2) To ascertain the effect of healing of the duodenal ulcer on the gastric response, the water test was applied to 15 patients who had remained symptom-free for at least a year after perforation of a duodenal ulcer and without any radio-

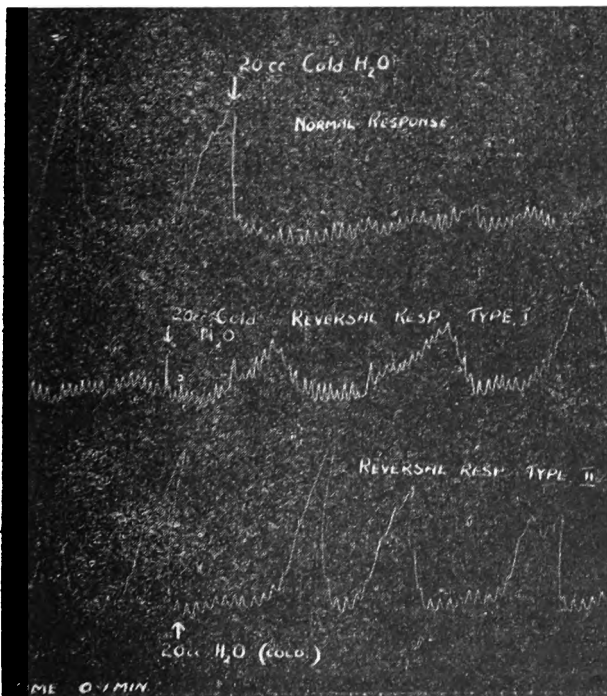


Fig. 3—Tracings of gastric motor responses to water test.

logical evidence of activity. This group was chosen on the assumption that the ulcers had completely healed. A normal response (inhibition) was obtained in all cases.

(3) The water test was applied to 34 patients with definite gastric disease (ulcer 12, carcinoma 22). A normal response was obtained in 33 patients. A reversed response was recorded in 1 patient with carcinoma of the stomach in whom, however, invasion of the duodenum was revealed at laparotomy.

(4) Carcinomatous involvement of the duodenum is so rare that it scarcely merits consideration as a possible fallacy in the water test. The only likely fallacy so far noted has been in patients with acute inflammation of the gall-bladder. Of 9 such patients investigated, in 2 the water test excited gastric contractions, and in 1 of these laparotomy revealed an empyema of the gall-bladder with adherent duodenum.

DISCUSSION

A gastric ulcer can usually be revealed with certainty with the aid of radiography and gastroscopy, but a duodenal ulcer cannot be so easily recognised. Endoscopy of the duodenum is not yet practicable, and the radiological demonstration of an ulcer crater in the duodenum is difficult.

Thus Templeton (1944) reported 809 cases of clinically active duodenal ulcer in only 526 (65%) of which a crater could be demonstrated.

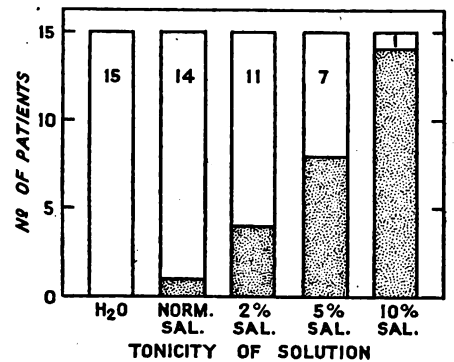


Fig. 4—Gastric motor responses in 15 patients with duodenal ulcer showing return of normal response (inhibition) with increasing tonicity of ingested fluid.

The gastric response to water is proposed as a test to decide whether or not there is a clinically active duodenal ulcer. This test has the advantage of being objective, whereas the personal factor is an inherent weakness of radiological investigation.

Besides its use in diagnosis, the gastric motor response to water may be used to test the healing of a duodenal ulcer. The gastro-enterologist who tries to assess the relative merits of various "cures" for duodenal ulcer quickly encounters difficulty in choosing an end-point for the healing of the ulcer. The absence of pain and of occult blood in the stool does not provide satisfactory evidence. The radiological disappearance of the ulcer crater almost certainly precedes actual healing. The gastroscopists have in fact shown that gastric ulcers often become "radiologically negative" for an appreciable time before complete healing is found gastroscopically. I suggest that the return of the normal gastric response to water (inhibition of contractions) is a dependable criterion of healing. Gastrograms are being recorded in duodenal-ulcer patients who become symptom-free and cease to show a crater on radiography. So far I have found that the gastric motor response to water may remain abnormal for as long as four weeks after a barium meal has shown no signs of ulceration.

SUMMARY

Ingestion of cold water inhibits gastric motility in normal subjects for about 5 minutes; hot water has a similar but briefer effect.

In the presence of active duodenal ulcer gastric activity is either unaltered or even stimulated by the ingestion of water.

The water test is therefore of value in the diagnosis of duodenal ulcer.

Evidence is presented which indicates that the receptor point for this gastric response to water is in the duodenum.

This duodenal mechanism, which normally inhibits gastric motor activity, is damaged by active ulceration but functions normally when the lesion has healed.

The water test can therefore be used to provide reliable evidence of healing.

I am indebted to my colleagues in the radiological department of the Western Infirmary, and to Prof. C. F. W. Illingworth for his direction and helpful criticism throughout this investigation.

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Medical Societies

DEVON AND EXETER MEDICO-CHIRURGICAL SOCIETY

Tubal Patency Tests

ADDRESSING this society on March 20 Dr. MARGARET HADLEY JACKSON said that disorders of the fallopian tubes are commonly held to be a causative factor in nearly half all cases of infertility. Of 570 cases submitted by her to tubal patency tests, not much more than 30% had any tubal disorder (including complete occlusion, partial or temporary occlusion by spasm or stenosis, and lack of normal tubal peristalsis). This figure is lower than that of most workers. Moreover, after repeated patency tests total organic occlusion was present in only about 10%. If routine tubal patency tests are not carried out the cause of some cases of sterility will be missed. It should be remembered that the indications for these tests are not only diagnostic but also therapeutic, since pregnancy quite often follows.

With acute pelvic infections patency tests are naturally contra-indicated. The best time for doing them is during the middle third of the menstrual cycle—well away from menstruation, as near as possible to the date of ovulation and preferably just before it. With the patient in the lithotomy position, a bivalve plastic speculum is inserted; not more than 150–200 c.cm. of CO₂ should be used and pressure should never exceed 210 mm. Hg.

Gentleness and asepsis are essential; antispasmodics should be given whenever there is spasm, but anaesthesia is rarely necessary, and is indeed a disadvantage since the patient's co-operation is needed at the operation. Moreover, anaesthesia does not relieve tubal spasm. The operation causes slight pain rather like that of mild dysmenorrhœa, unless there is obstruction or unless pressure is raised unduly, whereupon mid-hypogastric pain, sometimes referred to the sacrum or iliac fossæ, ensues. The patient rarely feels sick or faint, and the whole procedure is often completed without her being conscious of anything more than the insertion of the speculum. Late effects include transient and usually moderate shoulder pain on sitting up or, after the use of iodised oil, pelvic and sacral aching. The importance of repeating the tests before accepting a diagnosis of complete occlusion cannot be over-emphasised.

Tubal insufflation and iodised oil injection are complementary tests. Insufflation is inexpensive and not troublesome, taking only about 10–15 minutes. With a regularly tested kymographic apparatus peristaltic movements, spasms, and stenosis of tubes can be accurately recorded; a volsellum need hardly ever be used. On the other hand, with insufflation alone it is impossible to be sure whether both or only one tube is patent; nor can a block be located; air-embolism and sepsis are possible but avoidable dangers. By means of utero-salpingography the shape, size, and position of the uterus and of the cervix can be visualised; filling defects and spasticity can be shown; fixation of the uterus can be demonstrated by screening; and the length and tortuosity of tubes and points of obstruction or occlusion noted. Moreover, iodised oil has a therapeutic effect; but the procedure takes longer and is more expensive, and since a volsellum is necessary it is more painful.

Reviews of Books

The Embryology of Behaviour

The Beginnings of the Human Mind. ARNOLD GESELL, M.D., PH.D., SC.D., in collaboration with CATHERINE S. AMATRUDE, M.D. London: Hamish Hamilton. Pp. 239. 21s.

WITH some nineteen previous books on child development behind him, Dr. Gesell has produced a twentieth which is perhaps the most ambitious to date. In this he and his collaborator attempt to "indicate how an organic complexus of behaviour is built up concomitantly with the bodily development of the embryo, foetus, and neonate." The authors do not, however, appear to have been quite clear whether they were to produce a popular book or a serious contribution to scientific knowledge. The result in either case is somewhat unsatisfactory. This is particularly true of the sections dealing with antenatal development. Though profusely illustrated (largely from the works of other writers), they fail to give either a clear outline of what has been established experimentally about foetal behaviour, or to add materially to it. Once birth is over, Dr. Gesell is on more familiar ground. The substance of the book is essentially the results of intensive study, by photographic and other methods, of some 22 premature infants admitted to the World's Fair Hospital (Infant Incubators Inc.). It has thus been possible to construct for different stages of prematurity certain behaviour norms comparable to those the author has previously established for full-term infants. This is a valuable piece of observation, and it is perhaps a pity that a study of behaviour in prematures should have been given a somewhat misleading title.

Radiologic Examination of the Small Intestine

ROSS GOLDEN, M.D., professor of radiology, Columbia University, New York. London: J. B. Lippincott. Pp. 239. 36s.

RADIOLOGICAL study of the small intestine has progressed very slowly, and until recent years only gross abnormalities were accurately reported. Prof. Ross Golden has long been attempting to correlate radiological abnormalities of pattern and motility with the clinical findings of diarrhoea, intestinal bleeding, and abdominal pain. This volume, the fruit of many years' laborious research, advances our knowledge considerably. He rightly insists that we need to know the basic facts about the action and control of the small intestine; and the first 50 pages deal only with the normal. There is a good chapter on the use of the Miller-Abbott tube for so-called small-intestine enemas. Appearances in disorders of nutrition are given much space, and changes in the earlier and less defined cases have been compared with findings in more advanced cases as they improved under treatment. This study had yielded much new information on abnormalities of bowel pattern with varying disturbances of motility. Professor Golden suggests that radiologists should abandon the term "deficiency pattern," since similar appearances can be produced by many conditions other than vitamin deficiency, and proposes instead "disordered motor function." Inflammatory disorders and tumours are considered in great detail, and there are good chapters on allergy and the action of drugs. He is well aware of the great gaps in our knowledge; but his work has gone an appreciable way towards filling them.

In the 15th edition of Pye's *SURGICAL HANDICRAFT* (Bristol: J. Wright, pp. 668, 25s.) Mr. Hamilton Bailey has supplemented the text with many new photographs and diagrams, and has presented material concisely under clear headings. His list of contributors should ensure that confidence in this trusted book is maintained.

The British mission of the Allied Control Commission to Rumania has published a stout loose-leaf volume on PENICILLIN, being a compendium, in Rumanian, of the British papers on the subject published in the last year. This able piece of work, which has been done entirely on the initiative of members of the mission, has been warmly welcomed by Rumanian doctors and their government. It sets an example which ought to be followed widely.



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THE LANCET

LONDON: SATURDAY, APRIL 5, 1947

The Crisis and the Service

ONE effect of the economic crisis is that the Government are being urged to drop their programme of nationalisation and give their whole attention to the needs of today. The suggestion has been heard that they may be obliged, among other things, to postpone the establishment of the National Health Service, and this suggestion seems to be associated with an idea that the task of bringing the service into being is too great to be accomplished in the twelve months remaining before the appointed day. In political life, of course, hardly anything is certain; and it is possible that before April 1, 1948, we shall have another Government or that the present Government will have departed from its firm intention to carry the scheme through. For anyone to count on any such a possibility, however, would be most unwise, and there is no reason to think that the arrangements required under the Act cannot be made in the allotted time. The machinery of hospital administration will soon be coming into action: by next month at latest the regional boards will be constituted; their first duty will be to appoint the management committees; and the transition from one form of management to another presents no insoluble problems. On arrangements for medical practice, the proceedings of the Negotiating Committee are wrapped in silence; but we shall not be far wrong in guessing that, with concessions on both sides, the differences between the Minister and the committee will be narrowed to one or two issues. It seems likely, too, that having considered these issues the profession will ultimately decide on participation in the service; and, if that is so, it would be well to make the decision as soon as possible. The earlier it is reached, the more time there will be for settling details in advance, and the less chance there will be of injustices and confusion that would benefit neither patient nor doctor.

If we are right in thinking that the National Health Service will be introduced according to schedule, we are left nevertheless with the disquieting question whether the economic situation will seriously damage its quality and development. Medical services are not necessarily any more expensive to the nation if they are maintained by the citizen as taxpayer rather than as private person; but to many people they appear so; and their progress is necessarily related more closely to the state of the Exchequer. If therefore the change to State ownership coincides with a big effort to reduce the weight of taxation there is danger that developments—even some which might have been possible under the old system—will be prevented by the general policy of keeping down all Government expenditure. The fact that it has to be raised in taxes and compulsory contributions might thus for a time make it harder, rather than easier, to

find money for new hospitals, new health centres, and new health-workers.

But whatever the method of financing the service—and whatever Government is in power—the fundamental question will be: can a country in our position afford to devote more materials and man-power to medical work when these are needed for essential industries? If, as is probable, this question arises, we must be ready to show that efficient medical services are as necessary to a modern nation as they are to a modern army. If he is to give his best under difficulties the civilian, like the soldier, needs the best possible medical backing. And the full contribution which medicine can offer to national recovery cannot be made without large material improvements in many of the hospitals, clinics, and surgeries in which we now work at so much disadvantage.

Acholuric Jaundice

THE retirement of Prof. H. M. TURNBULL, F.R.S., from the department of morbid anatomy at the London Hospital has been marked by a special number of the *Journal of Pathology and Bacteriology*, all the contributors to which are his former pupils. Since the morbid anatomy of blood diseases is one of Professor TURNBULL's interests, it is appropriate that the articles should include one by LOUITT and MOLLISON¹ on the classification of hæmolytic icterus (acholuric jaundice) into congenital and acquired types.

Ever since 1907, when CHAUFFARD first described the disease and WIDAL distinguished congenital and acquired forms, this division has been a source of controversy. The congenital or familial form usually presents a clear-cut clinical picture—recurring attacks of anæmia and jaundice appearing in childhood or early adult life; an enlarged spleen; a variable anæmia, sometimes severe, with most of the red cells appearing as small densely staining spherocytes showing excessive fragility in saline solutions; and signs of active hæmolysis, such as reticulocytosis, normoblastic hyperplasia of the bone-marrow, and high serum bilirubin with increased pigment excretion in the fæces but no bilirubin in the urine. The characteristic morbid anatomy of the spleen was graphically described by TURNBULL² as "conspicuous narrow venous capillaries in a lake of blood." The acquired form is much more vague: it appears later in life and is clinically more severe; the spleen is not so prominently enlarged; neither increased fragility of the red cells nor spherocytosis is so pronounced; and splenectomy often brings only partial relief, in contrast with the clinical cure in the congenital cases. There is no doubt that many of the acquired cases described were really hæmolytic anæmias secondary to some identifiable condition, such as secondary malignancy in the bone-marrow, but there remains a group of cases that appears to be primary.

Quantitative fragility tests revealed that many of the relatives of patients with congenital hæmolytic icterus had a minor but detectable spherocytosis and increased fragility of the red cells. It was then supposed that the primary defect was in the erythropoietic tissue of the bone-marrow, where spherical, unduly fragile red cells were produced instead of the

1. Loutit, J. F., Mollison, P. L., *J. Path. Bact.* 1946, 58, 711.

2. Turnbull, H. M., in *The Anemias*, by J. Vaughan, Oxford, 1936.

normal biconcave disks; and this applied to congenital and acquired cases, the only difference being one of degree. NÆGELI³ together with DAWSON⁴ and VAUGHAN⁵ in this country and TILESTON⁶ in America were among the supporters of this view, but MEULENGRACHT⁷ maintained that the two conditions were separate and that acquired hæmolytic icterus was really a group of different diseases. Support for MEULENGRACHT'S view came from several sources. In 1920 EPPINGER⁸ had described, in addition to the splenic congestion typical of the congenital syndrome, at least two other histological pictures in the spleen in cases of hæmolytic jaundice—a pronounced histiocytic hyperplasia, sometimes associated with extramedullary hæmopoiesis, and one in which there were numerous small thromboses of capillaries and veins and consequent fibrosis. Such cases were described in this country by DAVIDSON⁹ and by ISRAËLS and WILKINSON¹⁰ in patients showing increased red-cell fragility and spherocytosis but with no detectable family history. The theory that spherocytes are produced only by a congenitally abnormal marrow received its most damaging blow from DAMESHEK and his co-workers in Boston,¹¹ who showed that spherocytes could be artificially produced in animals by the intravenous injection of hæmolytins, and that by varying the dose a whole range of hæmolytic syndromes, resembling the human syndromes from acute to chronic, could be produced. Their experiments led them to the view that spherocytes are formed outside the bone-marrow by the action of a hæmolytic agent on mature cells only, so that spherocytosis—and the parallel increase in red-cell fragility—is simply an indication of excessive intravascular hæmolysis. They again put the congenital and acquired varieties into one large group, the only difference being in the "dose" or effectivity of the hæmolytic agent; the symptomatic acquired cases—anæmias secondary to definite diseases like Hodgkin's disease, lymphosarcoma, and so on, or to drugs or poisons—were included; and SINGER and DAMESHEK¹² described 7 examples of secondary acquired hæmolytic icterus, 6 of which had spherocytosis and increased fragility of the red cells. Unfortunately, it proved rarely possible to demonstrate the hæmolytin, and the cases in which it could be demonstrated fell into the acquired group. Moreover, the hæmolytin may be only irregularly detectable; thus in a case described by STACEY¹³ an autohæmolytin was demonstrable during a hæmolytic crisis but could not be found eight weeks later when the patient was clinically improved. The Boston school were obliged to postulate subdemonstrable concentrations of hæmolytin and prolonged or sudden action—a not very satisfactory explanation.

LOUTIT and MOLLISON¹ have now tackled the problem from a new angle. They have studied the survival of red cells in these patients, and have

looked for evidence of sensitisation to hæmolytins by testing against a suitably prepared anti-human-serum serum. Completely opposing results were obtained in the congenital and acquired cases. In congenital hæmolytic icterus, normal red cells transfused into a patient survive normally; the patient's red cells transfused into a normal recipient survive only a short time (50% survival after 5–15 days, compared with the normal 50–60 days); and the cells are not agglutinated by anti-human-serum serum. After splenectomy, even when the patient is clinically cured, the patient's red cells are still rapidly destroyed by a normal recipient. In acquired hæmolytic icterus, normal red cells transfused into a patient survive only a short, or sometimes very short, time; the patient's red cells transfused into a normal recipient survive normally; and the patient's washed red cells are agglutinated by anti-human-serum serum. After splenectomy, the destruction of transfused normal cells is sometimes less rapid; clinical relief varies and is usually only partial. From these results LOUTIT and MOLLISON conclude that in the congenital form there is no evidence of any circulating hæmolytin or excessive activity of the reticulo-endothelial system; it is the red cells of these patients that are abnormally sensitive to the normal hæmolytic processes. In the acquired form there is no evidence of any abnormality of the red cells, but there is evidence of an intravascular hæmolytin that is rapidly destroying any circulating red cells—whether the patient's or transfused. They still agree with DAMESHEK and SCHWARZ that spherocytes are produced by the action in vivo of hæmolytins and are not produced by a congenitally abnormal marrow.

The ætiology of congenital hæmolytic icterus as proposed by LOUTIT and MOLLISON is as follows. Erythropoiesis is congenitally defective but the cells do not leave the marrow as spherocytes; they are unduly sensitive to normal lytic processes, and these, acting intravascularly, produce the spherocytic form. LOUTIT and MOLLISON think that lysolecithin may be the lytic agent responsible. It has been shown¹⁴ that this substance acts particularly in the spleen when the blood is slowed in its passage through this reservoir. There is evidence, too, that red cells in the splenic vein show greater spherocytosis than those in the splenic artery, and a substance with the properties of lysolecithin has been extracted from splenic-vein blood. This would explain why clinical cure and a great diminution in all the signs of hæmolysis may follow splenectomy, even though the congenital defect of the red cells is unaltered. The acquired cases LOUTIT and MOLLISON regard as secondary, even when the original source of the abnormal hæmolytin cannot be identified, and they therefore urge that all these cases should, when possible, be classified according to their ætiology rather than on the red-cell changes that indicate only hæmolytic activity. MÆGRAITH and colleagues¹⁵ have suggested that the hæmolytin in blackwater fever is due to a disturbance of the normal balance between tissue hæmolytins and lysin inhibitors in serum, the inhibitory power being much reduced. A similar disturbance may be the ætiological factor in the cases of acquired hæmolytic

3. Nægeli, O. *Blutkrankheiten und Blutdiagnostik*, Berlin, 1931, p. 292.

4. Dawson of Penn, Lord. *Brit. med. J.* 1931, i, 921.

5. Vaughan, J. *The Anemias*, Oxford, 1936.

6. Tileston, W. *Medicine, Baltimore*, 1922, 1, 355.

7. Meulengracht, E. *Der chronische hereditäre hämolytische Icterus*, Leipzig, 1922.

8. Eppinger, H. *Die hepato-lienalen Erkrankungen*, Berlin, 1920.

9. Davidson, L. S. P. *Quart. J. Med.* 1932, 1, 543.

10. Israëls, M. C. G., Wilkinson, J. F. *Ibid.*, 1933, 7, 137.

11. Dameshek, W., Schwarz, S. O. *Medicine, Baltimore*, 1940, 19, 231.

12. Singer, K., Dameshek, W. *Ann. intern. Med.* 1941, 15, 544.

13. Stacey, R. *Amer. J. med. Sci.* 1946, 212, 536.

14. Bergenheim, B., Fähraeus, O. *Z. ges. exp. Med.* 1935, 97, 555.

15. Maegraith, B. H., Findlay, G. M., Martin, N. H. *Lancet*, 1943, i, 573.

icterus in which no abnormal hæmolyisin can be detected.

Thus, what we know today confirms WIDAL's original idea that there are two clinically and aetiological distinct forms of hæmolytic icterus: one, sometimes familial, in which abnormal red cells are rapidly destroyed by normal lytic processes; and another, with no familial element, in which normal red cells are rapidly destroyed by abnormal lytic processes. It remains to find suitable names: spherocytosis applies to both, so "familial spherocytic anæmia" and "secondary spherocytic anæmia" would be short descriptive terms; or, with LOUIT and MOLLISON, we might be more explicit and term them familial and secondary hæmolytic anæmias of spherocytic type.

Treatment of Myasthenia Gravis

THE neuromuscular defect in myasthenia gravis has been the subject of much research in the last few years, and its mechanism is becoming clearer. Clinical observation suggested that the essential defect was in transmission at the myoneural junction, and this was proved conclusively by HARVEY and his colleagues¹ in 1941. There were three possible reasons for the interruption—too little acetylcholine might be produced; the acetylcholine might be destroyed abnormally rapidly by cholinesterase; or some substance similar in action to curare might block the action of acetylcholine. The last view was strongly supported by WILSON and STONER,² who tested the serum of patients with myasthenia gravis on the isolated nerve-muscle preparation of the frog and found that it blocked neuromuscular transmission if the patients were not receiving 'Prostigmin,' whereas serum collected from patients during prostigmin treatment had no effect.

The first advance in treatment was an empirical one. In 1930 EDGEWORTH³ found that ephedrine relieved the weakness of myasthenia gravis, and this was subsequently confirmed. In 1934 MARY WALKER,⁴ acting on the analogy between the symptoms of curare poisoning and myasthenia gravis, found that injections of prostigmin had a remarkable if transient effect on the muscle weakness; patients with profound weakness of the eye, face, and limb muscles might become almost normal within half an hour of the injection, but the effects wore off within 3–4 hours. When prostigmin was found to be effective by mouth, though the dose was considerably larger than by injection, a new era opened for the sufferers from this disease. In many patients, however, increasing doses had to be given, and in some the myasthenic symptoms were not properly controlled even by large doses. A new drug—di-isopropyl-fluorophosphate (DFP)—which inhibits cholinesterase activity has recently been introduced at the University of Pennsylvania. In 6 cases of myasthenia gravis COMROE and his colleagues⁵ found that the cholinesterase activity of the blood-serum was completely inhibited by oral or intramuscular

administration of DFP, and there was some increase of muscle power; but the effects were notably less than with prostigmin, while larger doses of DFP caused nausea, vomiting, and faintness which were not adequately controlled by atropine. The main advantage of DFP is that its action lasts much longer than that of prostigmin, and a combination of the two drugs might at times be helpful in treatment. Work is being carried on with congeners of DFP in the hope of finding a more efficient drug. If we accept the view that there is a curare-like substance in the serum of myasthenic patients, it is possible that prostigmin is more effective than DFP because it has a direct action on this substance whereas DFP relies solely on its anti-esterase activity.

Surgery offers an alternative approach. It was an old observation that cases of myasthenia gravis sometimes showed tumours of the thymus at autopsy, and on this basis BLALOCK and others⁶ in the United States, and CARSON and KEYNES⁷ in England performed thymectomy for the treatment of the disease. In 1946 KEYNES⁸ reported on 63 patients treated by thymectomy; there were 9 deaths, but 7 of these had occurred in the first 21 cases and the postoperative mortality had become steadily less. Of 41 patients followed up for a reasonable time 14 were apparently cured, 15 so much improved that the dose of prostigmin needed was considerably reduced, 3 only slightly improved, and 9 not improved at all. There is no doubt that thymectomy is a real advance in treatment, especially in the younger patients with a relatively short history. In Paris a new surgical treatment has recently been introduced—bilateral denervation of the carotid sinus. Suprarenal cortical extracts have been thought to improve the symptoms of myasthenia, and this operation is supposed to cause hyperplasia of the suprarenal cortex. THÉVENARD and LEGER⁹ have operated on one case of severe myasthenia with respiratory crises. Improvement started within two days after the right sinus had been denervated, and the patient was normal within four months; she relapsed shortly after that, but after denervation of the left sinus she again improved and two years later was said to be practically normal though still taking small doses of prostigmin. This appears to be the only case so far treated by this method, and in such a fluctuating disease little can be deduced from the results in one case. Indeed, the absence of a careful follow-up of a large series before the introduction of prostigmin makes it difficult to assess the results of any new treatment.

6. Blalock, A., Harvey, A. M., Ford, F. R., Lillenthal, J. L. Jun. *J. Amer. med. Ass.* 1941, 117, 1529.

7. Carson, J., Keynes, G. *Proc. R. Soc. Med.* 1942, 36, 140.

8. Keynes, G. *Ibid.* 1946, 39, 600; see *Lancet*, 1946, i, 739, 746.

9. Thévenard, A., Leger, L. *Pr. méd.* Feb. 8, p. 97.

1. Harvey, A. M., et al. *Bull. Johns Hopk. Hosp.* 1941, 69, 1, 529, 547, 566.
2. Wilson, A., Stoner, H. B. *Quart. J. Med.* 1944, 13, 1.
3. Edgeworth, H. *J. Amer. med. Ass.* 1930, 94, 1136; *Ibid.* 1933, 100, 1401.
4. Walker, M. *Lancet*, 1934, i, 1200.
5. Comroe, J. H. Jun., Todd, J., Gammon, G. D., Leopold, I. H., Koelle, G. B., Bodansky, O., Gilman, A. *Amer. J. med. Sci.* 1946, 212, 641.

Though still cramped through bomb damage and continued hospitality to other bodies, and hindered by staff shortage, the LONDON SCHOOL OF HYGIENE AND TROPICAL MEDICINE lost no time at the war's end in setting itself to restore and surpass pre-war standards. The report for 1945–46 records that teaching for the D.P.H. was resumed in the late summer of 1945, with a duplicate course for 39 further candidates beginning in April, 1946; and other departments were almost as quick off the mark. Among the year's developments were the formation of a new department of human nutrition and the creation of a chair of clinical tropical medicine; plans for a department of occupational hygiene have been approved.

Annotations

CONVALESCENT HOMES

THERE is still doubt (and some anxiety) about the position of convalescent homes in the National Health Service. Will the Minister of Health take them over on the appointed day, like hospitals; or will they be allowed to continue as independent units, perhaps under some form of central supervision? These homes are mostly small and often highly individual. Good food, fresh air, and a care-free atmosphere are their therapeutic weapons, and there is a feeling that while the State can supply the first, and nature the second, only institutions possessing complete freedom of action can supply the third. The fate of these homes will probably have to be decided on their merits, the regional boards being responsible for settling the degree of liberty to be accorded to each.

Meanwhile the surprising fact remains that no-one knows where all the convalescent homes are nor what they do. For the London area King Edward's Hospital Fund has set up a committee, with Sir Henry Tidy as chairman and Mr. O. N. Chadwyck-Healey as vice-chairman, which is now at work trying to make a comprehensive list of homes. The task of finding and visiting these has mainly been undertaken by members of the Institute of Almoners, who have already recorded details of about 150. The results of their labours will shortly be published in the form of a directory of convalescent homes, which should be assured of a welcome from doctors as well as hospital authorities. The committee also hope to increase the number of convalescent beds, which are urgently required, by giving financial and technical assistance to homes which need help. Many homes which are already open and active have asked for the committee's aid to expand or improve their work. But another group which require help still more are the dormant homes—those which closed during the war and have not yet reopened. Unfortunately the most popular area for convalescent homes in England is along the south-east coast, and since this was particularly exposed to enemy attack during the war very many had to close. To find out what has happened to these, and to encourage them to reopen, is an onerous but useful task. It is to be hoped that the committee will be able to restore a substantial proportion to the active list.

ELECTRICAL PROPERTIES OF TRYPANOSOMES

A NEW approach to some of the puzzles of African sleeping sickness and the allied trypanosomiasis is offered by Fairbairn and Culwick,¹ on the basis of many years' experimental and field work at the Tinde Laboratory in Tanganyika. Broom and Brown² showed ten years ago that 72 hours after infection of a tsetse fly with one of the polymorphic trypanosomes, *Trypanosoma gambiense*, *T. rhodesiense*, or *T. brucei*, the parasites in the gut of the fly all carry a negative electric charge. When the parasites invade the salivary glands of the fly their charge is reversed. Fairbairn found that after infection of a rat with salivary-gland forms of *T. rhodesiense* the trypanosomes are at first predominantly positively charged; as the infection progresses the proportion of positively and negatively charged parasites fluctuates widely.

Fairbairn and Culwick¹ now believe that much that is known of the polymorphic trypanosomes can be explained on the assumption that the electric charges they carry greatly influence their behaviour, that the

parasites obey the laws governing charged bodies, and that their heterogeneous properties are maintained by syngamy in nature. Examination of stained dried thin film preparations of blood was found to afford a simple and accurate means of determining the electrical charges carried by *T. rhodesiense*. Positively charged parasites are seen in contact with the red cells, which carry a negative charge; but negatively charged parasites are repelled by the red cells, and the red cells in close proximity to such parasites are deformed. There are long slender, short stumpy, and intermediate types of each electrically charged variant, the negatively charged being significantly shorter than the corresponding positively charged. The maintenance of strains for long periods by syringe passage in animals alters their virulence and their electrical, chemical, morphological, and developmental characters. Syngamy would tend to perpetuate heterogeneity of the parasites; but artificial conditions of maintenance and transmission would lead to genetic segregation. Syngamy was actually observed between trypanosomes carrying opposite charges, but not between negatively charged or between positively charged parasites. It was found that a trypanosome of any form—long, intermediate, or short—will fuse with another of the same or different form, provided it is of opposite charge. The long forms multiply freely by binary fission; but the intermediate and short forms do not readily do so; they result from syngamy of long forms and develop into long forms with or without further syngamy.

ALIVE, ALIVE-O

OYSTERS, of which Sam Weller noted the "wery remarkable circumstance—that poverty and oysters always seems to go together," have grown exclusive with the years, and are nowadays as scarce as formerly they were abundant. The reasons have been set out¹ by Mr. H. P. Sherwood, senior naturalist to the Ministry of Agriculture and Fisheries, who also considers mussels, cockles, scallops, and "queens" (all of which, like the oyster, feed by filtering particles out of the water passing through their gills), and whelks and periwinkles (which, on the other hand, are browsers). Our grandparents, it seems, devoured oysters so freely that breeding stocks fell and prices rose. Despite various Acts and orders our oyster beds have never recovered from these depredations, and moreover have been thinned still further by periodical hard winters, and by pests invading the beds. The output of native oysters fell from 38 million in 1920 to less than 7 million in 1930, stocks having been depleted by a heavy mortality in 1920-21. The average yearly output from 1924 to 1938 was 12½ million.

Yet even if oysters could abound as they did in the past, their reputation for carrying intestinal infection, including typhoid, would probably hinder a wide return to popularity. They are more liable to become polluted nowadays, because, during the last century, local authorities of towns near the sea began to dispose of water-carried sewage by discharging it untreated on foreshores or estuaries. Sewage is generally released after half-ebb, and runs through comparatively narrow channels, many of which contain oyster or mussel beds. The filtering capacity of these creatures is such that a single mussel in a day clears over 10 gallons of water of all suspended particles, including bacteria; so shellfish taken towards the end of the ebb are likely to be heavily polluted. Fortunately they have an equal capacity for cleansing themselves, given the chance; and it is with methods of providing such chances that Mr. Sherwood is chiefly concerned.

Disorders due to shellfish include typhoid and paratyphoid, and milder intestinal infections associated with

1. Fairbairn, H., Culwick, A. T. *Ann. trop. Med. Parasit.* 1946, 40, 421.

2. Broom, J. C., Brown, H. C. *Trans. R. Soc. trop. Med. Hyg.* 1937, 31, 81.

1. Safe Shellfish. Ministry of Agriculture and Fisheries. Pp. 13.

diarrhoea and vomiting; bacterial food-poisoning from stale shellfish; a rare type of paralytic poisoning acquired by eating shellfish which have been feeding on dinoflagellates (small poisonous organisms); and allergic symptoms, usually urticaria. This last can only be avoided, in susceptible people, by excluding shellfish from the diet; but the first three can be prevented if the shellfish are purified before they are sold and eaten.

The ceremony of purification, though simple, is based on careful experiment. The shellfish, spread about two deep on wooden grids in large tanks, are thoroughly hosed with a strong jet of water to remove external mud, and the mud is sluiced away. The tank is filled with purified sea-water, and the shellfish are left in it overnight. Their excreta fall to the floor of the tank, and the water soon becomes glass-clear. Next morning the tank is drained, the fish are hosed, and the waste matter is sluiced from the tank, which is refilled again, and again left overnight. Next morning the bath is drained and flushed again and the shellfish are once more hosed; they are then left covered for an hour in sea-water containing a trace of chlorine (3 parts per million), in which they remain closed, and which sterilises the outside of the shells. They are packed in bags or containers sterilised in chlorine, and sent to market.

Purification stations have been set up at Conway, at Lytham, and at Killorglin, Cromane, in south-west Ireland. Results have been good; at Conway, for example, cases of typhoid due to infected mussels, formerly common, are no longer reported, and Lytham mussels and Brightlingsea oysters have proved equally innocent. Mr. Sherwood thinks that confidence in the method is justified because the shellfish visibly discharge their contents, and the rectums of any examined are seen to be free from faeces; moreover, bacteriological tests show that sewage organisms are greatly reduced, though it is not claimed that they are removed outright. Whelks and winkles, being eaten after cooking, are always reasonably safe, but Mr. Sherwood considers that, thanks to improved conditions, "shellfish in general can now be eaten with greater confidence."

COLOUR-BLINDNESS

THE colour-blind are often unaware of their disability. This is partly because, as children, they learn to name colours by association: the grass is green, the sky blue, the pillar-box red, and so on. But it is also because they become skilled at using such clues as texture and brightness—yellow, for instance, appears brighter than red or green under the same illumination. This unawareness may give rise to difficulty and disappointment. A lad who has specialised in his later school years with the aim of entering the Navy or R.A.F. may be rejected when the entrance medical examination reveals for the first time that he is colour-blind. The committee set up by the colour group of the Physical Society¹ to consider defective colour-vision in industry quotes the case of the draper's assistant who startled customers by the ties and socks he offered in response to requests for definite colours. On another occasion a controversy arose through the inability of a colour-blind geologist to read a colleague's coloured maps.

In occupations where defective colour-vision might lead to disaster, all would-be entrants are tested. One of the classical tests, Holmgren's wools, was designed after a railway accident from this cause. In industries such as colour-printing and photography employers sometimes insist on testing entrants. But there is no

preliminary test for many of the occupations demanding accurate colour-vision: these range from textile weaving to horticulture, in which the colour-defective may find difficulty in deciding when fruit and tomatoes are ripe for picking. In these jobs the defective becomes slow and inefficient, often without recognising the real cause.

Colour-blindness is not uncommon, being found in various forms in about 8% of males. Usually, like hæmophilia, it is inherited by male children from their mothers. In the female it is rare, occurring only in children born of a colour-blind father and a mother who is a carrier. There are all degrees of disability, the most usual being difficulty in distinguishing between red, green, and yellow.

The committee holds that all whose colour-vision is not normal should be made aware of it, and should know how far the disability is likely to affect their careers. Colour-vision is already examined during pre-vocational testing in parts of Scotland, notably Edinburgh and Glasgow. Most of those employed in industry, however, go to work direct from school, and the committee recommends that the test should be made on all school-children—or at any rate all boys—at the age of about 13. It is suggested that one of the confusion chart tests, such as Ishihara's, could be modified so that a whole class could be tested simultaneously; those who failed could be examined individually. The tests need not be conducted by a doctor. An experiment in which the Ishihara charts were thrown on a screen by an epidiascope showed that the group-testing of colour-vision is feasible. Whether the addition of yet another non-educational activity to the school curriculum is desirable is another matter.

THE COST OF LIVING

THE plaintive note struck by one of our correspondents recently on what a contemporary unkindly labelled "The Doctor's Dilemma—or how to live on £1000 a year" gives point to the current discussions on the cost-of-living index. No doctor struggling with his personal budget is likely to be reassured by bland statements to the effect that the cost of living as measured by the present index has risen by only a third since 1939. Wage levels alone have risen by two-thirds, and this rise is reflected in the cost of most articles now for sale. In fact, the present index is admittedly so manifestly out of date that the Minister of Labour and National Service has adopted the recommendations of his committee¹ for an interim index "to provide a measure for the time being, of future changes in the retail prices of the things in which ordinary working-class households are interested." The present index, based on the purchases made by a sample of labourers' families before the first world war includes articles such as tallow candles which are unlikely (except perhaps during the half-light of the morning power-cut) to be of much interest to the modern housewife. Designed as it was to show the average percentage increase in the cost of maintaining unchanged the standard of living of a selected group of families at a fixed date, it takes no account of the changing patterns of purchasing habits demanded by the rise in the standard of living in between the wars. For example, in recent years demobilisation and the setting up of many new homes has increased the proportion of purchases of household goods compared with other items such as apparel and food.

To make the index a reasonable overall guide to the cost of the total purchases being made at any one time by the working-class population, the actual retail costs must be multiplied or "weighted" by factors propor-

1. Report on Defective Colour Vision in Industry. By a committee of the Colour Group of the Physical Society, 1, Lowther Gardens, London, S.W.7.

1. H.M.S.O. Cmd. 7077. Ministry of Labour and National Service: Interim Report of the Cost of Living Advisory Committee.

tional to their relative importance. Thus at the present time, household goods would be heavily weighted to indicate that so many men had to buy this type of merchandise. Conversely, the cost of tallow candles, having an insignificant weighting, would be negligible in the summation of all items to form the final index. The committee therefore suggests that sample inquiries into current purchasing habits should be made from time to time to ascertain the weighting indicative of the relative importance of the various items of expenditure whether essential or recreational. The first index calculated under this new régime will form the base-line of 100 against which future changes will be measured. There is to be no attempt at comparison with a pre-war standard. All this, of course, will take time, and as a temporary measure an index based on a 1937-38 survey of working-class budgets will be used. The increased weighting of rent, rates, and many "non-essentials" not previously included, and the decrease in the weighting of food which this entails, will make for a more realistic measure of the cost of modern working-class purchases.

The economic questions involved are very complex. Food subsidies have kept the level of the present index, to which the wage scales of 2½ million workers are related by agreements, within reasonable limits. Any increase in the index, either by reduced subsidies or by the new method of compilation, may bring fresh demands for higher wages and accelerate the upward spiral of inflation. As the *Times* remarks, "the interrelation of wage-rates, cost-of-living index and subsidies constitutes an impasse which must somehow be circumvented." This will inevitably influence the consideration of the terms of professional remuneration shortly to be negotiated.

EDUCATION FOR MEDICINE

It is always possible to learn from the difficulties of others, but where the problems are almost identical with our own a sense of comradeship is roused which bridges oceans and denies distance. In America, the Committee on Medicine and the Changing Order, established by the council of the New York Academy of Medicine, is reviewing educational method as applied to medicine, and under the ægis of this body Dr. Raymond B. Allen, from his wide experience as an educator, has made an analytical survey of the problems of American medical education,¹ much of which might well have been written about our own system.

Dr. Allen justly holds that the foundations of a medical career are laid in the early general education of the child. He points to the danger of dulling those bright facets of the child's untutored mind—"the natural curiosity and imagination" without which "there can be no lasting educational influence or progress"—by the imposition of a traditional educational system planned by adults. These inherent qualities of the child's mind are the mainspring of its future career; if they are congenitally absent or are destroyed by misuse, they cannot be replaced, and they must at all times be exercised by the challenge of appropriate studies. Outlining the programme of a liberal education which in this case happens to lead on to a medical career, but which might equally well culminate in any of the learned professions, Dr. Allen shows a breadth of outlook which makes his book worthy of study not only by deans of medical schools but by all who are concerned in child and adolescent education. Admittedly he looks to the ideal; and it is likely that the prevailing error of teaching too much in detail and too little in principle will defeat his aims.

It is clear that he deeply distrusts that early and enforced specialisation which, both in the United States and here, compels a disastrous narrowness of adolescent education at the most formative age. He comments upon the illiteracy of American students, and feels their lack of facility in oral and written communication "is a serious indictment of both secondary and collegiate education." He stresses the apparent lack of first-class brains among the student entry to the medical schools, which results in the padding-out of the schools and later of the profession with second-rate men, who though technically efficient lack the wisdom and the approach which endow each case of illness with a humanising intimacy linked with the individuality of a research investigation. Faintly but definitely he scents from afar the possibility, even in America, of a State medical service born of the inequality in the distribution of medical facilities to the poorer and the less populous districts. He suggests that this may not be purely a problem of money, but may be due in part to the training of students in hospitals armed with a profusion of specialised ancillary services; for after qualification the young physician may feel driven to live in an area where such services are freely available—not having been trained to manage without them.

For the future, Dr. Allen foresees a gradual reduction of specialists as rising standards of living and broad therapeutic advances, such as the bacteriostatic drugs, eliminate the difficult techniques upon which such specialism depends. Then the doctor will become the priest of good health: "the physician as a highly educated citizen shares responsibility with other community leaders in the endeavour to create the conditions which will improve the general economic and social well-being of the people as a whole." He asks, "Does medical education share in the responsibility for the failure of the medical professions to exhibit social insight and aggressive leadership in molding public opinion towards a comprehensive handling of the problem of adequate medical care for all the people? The answer is undoubtedly yes."

Many questions will stir in the reader's mind. Are we spoiling the child mind by traditional and inelastic methods of education? Is the occasional brilliant brain merely the one which is tough enough to survive a faulty educational system? Is that system sufficiently at fault to require, not patchwork revision from time to time, but radical reconstruction from an entirely fresh outlook? "It is the responsibility of education," writes Dr. Allen, "to keep pace with the times if, indeed, it cannot set the pace."

BETTER CARE FOR THE HOMELESS CHILD

THE Government have accepted the main recommendations of the Curtis and Clyde Committees, and have decided to make the Home Office the central department responsible for the care of homeless children in England and Wales. It will be remembered that the Curtis Committee wished to see supervision of these children brought under a single department, though they did not want that department to be responsible for every aspect of their lives. Thus the Ministry of Education should, it was felt, have the same responsibilities for educating them as it has for children living with their parents, and the Ministry of Health should have similar charge of their health. The supervising department was in fact to become a sort of father-figure to the children, and should have a children's branch which would make a study "of child welfare on the side of the home," and an inspectorate capable of considering the child's total welfare as a person.

These principles have been fully accepted by the Government. The Home Office is to have a new and enlarged children's branch and an expanded inspectorate; similar functions will be assumed by the Scottish Home

1. *Medical Education and the Changing Order*. By Raymond B. Allen, M.D., executive dean, University of Illinois. New York: The Commonwealth Fund, London: Oxford University Press. Pp. 142. 8s. 6d.

Department. A standing advisory committee containing representatives of the Ministries of Health, Education, and Pensions will support the Home Office in its new task. It has always been responsible for children in any voluntary homes not inspected by other departments and for children boarded out with foster-parents by juvenile courts; it will now take over, from the Ministry of Health, children whom public-assistance authorities have placed or boarded out in local-authority institutions or voluntary homes. One duty will be to make more good foster-homes available; and we share the Prime Minister's hope that an increasing number of people in comfortable circumstances will take children into their homes.

The most important recommendation of the Curtis Committee—that every local authority should appoint a children's officer—has also been adopted. These careful plans for homeless children are welcome; and should be explained simply to the children themselves. The knowledge that their country feels serious concern for their welfare should help to give them the security they so much need.

PROGNOSIS IN ERYTHROBLASTOSIS FŒTALIS

LAST year Wallerstein¹ reported 3 cases of severe erythroblastosis successfully treated by removal of the blood of the newborn infant and its replacement with Rh-negative blood. He has now published² 7 successful cases, 5 of them having a severe icterus gravis. (The protocols of the other 2 cases are not sufficient to make this diagnosis certain.) There were 2 failures in infants suffering from icterus gravis treated after the 48th and the 60th hour, and it is suggested that these might have been saved if the treatment had been instituted during the first 24 hours of life.

Wallerstein's original technique was to remove the infant's own blood by fontanelle puncture of the longitudinal sinus and to transfuse Rh-negative blood into a cannulated arm vein. He infused 75–100 c.cm. more blood than had been removed. Wiener and Wexler³ have found that, by heparinising the infant with 500 units intravenously and cannulating the cut radial artery, they could remove through a 20-gauge needle 150 c.cm. of blood before clotting occurred in the radial cannula; by giving a further 500 units of heparin it was possible to remove a total of 400 c.cm. Wiener⁴ has described 2 successful exchange transfusions in infants with icterus gravis, and promises a report on 17 infants with only 1 failure.

The procedure is readily practicable and satisfactory when the diagnosis is made early, and offers many advantages over simple transfusion with Rh-negative blood. It is still too early, however, to be certain that it offers a better prognosis. The early reports⁵ suggested that the prognosis could be dramatically improved by transfusion with Rh-negative blood, but this view has not been generally confirmed. The general impression of paediatricians is that the mortality from this disease is still around 50% and that in the infants who survive damage to brain and liver may be manifested later.

The pathogenesis of icterus gravis and erythroblastosis foetalis in general is still not fully understood. There is general agreement that in most cases of erythroblastosis foetalis there is an Rh blood-group incompatibility between mother and foetus, the mother being usually Rh-negative, with Rh antibodies in her serum, whereas the foetus is Rh-positive. It is generally accepted also that the maternal Rh antibody, be it agglutinin or incomplete antibody or both, crosses the

placenta and can there attack the foetal red cells which contain the Rh antigen. Wiener⁶ has postulated that the clinical type of affection of the infant depends on the type of maternal antibodies produced, so that the Rh iso-agglutinin in the mother leads to icterus gravis in the infant, whereas the incomplete or "blocking" Rh antibody in the mother causes congenital hæmolytic disease—that is, congenital anæmia or hydrops foetalis. Wiener⁷ has since produced statistical evidence in favour of this conception. In 25 instances where the mother's Rh antibody was the iso-agglutinin there were 2 stillbirths, 7 cases of hæmolytic anæmia, and 16 cases of icterus gravis. In 57 instances where the maternal agglutinin was a "blocking" antibody there were 25 stillbirths, 24 cases of hæmolytic anæmia, and 8 cases of icterus gravis. In 15 instances where the maternal antibodies were both bivalent and univalent there were 4 stillbirths, 10 cases of hæmolytic anæmia, and 1 case of icterus gravis. It seems probable that, under the term hæmolytic anæmia, Wiener includes cases which would be called icterus gravis in this country. His figures—41 cases of hæmolytic anæmia to 25 of icterus gravis—are certainly vastly different from those met with here, where the diagnosis "icterus gravis" is many times more common than "hæmolytic anæmia," even when hydrops foetalis is included under hæmolytic anæmia.

Both Wiener and Wallerstein, though they have made notable contributions to paediatric practice by evolving this technique of exchange transfusions, may be raising unduly high hopes. First, the treatment must be given very early. Secondly, both appear to lay too great a stress on the damage to the infant in extra-uterine life. That damage also occurs in intra-uterine life is evidenced by the high proportion of stillbirths in cases of Rh blood-group incompatibility between mother and infant with maternal iso-immunisation. If the foetal tissues contain the Rh antigen, as has been demonstrated by Boorman and Dodd,⁸ the tissue cells as well as the red cells will be damaged by the maternal antibody. In the long run, therefore, the greatest promise will be held out by a régime which will prevent the maternal antibody from being formed or from passing across the placenta to damage the infant.

IF THE TRIBUNAL ACQUITS

IN one of the committee discussions on the Scottish National Health Service Bill, which were concluded in the House of Commons on March 20, Mr. J. S. C. Reid drew from Mr. G. Buchanan, an Under-Secretary of State, an assurance that where the disciplinary tribunal acquits a doctor accused of misdemeanour the Secretary of State will have no power to reverse the decision. From the proceedings in England Mr. Reid had understood that an appeal would be allowed in either direction, so that where a doctor was acquitted by the tribunal the Minister could then appeal to himself; and he quoted a remark by Mr. Bevan which certainly lent colour to this idea. In fact, however, the position in England and Scotland will be the same: if the tribunal condemns the doctor he can appeal to the Minister, but if it acquits him the acquittal is final.

Dr. Walter Ramsden, senior fellow of Pembroke College, Oxford, and professor emeritus of biochemistry in the University of Liverpool, died on March 26. In 1897 he qualified from Guy's Hospital, and he held the lectureship in chemical physiology in the University of Oxford till he took up his Liverpool chair in 1915. His most notable original work was on the chemistry of colloids. After his retirement in 1931 he returned to Oxford, where he continued his observations on adsorption phenomena and also on silk-fibrinogen.

1. Wallerstein, H. *Science*, 1946, 103, 583.
 2. *Amer. J. Dis. Child.* 1947, 73, 19.
 3. Wiener, A. S., Wexler, I. B. *J. Lab. clin. Med.* 1946, 31, 1016.
 4. Wiener, A. S. *Westchester med. Bull.* 1946.
 5. Mollison, P. L. *Arch. Dis. Childh.* 1943, 18, 161. Gimson, J. D. *Brit. med. J.* 1943, ii, 293.

6. *N.Y. St. J. Med.* 1946, 46, 912.
 7. *Amer. J. clin. Path.* 1946, 16, 761.
 8. Boorman, K. E., Dodd, B. E. *J. Path. Bact.* 1943, 55, 329.

Special Articles

SOCIAL MEDICINE

The Appeal of the Common Man

LORD HORDER'S ADDRESS IN NEW YORK

In an address to the Institute on Social Medicine of the New York Academy of Medicine on March 21, Lord Horder spoke of the new field now opening for the statesman, the sociologist, and the doctor—a field that is common ground for all three.

Although we have not been blind in the past to the sociological aspects of Medicine, he said, we have as yet done very little about it. I think the recognition of the omission has gone far in the United Kingdom towards deciding our statesmen that something *should* be done about it. Looking at our health services in a more objective way than the physician can possibly do they take note of this big gap that he himself is doing so little to fill. Then war, the great accelerator, has taken a hand by stressing the importance of "intelligence, agility, endurance, strength," and by giving the term "positive health" a more exact meaning. In short, "Social Medicine . . . signalises . . . the birth of a new outlook on human affairs, a new interpretation of human relations in a free society and a new scale of social values" (Crew).

But Virchow spoke of Medicine as a "social science." Can his use of the word "science" be justified in relation to Medicine? I think it can and should. . . . But to make Medicine a complete science in the service of man we must arrange that it infiltrates this important and now more clearly perceived sphere—as yet largely neglected—of social need. This sphere lies between that in which the diseases of the individual patient are presented and treated by the individual doctor and the sphere in which the preservation of the public health is achieved by the proved methods of the State health officer. This largely untilled field includes all the environmental factors which influence the citizen's health and happiness—his conditions of work, his house and home life, his sense of security or insecurity, and his ignorance of the things that make for the salvation of his body and his mind. In short, as Professor Ryle has it, "our next advance" (in Medicine) "will be . . . concerned with causes" (as the last was) "but with the ultimate, rather than with the intimate, causes of disease."

OBSTACLES

As things are at present I do not feel at all hopeful that the physician is capable of dealing with this aspect of Medicine. I believe his incapacity to be due to two things—his lack of training for the particular job and his lack of time in which to do it.

The student's premedical education is lopsided. Almost from the moment the boy or girl has decided to become a doctor the confines of his or her interest tend to be more and more narrow. Medicine, which should have the widest contacts of any profession, almost ceases to be a "liberal" education, for its cultural outlook dwindles from this moment. . . . May I repeat something that I said about eight years ago?

" . . . if it be advanced that the doctor's training has not, up to now, fitted him for work of this sort, then the sooner it does so fit him the better. Inevitably the doctor's work in the future will be more and more educational and less and less curative. More and more will he deal with the physiology and psychology of his patient, less and less with his pathology. He will spend his time keeping the fit fit rather than trying to make the unfit fit. And we must make it worth his while to do this work. This reorientation of his education, and of his work, is overdue, and it will remain overdue until reorientation occurs in the attitude of the health authorities towards him and towards his sphere of usefulness."

The other, and more serious, handicap to the physician in any effort he may want to make towards the furtherance of "social trends" that overlap so closely with Medicine, is his want of time. This, as I say, is probably a more severe handicap than mere lack of special preparation in this field. For, after all, the doctor is in the very midst of all that is happening to the various groups within the social fabric. He sees the people's needs and his natural inclination is towards helping; if it were not so he is unlikely to have chosen Medicine as his vocation. But time is essential, and this he just hasn't got. He hasn't got it because he is generally grossly overworked and his day is badly organised. And it is here, perhaps more than anywhere else, that the need for developing our health services is so urgent.

When the statesman seeks to free the doctor from trivialities and time wastage so that he may be able to pull his weight in the field of Social Medicine he deserves, and must be given, all our sympathy and all our help. But there are many of us in Britain who think that this freedom should not be secured by nationalising Medicine, because we consider that such a policy would lose to Medicine two of its most virile characteristics, which are individual initiative and the spirit of adventure.

How, then, are we to free the doctor from his incessant grind and hurry? I think the Health Centre is the answer. The Health Centre could do much to organise a doctor's work; it could also save him from the sterilising effects of isolation. Moreover it could itself be a place where the social aspects of Medicine of which I have been speaking might be studied. . . .

MEDICINE MUST BROADEN

There are some 54,000 practitioners engaged in medical care in my country. There are nearly three times that number in yours. What is called the "impact" of these skilled armies upon the public mind is potentially tremendous. I have dealt with the doctor's influence in society in another place, saying of him that I thought he was the most important citizen the nation possesses. This sounds egregious seeing that I am a doctor myself. But I believe the public takes the same view. The physician owes his power to three things—to his training, to his humanist outlook, and to his opportunity to effect a "close-up" with the individual patient. We must be insistent that the "close-up" should be preserved in any attempt to integrate our health services; it is a privilege that should be jealously guarded in the interest of the citizen and of medical progress.

But the scope of Medicine must broaden. There is today hardly a field of human endeavour that does not require the physician's advice at some time or other. In the words of Sigerist, "no longer a magician, priest, craftsman or cleric, he must be more than a mere scientist. Scientist and social worker, prepared to cooperate in team-work and in close touch with the people he serves, a friend and a leader, he will direct all his efforts towards the prevention of disease and become a therapist when prevention has broken down—the social physician protecting the people and guiding them to a healthier and happier life."

The "all-in" war that has so recently swept like a blizzard across our social fabric at home has shaken us rudely, physicians included, out of a number of our former complacencies. A few of us grouse because a lot of the things we have to do seem trivial, detached, or beneath our dignity. We can't any more do only the things we like doing most, nor only the things we think we can do best. And I am not at all sure that we will ever have the same choice of doing things that we previously had, or that it is good that we should. And therefore I consider that to yield in this matter is an ignoble attitude. I would prefer to think that we orientate willingly and actively towards the general social scheme: The doctor's

job has, by its nature and traditions, always been linked up closely with the special structure of the day; only in quite recent times does the doctor seem to have been aloof from the rapidly changing pattern that has disclosed itself.

When I use the phrase "general social scheme" I do not mean yet another plan; I mean, pragmatically, things as they are at this moment in the unbroken stream of human welfare; and of course I have in mind also the probable continued trend of things in the future.

I want to see a "close-up"—or it would be more accurate to say a "closer-up"—between the physician and the social services. Is the physician—and when I say physician in this connexion I mean the family physician, than which I can give him no better or more significant title—is the physician going to continue only to cure or relieve disease, or is he going to make contact with this health business that we are finding to be such a vital national asset? This rigid distinction between the G.P. and the S.H.O. (State health officer), and, alas! the antipathy so often seen between them, are surely due to a misconception on both sides as to what the medicine man's function really is; he was the "health man" to the tribe, and he should be still, and only, that, to the men and women of today.

We all pay lip service to the great importance of preventive medicine. But again and again we say "that is the State health officer's job," when really it is every doctor's job. To do the G.P. justice, he does make many contributions to preventive medicine that are not recognised as such, but they *should* be recognised and it is the business of the State to recognise them. Inevitably, if the G.P. does not accept the challenge of this position, and is not helped by all of us to accept it, the S.H.O. service will expand whilst that of the G.P. contracts and there will then be intensified that rivalry between private and public medicine which we all of us surely deplore.

I want to see the physician not only make use of the public-health services, but show some passionate conviction about them in his patient's interest. Take school meals as one example: if the physician is only doctrinaire on the matter, and not intensely practical, Mrs. Jones isn't stimulated and the local education authority doesn't get busy.

THE BASIC NEEDS

Take the case of industry. Work is good; work is health-giving. But it is the doctor's duty to protect the worker against excess fatigue, against dullness, and against the various hazards of his job. In all these matters Medicine has accumulated a mass of facts, but they are very largely wasted because they are not implemented in terms of social service. If I embarked upon the subject of Nutrition, and the light which our rapidly growing knowledge in regard to it has thrown upon food, I could, of course, give equally striking examples of the need for the physician's direction and execution. To say the truth, there is very little in the life of John Citizen, whether he be in a factory, an office, or a public-utility service, that does not give the physician scope for the practice of Social Medicine.

Consider the basic needs of the citizen—I have long ago stated and re-stated them:

1. Sufficient of the proper food.
2. Suitable shelter and clothing.
3. A satisfactory job of work.
4. Access to the fresh air and sun.
5. Reasonable leisure and the amenities of life.

In every one of these the doctor must stake out his claim, for in every one of them his is the knowledge that should guide and it is his enthusiasm that can stimulate to achievement. It is not as mere passengers that we physicians must take our part in these affairs. We must lead; we must guide the politicians since they cannot

act effectively without expert help, and we must keep the citizen's end up, since he learns to rely upon us for this.

But suppose the politician won't be guided? Suppose it is as Swift wrote in a letter to Pope: "Although I have known many great Ministers ready enough to hear opinions," said Swift, "yet I have hardly seen one that would ever descend to take Advice; and this pedantry ariseth from a maxim which they themselves do not believe at the same time they practice it, that there is something profound in politicks, which men of plain honest sense cannot arrive to." In that case the physician has no alternative but to appeal to public opinion, continuing to serve his patient in the manner which he believes to be in the patient's best interest. . . .

THE FUTURE

If, finally, any one of you should ask me, point-blank: "Do you see hope in the future of Medicine?" I should reply: "Yes—I see more hope for ourselves as doctors and for the people who will come under our care, in the future of Medicine than perhaps in any other single thing in the new world towards which we are hacking our way. We at least have not—yet—forfeited the trust of people for whom we work; we at least have not—yet—turned inwards in despair, bartering our spirit of adventure for a mere hope of security. We stand for sane knowledge, selflessness, and mercy in a world gone mad. We cannot let these people down who trust our profession, and it is in this firm resolve that we shall face the future of Medicine."

A MEDICAL SERVICE FOR STUDENTS

FROM OUR EDINBURGH CORRESPONDENT

For the past 17 years students at Edinburgh University have been entitled to free medical examination at entry and at other times as they wish; they have also been encouraged to engage in physical education. Domiciliary treatment, though sometimes arranged unofficially, has hitherto not been organised by the university.

Lately the service has been extended, and every new student is now advised to avail himself of the chance of free clinical examination and chest radiography. During the present academic year 752 (about 60%) of the male students have taken advantage of the scheme; and the proportion of women is about the same. Amongst the men pulmonary tuberculosis was disclosed in 8, all of whom had been unaware of it.

Besides routine medical examinations, consultations are now held three days a week for students wanting advice; and any student unfit to attend may obtain free domiciliary treatment. The medical service works in liaison with the department of students' social service, the director of which makes a point of getting into touch with the parents of sick students. The service has been devised for the benefit of those whose homes are not in Edinburgh; and local students are encouraged to seek the advice of their family doctor rather than call upon the university medical service. The Royal Infirmary has for many years provided a separate students' ward, which is still used to the full. A dental service, organised through the Dental Hospital, is already in existence.

Discussions which are now being held will, it is hoped, eventually result in the establishment of a university "sick bay" or "sick dormitory" in one of the university hostels; and a scheme for the full care of students with tuberculosis is also being considered. The physicians operating the medical service hope to obtain useful data on students' health and on their physical and psychological reactions to environmental circumstances.

"... No-one can foresee the basic discoveries of tomorrow; the predictable belongs to the level of applied research. At best we can merely select phenomena which we do not understand, confident that if we investigate them in a true scientific spirit, some useful knowledge will emerge."—Dr. JAMES CRAIGIE, F.R.S., in his presidential address to the Society of American Bacteriologists. *Bact. Rev.* 1946, 10, 73.

Reconstruction

"THE SYLLABUS"

FROM A CORRESPONDENT

THE General Nursing Council has been considering the "improvement" (by elaboration and addition) of the syllabus to be covered in preparation for the State examinations for nurses. The Royal College of Nursing, full of zeal for the development of "nursing education," has announced an optimistic scheme for setting up a University School of Nursing. Mr. David Patey, F.R.C.S., in the *Times* of March 7, challenges the council of the college on the results of American experiments in making nursing a university subject, as compared with the results of the British system of nurse training. Both he and *The Lancet*¹ quotes the opinion of an American surgeon who says that under the programme of advanced nursing education in the United States, the nurse is not being trained primarily to care for the patient.

Thus we meet once again, in modern dress, the old controversy: do nurses have "too much theory" nowadays; does it matter how much or rather how little they know, as long as they have "nurses' hands" and do what they are told? Has actual bedside nursing deteriorated since the theoretical course became more exacting, and if so is it a case of propter hoc or only a case of post hoc? The conservative party in this debate (including many members of the medical profession) assumes a conflict between theory and practice: if the theory goes up, the nursing practice at the other end of the seesaw must inevitably go down. The "progressives," who include the most articulate portion of the nursing profession, might sometimes be thought (no doubt quite unjustly) to believe that if you take care of the theory, the practice will take care of itself. Truth, as is her wont, has eluded the earnest controversialists, and laughs at them unnoticed from a corner of her own.

The first responsibility of the nurse, as of the doctor, is the well-being of the patient. The physician's responsibility demands knowledge, judgment, reflection, clinical experience, and skill. The nurse's responsibility is less directive, but is more constantly and more intimately concerned with the patient's comfort and well-being in mind and body. The most important part of her teaching, therefore, should take place at the bedside, and it is there that she should develop the skills which are the real measure of her proficiency and success as a nurse. Where this does not happen, it may be because she is distracted by classroom work for which her educational background is inadequate and is worried by the prospect of examinations. But it is at least as likely to be because her time and energies are used up in a scramble of ward routines connected only very remotely (if at all) with the comfort and well-being of the individual patient, and because no-one in the wards has time or responsibility to teach her the true art of nursing. It is not the patient, and not always even the medical staff, whose well-being is most seriously disturbed if every piece of ward furniture and every flower-vase is not set to an unchanging pattern by 10 A.M. In the immediate shortage of domestic help, some admixture of domestic duties with nursing is inevitable, but there should be some system whereby the necessity for this is questioned at frequent intervals now that there may be a temptation to economise in the more highly paid domestic labour at the expense of the student nurse.

If the training of every nurse were centred in the wards and in the care of her patients as individuals, surely the classroom work could and should be allowed to vary in accordance with the capacity and educational background of the students or pupils which each training

school can recruit. It is only common sense to suppose that the nurse who is capable of grasping the principles underlying the techniques she must follow in the wards will be the better for knowing them, and should be taught them as part of her course, rather than being left to find them out for herself from textbooks if she has sufficient enterprise. As regards the more advanced nursing procedures, there is real danger in practical training which is so stereotyped and so unrelated to principles that the nurse cannot adapt her practice safely to varying conditions. Recent developments in medical treatment could provide many instances of the risk of leaving a nurse to follow instructions without knowledge and understanding of the processes involved.

The moral? Neither a more advanced compulsory syllabus nor an arbitrary levelling down to the capacity of the girl whose education ceased at 14, but a much greater variety in the content of the nursing course, to match the great range of educational standard and of mental capacity. Freedom for training schools to develop their course on the lines best fitted to the student body which they are able to recruit, and financial independence to enable them to let that course centre in bedside teaching on a planned curriculum, undisturbed by the labour requirements of the hospital. A periodical review of the more impersonal ward routines to see which can be eliminated or mechanised, so that the individual care of the patient may come first.

Can all this be fitted into the present machinery for State registration? If not, an examination of the results of the present system may suggest that it is not simply the syllabus which should be revised, but the whole concept of a rigid national standard imposed on a profession which surely needs at least as much diversity and flexibility in its training and qualification as any other.

"We must make arrangements which will attract well-educated women into a profession demanding all their powers, but will nevertheless permit any sensible girl to attain the title of nurse if she shows aptitude for the care of the sick."¹ The planners of the National Health Service would do well to make this twofold objective a matter of urgency, remembering that numerically the nurses are the most important group within the team on which the operation of the National Health Service will depend.

Public Health

A City Replanned

Charles Hastings, who maintained that no physician could practise without a knowledge of his locality, studied the population trend of his native city of Worcester in the year 1834, attributing its rapid rise rather to the lowered death-rate and greater expectation of life than to an increase in the birth-rate.¹ He reviewed the occupational diseases of leather-workers, glovers, needle-pointers, and operatives in the china works, and noted associations between the incidence of fever and the periodic flooding of the river Severn. Hastings, who had advocated compulsory drainage and vaccination and who had railed at the Government for its indifference to medical research and for its encouragement of quackery, reviled his fellow citizens for allowing their city to develop haphazardly at the expense of parks and natural amenities. Over a century has passed and the country has now entered upon an age of planning such as would have delighted his heart.

The city council of Worcester is to be congratulated on having commissioned, on a high professional level, an economic and social survey²; it has been prepared

1. Illustrations of Natural History of Worcestershire. London. 1834. Observations on Longevity and on Public Health. *Trans. Worcestershire Nat. Hist. Soc.* 1840.
2. County Town. A Civic Survey for the Planning of Worcester. By Janet Glaisyer, T. Brennan, W. Ritchie, and P. Sargant Florence. London: J. Murray. Pp. 320. 21s.

1. *Lancet*, March 15, p. 333.

In England Now

A Running Commentary by Peripatetic Correspondents

I WISH newly qualified men would do six months general practice first and house-jobs afterwards. Don't tell me they learn confidence in themselves in hospital. There is no training for a G.P. like general practice. No big white chief comes round in the morning to check our diagnoses and treatment. No nurses stand straining at the leash for our commands. And the G.P.-turned-houseman would at least answer the telephone. Compare this with the present commonplace state of affairs—the sluggish, laconic young houseman answering an emergency call after 30–40 minutes, blissfully unaware that the G.P. at the other end has three more calls and is gnashing his toothless gums in frozen fury in a distant telephone booth.

* * *

As all good peripatetic correspondents should, I have been on tour. The trip did not carry my feet very far, but my mind has been forced out of the ruts that encompass it more closely every day. The traditional impossibility of getting away having been proved a downright lie, one wonders whether it was worth the trouble. It is pleasant to see old friends after the lapse of years, but it is of inestimable value to hear about their work. Medical thought, before it reaches the stage of print, is a local thing that can be snared only in its own lair. My friends were very generous, so my mind is stocked with a hundred new ideas. It is only by going the rounds that one realises how much local variation there is in hospital administration. The problems, in general, are the same throughout the country, but the solutions are the fruit of local action, local prejudice, and local competence—an example of the survival of the fittest in a field of infinite variation. I was even fortunate in finding a hairdresser who "never talked politics to gentlemen in the chair" and then condemned the whole Government in one sentence repeated in different terms with a twitch at my hair each time by way of emphasis. Finally, my mind replete, a kind friend found for my stomach a draught of nectar. So it was well worth while and I hope the all-seeing State will make a monthly "swan" one of its compulsory sessions for those of us who live in isolation. Perhaps it is too much to expect the nectar as well.

* * *

She was a multipara and well on in the second stage when I arrived. "No, Doctor," she said, "I haven't any rubber sheeting or thick brown paper. You'll have to use newspapers." A few moments later the baby was shot out on to a sodden copy of the *Daily Express*. This adhered lovingly to the child, and when the mother asked to see her latest I felt like a fishmonger displaying sixpenn'orth of cod.

* * *

The howlers which Dr. Firth quoted in his letter of March 22 are of course as nothing compared with the sort of answers one gets in the examination papers of native nursing assistants in South Africa. Their examination follows only 6 months' instruction, and they have a serious language difficulty to grapple with. Take these, for example: "After severe sweating the patient falls into a comet." "Our best source of mineral salts is Popular Pop." "The temperature is taken from him when he is warm. After that send the temperature to the doctor so that he may know what goes on and what comes back." "The nasopharynx has openings to the station." But this might be hung over the mantelpiece of every nurses' home: "Only for fire or bleeding must a nurse hurry, otherwise she must stroll." My reaction to these was Dr. Firth's second one: admiration for a gallant, if ineffectual, effort of memory.

* * *

Cautionary Tale

This is the fable of the two rectors' daughters. In the land of Albion were two villages so far apart that in each they did not know what happened in the other; though

by the commerce department of the University of Birmingham and covers not only the city, which now has a computed population of 51,686, but the surrounding country and towns for which it is the transport, marketing, and social-services centre. The survey is literally built up from rock bottom, and shows how industrial expansion may be discouraged by reason of low water-pressure from piped sources, especially on a Keuper marl elevation with poor natural supply.

The industries change with the years. Just as in the past the clothing and carpet industries declined, the glove trade is now on the wane, and many reasons are given to account for this. On the other hand, engineering industries have developed rapidly within recent years, while the city is fortunate, especially in times of depression, in possessing a balance of industries not dissimilar from those for England and Wales as a whole, although in general a relatively higher proportion of juveniles is employed. The surveyors show the need to dovetail industries with differing seasonal fluctuations, to splice declining with growing industries, and to mix stable industries with those subject to severe cyclical depressions. One valuable suggestion is that the city should provide blocks of playing-fields to be let to those small factories which cannot afford to maintain their own. For Worcester to fulfil its function as the medical centre of the west Midlands, improvement of the hospital facilities is essential. With only 36 maternity beds and a central clinic over-ripe for condemnation, the city is not well provided for: the outstanding needs are for a "health centre," a maternity hospital, and at the other extreme a crematorium.

In the past the doctors in the vicinity of Worcester have frequently looked to Birmingham for consultants, so that there is need for further decentralisation of medical specialist services towards Worcester, especially if the city is to increase in size and if Droitwich and Malvern are to play their part in the comprehensive medical rehabilitation service.

Better bus services, more attractive shops and hotels, improved facilities for adult education, and good recreational amenities, including public gardens and an up-to-date outdoor swimming pool, will all be needed if Worcester is to become, as the surveyors hope, a tourist centre. The city, which is so full of historic associations, has delightful architectural features and with little trouble the river frontage could be made attractive, although it is disastrous that circumstances should recently have necessitated the erection of a large ugly power-station on the riverside. Surely even at this late date something could be done to remedy this harm.

Infectious Disease in England and Wales

WEEK ENDED MARCH 22

Notifications.—Smallpox, 0; scarlet fever, 1362; whooping-cough, 2277; diphtheria, 212; paratyphoid, 6; typhoid, 1; measles (excluding rubella), 11,295; pneumonia (primary or influenzal), 1035; cerebrospinal fever, 114; poliomyelitis, 3; polioencephalitis, 1; encephalitis lethargica, 3; dysentery, 48; puerperal pyrexia, 169; ophthalmia neonatorum, 57. No case of cholera, plague, or typhus was notified during the week.

Smallpox.—Up to March 29 no further case was reported. The last reported case, as we said last week, was in a man admitted to Surrey County Isolation Hospital on March 21.

Deaths.—In 126 great towns there were no deaths from enteric fever or scarlet fever, 3 (0) from diphtheria, 18 (1) from measles, 24 (5) from whooping-cough, 76 (13) from diarrhoea and enteritis under two years, and 66 (9) from influenza. The figures in parentheses are those for London itself.

The number of stillbirths notified during the week was 272 (corresponding to a rate of 25 per thousand total births), including 28 in London.

Planned Psychiatric Service.—The memorandum reviewed under this heading in our last issue (p. 421) is an appendix to a report on the planning of hospital services in the Berks, Bucks, and Oxon region, which is obtainable from the Nuffield Provincial Hospitals Trust, 16, King Edward Street, Oxford.

when matters arose in both that had a similarity the one to the other they were known in the great city in between. Hence this fable. In each village there was an elderly rector who had married late in life, and to his ageing wife one girl child had been born who at the time of the story was growing up. And in each village was a doctor who for four years had had no holiday—not for a single day—because Albion had been at war, and both of them had decided on a break and had employed a young locum tenens back from the war.

Now one of these young men had been trained at St. Didymus's Hospital. He was a graduate of an ancient monastic university and had taken a fellowship, and he was a very brilliant young man. He was called to the rectory because the daughter had a soreness of the throat; and he looked at it and said, "I think this is syphilis: we must have a Wassermann." Neither the rector nor his wife knew what syphilis was or who Wassermann had been. But they learnt later, after they had told all the village. The report came back negative; but the old man with his grey hairs went down with sorrow to the grave because it had even been suggested that his daughter could suffer from such a disease. Before that he complained to the doctor, who came back from his holiday and sent away the young man with a very bad chit to the agency so that they would not employ him again, and he could get no work, and took to drink, and finally breakfasted on gin on the seashore of a distant island, and there he died.

To the other practice went a Fawkes' man who was only an L.S.A. and he also was called to the rectory because the rector's daughter had a sore throat. She was a demure and silent little maiden, and he looked at her throat and wondered what it was. Now he was an early riser, and there had been some rain in the night, and as he had walked round the garden he had seen on the wall a slimy track where a snail had climbed. The track came back into his mind as he looked at that throat. So he asked the rector's wife to arrange for her daughter to strip to the waist that he might examine her chest. And as he listened to her lungs he looked at the skin of her chest, but it was without blemish. Then he took her by the hand with one of his own and bent her elbow, and with a finger of the other hand felt above the internal condyle on the arm. He felt a lymph-node on either side; and he wondered how he could get a blood-test without the old folks knowing. He dried his hands and went back into the drawing-room and told the rector and his wife that their daughter was suffering from a blood-poisoning and he must give her a tonic. And he turned to the girl and said, "It will be ready for you at 4 o'clock today; perhaps you will fetch it yourself?" and as he spoke he looked pointedly at her. When she came he asked her whether she knew what "syphilis" meant, and she answered, "Good God! It isn't that, is it? It must have been that blighter Bill. But how could that be? He rejoined his ship three months ago." And the young locum tenens said, "That is just about the time it would be; but I cannot be certain without a blood-test"; and he drew blood from her arm and it was strongly positive. When he told the girl she said, "Mother and father must never know," and he asked her whether there was anyone else with whom she could go and stay. She said, "Yes, there's my Aunt Judy: she's a sportsman and lives at Brighton." So the young doctor went to the rectory and told the old couple that their daughter was not progressing and he feared she might go into a decline and he thought she needed bracing air such as that of Dr. Brighton. And the rector said, "Well, there's Judy. She would have her. She's coming on Friday to stay the week-end"; and on Saturday he saw Aunt Judy and fixed things up, and he wrote to a friend in Brighton. From time to time for the next four years the rector's daughter went and stayed with her Aunt Judy and was cured of her blood-poisoning, nor did she go into a decline. And the young man from Fawkes' Hospital, who was only an L.S.A., pleased the doctor when he returned after having had an extra week's holiday, and he made him his assistant. Then he took him into partnership, and he married the rector's daughter, who was quite a nice girl after all, and she bore him four healthy children and they lived happily for twenty years till he gave his life on a desert in another war.

Letters to the Editor

SERVICE MEDICINE

SIR,—I have always looked to your journal to propound a realistic and objective policy; but I cannot conceive that any real advantage would be gained from a merging of the medical branches of the three Services. I could not agree with you more than when you state, in your leading article of March 22, that "medicine must speak as an equal in the highest counsels of the Armed Forces"; but it is just because the sailor, soldier, and airman have to perform such diverse duties, and are therefore such different persons, that separate organisations are required to keep them in health and attend to their sicknesses.

Health is not merely a negative state characterised by the absence of sickness, but is very definitely a positive state of well-being, which, in the case of Service personnel, must be planned and fought for by the executive and medical officers as a team. In order to exercise his greatest influence in this team-work the medical officer must be an officer first and a doctor second. No officer can be a "good" officer unless he has fully studied the environment and duties demanded of his men and the traditions of their Service. He must, therefore, be an officer of that Service who has been trained in its requirements and has lived in its spirit—only then can he hope to possess the knowledge and prestige to talk with authority at the highest level.

You suggest, further, that we need a training school for Service medical officers which will bear comparison with that of the Americans; but even the Americans have their flight surgeons!

No, Sir, such a training school for a gargantuan combined medical service would not produce medical officers any more capable of either maintaining or re-establishing the fighting efficiency of our individual sailor, soldier, and airman, but would only create a fourth arm of "Service doctors." Presumably this idea would appeal to those of bureaucratic, totalitarian persuasion; but not to those whose aim it is to render the most efficient and effective service to the individual members of the Armed Forces, and so to those Forces as a whole.

R.A.F. MEDICAL OFFICER.

SIR,—It is not without significance that the material for your leading article of March 22 is quite openly admitted to be a study of the medical organisation of only one of the Services; and therefore it is perhaps pertinent to ask whether this can be an impartial survey of the organisation of "the medical services of the Armed Forces," or whether "it is generally agreed that their organisation left much to be desired."

That your journal, which is to be congratulated on publishing such an impressive and impartial article on Exports and Agriculture in your issue of March 15, should publish such a misleading, mischievous, and misinformed article on Service Medicine is greatly to be regretted. More particularly is this so at a stage in the evolution of a State medical service for the community in general when there is a real need for informed opinion on the efficiency of the organisation of some, if not all, of the existing State medical services.

NEC ASPERA TERRENT.

P.S.—It is of some interest that airmen rejoining the Royal Air Force as a result of the Government drive for recruitment to the Armed Forces have publicly stated that one of the greatest factors influencing their re-enlistment is the existence of "a first-class medical service."

SIR,—Your plea for unification of the medical services of the Navy, Army, and Air Force under a single head will be supported by many ex-Service doctors, particularly those who have suffered from the parochial atmosphere and the backwardness of one of the smaller services, those who while working in combined hospitals have experienced the labour of complying with three different sets of medical regulations, and those who knew the acute local medical shortages or duplication of facilities, the frustration and lack of medical liaison between the Services which existed in all but the most important fronts during the war.

There are other grounds for suggesting unification. A combined service offering a temporary commission with possibilities of duties at sea, abroad, or on air stations would probably attract many more young doctors than could the three separate services between them, and the unwelcome conscription of these young men at a vital stage in their apprenticeship might then be unnecessary. Secondly, promotion would come to depend more on professional or administrative ability than on seniority, a tendency which could only lead to better standards of work. Thirdly, I submit, a member of a medical corps would, to the average man, be more welcome as a medical attendant than an officer of the Navy, Army, or Air Force.

Bristol.

J. NAISH.

AMYLOID MACROGLOSSIA

SIR,—I read with interest the article by Dr. M. D. Baber (Feb. 8) and the subsequent discussion by Dr. Parkes Weber, and Dr. Smith and Dr. Cooke (March 15).

It is apparent to me that more attention should be paid to the reports of Askanazy¹ in 1904 and of Magnus-Levy² in 1931, which noted the relationship of atypical systemic amyloidosis to diffuse plasma-cell myelomatosis; indeed, Dr. Parkes Weber³ himself as early as 1903 remarked upon this association. After examining many cases of atypical amyloidosis, Magnus-Levy emphasised the fairly frequent association of these two rare conditions. Repeated confirmation of this relationship has come from the United States (Moschowitz⁴; Robertson and Brunsting⁵; Rosenblum and Kirchbaum⁶; et al.) One case recently under my own observation illustrated the relationship extremely well.

I understand from Dr. Baber's report that the skeleton and marrow were not examined histologically. I would make a plea that this relationship be borne in mind in all cases of atypical amyloidosis, and that future publications relating to the occurrence of either localised or generalised atypical amyloidosis should include a description of the state of the bone-marrow. I believe that if this were done the frequency of such phrases as "unknown aetiological factors" and "obscure aetiology" might be reduced.

J. H. FODDEN.

Department of Pathology, University of Liverpool.

STAMMERING

SIR,—May I correct a mistake in Dr. Stein's letter (March 15)? The Chinese word for stammering is *k'ou-chih* (using the Wade system of Romanisation), and the version which he gave, *kchi-ko*, must surely be a corruption of that, even allowing for Romanisation in the German manner, employed by Kussmaul.

I should like to comment on the contention that stammering does not occur in the Chinese because they have a monosyllabic language. It is not only that Colombat seized upon a little anecdote as valid scientific evidence, but both he and Kussmaul misunderstood the actual nature of Chinese language and speech.

While it is true that from a philological point of view Chinese is basically a monosyllabic language, yet I learn, in conversation with a philologist friend, Mr. D. C. Yu, that, from earliest times, borrowings from the Sanskrit and Persian have contributed in effect polysyllabic words to the language. These were frequently phonetic translations, each syllable of the word being rendered by a single ideograph, which by itself possessed no meaning. These polysyllabic words (made up of several ideographs each carrying a syllable) are however rare, though phonetic translations of words from western languages are nowadays quite common.

On the other hand, a great number of Chinese words are made up of two or three independent ideographs, each of which standing by itself has meaning (apart from carrying a sound). Thus the word *k'ou-chih* itself is bisyllabic: *k'ou* means mouth, *chih* means eat. It is obvious that *k'ou-chih* means something more than *k'ou* and *chih*, just as *wireless* means

more than *wire* and *less*; the word is a unitary whole, and not merely the sum of its parts. This tendency to form new words by combining ideographs is a fundamental one in the language (it is not, technically, *agglutination*), so that in a very real sense the language is also polysyllabic. The habit of certain translators from the Chinese, who render Chinese words into, say, English, according to their component parts, is pardonable for the sake of literary effect, but is psychologically false.

There is no reason to suppose then that Kussmaul's hypothetical "centre for integrating syllables" in speech is less exercised by Chinese than by any other (polysyllabic) language. Indeed it must be obvious to all who speak Chinese that words of several syllables exist, and it does not require acquaintance with the concept of organic integration in modern biology and psychology to realise that a work formed by two or more others is something on a level by itself, not explained entirely by its components.

That Kussmaul did not apprehend this can only be another historical illustration of the dangers besetting those who turn to anthropology for evidence to establish a theory.

Maudsley Hospital, London, S.E.5.

POW-MENG YAP.

PERSPEX SPECIMEN BOXES

SIR,—For museum specimens I have used 'Perspex' containers for a year, and have seen no sign of deterioration. I am glad, however, to see Mr. Fatti's favourable report (Feb. 1) after two years' experience with boxes made by Mr. John Carr.

Apart from a pleasing appearance, the special attractions of these containers are (1) that they are "made to measure," thus saving size and weight, and obviating the need for a large stock of jars of all sizes and shapes; and (2) that, unlike some glass jars, they withstand changes in atmospheric temperature and pressure without leaking or cracking. My technique, which is rather different from Mr. Carr's, is designed for people with little equipment or skill in carpentry.

The four upright sides are cut from $\frac{1}{8}$ -in. sheeting and cemented with perspex cement no. 6 on to a base cut from $\frac{1}{4}$ -in. sheeting. The base is cut large enough to project about $\frac{1}{4}$ in. beyond each of the four vertical panels or (in the case of a tall thin box) sufficiently for it to stand firmly. This projection reduces the risk of scratching, by preventing the sides of one box from knocking or rubbing against those of another.

The sides are joined as in the illustration. The trough on the outside is filled with cement, and as this shrinks with drying it must be filled several times. Next day the joint is smoothed and rounded with a file, after which the polish can be restored by coating the filed surface with a thin layer of cement. With this type of joint accurate carpentry, though desirable, is not essential; quite large gaps can be invisibly filled. It is best, before cementing, to file any cut edges, so as to remove saw marks, which might trap air-bubbles; but there is no need to apply pressure to the joints. The box is tested for leaks by filling it with water.

The specimen is sewn to a sheet of $\frac{1}{16}$ -in. perspex through holes pierced with a hot needle. It is then placed in the box (previously filled with mounting fluid so that no unnecessary strain is placed on the supporting stitches) and the box is filled to within $\frac{1}{2}$ in. of the top. There is no need for supporting struts.

A piece of $\frac{1}{8}$ -in. sheeting is laid on the top of the box, and the pattern for the lid is marked on the under surface by running a pencil around; the saw cuts are made slightly inside the pencil marks. The lid is now cemented on with a joint like those at the sides, the trough being filled with cement in the same way. Finally, the box is completely filled with mounting fluid, in which the appropriate amount of sodium hydrosulphite for colour restoration has been dissolved, through a small hole pierced in the lid. The hole is sealed with a blob of cement, and the joint holding the lid is rounded and polished in the same way as the side joints.

J. E. WENTWORTH

Museum technician.

Welsh National School of Medicine,
Cardiff.

1. *Verh. dtsch. path. Ges.* 1904, 7, 32.
2. *Z. klin. Med.* 1931, 116, 510.
3. *Med.-chir. Trans.* 1903, 86, 395.
4. *Ann. intern. Med.* 1936, 10, 73.
5. *Amer. J. Path.* 1936, 12, 766.
6. *J. Amer. med. Ass.* 1936, 106, 988.

JOINT CHANGES IN CANCER OF THE LUNG

SIR,—Your annotation of March 22 almost coincided with a report by me to the section of medicine of the Royal Society of Medicine of 3 cases of gross pulmonary osteoarthropathy with lung cancer, which have come under my care during the past three years. In these cases the lung tumours were practically symptomless, and the connexion between the joint and lung conditions was not immediately apparent. In all, however, chest radiology in the anteroposterior and lateral planes revealed a tumour, while additional investigations revealed the precise nature of the lung lesion. All 3 cases were referred to me as examples of atypical rheumatoid arthritis.

CASE 1.—This was a man of 55 whom I saw at the Rheumatism Unit of the London County Council on account of pain, swelling, and stiffness of both knees, thickening of the long bones, and marked crippling. Examination revealed a rheumatoid type of lesion with effusions into both knee-joints. Examination of the synovial fluid showed a cytology typical of a non-specific rheumatoid lesion. The condition was complicated by gross pulmonary osteoarthropathy with an ossifying periostitis of the radius, ulna, femora, tibiae, and fibulae. The fingers, toes, and even the nose showed gross clubbing. There were no symptoms referable to the chest, but investigation showed a well-defined opacity in the right upper lobe. Mr. R. C. Brock, who kindly saw the patient for me, decided that his condition would only permit a lobectomy. Subsequent histological investigations showed the growth to be a bronchial carcinoma. Almost immediately after its removal the knee-joint swellings began to subside, and the fingers, toes, and nose became less clubbed; now, nearly two years later, the joint and soft-tissue swellings have almost completely subsided.

CASE 2.—A man, aged 48, had similar physical signs and was likewise operated on by Mr. Brock. Secondary mediastinal-gland involvement was treated with deep X-ray therapy, which unfortunately flared up a latent tuberculous focus that was not revealed clinically or radiologically; and he succumbed to this.

CASE 3.—This patient, a man aged 53, is at present under investigation. I first saw him a month ago as a case of "polyarthritism." The history was of rather sudden onset of pain, swelling, and stiffness of the knees some twelve months previously, followed within a month by swellings of the ankles, fingers, and toes. The swellings subsided after a month in bed, and the patient resumed work in spite of disablement. Six months later recurring joint swellings increased his crippledness, and three months ago he was obliged to give up his work. When I saw him he presented a clinical picture of a somewhat acute rheumatoid arthritis; he was febrile (99–100° F); there was pronounced anaemia, with lymphadenopathy but no clinical enlargement of the spleen. The joint changes included effusions into both knees and some involvement of the wrists, left elbow, left shoulder, and ankles; and the condition was complicated by gross clubbing of the fingers and toes and thickening of the long bones. Clinical examination of the chest showed no localising physical signs. The knee-joint fluid was typical of a non-specific rheumatoid lesion. X-ray examination of the chest showed in the lateral view a well-defined rounded opacity, 2½ in. in diameter, lying in the posterior basal segment of the right lower lobe. Although bronchoscopy has revealed little abnormal the findings favour a peripheral carcinoma of the lung. Mr. Brock will be seeing the case for me with a view to thoracotomy and possibly pneumonectomy.

In neither of the first 2 cases was there any real evidence of extensive tissue breakdown or appreciable infection; and the association of the joint and lung conditions on the basis of infection alone or of anoxia (suggested as possible causes) is difficult to explain.

The potential significance of the pituitary in relation to the aetiology of chronic arthritis has received some attention in recent years, and the connexion between acromegaly and pulmonary osteoarthropathy has been noted by Fried¹ in his work on lung cancer. He has advanced the theory that the diffuse pulmonary osteoarthropathy found in some cases is probably due to a dyspituitarism akin to acromegaly. The possible relation of endocrine imbalance to chronic arthritis and pulmonary

osteoarthropathy in these cases is significant, although the pathogenesis of diffuse pulmonary osteoarthropathy (Bamberger-Marie's disease) is as obscure today as when it was first described by Bamberger and Pierre Marie in 1889 and 1890 respectively. Can one postulate, as Crump² has done, an abnormal substance circulating in the blood, affecting the periosteum, the bones, the joints, and the soft parts of the terminal phalanges as evidenced by clubbing of the fingers? And might not the lungs—"pulmonary glands," as Aschoff³ among others has suggested—take on additional functions as secretory organs? Certainly the association of joint changes, osteoarthropathy, and lung cancer is worthy of more detailed investigation.

London, W.1.

PHILIP ELLMAN.

HEALTH INSURANCE IN THE UNITED STATES

SIR,—The commercial insurance interests of America are seeing to it that the proposed Federal health insurance scheme, backed by President Truman, does not become law—not if they can help it. Here is a sample of one of their widely circulated leaflets, headed *Socialised Medicine—Bad Medicine for You!*

Dr. Edward H. Ochsner of Chicago testified at the recent Wagner-Murray Bill hearings in Washington that

This is how it was in Britain:

The doctor got back to his office just at 2 o'clock. "How many?" he said to his nurse. "Forty." Casually, without hurry, he put on his white jacket and poked his head into the waiting-room where the forty patients sat: "Will those of you with headache please stand?" he said. Six stood. The doctor took identical printed prescriptions out of his desk and handed one to each of the six and dismissed them. "Will those of you troubled with a cough please stand?" Another group got up and again he handed them printed prescriptions and dismissed them. The others he took one by one into his private office for a few minutes. Two hours later the office was empty, the 40 patients gone, an average of 3 minutes per patient. In Germany, under compulsory insurance, some doctors did even better—30 to 40 patients in one hour!

This same leaflet lectures insurance managers to be more active on the political war-path.

"It is, of course, not natural for executives whose job it is to smell a dollar to delve into this field, because there can't be a profit—the objective being merely to avoid losing money. But it is a matter of large import to private insurance from the long-range standpoint. We need only recall that England has had a cash sickness scheme since 1911 and now industrial life insurance and workmen's compensation have become lost to commercial insurers!"

Shiplake.

RONALD DAVISON.

SUCCESSFUL REVACCINATION

SIR,—I frequently dispute two widely held inferences about revaccination: that an early reaction is evidence of immunity, and that "no reaction" is unacceptable because it is due to failure to vaccinate properly. I welcome Dr. Broom's paper (March 22) as supporting my views.

For revaccination to be properly performed and recorded there are four essentials: the lymph must be potent; the technique must be correct; the reading of the reactions must be accurate; and the interpretations of the findings must be true. I maintain that today it is possible for every one of these factors to be at fault and yet for the subject to be certified as successfully vaccinated. Paradoxically it is the desire to eliminate such faults, by refusing to accept a "no reaction," which has been largely responsible for recent reports of a high incidence of smallpox among the recently vaccinated.

It is but a short step from the standpoint that "there must be some reaction to vaccination" to the erroneous and dangerous assumption that any sort of reaction is evidence of successful vaccination and no reaction is proof of failure. It is precisely among those early reactions which are called "reactions of immunity" that the most serious errors of interpretation are made.

The explanation of my views will be helped if the term "immunity" is avoided and the subject is considered

2. Crump, C. *Virchows Arch.* 1929, 271, 467.
3. Aschoff, L. *Z. ges. exp. Med.* 1926, 50, 52.

1. Fried, B. M. *Arch. intern. Med.* 1943, 72, 565.

in terms of susceptibility. Vaccination is both a test of susceptibility and an immunising inoculation. The highly susceptible respond by a typical *primary vaccinia*; the less susceptible show a so-called accelerated reaction, which is better described as an *abortive vaccinia* or *vaccinoid*; while the insusceptible show *no visible response at all*, as in 238 of Dr. Broom's 1227 cases.

Besides these responses others may appear which are not concerned directly with susceptibility; of these, the most important is the sensitivity reaction to products of the virus, living or dead. The reaction develops in some of those who have had previous experience of vaccine lymph. It may occur in all the above groups—the highly susceptible, the less susceptible, and the insusceptible—although it is true that there is some association between sensitivity and immunity, because sensitivity implies previous exposure to the virus and an opportunity of acquiring resistance. Now, Sir, despite a vast literature on immunology and allergy, the distinction between immunity and sensitivity is still confused; and frequently reactions of sensitivity are accepted as evidence of immunity. In vaccination this is particularly dangerous, because vaccination requires the use of a living virus and the sensitivity response can occur with inactive lymph, as the 110 control reactions in Dr. Broom's series show.

It comes to this: if revaccination is followed by primary vaccinia or aborted vaccinia, the subject is susceptible and the vaccination has boosted his resistance to a safe level. (It would help enormously if we restricted the term "successful vaccination" to the susceptible and held that the immune cannot be successfully vaccinated.) If revaccination is followed by an early reaction or by no reaction, no positive inference can be drawn as to the susceptibility of the individual. The early reaction may be specific, non-specific, or traumatic. If specific, it may be a sensitivity response to the products of the virus, living or dead. What is certain is that it is not a reaction of immunity, and this term should be dropped. On the other hand, if no reaction occurs the vaccination may be faulty in some way or the subject may be immune. In face of this uncertainty repeated revaccination may be desirable, but no further inferences can be drawn beyond those stated above. For these reasons I agree with Dr. Broom in advocating a change in the international certificate of vaccination.

River Hospitals, Joyce Green,
Dartford.

MAURICE MITMAN.

INFANTILE INSOMNIA AND MATERNAL GRAVES'S DISEASE

SIR,—The following case-histories show that infantile insomnia may be the presenting symptom of maternal Graves's disease, and they are also interesting as a study in the emotional relationship between mother and child.

Mrs. A came to the outpatient department with her first child, aged 5 months. Her complaint was that the baby never slept for more than an hour or two consecutively. The baby proved to be a fine healthy if over-active bottle-fed girl, weighing 14 lb. 12 oz. and looking the picture of health. Her mother, however, said that she herself had lost 10 lb. in weight since the birth of her child. The mother was found to have tachycardia, with a pulse-rate of 100 per min. at rest, slight exophthalmos, a visible swelling of the thyroid, and a fine tremor of her fingers.

Mrs. B, the mother of two boys, separated from her husband for the past year because he had to work in Wales while the home remained in London, brought her son, aged 2 years, with the complaint that he was very restless at night, sleeping a total of 4 hours only. With him came his brother, aged 4 years. They were tough noisy healthy children, over whom their mother had little control. She looked worn out, had well-marked exophthalmos of some years' standing, a pulse-rate of 110 per min. at rest, tremor of the fingers and hands, a palpable swelling of her thyroid, and obvious over-anxiety.

Mrs. C, an excitable Jewish mother, brought her first child, aged 9 months, with the complaint that the baby girl apparently never slept either day or night. She was a large lackadaisical over-fed child, constipated but otherwise healthy, weighing over 20 lb. She was in the process of being weaned and had a good mixed diet in addition to four breast feeds daily. The mother was stout, florid, and emotional. She

thought she had lost weight herself, but did not know how much. She had a very variable pulse-rate which was consistently over 100 per min. at rest. Her exophthalmos was not pronounced, but she had a lid-lag and a fine tremor of her fingers. She said her nerves had been bad since she had tried to wean the baby at 6 months and had failed.

All these children slept within earshot of their mothers, the two girls in the same room and the boy in the next room with an open communicating door. In the first two histories there was no question of the babies getting too much thyroxine from their mothers' breast milk, and, although this is a possibility in the last instance, the appearance of positive health with a regular gain in weight in all these infants belied their mothers' stories of insomnia.

It seems probable that they were normal healthy babies whose every cry or movement was heard by an over-anxious parent, and whose insomnia if not entirely imagined was induced by their mothers, who picked them up and generally disturbed them every time they so much as whimpered or turned in their sleep.

All three patients came to the outpatient department of the Hospital for Sick Children, Great Ormond Street, within a year. The mothers had to be sent elsewhere for confirmation of the diagnosis and treatment. This confirmation was obtained from the adult hospital in each case. No treatment was given to the children, two of whom are reported, in reply to a written query, to be sleeping well, while their mothers, who are at home, say they themselves are much improved. These two mothers are being treated with thiouracil; the other one has not yet left hospital.

I wish to thank the honorary staff of the Hospital for Sick Children for permission to publish these case-histories.

R. E. BONHAM CARTER.

Institute of Child Health, Hospital for Sick Children,
Great Ormond Street.

THIOCYANATE FOR HYPERTENSION

SIR,—In his article of March 15 Dr. Mills claims that potassium thiocyanate produced striking symptomatic relief in 27 cases of benign hypertension in which headache and dizziness were prominent symptoms. He states, however, that the drug does not permanently lower the blood-pressure, even in cases in which there is much symptomatic relief. These results are at variance with those of other workers published in the past ten years. They have claimed to produce relief of symptoms in a much smaller proportion of cases, but have often found a reduction of blood-pressure. A typical example is the report of Barker et al.¹ a carefully controlled series of 246 hypertensives treated with thiocyanate for 2–11 years. Persistent symptomatic improvement occurred in 56%, and reduction of blood-pressure by 30/20 mm. or more was obtained in 67%.

Dr. Mills's failure to lower the blood-pressure was probably due to inadequate dosage. He aimed at a blood thiocyanate of 5–8 mg. per 100 ml., whereas previous writers have found 8–12 mg. necessary. One wonders whether the doses Dr. Mills used could have had much real effect on the patients. In considering the claims of any treatment to relieve the symptoms of hypertension without lowering the blood-pressure, the work of Ayman² should be borne in mind. He produced decided symptomatic relief in 82% of a series of hypertensives by administering solemnly and with enthusiasm doses of coloured water.

Beverly Emergency Hospital,
East Yorks.

S. G. SIDDLE.

SIR,—Dr. Geoffrey Evans has asked me to correct a mistake in my paper in your issue of March 15. I stated that in his paper with Dr. D'Silva he maintained "that some benefit was derived from this drug in all cases." Apparently I had not made my meaning clear. I wished to point out that although they likewise found that headache was the symptom which was most relieved by potassium thiocyanate, they also found that all symptoms obtained some benefit in certain cases—for example, insomnia and mental changes (lack of concentration). I was unable to confirm any benefit in cases with such

1. Barker, M. H., Lindberg, H. A., Wald, M. H. *J. Amer. med. Ass.* 1941, **117**, 1591.
2. Ayman, D. *Ibid.* 1930, **95**, 246.

symptoms, but as I stated in my article I only treated 8 cases in which headache was not the predominant symptom.

Lister Emergency Hospital,
Hitchin, Herts.

P. J. W. MILLS.

COMPRESSION OF MEDIAN NERVE IN CARPAL TUNNEL

SIR,—Since our article appeared on March 8 we have seen a paper by W. B. Cannon and G. J. Love in *Surgery* (1946, 20, 210) reporting 9 patients in whom the transverse carpal ligament was divided for median compression. In 3 cases the condition was thought to have arisen spontaneously, and the characteristic swelling of the nerve is described.

MARCIA WILKINSON.

Maida Vale Hospital for Nervous Diseases, London, W.9.

STEVENS-JOHNSON SYNDROME

SIR,—I was most interested in the accounts by Dr. Maurice Nellen and Dr. J. O. Murray in your issue of March 15. It is strange that so few reports of the syndrome have appeared in England, for there are many references to it in Continental and American literature. A case was described, however, by Low and Davies¹ in 1938, under the diagnosis of dermatostomatitis—the name given to the condition by Baader in 1925.

It is not very uncommon here; in the last six years I have seen 8 identical cases, which will be reported in detail elsewhere. Of these, 5 were in young male adults in the Royal Navy, while 3, seen during the last six months, were civilians. The later group included one woman of 55 and a child of 9; the onset of whose illness followed a trivial injury to the lip, as in Dr. Murray's first case.

It is impossible not to be struck by the constancy of the symptoms and of the course of the illness; it does appear to me to be an entity and not a variety of erythema multiforme. This conclusion is also reached by the Commission on Acute Respiratory Diseases, of Fort Bragg, N.C., in a recent article on the association of the syndrome with atypical pneumonia.² Despite extensive bacteriological and animal inoculation studies, they were unable to establish the aetiology.

The impression from American articles that severe ocular complications are common has not been borne out in the cases I have seen; only 1 of my series developed chronic conjunctivitis, and the remainder recovered completely.

Department for Diseases of the Skin,
Royal Infirmary, Sheffield.

I. B. SNEDDON.

THE TRAINING OF FUTURE PSYCHIATRISTS

SIR,—Admitting my temerity, I submit that the recommendations for the future training of D.P.M. candidates set out in the interim report of the committee on psychological medicine of the Royal College of Physicians, and embodied to some extent in the new Conjoint regulations for this diploma, are uninspiring, and that if followed they will tend to produce psychiatrists who are robots. Not very good robots either, because the recommendations contain serious sins of omission as well as of commission.

To train in a circumscribed subject for five years with the object of taking an examination at the end of that time is a formidable task. The temptation to "learn" current official viewpoints and not to develop gradually individual thought will be a pitfall difficult to avoid. The first five years of a would-be psychiatrist's life are highly impressionable. That his goal at the end of that journey should be the passing of an examination does not seem the most sound way of developing the best that is in him. A good examinee and yes-man would be the safest albeit the least desirable candidate.

A less imposing qualification than the proposed future D.P.M., and an honours qualification that could be acquired later, or recognised useful stages of the D.P.M., to be passed at intervals of six months to a year, would be much sounder propositions.

That the value of a certain period of non-medical work in the training of a psychiatrist is not recognised or

recommended as part of the D.P.M. curriculum is a very great pity. The average medical man or woman, and this includes psychiatrists, has actually rubbed shoulders on equal terms very little with the workaday, unacademically minded world. The journey has been from college to university, thence to the medical school and wards, with very little time to spare for other than necessary recreation. Three to six months' compulsory work right outside medical and psychiatrically trained circles would be a valuable part of training and in many cases might be the starting-point of original psychiatric thought.

The omissions in the recommendations are depressing. That a personal analysis should be considered a necessary part of the training of a psychiatrist is surely as reasonable as to expect that the student of medical anatomy should spend some time in the dissecting-room. There are some things, in fact the most important things, in psychiatry that cannot be learnt from a book or by attending lectures and clinics. Only the physician who has faced the bogies in his own mind will be able to search fearlessly the mind of his patient. And just as it is important to maintain strict asepsis in the operating-theatre, so it is necessary that the psychiatrist should not project his own problems into the therapeutic session. This danger can only be guarded against by the deeper self-knowledge acquired during personal analysis.

I feel that the recommendations for the training of future psychiatrists ignore the intelligence and latent abilities of the men and women who wish to take up this fundamentally important branch of medicine, and that if carried out they will seriously hinder the development of British psychiatry.

Cassel Hospital, Stoke-on-Trent.

ALICE E. BUCK.

PALPABLE EPITROCHLEAR GLANDS

SIR,—Surveys and tables no doubt have their uses, and Dr. Laurence Martin's dip into the literature of syphilis (March 22, p. 363) has its interest; but clinical medicine does not work like that when it deals with a problem, such as a patient with a suspicious lesion of the tonsil. It is then that palpation of the epitrochlear lymph-nodes has its value. If the glands are palpable on both sides you must go on and withdraw blood for a Wassermann reaction whatever the domestic implications may be. The diagnostic value of the epitrochlear nodes lies in the fact that they are the only superficial ones which are not fairly frequently palpably enlarged in healthy people. You find those in the groin enlarged in people that walk a lot, those in the axilla in people with sweaty arm-pits, those in the neck in adults in whom they are left over from the physiological recurring enlargements of childhood. Dr. Martin finds that he can palpate a normal epitrochlear lymph-node; I cannot. When there is a general enlargement of the lymph-nodes throughout the body I can feel this gland; and one of the conditions in which this occurs is secondary syphilis, where it may be palpable before there is any rash.

If, then, a person has a suspicious lesion on the tonsil and both epitrochlear lymph-nodes are palpable you must follow up the line of inquiry. It is not a question of making a diagnosis on these findings alone. In the old days the inquiry consisted in asking the patient to show the external genitalia and waiting for further secondary symptoms. Today it is taking a Wassermann. In the 39 years in which I have followed and taught this traditional advice I must have felt for enlarged epitrochlear glands in quite 300 people who turned out not to have syphilis, but I do not remember one in whom I could feel them on both sides. On one side I have felt them from a small infective lesion of the little finger; but in my experience these septic lesions are not bilateral.

It is probable that in a throat department we are especially faced with this clinical problem; until about 1930 I used to have one example every three months or so and could go over the question with each set of dressers. Since then they have been very rare; but we have had one in a man during this three months. Perhaps the cases are going to the L.C.C. hospitals. During the war I saw three or four at one of these where I was then working, though none came to my clinic at Guy's. One was

1. Low, E. B., Davies, J. H. T. *Brit. J. Derm.* 1938, 50, 141.

2. *Arch. intern. Med.* 1946, 78, 687.

in a young man sent up with a demand that I should perform tonsillectomy.

It will be a pity, I think, if Dr. Martin's paper is interpreted to mean that to palpate for epitrochlear lymph-nodes is of no clinical value in a suspected case of secondary syphilis.

Throat Department, Guy's Hospital.

T. B. LAYTON.

RECURRENT SHOULDER DISLOCATION

SIR,—Until I read Mr. Hindenach's article on the anterior bone graft (March 22) I had thought that this fearsome operation had begun to be forgotten after its recent revival.

The lesion in recurrent dislocation of the shoulder (detachment of the capsule from the anterior aspect of the neck of the scapula) was first described by Perthes, who was treating the condition by suture as far back as 1906, and gives an excellent review of the problem.¹

Mr. Hindenach appears to recommend the bone-graft operation when "the capsule is thin . . . or friable." I have never met this condition, nor does Perthes mention it in his article.

In this country Bankart popularised Perthes's operation, which is the only reliable procedure. The method of suture described by him is, however, unnecessarily difficult and traumatising. Recently there has been a return to Perthes's original method of using a steel staple (U-shaped nail of Perthes). An account of the method used in South Africa has been given by Sir Heneage Ogilvie² but even this method is needlessly traumatising; and I would refer Mr. Hindenach to a letter by me³ describing an exceedingly simple approach to the anterior aspect of the neck of the scapula, sufficient to allow repair of the lesion using a staple introducer of the type described by Ogilvie and myself. Post-operative immobilisation is unnecessary; the patient need only be in hospital a few days; and there is a rapid return of function.

I hope the bone-graft operation will never become popular in this country.

London, W.1.

J. S. MAXWELL.

ANTENATAL PREFERENCES

SIR,—As a prelude to a study of normal child behaviour in the borough of St. Pancras, it seemed worth surveying the preferences of husbands and wives for male or female children.

At antenatal clinics 100 married primiparæ, under thirty-five years of age, were questioned; 70 of the husbands were labourers or artisans and 30 were clerks, small shopowners, or skilled technicians: 31 women wanted a boy, 35 wanted a girl, and 34 had no preference. Of their husbands, 41 were said to want a boy, 32 a girl, and 27 to be indifferent.

Many factors influence the choice of sex for the first-born. There is the influence of the parent's own family, for the children one knows best are oneself and one's siblings. No relation between predominance of siblings of one sex and preference for a firstborn of a particular sex could be proved in this small series, but several mothers cited their brothers or sisters as biasing their choice. The mate may have strong views: of the 50 couples, both members of whom held opinions, 30 agreed and 20 disagreed in their choice. The effect of topical events has probably been over-rated; although over a quarter of the primiparæ gave reasons for preferring a boy or a girl, only one mentioned war as a deterrent to bearing a boy. State custom in some races has encouraged selective infanticide of boys or girls⁴; but in England we have merely a mild patriarchal tradition.

One does not know if preferences vary in different social groups in this country, but male and female sex prestige seem approximately equal in the district where this study was made.

The 100 secundiparæ who were also questioned had borne 53 boys and 47 girls. Of the husbands, 70 were labourers or artisans, and 30 clerks, &c.: 60 women wanted a child of different sex to that of the firstborn, 24

were indifferent, and only 16 wanted a child of the same sex; 64 men wanted a child of different sex, 21 did not mind, and 15 wanted a child of the same sex as the first. 54 couples agreed and 11 disagreed in their choice.

It is interesting that the desire for a mixed family is so strong despite the economic disadvantages (e.g., waste of clothing and sleeping accommodation).

How do these preferences vary in different social groups? To what extent do they affect family planning? And how much do they influence the subsequent relationship of parent and child?

RICHARD MEYER.

Maternity and Child Welfare Department,
St. Pancras, London, N.W.1.

MACROCYTIC ANÆMIA: A CORRECTION

SIR,—I write with all haste to disclaim the suggestion in the report (March 15) of a recent meeting of the Association of Clinical Pathologists that I described two cases of "pernicious anæmia" in which hydrochloric acid appeared in the gastric juice after treatment with folic acid.

One of the cases was of a young man who developed a macrocytic anæmia after resection of a long stretch of small bowel; the other of a young woman in whom a similar anæmia appeared after pregnancy. In both cases intractable diarrhoea was a prominent symptom; and in both the anæmia was irresponsive to liver.

I have on various occasions maintained both in speech and print that responsiveness to liver is an essential criterion for the diagnosis of pernicious anæmia. I regarded neither of these cases as falling within this category.

S. C. DYKE
Director, Pathological
Laboratories.

Royal Hospital, Wolverhampton.

PERFORATED PEPTIC ULCER TREATED WITHOUT OPERATION

SIR,—While the work of Mr. Hermon Taylor may make all previous ideas of the treatment of perforated peptic ulcers of historical rather than practical importance, my experience with conservative treatment in the last three years may be of interest.

Two problems have presented themselves in dealing with these sealed ulcers—diagnosis of the perforation and the indications for conservative treatment. The diagnosis of a sealed perforation is made on the same lines as the usual type, but because the symptoms are much less definite many cases are probably missed. The two most reliable symptoms are sudden onset of upper abdominal pain, which is invariable, and shoulder pain, which occurs in the great majority. The combination of these two symptoms should suggest a perforation, even if the rigidity is minimal. The signs may be very slight, particularly if the case is not seen for some hours, but there is always some rigidity and tenderness in the right upper quadrant. The diagnosis can be confirmed but not excluded by a straight radiogram taken after the patient has been sitting up for a few minutes.

The following rules have been evolved for deciding to treat a case conservatively. (1) At least one quadrant of the abdomen, usually the left lower, must show slight rigidity. (2) The area of board-like rigidity must be less than one complete quadrant. (3) The patient's general condition must be good and the pulse-rate less than 100 per min. when he has settled down after admission. All the cases treated conservatively have had a gas bubble less than 2 in. in depth.

At first these patients were kept strictly in Fowler's position, but in the last two years they have been treated in the most comfortable position. Nothing is given by mouth until the form of treatment has been definitely decided. The pulse is recorded half-hourly, and the abdomen examined every hour for four hours. If the ulcer is sealed there is a well-marked improvement within two hours; the pain diminishes, and the rigidity recedes towards the right costal margin. Within four hours a definite decision to operate or to treat conservatively is taken. The patient is put on a slow rectal drip, and allowed sips of water by mouth. The possibility of a further leak must always be considered, so he is not given any morphine for at least twelve hours, and any increase in pain or rise in pulse-rate must be reported. I have never been faced with the necessity of considering a

1. *Dtsch. Z. Chir.* 1925, 194, 1.

2. *Brit. med. J.* 1946, 1, 362.

3. *Ibid.*, p. 588.

4. Ploss, H. H., Bartels, M., Bartels, P. *Woman*, London, 1935, vol. 1, p. 548.

change in the line of treatment once it has been started. After twelve hours the patient is allowed an ounce of water hourly, and this is increased until he is on an ulcer diet after four days.

In the last three years among 42 consecutive cases diagnosed as perforation, 9 have been treated conservatively. There have been no deaths and no residual abscesses, but it is unlikely that there would have been any mortality in this type of case if they had been sutured. One case in which the above indications were exceeded gave anxiety for forty-eight hours, but then recovered uneventfully. The morbidity has been greatly reduced. The patients are over the perforation in four to five days, and gastric investigations can be started after seven days.

All forms of peptic ulcer will seal themselves. The series described is too small for analysis, but there have been both gastric and duodenal ulcers, and, in the cases of this type explored and found sealed before the conservative line of treatment had been adopted, there were all stages from acute ulcers, with a very short history, to old sclerotic ulcers with a long definite history.

Unfortunately the importance of the proximity of the last meal was not realised, so no records have been kept. Gastric suction has not been employed, but I consider that it would have greatly extended the scope of the conservative method.

Gloucester.

P. M. BIRKS.

TEMPORARY HYPERTENSION AFTER CURARE

SIR,—A slight rise in blood-pressure after the administration of curare has already been recorded^{1,2}, and we have often seen cases where a rise in pressure of up to 30 mm. Hg has followed its use, whatever method was used for the accompanying narcosis. Recently we were perturbed to encounter the following case:

A man, aged 71, exceptionally fit for his age and with a blood-pressure (B.P.) of 160/90 mm. Hg, was undergoing colectomy for carcinoma. After premedication with morphine gr. $\frac{1}{4}$ and atropine gr. $\frac{1}{100}$ anaesthesia was induced with 0.25 g. 'Intraval,' and a no. 8 Magill tube was passed blindly, under light cyclopropane anaesthesia, after the soda-lime had been cut out of the circuit for a few breaths. 15 mg. of 'Tubarine' was given intravenously just before he was taken into the theatre, a little cyclopropane later being added to the circuit from time to time for maintenance.

At the beginning of operation the B.P. was 140/90 mm. Hg and the pulse-rate 80 per min. After half an hour the pressure rose suddenly to 180/120 and continued to go up steadily, twenty minutes later reaching 200/110; fifteen minutes after this the beat could be heard at the extreme top of the sphygmomanometer scale, giving a reading of at least 260/120. All these abnormal systolic readings were confirmed by palpation of the radial pulse. Thirty-five minutes later the pressure dropped to 200/110, and after a further twenty minutes it was 160/100. The pulse-rate had remained between 80 and 100 throughout, and the patient left the table, after $2\frac{1}{2}$ hours' anaesthesia, with a blood-pressure of 180/110 and a pulse-rate of 90. Removal of the mask revealed that a profuse epistaxis had taken place, which, we must hasten to add, had not appeared immediately after the passage of the tube. The patient's reflexes returned while he was still in the theatre.

Postoperatively he showed no untoward effects of his temporary hypertension. The night following operation his pulse-rate was 64 and of normal volume, no reading being taken to avoid disturbing him. The following morning his B.P. was 160/90, at which it remained until his discharge.

During the operation there was neither gross respiratory depression nor anoxia; the soda-lime was fresh and, indeed, was changed as a precaution as the blood-pressure rose; and we were certain the narcosis was not too light. The sphygmomanometer was subsequently checked. We concluded that curare was responsible for this alarming rise in blood-pressure; that the epistaxis indicated the functioning of a most auspicious "safety-valve"; and that the pharmacology of curare can certainly bear closer investigation.

GORDON OSTLERE

Senior Resident Anaesthetist.

Hill End Hospital (St. Bartholomew's), St. Albans.

1. Gray, T. C., Halton, J. *Proc. R. Soc. Med.* 1946, 39, 400.

2. Prescott, F., Organe, G., Rowbotham, S. *Lancet*, 1946, ii, 80.

INFORMING THE PATHOLOGIST

SIR,—In many teaching hospitals the study of clinical pathology is much restricted, and pathologists elsewhere can usually tell at once whether a new houseman has been taught how to use a laboratory. It is perhaps not to be expected that this ancillary though all-embracing branch of medicine should receive much attention in an already overburdened curriculum; but there are, I think, some simple ways in which the student could be made aware of the importance of an efficient approach to the laboratory, and of the benefit that could accrue to him through such an approach.

Often request forms submitted to the laboratory are badly filled in, causing irritation and delay. One could quote many examples: for instance, a request for a blood-count accompanied only by the diagnosis "fractured femur" does not get anyone very far; an extra few words—"clinically anæmic" or "P.U.O."—would raise the status of the request form from that of a penny-in-the-slot to a reasonable medical document. Similarly with histological requests: "tumour of the leg—section please." The pathologist at once wonders how big it is, how long present, and whether it was easily removed. In his own hospital the pathologist can overcome these things by personal contact with the houseman, but when specimens arrive by post further information may be difficult to obtain.

Would it not be possible for every student to spend at least one full working day in a clinical pathological laboratory, perhaps at about the end of the second month in the medical wards or sooner? The purpose of this would be simply to show him what happens to specimens when they arrive at the laboratory. Seeing the forms that accompany them, he would appreciate the value of filling them in correctly with essential clinical details. He would come to understand that the purpose of the form is not just to enable the specimen to travel from the ward to the laboratory. Even if he learnt no clinical pathology he would at least have learnt the correct approach to the laboratory; and possibly his interest might be stimulated.

One more point. The making of blood films is simple when properly done; but it rarely is properly done by clinicians. A good blood film is essential where blood for counts has unfortunately to be sent by post. After all, the blood film is usually the most important stage of a blood-count. The pathological service is to be extended, and even the smallest coöperation between the clinician and the laboratory will increase its value.

Canterbury.

I. B. MORRIS.

Parliament

QUESTION TIME

What We Eat

Mr. W. ELLIOT asked the Minister of Food what intake of calories per head per day was shown, for the latest available month, by his department's dietary food survey; and what were the comparable figures for the corresponding month of 1946.—Mr. J. STRACHEY replied: Our latest available figure is for November last. It is based on a small but representative sample of working-class families. It covers only food eaten in the home, and not, for example, school or canteen meals. The figure is 2320 calories, which shows no variation from the figure for November, 1945. It is very difficult to know what addition ought to be made for meals taken out, but a canteen meal will contain anything from 600 to 1000 calories.

Family Allowances Claims

Replying to a question Mr. JAMES GRIFFITHS stated that though the total number of families entitled to draw family allowances was not precisely known, it was estimated that up to the present about 93% of the families initially entitled have received awards. Belated claims were still coming in.

Mr. JOHN LEWIS asked the Minister of National Insurance if he would consider introducing amended legislation so that under the Family Allowances Act, claims by parents for family allowances should not be affected by their having children over the age of 14 years who were mentally defective or incapacitated and who were not included in the category of those undergoing full-time instruction in a school by virtue of the Family Allowances (Qualifications) Regulation,

1946.—Mr. GRIFFITHS replied: I sympathise with this point but a number of anomalies would arise if this particular type of case were picked out for special treatment. The Family Allowance Scheme has only been running for just over 6 months and I think we must have more experience of its working before we contemplate further legislation.

Industrial Injuries

Mr. D. J. WILLIAMS asked the Minister whether he had received the report of the Interdepartmental Committee on the Assessment of Disablement due to Specified Injuries; and what action he intended to take in the matter.—Mr. GRIFFITHS replied: I have considered the recommendations of the committee and I am prepared to accept them in principle as a basis for the regulations which I shall have to make regarding the assessment of injuries under the Industrial Injuries Scheme.

Doctors in the R.A.F.

Mrs. AYRTON GOULD asked the Secretary of State for Air if he was aware that the proportion of medical officers to officers and other ranks in the R.A.F. was 30%, higher now than it was at the end of the European war; and if he would take steps to reduce the proportion of medical officers to other personnel in the Service to the war-time level.—Mr. PHILIP NOEL-BAKER replied: I am aware that the proportion of medical officers in the R.A.F. is higher now than at the end of the war. There are some good reasons why this should be so, but I share, nevertheless, the preoccupations expressed by my hon. Friend. I propose to consider the matter again in consultation with my right hon. Friends.

Appointments

ANGEL, R. E., M.B. Lond., D.A.: anaesthetist, Prince of Wales's Hospital, Plymouth.

WARD, R. D., M.B. Lond., D.O.M.S.: chief asst., ophthalmic department, St. Thomas's Hospital, London.

St. Bartholomew's Hospital, London:

BADENOCH, A. W., M.D. Aberd., F.R.C.S.: asst. surgeon.

GIBB, W. E., B.M. Oxid., F.R.C.P.: asst. physician.

Middlesex County Council:

BABER, MARGARET, M.D. Lond., M.R.C.P., D.C.H.: paediatrician, Redhill County Hospital, Edgware.

DOEL, G. G., M.R.C.S., D.M.R.E.: radiologist, Chase Farm Hospital.

PERKINS, A. C. T., M.D. Lond., D.P.H.: deputy county M.O.

*Kent County Council:

Pathologists:

BOWERS, V. H., M.D., B.Sc. Lond.

CLOSE, H. G., M.D. Lond.

GRIFFITHS, L. L., M.B. Dubl., D.P.H.

Royal Liverpool Children's Hospital:

AITKEN, HENRY, M.B. Aberd., F.R.C.S.E.: asst. ear, nose, and throat surgeon.

MCCANN, J. A., F.R.F.P.S.: ophthalmic surgeon.

Examining Factory Surgeons:

COWAN, J. M., M.B. Glasg.: Stafford.

CRAIG, D. M., D.S.O., M.R.C.S.: Framlingham, Suffolk.

SOMERVILLE, ARTHUR, M.R.C.S.: Beeston, Notts.

* Amended notice.

Births, Marriages, and Deaths

BIRTHS

BROWNE.—On March 25, at Haywards Heath, the wife of Dr. Hugh Browne—a son.

CUSACK.—On March 18, in Bermuda, the wife of Surgeon-commander J. J. Cusack, R.N.—a daughter.

GUTTMANN.—On March 26, Dr. Elizabeth Rosenberg, the wife of Dr. Erich Guttman—a son.

PARSONS.—On March 23, the wife of Dr. H. M. Parsons—a son.

PAYNE.—On March 23, in Southern Rhodesia, the wife of Dr. Cyril Payne—a son and a daughter.

THOMAS.—On March 24, at Bishop's Stortford, the wife of Flying-Officer Merley Thomas, M.R.C.S.—a son.

MARRIAGES

HARDISTY—JARNUM.—On March 24, in Copenhagen, R. M. Hardisty, M.R.C.S., captain R.A.M.C., to Jytte Jarnum.

OWEN—LEWIS.—On March 22, in London, Kenneth Owen, M.B., to Barbara Caroline Lewis.

TOWERS—LEACH.—On March 22, at Salthouse, Norfolk, John Towers, B.M., to Barbara Minnie Leach.

DEATHS

COLYER.—On March 26, at Croydon, Horace Charles Colyer, M.R.C.S., L.D.S., aged 63.

MAIN.—On March 26, at Forest Row, Sussex, William Ritchie Main, L.R.C.P.E., aged 82.

RAMSDEN.—On March 26, at Oxford, Walter Ramsden, M.A., D.M. Oxid., aged 78.

WALKER.—On March 26, at Eppingham, Surrey, Reginald Field Walker, M.B.E., M.R.C.S., aged 82.

WATSON.—On March 22, at Dublin, Edward John Macartney Watson, M.D. Dubl., F.R.C.P.I.

WORTABET.—On March 15, in London, James Rashid Wortabet, M.B. Glasg., D.P.H.

Notes and News

SAFETY FROM SPARKS

THE risk of anæsthetic vapours becoming ignited in operating-theatres may be still further reduced by the introduction of a new form of rubber which will be exhibited at the British Industries Fair. The commonest causes of ignition are the cautery, diathermy, electrical switches, or similar appliances; or the overheating, short-circuiting, or breakage of the small electric bulbs used in endoscopy. But the static electricity generated by friction between non-conducting blankets or mats is another possible cause which has proved very difficult to overcome. In one test drawing a blanket rapidly over a rubber mat on a trolley produced a static charge of 30,000 volts, giving a spark which would be fully capable of igniting ether vapour. In its draft warning notice, circulated to hospitals three years ago¹ by the Ministry of Health, the Operating Theatres Electrical Apparatus Committee recommended the fitting of trailing chains to all apparatus insulated by non-conducting tyres or pads, and some hospitals have practised humidifying the atmosphere. These cumbersome precautions may be superseded by the use of electrically conductive rubber. Conductivity has been achieved by adding to the rubber mix very finely divided carbon, which, while blackening the material, increases its resistance to wear and tear. To prevent the generation of static charges all rubber articles in the theatre must be of this material—its partial installation might increase rather than diminish the danger of explosion. This substance, devised by the Dunlop Rubber Co. Ltd., is a development from earlier work on antistatic tyres for aircraft.

DEODORANTS REVIEWED

IN America, deodorants seem to be sold more freely than here, both to hospitals and private people. The research department of the Hospital Bureau of Standards and Supplies Inc., of New York, has published a useful survey by Mr. Dewey H. Palmer of common deodorants and deodorising equipment, assessing their value.

Three types of deodorants are widely sold—liquid vaporising types, ozone generators, and substances which act by adsorption. Mr. Palmer reviews five popular vaporising liquids, one of them selling to the tune of 4 million dollars a year. Such liquids form the greatest proportion of all deodorants sold to institutions, but chemical analyses and tests have shown that any effect they have is due to their covering odours. Some contain formaldehyde, which reduces the sense of smell slightly but also irritates the nasal mucosa. Chlorophyll, much advertised as an important component of others, has no deodorising properties at all; it will not even vaporise at ordinary temperatures: if it did, as one chemist put it, green clouds would rise from every kettle of spinach. Two of the products reviewed had been investigated by the U.S. Naval Medical Research Institute and found to be completely ineffective. Claims that such vaporising liquids work by chemical action and oxidation have been proved on test to be unfounded; any such action was too slight to affect strong odours.

Ozone generators are also found to be ineffective. The Council on Physical Medicine of the American Medical Association consider that the smell of ozone may mask other odours and also fatigue the olfactory nerves; but "contrary to aiding well-being, exposure to ozone may result in irritation of the mucous membranes of the nose, throat, and lungs, headaches, drowsiness, fatigue, and a burning sensation in the eyes." So much for the favourite seaside tonic.

The Naval Medical Research Institute report that activated carbon is the only agent capable of reducing or removing odours. The air must pass through a substantial quantity of activated carbon, being pumped or sucked through canisters by various devices; but adsorbent devices which depend for their effect on the natural circulation of air are not a success. For foul-smelling wounds or other local physical troubles associated with smell the most successful method is pronounced to be the use of filter cloth, impregnated with activated charcoal, which was first described in THE LANCET in 1942 (vol. i, p. 755). This can be cut to any shape and applied over dressings, or made into boots or other garments to cover and enclose an infected area.

Mr. Palmer concludes that washrooms and toilets can best be deodorised by frequent cleaning with soap and water,

1. See *Lancet*, 1944, ii, 57.

and by good disinfectants with a mild and unobjectionable smell. In kitchens ventilation and sanitation are needed. In places where food is stored volatile deodorants should never be used because they flavour food; smell can be kept down by frequent cleaning. In hospital wards no amount of vaporising deodorants will neutralise the smell of infected wounds, and Mr. Palmer is confident that filter cloth is the answer.

HOME FRONT

In *Total War at Haverington* (Longmans, Green, pp. 336, 10s. 6d.) Miss Josephine Bell shows a small English country town in action on the home front—in its shops, at the W.V.S. headquarters, in its gardens, and in the committees of the town council—and beside her vivid picture of a community the personal affairs of her principal characters seem unimportant. Some of the most amusing skirmishes of the engagement are fought between the local doctor and the public-assistance committee, and finally the palm of victory, in the shape of a new wash-basin for his clinic, is bestowed on Dr. Clayton. The trophy comes only after he has succeeded in joining the R.A.M.C.; but though tardy it is well deserved, for in all the town's struggles to cope with its evacuees Dr. Clayton has given of his sensible if sometimes irascible best. "I don't get the real dirty work in my own practice," he confesses, and we leave him wondering "if this new National Health Scheme will be able to touch it."

University of London

Dr. Alan Kekwick has been appointed to the chair of medicine at the Middlesex Hospital medical school as from last October.

Dr. Kekwick, who is 37 years of age, was educated at Charterhouse School. He qualified from the Middlesex Hospital in 1933 and took his M.B. at Cambridge in the following year. In 1935, while holding a house-appointment at the Middlesex, he published with H. L. Marriott, whom he later succeeded as R.M.O. there, the first of a series of papers on continuous drip transfusion and described a new method of bleeding donors. In 1939, with a Leverhulme scholarship, he undertook research at the Bland-Sutton Institute and the Hematological Institutes at Moscow and Leningrad, which he completed after joining the R.A.M.C. at the Army Blood Transfusion and Surgical Research Institute at Bristol. He was also a member of L. E. H. Whitby's team which produced valuable papers on blood substitutes, blood-storage, and shock. The latter part of the war Kekwick spent in East Africa, where he was in charge of a medical division of a general hospital of over 1000 beds, with the rank of lieutenant-colonel. This new environment gave a fresh turn to his interests, and he undertook, with collaborators, a comprehensive dietetic survey of African Army personnel, part of which was published in our columns last week. During this period he also acted as physician to the peripheral vascular disease centre and became a member of the medical investigation committee of the East Africa Command. He obtained the M.R.C.P. in 1937, and was elected F.R.C.P. last year. He was appointed assistant physician to the Middlesex Hospital a few months ago.

University of Liverpool

At recent examinations the following were successful:

M.D.—Anne E. McCandless, H. Peaston, T. G. Richards, A. G. Rickards.

M.B., Ch.B.—J. C. Davis, Janet H. Mountford, H. H. Whincup (with second-class honours), Olive M. Bell, J. H. Brenner, G. B. Brown, Mary E. Casper, Beryl G. Castell, J. B. Cowie, W. M. Edwards, Jeanne A. Elphick, D. W. A. Evans, A. J. Farmer, I. L. Francis, H. J. Gilbride, T. H. H. Green, P. Hampson, M. F. Holt, Joan M. Hughes, E. Jones, Meira Jones, S. Kalinsky, H. Keidan, F. D. Kitchin, Edith G. Mercer, Alicia J. Middle, J. Moloney, Dorothy M. Morris-Jones, J. M. Old, W. L. Owen, Dorothy C. Peterson, Helen Poole, J. S. Porterfield, J. K. M. Rawlinson, Elizabeth Rhind, L. Robinson, D. L. Sharples, K. S. Shaw, W. B. Smellie, R. J. Smith, Elizabeth Taylor, W. A. L. Thompson, B. Towers, Pamela J. Tyson, D. G. Walker, Barbara M. Webber, D. J. West, D. P. C. Williams, Jessie I. Young.

D.P.H., part I.—A. R. Unsworth, P. Weyman.

University of Manchester

Under the scheme for the establishment of a research centre for the study of chronic rheumatism in Manchester the council of the university have appointed Dr. S. L. Baker pathological director of the new centre with the title of professor of osteopathology. They hope soon also to appoint a clinical director to the centre.

Dr. Baker took the Conjoint qualification in 1913 from the London Hospital, and after holding house-appointments there he served with the Royal Navy from 1915 to 1918. On demobilisation he became pathologist to the King Edward VII Sanatorium at Midhurst and later chief assistant at the Bland-Sutton Institute at the Middlesex Hospital. He was reader of morbid anatomy and histology in the University of London from 1928 till 1931, when he was appointed to the chair of pathology and pathological anatomy at Manchester. He is also pathologist to the Manchester Royal Infirmary and he has made a special study of changes in bone in human diseases. He took his Ph.D. Lond. in 1931 and his M.Sc. Manc. in 1935.

University of Glasgow

During April, on Wednesdays at 8 P.M., the following meetings will be held in the department of ophthalmology: Prof. W. J. B. Riddell, American Gleanings (April 9); Dr. R. Leishman, Chemical Injuries of the Cornea (April 16); Dr. J. D. Fraser, Industrial Cataract (April 23); Dr. Alexander Mellick, Heterophoria (April 30). The meetings will be open to doctors and senior students.

General Medical Council

An election for a member of the council, representing the registered medical practitioners resident in England, is to be held shortly, and nominations should reach the registrar of the branch council for England, 44, Hallam Street, London, W.1, on or before April 14. Further particulars will be found in our advertisement columns of March 29. The British Medical Association is supporting the candidature of Dr. J. A. Brown, of Birmingham, who was a member of the Spens Committee.

French Health Resorts

Information about French spas can now be obtained from the French National Tourist Office, 179, Piccadilly, London, W.1.

General Board of Control for Scotland

Dr. Laura Mill has been appointed a medical commissioner of the board in place of Dr. Kate Fraser, who has retired. Dr. Mill has been in the service of the board as a deputy commissioner since 1936.

International Conference of Physicians

This conference, which is to be held in London from Sept. 8 to 13, will be divided into the following sections: cardiology, dermatology, disorders of the chest, general medicine, neurology, paediatrics, psychiatry, and social medicine. Application for tickets of admission to the sections should be made to Dr. G. B. Mitchell-Heggs, organising secretary, Royal College of Physicians, Pall Mall East, London, S.W.1, before May 31.

Clinic for Psychotherapy

A clinic for psychotherapy has been started by the Society of Analytical Psychology Ltd., 32, Carlton Hill, St. John's Wood, London, N.W.8 (Maida Vale 7039). The clinic is open on Mondays and Thursdays, and appointments must be made for all interviews.

The society has also drawn up a syllabus of training for analysts, which includes a personal and training analysis of at least three years, followed by a period of work under supervision.

Corrigendum.—In an annotation on delinquency on March 22 we referred to a *Times* letter as signed by Mr. J. A. F. Fergus. The signatory was Mr. John A. F. Watson, chairman of the Tower Bridge juvenile court.

Diary of the Week

APRIL 6 TO 12

Tuesday, 8th

ROYAL SOCIETY OF MEDICINE, 1, Wimpole Street, W.1
4.30 P.M. *Psychiatry (Joint meeting with Medico-Legal Society).*
Dr. E. A. Bennett, Dr. H. Mannheim, Dr. D. Stanley-Jones: The Social Problem of Homosexuality.

Wednesday, 9th

ROYAL COLLEGE OF SURGEONS, Lincoln's Inn Fields, W.C.2
5 P.M. Mr. F. A. R. Staumers: Surgery of the Posterior Fossa of the Skull.

ROYAL SOCIETY OF MEDICINE
4.30 P.M. *Physical Medicine.* Prof. Henry Cohen: Rheumatic Diseases—a Challenge and an Opportunity (Samuel Hyde lecture).

Thursday, 10th

ROYAL COLLEGE OF SURGEONS
5 P.M. Mr. Phillip Mitchiner: Gangrene (excluding gas-gangrene).
ROYAL SOCIETY OF TROPICAL MEDICINE AND HYGIENE, 26, Portland Place, W.1
8 P.M. Prof. J. T. Culbertson: Experimental Chemotherapy of Filariasis.

Friday, 11th

ROYAL COLLEGE OF SURGEONS
5 P.M. Mr. H. S. Souttar: Surgical Treatment of the Oesophagus.
ROYAL SOCIETY OF MEDICINE
8 P.M. *Anaesthetists.* Dr. Frederick Prescott, Dr. Geoffrey Organe, Dr. F. B. Mallinson: Further Experiences with Curare.
BIOCHEMICAL SOCIETY
2.30 P.M. (Rowett Research Institute, Bucksburn, Aberdeen.)
Short communications and demonstrations.

OUTBREAK OF VIRUS ENCEPHALOMENINGITIS IN NORTH-WEST MIDDLESEX

G. H. JENNINGS

M.D. Camb., M.R.C.P.

SENIOR PHYSICIAN, REDHILL COUNTY HOSPITAL, EDGWARE

It has been said that there has not yet been an extensive epidemic of acute lymphocytic meningitis, and Wallgren (1924), who first described the condition, specially mentioned Ustvedt's 14 cases in three years, including 6 in as many months. Since then several neurotropic viruses have been recognised as causes of lymphocytic meningitis, but two-thirds of all cases of this type are caused by viruses as yet unknown. The meningitic signs have also been associated with signs of encephalitis and myelitis; hence the term "benign lymphocytic meningitis," applied to the condition caused by the virus of Armstrong and Lillie (1934), is inadequate.

An outbreak of neurotropic virus infections in which meningitic and encephalitic symptoms were prominent was observed between March and November, 1946; and, though they may not all have been due to the same virus, their occurrence within a comparatively brief period has prompted me to group them together for the purpose of description and discussion. In this outbreak 22 patients with meningitis or encephalitis and 13 with less clear signs and symptoms were admitted to Redhill County Hospital, and others were admitted in the neighbourhood. The cases occurred chiefly during the summer, the numbers gradually declining after the first part of July (see figure). The patients came from a wide area of N.W. Middlesex: 11 from Edgware; 4 each from Colindale and Burnt Oak; 3 from Hendon; 2 each from Stanmore, Kingsbury, Mill Hill, and Wembley; and 1 each from Harrow, Golders Green, Queensbury, Cricklewood, and Wealdstone.

In no case was it possible to trace a direct contact with another case in the family, school, or work-place. This fact appears to differentiate them from the 37 cases described by Noone et al. (1936) in an outbreak of communicable encephalomyelitis in children, which otherwise were somewhat similar to ours and showed an occasional tendency to drowsiness, arm tremors, and positive Babinski responses.

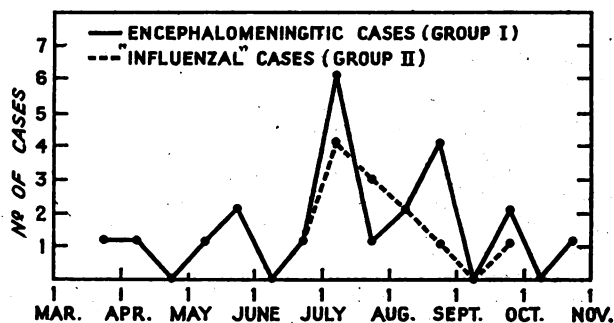
One peculiar coincidence was the admission of case 11 on the same day as a class-mate who had clinical poliomyelitis. There was, when these cases were seen, an outbreak of poliomyelitis in Middlesex and in the neighbouring part of Hertfordshire, and by courtesy of Dr. J. A. Livingston I examined some of the cases then being admitted to Hendon Isolation Hospital. These were certainly, on clinical evidence, cases of acute poliomyelitis, but others which were similar to those at Redhill were admitted at Hendon in the same period.

Brodie's (1937) statement that half the poliomyelitis cases in an epidemic are non-paralytic might suggest that our cases were atypical forms of poliomyelitis. Without making any assumption about the nature of the infection in our somewhat varied cases, it may be said that they were clinically not unlike those infected by the virus first described by Armstrong and Lillie (1934), and whose most characteristic manifestation is "benign lymphocytic choriomeningitis." MacCallum and Findlay (1939) have shown that this virus sometimes causes an illness very similar to poliomyelitis with weakness and wasting of leg muscles. No similarity of this kind was observed in any of our cases, which, so far from showing muscular wasting and depressed tendon-jerks, often showed increased reflexes and various degrees of Babinski response. In case 10 alone was there much muscular tenderness, but this patient showed exaggerated deep reflexes and transient ankle-clonus on one side.

Our cases were neither more nor less varied than those described by Armstrong (1941), being meningitic or encephalomyelitic (group I), or abortive and influenza-like (group II). But we found no hard and fast line between our two groups, and the distinction into groups is made solely for the purpose of description. In group I cases varied greatly in severity from definite encephalitis to a very mild meningeal reaction; while group II included 2 patients with cerebral symptoms compatible with a mild encephalitis.

CLINICAL PICTURE

Most of the cases were in children or young adults. The illness usually began suddenly with fever and frontal headache, but there was in many of the cases about a week's prodromal period of fluctuating fever and headache before the onset of the more severe symptoms, and this was sometimes accompanied by increased fever and by shivering. But, though meningitic manifestations (headache, vomiting, photophobia, and stiffness of the neck) were almost constant at this stage, they were sometimes not well marked; neck stiffness was often very moderate and at times even so slight as not to be noted by anyone not looking specially for it. It was thus often quite difficult



Half-monthly incidence of encephalomyelitic and "influenzal" cases (1 case in November and 1 case in December omitted).

to draw a clear-cut line between prodromal and meningitic symptoms. Difficulty in diagnosis was also caused at first by the patients with normal cerebrospinal fluid (C.S.F.) who, like those just described, had severe headaches and very moderate neck stiffness—e.g., cases in group II and case 19 at the outset.

Case 17 was admitted on the twenty-first day of his illness, case 4 on the fifteenth, case 2 on the tenth, and 9 patients in group I on the sixth or seventh day. The remaining patients in group I were admitted on the third or fourth day of the illness, and case 19 did not show C.S.F. changes until a few days after admission. Furred tongue and anorexia were common in the early stages, but faecal inflammation and coryza were uncommon. Diarrhoea and constipation were prominent in 3 or 4 cases. Only in 7 of the cases in group I did the prodromal phase appear to be absent.

The increased severity of headache, which probably often marked the onset of the meningitis, was apparently the determining factor in causing the admission to hospital of many of the patients, but in 5 children and 1 adult symptoms suggesting encephalitis (apathy, twitchings, severe drowsiness, delirium) were the main symptoms; headache and meningeal signs were less severe in these cases.

A striking occasional feature was the cranial-nerve weaknesses seen. In 4 cases there were unilateral facial palsies (supranuclear in case 7); in case 1 the auditory nerve was also involved, and in case 6 the hypoglossal nerve, in each case on the same side as the facial nerve involvement. In case 5 the internal strabismus improved rapidly: but the facial-nerve weakness recovered very slowly and still persists in 2 cases. Transient diplopia was noted in case 1, and 2 other cases showed slight nystagmus at first.

Case 1 had transient weakness of the right side of the body, cerebellar symptoms, and extreme giddiness. Three children during convalescence had rather prominent leg weakness with increased tendon reflexes, and it is possible that in these cases at least there was myelitis as described by Findlay et al. (1936). Sensory or sphincteric disturbance was not observed in our cases.

After admission the course of the illness was variable, but in most cases there was fever for about a week, and in many cases it was of low grade (99°–100° F). Several cases had temperatures of 102° F for the first two or three days, and in case 18 temperatures of 103° and 104° F were recorded. In case 8 there was low-grade fever for four weeks. Usually all signs and symptoms had disappeared by the end of the febrile period, but this was not true of the facial palsies; nor was it true in some of the more severe cases—e.g., cases 4 and 10. The temperature fell by lysis in all cases.

Leucocyte-counts were done in nearly all cases, and, though slight leucocytosis or slight leucopenia was seen in both groups, there was usually little abnormality in most counts. In a few of the abortive cases (group II) there was slight leucopenia and a relative lymphocytosis, but in no instance did the count strongly suggest infectious mononucleosis.

Paul-Bunnell and Widal tests, done in some cases, were negative.

The C.S.F. findings (table 1) were used arbitrarily to divide the cases into group I, with positive findings, however slight (the meningitic and encephalomeningitic cases) and group II, with negative findings (the abortive, "influenzal," or non-meningitic cases). Case 35 in group II might be regarded as an intermediate case. Another case seen recently and not included in the series was also of this intermediate type. Here well-marked neck rigidity was associated with a blotchy rash on the limbs and with conjunctival and faucial injection; the C.S.F. contained 7 lymphocytes per c.mm. and 40 mg. of protein per 100 c.cm.

To illustrate the general pattern of the outbreak sample case-records are given from group I; and, though all these cases showed meningitic signs, they are subdivided, for convenience of description, into those which also had encephalitic symptoms or cranial-nerve palsies and those in which the meningitic signs predominated. This subdivision is an artificial one, since many of the "meningitic" cases had transient extensor plantar responses. In the same way the cases of group II have been put together for descriptive purposes and without implying a clear-cut pathological distinction.

GROUP I—ENCEPHALOMENINGITIS

Cases with Encephalitic Symptoms or Cranial-nerve Palsies

Case 1.—A woman, aged 47, was admitted on March 27, 1946, with a history of sudden onset of pain round rt ear, tinnitus, giddiness, and vomiting on the 20th, and two days later, rt facial weakness (lower motor neurone), and general weakness on rt side of body (reported by her doctor). Rt side of face felt numb for a short time. Some mental confusion and sphincteric incontinence before admission.

On admission she was rather drowsy and uncooperative; unable to sit up, because of extreme giddiness; slight neck stiffness; Kernig negative; complete rt facial palsy (lower-motor-neurone type); nerve deafness of rt ear (drum normal); no facial sensory loss; no loss of power or of coordination in limbs; doubtful loss of tone on rt side of body; rt ankle-jerk definitely depressed, and doubtful extensor rt plantar response; all other tendon-jerks brisk, but abdominals absent.

C.S.F. (April 2): pressure 40 mm. H₂O; faint opalescence; total protein 20 mg. per 100 c.cm.; Pandy, faint trace; Wassermann reaction negative; polymorphs and lymphocytes 100 per c.mm.; sterile.

Further Course.—Very slow progress. Gradually able to sit up, with decreasing giddiness and lessening tendency to vomit on movement. Showed tendency to past-pointing to right for

a time, and also brief period of diplopia on looking to left. Rt facial palsy and deafness very persistent. After a week tendon-jerks were all very brisk, and knee-jerks exaggerated (lt > rt). Plantars, lt flexor, rt extensor. After two weeks knee-jerks were less exaggerated, and plantars were both flexor.

C.S.F. (April 25): pressure very low; clear; total protein 20 mg. per 100 c.cm.; Pandy negative; 18 lymphocytes per c.mm.; sterile.

Much less giddy by end of first month, and after six weeks began walking. Great tendency to reel in either direction at first, but later deviated more to rt side.

Later made gradual improvement with instruction in walking and now gets about very well. Deafness in rt ear persists, as does much rt facial weakness, though this is still improving slowly (Nov. 8).

Case 6.—A boy, aged 4 years, was admitted on July 6 with a history of sudden onset of fever, sleepiness, apathy, and miserableness on the 5th. Also seemed to have pain in rt side of head, and a few hours before admission mother noted weakness of rt side of face.

On admission he was sleepy and apathetic; neck a little stiff and painful to flex; complete lower-motor-neurone lesion of rt facial nerve and deviation to right of protruded tongue; throat rather red, but nothing abnormal found in ears; temperature 101.4° F, pulse-rate 130.

Further Course.—Given short course of sulphadiazine for throat infection, and lumbar puncture done on second day of course.

C.S.F. (July 8): clear; pressure about 180 mm.; total protein 40 mg. per 100 c.cm.; Pandy, trace; chlorides 760 mg. per 100 c.cm.; lymphocytes 12 per c.mm.; sterile.

White-cell count (July 8): 11,700 per c.mm. (polymorphs 45%, lymphocytes 47%, mononuclears 7%, eosinophils 1%).

Temperature fell to normal on third day, but drowsiness, miserableness, and apathy persisted two weeks. No weakness apart from rt facial weakness, and tendon-jerks all were definitely increased, especially on rt side. Plantars were flexor, but some bilateral withdrawal response was noted up to end of third week. Early walking caused leg pains, and progress at first was slow.

Follow-up (Oct. 8).—Now is very well, and only disability is a decreasing rt facial weakness of lower-motor-neurone type, though protruded tongue still deviates slightly to the right.

Case 7.—A boy, aged 4½ years, was admitted on July 9 with a history of having been tired and sleepy for three days before admission; two days before admission, from his mother's account, he seemed unable to walk, though "his legs did not look weak." On day of admission he fainted and showed weakness in the lower part of his face on the rt side.

On admission he was alert and sensible; no headache, but unable to sit up, because of unsteadiness; neck stiffness; rt facial weakness of upper-motor-neurone type; cranial nerves otherwise normal, and no obvious weakness in limbs; Kernig negative; tendon-jerks increased in legs, particularly on rt side; plantar responses flexor, but withdrawal response of legs present on both sides; abdominals all present.

C.S.F. (July 9): clear; pressure 100 mm.; no block; total protein 40 mg. per 100 c.cm.; Pandy, trace; chlorides 700 mg. per 100 c.cm.; lymphocytes 31 per c.mm.; sterile.

White-cell count (July 9): 7900 per c.mm. (polymorphs 40%, lymphocytes 55%, mononuclears 4%, eosinophils 1%).

Further Course.—Made good recovery and became very active; soon lost neck stiffness; facial weakness diminished considerably, and emotional facial movements became normal; reflexes in limbs remained unchanged.

C.S.F. (July 17): clear; pressure 120 mm.; no block; total protein 40 mg. per 100 c.cm.; Pandy, trace; chlorides 720 mg. per 100 c.cm.; lymphocytes 7 per c.mm.; sterile.

Follow-up (August 15).—Only showed slight weakness on lt side of mouth during voluntary movement of facial muscles. Mother states that these muscles show involuntary spasms when he is excited.

Case 9.—A girl, aged 6½ years, was admitted on July 12 with a history of having been vaguely unwell, irritable, and off her food for a week; and of severe headache and photophobia for a day before admission, and of vomiting on the day of admission.

On admission she was flushed (temperature 103° F); herpes labialis; mentally clear and no headache; definite neck stiffness, but Kernig's sign negative; throat clear; nothing of note in any system, but tendon-jerks and abdominals were all depressed; plantars flexor.

C.S.F. (July 13): clear; pressure 200 mm.; total protein 20 mg. per 100 c.cm.; Pandy negative; chlorides 730 mg. per 100 c.cm.; cells 50 per c.mm. (lymphocytes 98%, polymorphs 2%).

Further Course.—Two days after admission temperature was falling to normal and child was comfortable; but, besides a persistent neck stiffness, she now showed a lt facial weakness of lower-motor-neurone type. The tendon-jerks were brisk; and, though the plantars remained flexor, there was an involuntary leg withdrawal response, more marked on the rt side. Subsequently the child made good progress, but occasional headaches and a little neck stiffness were noted during the first week.

C.S.F. (July 19): clear; pressure 170 mm.; total protein 20 mg. per 100 c.cm.; chlorides 740 mg. per 100 c.cm.; lymphocytes 12 per c.mm.

At discharge, rt facial palsy was little better, but child was otherwise well.

Follow-up (Oct. 22).—Fully recovered, apart from very occasional rt frontal headache; alert and well and free from facial palsy; all reflexes normal.

Case 10.—A boy, aged 3 years, was admitted on July 22 with a history of having been unwell and apathetic for a week before admission. No headache had been present, but parents had noted a tendency to muscular twitching during sleep. Persistent constipation.

On admission he was rather apathetic, apprehensive, and miserable; generally resistant to muscular movement and unable to sit up; held his back stiff if lifted, and kept hips and knees flexed; resistance to neck flexion, but no well-marked neck rigidity; Kernig's sign positive; knee-jerks slightly depressed, and ankle-jerks increased; plantars flexor; temperature 99° F; pulse-rate 120; otherwise normal, apart from a few enlarged glands in posterior triangles of neck; Mantoux 1: 1000 negative; blood-sedimentation rate 7 mm. in 1 hour.

C.S.F. (July 21): clear; total protein 60 mg. per 100 c.cm.; lymphocytes 3 per c.mm.

White-cell count (July 22): 9000 per c.mm. (polymorphs 40%, lymphocytes 55%, mononuclears 5%).

Further course showed a persistent stiffness of neck and spine, and increased tone in the hamstrings, which led to the legs

TABLE I—C.S.F. FINDINGS IN ENCEPHALOMENINGITIC CASES

| Case | Age (years) | Date 1946 | Appearance | Pressure (mm.H ₂ O) | Total protein (mg. per 100 c.cm.) | Pandy test | Nonne-Apelt test | Chlorides (mg. per 100 c.cm.) | Total cells (per c.mm.) | Lymphocytes (%) | Polymorphs (%) |
|------|-------------|---------------|-------------------------|--------------------------------|-----------------------------------|------------|------------------|-------------------------------|-------------------------|-----------------|----------------|
| 1 | 47 | April 4 | Very faint opalescence | 40 | 20 | Ft. tr. | .. | .. | 100 | .. | .. |
| | | May 2 | Clear and colourless | 40 | 20 | Neg. | .. | .. | 13 | 100 | .. |
| 2 | 42 | April 11 | Opalescent; large clot | 160 | 400 | +++ | .. | 620 | +++ | 95 | 5 |
| | | " 16 | Clear; clot | 120 | 240 | ++ | .. | 690 | 100 | 95 | 5 |
| 3 | 11 | May 27 | Slight opalescence | 120 | 30 | Neg. | .. | 710 | 62 | 48 | 52 |
| 4 | 10 | June 11 | Clear and colourless | 170 | 200 | ++ | .. | 730 | 1 | 100 | 0 |
| | | " 15 | " " | 190 | 190 | +++ | .. | 690 | 4 | 100 | 0 |
| | | " 26 | " " | 100 | 200 | +++ | .. | 710 | 2 | 100 | 0 |
| | | July 16 | " " | .. | 80 | +++ | .. | .. | 1 | 100 | 0 |
| | | " 23 | " " | .. | 100 | .. | Hvy. tr. | .. | 4 | 100 | 0 |
| " 24 | " " | .. | 130 | 40 | + | Neg. | 730 | 2 | 100 | 0 | |
| 5 | 5 | July 5 | Slight opalescence | 210 | 60 | + | Tr. | 730 | 200 | 40 | 60 |
| | | " 17 | Clear and colourless | 100 | 40 | + | .. | 710 | 5 | 100 | 0 |
| 6 | 4 | July 8 | " " | 180 approx. | 40 | Tr. | Neg. | 760 | 12 | 100 | 0 |
| | | " 18 | " " | 110 | 40 | + | .. | 730 | 5 | 100 | 0 |
| 7 | 4 1/2 | July 9 | " " | 100 | 40 | Tr. | Ft. tr. | 700 | 31 | 100 | 0 |
| | | " 17 | " " | 120 | 40 | Tr. | .. | 720 | 7 | 100 | 0 |
| 8 | 30 | July 10 | " " | 110 | 40 | Tr. | .. | 740 | 25 | 95 | 5 |
| | | " 19 | " " | 80 | 40 | + | .. | 730 | 43 | 95 | 5 |
| | | " 31 | " " | .. | 20 | Ft. tr. | Ft. tr. | 740 | 4 | 100 | 0 |
| 9 | 6 1/2 | July 13 | " " | 200 | 20 | Neg. | .. | 730 | 50 | 98 | 2 |
| | | " 18 | " " | 170 | 20 | Neg. | .. | 740 | 12 | 100 | 0 |
| 10 | 3 | July 21 | " " | .. | 60 | + | .. | .. | 3 | 100 | 0 |
| | | " 26 | " " | 250 approx. | 80 | + | .. | 730 | 6 | 100 | 0 |
| | | Aug. 6 | " " | 150 | 40 | + | .. | 690 | 35 | 100 | 0 |
| 11 | 6 | July 29 | " " | 180 | 30 | + | .. | 730 | 85 | 63 | 37 |
| | | Aug. 8 | " " | 80 | 40 | Neg. | .. | .. | 4 | 100 | 0 |
| 12 | 4 | Aug. 16 | " " | 100 | 40 | Tr. | .. | 720 | 54 | 97 | 3 |
| | | " 29 | " " | .. | 40 | Ft. tr. | Neg. | .. | 3 | 100 | 0 |
| 13 | 13 | Aug. 20 | " " | 75 | 30 | Ft. tr. | Neg. | 710 | 7 | 100 | 0 |
| | | " 29 | " " | .. | .. | .. | .. | .. | .. | .. | .. |
| 14 | 40 | Aug. 25 | " " | 110 | 40 | + | Neg. | 700 | 178 | 58 | 42 |
| | | " 29 | " " | 40 | 25 | Neg. | .. | .. | 14 | 100 | 0 |
| 15 | 4 | Aug. 25 | Turbid | 250 | 90 | + | .. | 710 | 350 | 15 | 85 |
| | | " 27 | " " | Low | 100 | + | Tr. | 705 | 225 | 10 | 90 |
| | | Sept. 6 | Clear and colourless | Low | 40 | + | .. | .. | 1 | 100 | 0 |
| 16 | 16 | Sept. 3 | " " | 145 | 25 | + | Neg. | 720 | 15 | 66 | 34 |
| | | " 18 | " " | 15 | 20 | Ft. tr. | .. | 710 | 2 | 100 | 0 |
| 17 | 26 | Sept. 21 | " " | 70 | 20 | Neg. | .. | .. | 20 | 80 | 20 |
| | | " 29 | " " | .. | .. | .. | .. | .. | .. | .. | .. |
| 18 | 15 | Oct. 5 | " " | 170 | 30 | + | Ft. tr. | 690 | 130 | .. | .. |
| | | " 11 | " " | 155 | 30 | Tr. | .. | .. | 30 | 90 | 10 |
| 19 | 17 | Oct. 3 | " " | Low | .. | Neg. | .. | .. | 2 | 100 | 0 |
| | | " 8 | Slightly opalescent | 40 | 30 | Tr. | .. | 700 | 350 | 0 | 100 |
| | | " 14 | Very slight opalescence | 70 | 30 | Neg. | .. | .. | 12 | 84 | 16 |
| | | " 22 | Clear and colourless | 70 | 50 | Tr. | .. | .. | 40 | 100 | 0 |
| 20 | 10 | July 15 | Turbid | 300 | 160 | ++ | .. | 680 | 1000 | 20 | 80 |
| | | " 22 | " " | .. | .. | .. | .. | .. | .. | .. | .. |
| | | " 29 | " " | .. | .. | .. | .. | .. | .. | .. | .. |
| 21 | 49 | May 12 | Clear and colourless | 230 | 160 | + | Ft. tr. | .. | 1 | 100 | 0 |
| | | " 17 | " " | 40 | 80 | + | .. | .. | 1 | 100 | 0 |
| | | " 23 | " " | .. | 55 | .. | .. | .. | 1 | 100 | 0 |
| 22 | 25 | Nov. 2 | " " | 160 | 50 | Neg. | .. | 710 | 74 | 100 | 0 |
| | | " 8 | " " | 130 | 50 | + | .. | 740 | 56 | 100 | 0 |
| | | Jan. 22, 1947 | " " | 90 | 40 | Tr. | Neg. | .. | 2 | 100 | 0 |

.. indicates that test was not done. Fluids sterile in all cases. Wassermann reaction, done in adults, always negative.

being kept in a "frog-like" position. The stiff muscles were tender but showed no atrophy. Tendon-jerks all became increasingly brisk during his stay in hospital, and the rt ankle-jerk gave an almost clonic response. (There was a notable tendency to hold rt foot plantar flexed.) Abdominals were absent, and the plantars difficult to obtain but probably flexor. Gradual lessening of pain and stiffness in back, leg, and thigh muscles, and gradual return of free movements. Simultaneous lessening of apathy and increased cheerfulness.

C.S.F. (July 26): clear; pressure about 250 mm.; total protein 80 mg. per 100 c.cm.; Pandy positive; chlorides 730 mg. per 100 c.cm.; lymphocytes 6 per c.mm.; sterile.

C.S.F. (August 6): clear; pressure 150 mm.; total protein 40 mg. per 100 c.cm.; Pandy positive; chlorides 690 mg. per 100 c.cm.; 35 lymphocytes per c.mm.; sterile.

Follow-up.—After discharge, he gradually regained use of legs, and six weeks later (Sept. 30) was running about though a little unsteadily. Mother also thought that there was at that time a little unsteadiness in use of rt arm for fine movements. No muscular wasting, and all movements full and free. Some persistent exaggeration of ankle-jerks, especially on rt side, but both plantars definitely flexor. Ultimately made complete recovery.

Case 11.—A girl, aged 6 years, was admitted on July 29 with a history of sudden onset of severe frontal headache and temperature of 102° F six days before admission. Intermission in fever and headache had followed for two days, but in last three days before admission there had been fever and increasing headache and drowsiness. Delirium on day of admission.

On admission she was very drowsy and hard to rouse for first three days in hospital; neck stiffness, but Kernig negative; no cranial-nerve abnormality apart from slight nystagmus; no wasting or loss of muscle power; tendon-jerks all brisk, apart from lt knee-jerk, which was slightly depressed; plantars both extensor.

White-cell count (July 29): 15,700 per c.mm. (polymorphs 74%, lymphocytes 20%, mononuclears 5%, myelocytes 1%).

C.S.F. (July 29): clear; pressure 180 mm.; total protein 30 mg. per 100 c.cm.; Pandy positive; chlorides 730 mg. per 100 c.cm.; cells 85 per c.mm. (lymphocytes 63%, polymorphs 37%); sterile.

Further Course.—Child brightened rapidly after first few days, and temperature was normal on third day in hospital. Neck stiffness not noted after first week in hospital, but tendon-jerks all became exaggerated; and, though plantars became and remained indefinite, there was a slight reflex leg withdrawal for about two weeks. Abdominals absent. Cranial nerves normal. Walking at first was unsteady; but, ten weeks after onset of illness, child is strong and active, although ankle-jerks are slightly increased and plantar responses remain indefinite.

C.S.F. (August 8): clear; pressure 80 mm.; total protein 40 mg. per 100 c.cm.; Pandy negative; 4 lymphocytes per c.mm.

Case 21.—A woman, aged 49, was admitted on May 12 with a history of having had headaches and giddy attacks for two years, but neurological investigations had been negative. Severe attack of vomiting in the morning was rapidly followed by unconsciousness, and she was admitted in light coma.

On admission she was febrile (temperature 103.2° F) and was semi-conscious and frothing at the mouth; could just be roused but made no further response; neck showed very slight stiffness; pupils small and not reacting to light; cranial nerves otherwise normal; slow athetoid movements of arms; tendency to flexion of arms, wrists, and fingers, but legs held firmly extended at knees, and feet plantar flexed; great increase in tendon-jerks, especially on the right; abdominal responses absent, and plantars indefinite; blood-pressure 140/80; nil of note elsewhere; skull radiogram normal.

C.S.F. (May 12): clear; pressure 230 mm.; no block; total protein 160 mg. per 100 c.cm.; Pandy positive; 1 lymphocyte per c.mm.; sterile.

Blood Wassermann reaction negative.

Further Course.—Patient recovered consciousness during the next two days, and pupil reaction gradually returned in this time. She was noisy on the third night in hospital, but thereafter rational. Temperature was normal on third day. Central nervous system on fourth day, apart from accentuated tendon-jerks in the legs (rt > lt) and an equivocal rt plantar response, was normal.

Early in convalescence an involuntary shakiness of arms was noted, but subsequently this disappeared and patient made a good general recovery.

Mr. T. G. I. James, of the Central Middlesex Hospital, kindly excluded any local lesion of the central nervous system before patient was discharged, and I am indebted to him for some of the later observations on this case.

The possibility of encephalitis lethargica was considered but thought improbable, since, according to Hall (1924), sudden onset is unusual and a high c.s.f.-protein level is rare in that infection. The good progress made up to Nov. 15 also, to some extent, supports the inclusion of the case in this series.

Cases Showing Predominantly Meningitic Signs

Case 2.—A man, aged 42, was admitted on April 11 with a history of very sudden onset of severe general headache, vomiting, and mental confusion on April 1. He had vomited for four days, and then symptoms had begun to abate.

On admission he was lucid; well-marked neck stiffness; Kernig negative; fine bilateral nystagmus; tendon-jerks all very brisk, but not much exaggerated; abdominals just present; plantars flexor.

C.S.F. (April 11): pressure 160 mm.; opalescent; total protein 400 mg. per 100 c.cm.; Pandy +++; chlorides 620 mg. per 100 c.cm.; leucocytes +++ (lymphocytes 95%, polymorphs 5%); sterile.

Further Course.—Later cleared well, but showed transient depression of lt ankle-jerk and exaggeration of lt knee-jerk; final complete recovery.

C.S.F. (April 16): pressure 120 mm.; total protein 240 mg. per 100 c.cm.; Pandy ++; chlorides 690 mg. per 100 c.cm.; leucocytes 100 per c.mm. (lymphocytes 95%, polymorphs 5%).

Case 3.—A girl, aged 11 years, was admitted on May 27 with a history of fever six days before admission. After a brief subsidence, this had returned two days before admission, with rigor, frontal headache, and generalised muscular pains. There had been intermittent, general, and severe headaches, and vomiting on the day before admission.

On admission she was febrile; tongue furred; frontal headache and mental irritability; slight neck stiffness; Kernig negative; tendon-jerks all exaggerated; abdominals all very brisk; plantars both extensor; cranial nerves all normal, and no limb weakness; chest clear.

C.S.F. (May 27): pressure 120 mm.; slight opalescence; total protein 30 mg. per 100 c.cm.; Pandy negative; chlorides 710 mg. per 100 c.cm.; cells 62 per c.mm. (lymphocytes 48%, polymorphs 52%).

White-cell count: 10,200 per c.mm. (polymorphs 68%, lymphocytes 28%, mononuclears 6%).

Further Course.—Rapid recovery; symptom-free after four days, and afebrile after one week; but tendon-jerks were still very brisk, and plantars both extensor. Even at discharge lt plantar was indefinite, though rt was flexor.

Follow-up (Nov. 5):—Has remained perfectly well, and reflexes are now normal.

Case 4.—A boy, aged 10 years, was admitted on June 11 with two weeks' history of occipital and nuchal pain, soon followed by pains in lower limbs. Neck pains associated with stiffness of neck muscles. Leg pains greatly accentuated by sitting up in bed.

On admission he was thin and weakly; temperature 99.8° F; tongue furred; no headache, but pain on attempted flexion of neck; very marked neck stiffness, and Kernig very strongly positive; stiffness of back muscles; cranial nerves all normal; no muscular wasting, and no loss of power or of coordination in limbs; all tendon-jerks depressed, apart from knee-jerks, which were very brisk; abdominals all present; but plantars indefinite.

C.S.F. (June 11): pressure 170 mm.; clear; no block; total protein 200 mg. per 100 c.cm.; Pandy ++; chlorides 730 mg. per 100 c.cm.; 1 lymphocyte per c.mm.; sterile.

Further Course.—Gradual slow improvement, but low intermittent fever, with evening temperatures between 98.4° and 99.4° F until sixth week in hospital. Became generally brighter and stronger, but neck stiffness was still just present two weeks after admission. Kernig's sign was still strongly positive at end of month. Only occasional headaches by then. Tendon-jerks remained very brisk, particularly on lt side, and though plantar responses were flexor there was tendency to a withdrawal response in lt lower limb almost up to time of his discharge. Chest normal.

June 12: white-cell count 10,400 per c.mm.

June 17: blood-sedimentation rate 6 mm.; Mantoux negative 1:1000.

TABLE II—DETAILS OF NON-MENINGITIC ("INFLUENZAL") CASES

| Case | Age (yr.) | Duration of prodromal malaise (days) | Onset | Duration of fever (days) | Duration of headache (days) | Vomiting | Neck stiffness | Photophobia | Mental changes | Diarrhoea | c.s.f. changes | Backache | White-cell count |
|------|-----------|--------------------------------------|---------|--------------------------|-----------------------------|----------|----------------|-------------|------------------------|-----------|---------------------|----------|---------------------|
| 23 | 33 | .. | Sudden | 10 | 8 | No | + | + | V. excitable | No | No | + | Normal |
| 24 | 19 | .. | " | 6 | 6 | + | + | No | No | " | " | + | Slight leucopenia |
| 25 | 5 | 28 | " | 6 | 5 | + | + | + | Irritable | " | " | No | Normal |
| 26 | 10 | 28 | " | 7 | 3 | No | No | No | No | " | .. | + | Leucopenia |
| 27 | 18 | .. | " | 6 | 6 | + | " | " | " | " | .. | .. | Normal |
| 28 | 26 | .. | " | 4 | 4 | No | " | " | " | " | .. | + | Leucopenia |
| 29 | 15 | .. | " | 7 | 7 | + | " | " | Drowsy | " | No | + | .. |
| 30 | 30 | 28 | " | 6 | 5 | No | + | + | Confused and depressed | " | Ft. tr. of globulin | No | Slight leucopenia |
| 31 | 15 | .. | " | 5 | 4 | " | No | No | No | " | 4 lymphs. per c.mm. | " | Slight leucopenia |
| 32 | 33 | .. | Gradual | 10 | 9 | " | " | + | " | + | .. | " | Normal |
| 33 | 63 | 2 | Sudden | 9 | 10 | " | + | + | " | No | 4 lymphs. per c.mm. | + | .. |
| 34 | 19 | 28 | Gradual | 10 | 4 | " | No | No | " | + | .. | + | Slight leucocytosis |
| 35 | 4 | 21 | Sudden | 5 | 3 | + | + | Slight | Drowsy | No | 6 lymphs. per c.mm. | No | Normal |

.. indicates test not done.

Follow-up (August 24).—Very well and free from signs and symptoms. (For later examinations of c.s.f. see table I.)

Case 19.—A boy, aged 17 years, was admitted on Oct. 2 with a history of severe headache several hours after a fall from a ladder four days before admission. Head not appreciably injured. Anorexia and fever with the headache, and next day more severe headache and vomiting. Nausea and severe occipital headache persisted up to the time of admission.

On admission he was flushed and febrile (temperature 102° F); coryza, with suffusion of conjunctivæ; slight neck stiffness; some mental dulling; all tendon-jerks brisk; plantars probably both flexor; abdominals all a little depressed.

C.S.F. was under low pressure and showed no abnormality (table 1). Skull radiogram normal.

White-cell count (Oct. 8): 7200 per c.mm. (polymorphs 59%, lymphocytes 33%, mononuclears 3%, eosinophils 5%).

Further Course.—Remained unwell for a week after admission, with temperature rising to 103° and 104° F in first five days. Frontal headache and mental dulling persisted in this period, and the neck stiffness and a positive Kernig's sign were just apparent. The central-nervous-system signs remained little changed, though the rt plantar at times showed an extensor tendency.

Lumbar puncture was repeated on Oct. 8, with now definite meningitic findings; slightly opalescent fluid; total protein 30 mg. per 100 c.cm.; chlorides 700 mg. per 100 c.cm.; polymorphs 350 per c.mm.; sterile.

Thereafter steady improvement was made; and, though slight stiffness of the neck and occasional frontal headaches were noted for another ten days, temperature became normal and remained so. Plantar responses also became definitely flexor, and patient appeared fully recovered four weeks after his admission.

Subsequent c.s.f. examination showed fewer cells and a preponderance of lymphocytes (table 1).

Had occasional headaches for a short while after discharge; otherwise well.

Case 12.—A girl, aged 4 years, was admitted on August 16 with a history of general malaise, irritability, anorexia, and fever for seven days, and neck stiffness and drowsiness for a day.

On admission she was drowsy, but coöperative when roused; neck very stiff; Kernig positive only on rt side; no muscle wasting and no loss of power; tendon-jerks normal, and brisk abdominals; plantars flexor; throat clear; tongue clean; temperature 99° F.

C.S.F. (August 16): clear; pressure 100 mm., total protein 40 mg. per 100 c.cm.; Pandy, trace; chlorides 720 mg. per 100 c.cm.; cells 54 per c.mm. (lymphocytes 97%, polymorphs 3%); sterile.

Further Course.—Made good progress, quickly becoming afebrile and losing meningitic signs in four days; but rt

plantar was extensor during the second half of the first week in hospital, and the knee-jerks were very brisk at this time. Fully recovered by discharge (Sept. 4).

C.S.F. (August 31): clear; total protein 40 mg. per 100 c.cm.; Pandy, faint trace; 3 lymphocytes per c.mm.

This last case might be taken as characteristic of the predominantly meningitic cases, those not described here in detail showing similar courses and signs.

GROUP II—NON-MENINGITIC CASES

There were 13 cases (table II) in which the symptoms and signs were very similar to those just described, but the changes in the c.s.f. (when this was examined) were absent or so slight as to have little diagnostic weight. These cases were again largely in children and young adults, and headache and slight stiffness of the neck were again the chief features in a brief febrile illness usually of sudden onset. Sore throat and coryza occurred occasionally, and chest, lumbar, and limb pains were sometimes noted. Diarrhoea was reported twice. In cases 23 and 30 there was transient mental confusion and excitement which may have been due to mild encephalitis; in the others the mind remained clear. Accentuated tendon-jerks were again noted in many patients, but the plantars were flexor in all cases except a child (case 35) seen at the end of November with a history of sudden headache following a period of malaise, and with mild meningitic signs and transient extensor plantar responses.

The others appeared during the same period as the encephalomeningitic cases just described, and the peak of incidence of the two groups fell within the same period (see figure). The chief features of these patients, who seemed to be less intensely affected by the same causal virus as was active in cases 1–22, are detailed in table II. The headaches were either predominantly or entirely frontal, and the fever tended to be irregular and intermittent. In nearly all cases temperatures of 102° to 103° F were recorded. In case 23 the spleen was just palpable for the first few days. As in the meningitic cases, there was in the blood a tendency to leucopenia and relative lymphocytosis rather than leucocytosis. The Widal and Paul-Bunnell tests were done in some of the cases and were negative in each instance.

Though in all cases the severe symptoms came on suddenly, there was in some of them a period of a few weeks in which there had been lassitude and subnormal health (cf. cases 8 and 17 in group 1).

The diagnosis of "influenza" might have been applied to these cases had they not occurred in the same districts of N.W. Middlesex at the same time as the evident neurotropic-virus infections. That fewer of them were seen in hospital than the frankly encephalomeningitic types was probably due to the fact that other patients were not sufficiently ill to need hospital treatment. Cases 28, 30, and 34 were members of the Redhill Hospital nursing staff.

As in group I all the cases in group II made full and lasting recoveries.

CEREBROSPINAL FLUID FINDINGS

Table I shows that a great variety of results was obtained in the C.S.F. examinations, but not more than in other features. Some cases showed a very low cellularity, making them hardly separable from the "non-meningitic" cases. In cases 2 and 21 the cell-counts reached four figures. Usually our cases showed much fewer cells than did those detailed by Armstrong (1941). Polymorphs predominated at the outset in cases 3, 5, 14, 19, and 21, but in the other cases, though various numbers of polymorphs were seen early on, lymphocytes predominated.* In all cases where repeated observations were made the cells became increasingly lymphocytic as the illness took its course; and in the great majority no treatment, apart from the lumbar punctures, was used. The protein content was normal or only slightly increased in most cases, and its increase appeared to bear no constant relationship to the cell-count. The cases with high protein contents were the most severe in the series, and some of these showed very few cells. These cases may have been infected with a different virus from that in other cases. The protein showed no real tendency to rise, but was usually less in the later lumbar punctures. The chlorides, except for a fall in 1 case to 620 mg. per 100 c.cm., were little if at all reduced, and so support the view that they are a useful diagnostic aid in excluding tuberculous meningitis. On the other hand, cases of tuberculous meningitis may show a delay in the fall of chlorides, which causes a temporary difficulty in diagnosis.

The pressures recorded in the C.S.F. were extremely variable, and, allowance being made for the fact that in some of the small children the pressure was probably raised by nervous activity, there were a surprising number of low readings.

In all cases the fluid steadily returned towards normal in two or three weeks, but in several cases there was some excess of lymphocytes at the end of this time.

COURSE AND TREATMENT

The patients all made good recoveries, though 3 complained of occasional headaches for several weeks after discharge, and 2 with facial paralysis have yet to recover completely from these palsies. Most patients were in hospital two or three weeks; in the mildest cases the illness lasted about a week, but 3 of the patients most severely affected were ill six weeks. Case 8, with simple meningitic signs, showed a low fever for four weeks.

Treatment appeared to have little effect on the illness. Short courses of sulphonamides were given in cases 6, 15, and 20, but these patients did no better than many who had no treatment. Of 2 cases of equal severity, both treated with sulphonamides and penicillin, case 15 showed prolonged meningeal signs and case 20 showed rapid improvement. Other writers have not found sulphonamides effective in lymphocytic meningitis, but from our brief experience it is impossible to draw any conclusions about the effect of penicillin. There is rarely any need for special therapy, apart from the usual analgesic treatment for headaches.

* Since the end of this series two further cases of virus meningitis have been seen with well-marked initial polymorph predominance (80-90%) in total cerebrospinal fluid cell-counts of 300 per c.mm.

Lumbar puncture gave symptomatic relief where the headache was associated with a raised C.S.F. pressure.

DISCUSSION

In 35 cases of infection, with headache and other features in common, seen in a large district during eight months, only rarely was there good evidence of the initial upper respiratory infection noted in benign lymphocytic choriomeningitis (Armstrong and Dickens 1935), but the illnesses were, in many cases, at first general and of sudden onset, the signs of nervous system involvement following several days later. These nervous signs at times were well marked; at other times they were slight enough to be obscured by the general illness and to make the clinician hesitate about lumbar puncture. In spite of variable intensity of the illness and of the variable involvement of the nervous system, it is suggested that many of these cases were due to the same virus. It is obviously impossible, without further examination, to say what that virus may be, but it may be noted, without any implications, that its effect on the nervous system resembles that of the virus of so-called "benign lymphocytic choriomeningitis" (Armstrong and Lillie 1934). Our cases fall readily into Armstrong's (1941) purely descriptive classification of "influenzal," meningitic, and encephalomeningitic types (see also Armstrong and Hornibrook 1941, and Keliher 1944). According to Wyburn-Mason (1944), they also resemble cases infected with this virus in that most of them show a prodromal premeningitic phase. A point of difference is the main incidence of our cases about midsummer (see figure), whereas the group described by Armstrong occurred mainly in spring and autumn. Our cases also showed much fewer cells in the C.S.F., on the average, than were found in his (Armstrong 1941). A further distinction between our cases and Armstrong's is the slender evidence in favour of a mouse-carried infection in the Middlesex cases (see below).

In mind of the source of the infection we have borne in mind Armstrong's (1940) report of the work of Lillie and himself in which grey mice trapped at random were found to be harbouring the choriomeningitis virus. They found also that mice caught in the homes of virus-meningitis patients were very often infected with the virus.

Our inquiries on this subject gave various, but mainly negative, answers. Cases 3 and 6 came from homes "overrun with mice," and cases 4, 7, 9, and 19 had some mice in their homes. Yet case 14 had no mice at home, but had just spent a holiday in an old house in the country. In 22 cases, including 12 in group II, there were no mice in the homes. The houses in the district are for the most part new; and many homes had cats, to which due tribute was paid.

In view of the prevalence of abortive influenza-like attacks in the past year, it is possible that some of these may be examples of a very mild type of neurotropic virus infection. Armstrong found considerable evidence of abortive choriomeningitis infection in the United States, where 11% of 2000 sera collected at random from persons without history of nervous disorder contained antibodies for the virus. The possibility of such human agents in spreading these infections has yet to be fully excluded.

Infections which may cause meningitic illnesses similar to those of our cases are mumps, glandular fever, Weil's disease, herpes zoster (Armstrong 1943), swine-herd's disease (Durand et al. 1936), and pseudo-lymphocytic choriomeningitis (MacCallum et al. 1939). No evidence to support the first four conditions was found, and the fifth is mainly confined to France and Italy.

Though less similar, poliomyelitis has to be considered in certain cases, such as 4 and 10, in our series, where the C.S.F. protein was raised and the cells little increased. In case 21 encephalitis lethargica has been

considered as a possible cause of the illness; but it has been felt justifiable to include all three in the series. If their inclusion provokes disagreement, it is hoped that it may also serve as a reminder that in cases of this type the clinician greatly depends for an exact diagnosis on the help of the expert in virus infections.

The virus of lymphocytic choriomeningitis (Armstrong and Lillie 1934) may cause a severe general infection and death, and Smadel et al. (1942) have described pneumonic lesions in two such cases. Though one of our cases had transient chest pain, we found no evidence of pneumonia in any of them, and so were unable to link the condition in any way with the virus pneumonias which have been prevalent in recent years, often with severe headache as a troublesome symptom.

In the group of cases described by Noone et al. (1936) one died of encephalitis, and another death was reported by Viets and Shields (1937). Whether due to the virus of Armstrong and Lillie or to a similar neurotropic infection, there is no need, at this point, to emphasise the fact that all these infections, though often transient, sometimes are not "benign" and are liable to be much more than a mere "choriomeningitis." The term "lymphocytic" also may not always be applicable in the early stages, if the Middlesex cases are to be taken as a guide; Wyburn-Mason (1944) also cites other authors who have noted a predominance of leucocytes in the early stages of virus meningitic infections.

In an attempt to isolate the causal agent, the following experiments have been carried out by Dr. F. O. MacCallum at the Central Public Health Laboratory, Colindale. Seven specimens of c.s.f. obtained on the sixth to tenth days from onset of illness, and nine specimens of blood obtained on the seventh to twentieth days from onset, were used for the inoculation of mice, guineapigs, white rats, cotton-rats, and rhesus monkeys. Three pools were used for mice and guineapigs, and one for rats, cotton-rats, and monkeys. The c.s.f. were inoculated intracerebrally, and blood and c.s.f. intraperitoneally. There has been no evidence of illness following inoculation of these animals. Examination of convalescent sera for antibodies for various neurotropic and other virus diseases will be done later.

CONCLUSION

It may be said that the weight of evidence is against these cases being due to an infection by the virus of Armstrong and Lillie. Whether one or more viruses were responsible for the infections also remains to be shown; and whereas it is easy to dismiss such a group of cases as due to various infections, it is more difficult to adduce certain evidence either for or against this conception. On the one hand, the well-known variations in the c.s.f. findings and the clinical picture, even in a recognised infection such as Armstrong's virus, and, on the other hand, the number of neurotropic viruses as yet not isolated, both make exact diagnoses difficult. An outbreak of virus infections of the nervous system, such as has been described from one district, always requires identification by an expert in virus diseases.

I am indebted to Dr. F. O. MacCallum and Dr. Robert Cruickshank, of the Central Public Health Laboratory, Colindale, for their help with the virus investigation of these patients; to Dr. J. Hamilton-Paterson and the Pathological Department at Redhill County Hospital for the other laboratory investigations; to my colleague, Dr. L. I. M. Castleden, for showing me three of the cases; and to Dr. F. Ashton for help with the investigation of the younger children.

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CONTINUOUS INJECTION OF PENICILLIN

THE SECUNDERABAD APPARATUS

J. H. BOWIE

M.B. Edin.

MAJOR I.M.S.

G.H.Q. (INDIA) PENICILLIN RESEARCH TEAM

M. D. BORCAR

CAPTAIN I.A.M.C.

THE penicillin research team (India Command) was associated with the war wounds research centre at the India Command Orthopaedic Hospital in Secunderabad, to which British troops were evacuated from Burma. The cases treated at the centre were mainly unhealed compound fractures of the femur. The average period between wounding and admission to the centre was three months, and in these cases penicillin often had to be administered over long periods. The general condition on admission was exceptionally low owing to the long-continued sepsis, malaria, dysentery, nutritional macrocytic anaemia, effects of heat, and other conditions inseparable from active service in this theatre.

The difficulties experienced in these cases, when penicillin was administered by three-hourly injections or by ordinary Army saline-giving sets, prompted the development of a method for continuous administration in small volume. In this we were encouraged by the results reported by the pioneers in continuous injection of penicillin (McAdam et al. 1944, Morgan et al. 1944) and by Army medical reports from Middle East and Europe by Brigadier J. S. K. Boyd, Lieut.-Colonel G. K. G. Mitchell, Major K. E. A. Hughes, and Major S. T. Cowan on their experiences with available methods of continuous injection. We concluded that penicillin should be injected continuously in as small a volume as possible, and that rubber tubing should be avoided. Since the amount of sodium penicillin commonly administered in twenty-four hours is readily soluble in 2 ml. of water, we formed the opinion that a syringe should be attached to the patient and some means evolved to depress the piston slowly over a period of hours.

Lieut.-Colonel H. R. Harley, who commanded the war wounds research centre, Captain R. A. Ree, R.E.M.E., and Lieutenant W. C. Osbourne, R.E.M.E., were associated with us in the development of the apparatus.

THE APPARATUS

The apparatus (fig. 1) consists of a 2 ml. syringe mounted on the convex surface of a small aluminium base plate; the syringe is retained in position by front and rear clasps. The concave surface of the plate is secured to the patient's skin with short 'Elastoplast' straps (fig. 2). Arranged on the base plate, behind and in line with the syringe, there is a lead-screw* which engages a screw-threaded hole in the centre of a sliding block (fig. 1). The block is supported by, and slides along, two guides which transfix the block and lie one

* A screw whose rotation causes an object threaded on to it to move to and fro along the axis of the screw; vices and adjustable spanners are examples of the principle.

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on each side of, and parallel to, the lead-screw; these guides prevent rotation of the sliding block. The block is moved away from or towards the syringe by clockwise or anti-clockwise rotation of the lead-screw. The enlarged rear end of the piston rod is clamped in a suitable recess provided in the sliding block. The to-and-fro movement of the sliding block is communicated through a hollow piston rod to the piston block in the syringe barrel.

The pitch of the thread cut in the lead-screw is such that twenty-four complete revolutions cause the piston to move up or down the syringe barrel a distance of 33 mm.; these excursions of the piston effect complete charge or discharge of the 2 ml. injection syringe.

To prevent clothes becoming caught up in the rotary mechanism, a transparent plastic removable cover (fig. 2) stretches from side to side over the lead-screw, syringe, and plate.

The lead-screw is rotated by an alternating-current electric motor acting through a flexible drive in the form of a motor-car speedometer cable in a flexible plastic sheath (fig. 2). The inner cable is attached to the lead-screw by inserting its square end into a square hole at the rear end of the lead-screw; the outer cover cable is attached to the base plate with a thumb-screw. Both inner and outer cables are therefore readily detachable. Each cable is 9 ft. long, and cables can be joined together lengthwise with simple junction pieces. Before the injection can start, sufficient torque must be built up in the inner cable; this occupies 5-7 min. for each 9-ft. length, attached lengthwise between motor and syringe, at the slow speed of rotation by the specially low-g geared motor.

Between the motor and the flexible drive cable a reduction gearing system is interposed to produce twenty-four revolutions in twenty-four hours in the lead-screw on the base plate; it thus takes a day to evacuate the syringe.

To cope with fluctuations in voltage, a centrifugal constant-speed device is incorporated between the motor and the reduction gearing system.

To recharge the syringe, rotation of the flexible drive is performed by hand with a gramophone winding handle, after disconnecting the reduction gearing and motor from the flexible drive with a clutch.

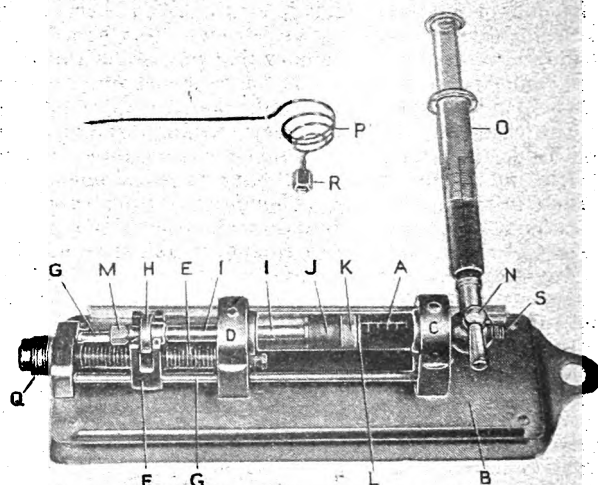


Fig. 1.—Base plate and injection syringe (with needle and flexible drive detached) to show details of lead-screw and loading syringe in position: A, injection syringe; B, base plate; C and D, front and rear claps; E, lead-screw; F, sliding block; G, sliding block guides; H, enlarged rear end of piston rod; I, hollow piston rod; J, piston block; K, ring of resilient material; L, circular disk; M, regulating thumb-screw to adjust K; N, three-way tap; O, reloading syringe; P, flexible coiled injection needle; Q, thread to attach thumb-screw of flexible drive outer cable; R, needle-retaining nut; S, thread for R.

Owing to the slow advance of the piston during injection of 2 ml. in twenty-four hours the liquid in the syringe tends to leak past the piston. To obviate leakage at this point the piston is fitted with a ring of resilient material disposed between a shoulder at the front of the piston block and a circular disk, the diameter of which is a shade less than the bore of the syringe (fig. 1). The position of the disk is controlled by a rod fixed to its rear flat surface. The rod extends axially of the piston rod, which is tubular, and is provided at its free end with a regulating thumb-screw. By moving the disk towards the shoulder with the thumb-screw, the ring of resilient material is expanded in diameter and can thus be brought into very close engagement with the interior of the syringe barrel and in this way prevents any leakage past the piston. The regulating thumb-screw can be adjusted while the piston is in motion.

The end of the syringe to which the needle is not attached is closed with a small pledget of wool inserted between the inner surface of the barrel and the piston rod; this maintains sterility inside the syringe during the daily excursions of the piston. The wool is kept in position with a cap which fits over the syringe barrel and is enclosed by the rear clamp retaining the syringe on the plate.

The end of the syringe to which the needle is attached is provided with two exit openings controlled with a three-way tap (fig. 1). One of the openings forms an adapter for the nozzle of a second syringe, with which the injection syringe can be automatically recharged by twenty-four manual rotations of the lead-screw through the flexible drive. This adapter is flamed before reloading, and sterility is maintained during the twenty-four-hour injection period with an air-tight cap.

The second exit opening from the injection syringe forms the

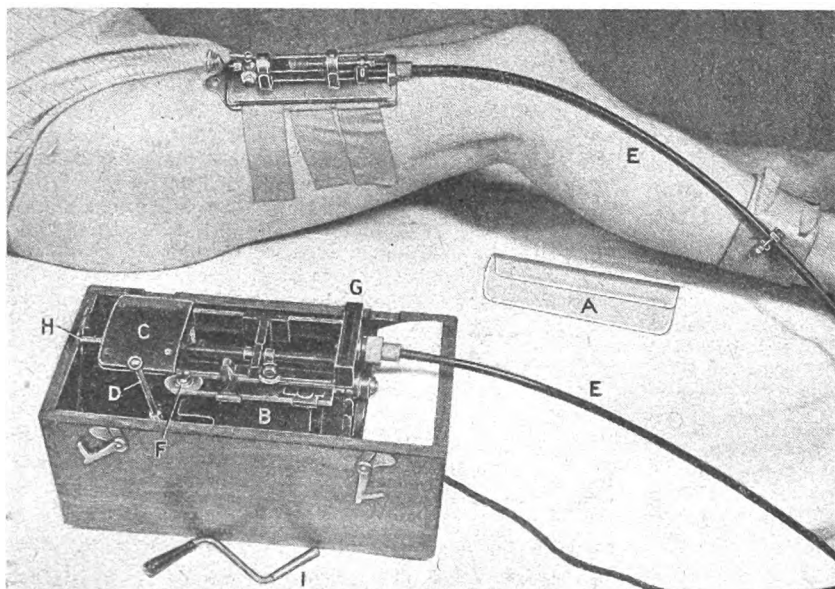


Fig. 2.—Apparatus set up for use on patient: A, plastic cover to protect syringe and coiled needle; B, motor; C, reduction gear-box; D, clutch handle; E, flexible drive (speedometer cable); F, trip-switch; G, distribution box; H, spindle for reloading; I, handle for reloading.

concavity into which the bulbous end of the special injection needle is clamped with a retaining nut; the method is similar to the fixation mechanism between needle and syringe in the type of all-metal syringes used to induce local anaesthesia in dentistry.

An intermediate portion of the needle is coiled like a delicate spring (fig. 1) to impart flexibility to the needle; the coil takes the place of rubber or plastic tubing in other methods of continuous injection. The needle can be suitably shaped for intramuscular, subcutaneous, or intravenous injection.

ADVANTAGES

This method has the following advantages over other methods described for continuous injection:

(1) The mechanical advantage inherent in rotary drive through a lead-screw ensures an absolutely constant injection; this in turn ensures a maximal constant blood-penicillin level at minimal expenditure of the drug.

(2) The mechanism of the sliding block is identical with that of an ordinary vice, and the potential pressure under which the injection is effected is 52 lb. to the square inch; this eliminates the possibility of blockage in the needle during injection.

(3) Supervision is unnecessary, except when the apparatus is set up on the patient and when the syringe

TABLE I—CONSTANT BLOOD-PENICILLIN LEVELS UNDER CONTINUOUS ADMINISTRATION OF PENICILLIN

| Case no. | Body-weight (lb.) | Daily dose of penicillin (units) | Constant blood-penicillin level attained within 48 hr. | Figures in previous column corrected for standard body-weight of 140 lb. | Dose, calculated from daily dose and blood-penicillin level, required to maintain a constant level of 0.02 unit of penicillin per ml. of serum per 140 lb. of body-weight |
|----------|-------------------|----------------------------------|--|--|---|
| 1 | 142 | 120,000 | 0.128 | 0.13 | 18,500 |
| 2 | 135 | 120,000 | 0.128 | 0.123 | 19,500 |
| 3 | 180 | 100,000 | 0.068 | 0.087 | 23,000 |
| 4 | 175 | 100,000 | 0.068 | 0.085 | 23,500 |
| 5 | 138 | 80,000 | 0.068 | 0.067 | 24,000 |
| 6 | 160 | 80,000 | 0.068 | 0.077 | 20,500 |
| 7 | 136 | 80,000 | 0.068 | 0.066 | 24,000 |
| 8 | 136 | 35,000 | 0.032 | 0.032 | 22,500 |
| 9 | 170 | 35,000 | 0.023 | 0.028 | 25,000 |
| 10 | 140 | 35,000 | 0.032 | 0.032 | 22,000 |
| 11 | 140 | 28,000 | 0.023 | 0.023 | 25,000 |
| 12 | 134 | 28,000 | 0.023 | 0.022 | 25,500 |
| 13 | 132 | 28,000 | 0.023 | 0.022 | 26,000 |

the flexible cable drive is attached to the syringe base plate with a thumb-screw, he can leave the ward by separating the cable at this point.

(6) Booster doses can be given at any time during treatment—e.g., in the operating theatre—by manual rotation of the flexible drive.

(7) According to the number of cable adapters fitted to the distribution box on the motor, any number of patients in a ward can be treated simultaneously.

(8) The penicillin is not in contact with rubber tubing, which may have a deleterious action on it. Soft flexible tubing of any sort entails dead space and limitation of movement on the part of the patient in avoiding kinks.

BLOOD-LEVELS OBTAINED

Assays of penicillin were performed at short intervals on the serum of patients under continuous administration with this apparatus, to determine whether the blood-penicillin level was constant or rose during the night, and whether it varied among individuals on the same dose.

The blood-penicillin level was assayed by a slide-cell test based on that of Colebrook et al. (1923), as modified by Florey and Florey (1943), Heatley (1944), and Fleming (1943 and 1944).

Since it was desirable that abnormal blood volumes should not distort results, and since blood would have to be taken at short intervals during the day and night, we used volunteers among convalescent patients.

Two patients were put on 120,000 units per twenty-four hours, two on 100,000, three on 80,000, three on 35,000, and three on 28,000. The penicillin used was 'Lederle' no. 782 H134C, expiry date Sept. 23, 1945.

The constant blood-penicillin level attained in each case is given in table I, with the patient's weight and the

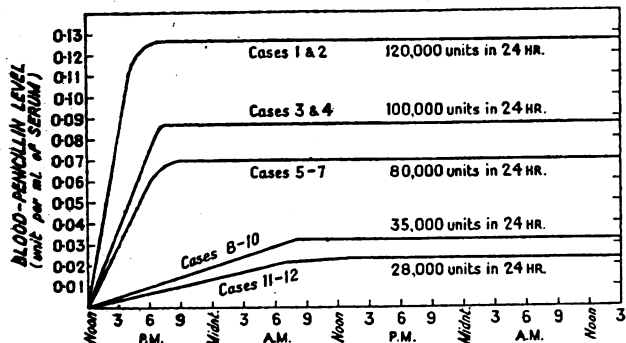


Fig. 3—Average blood-penicillin levels in patients on same doses, assayed three-hourly and adjusted for a standard body-weight of 140 lb.

is recharged at intervals of twenty-four hours. The penicillin produced by most manufacturers causes some tissue damage at the site of continuous injection; this is rendered apparent on the fourth or fifth day by the onset of tenderness near the needle. It is advisable to avoid the possibility of abscess formation by changing the site of the needle every four or five days.

(4) The small volume (2 ml.) in which the penicillin is injected reduces proportionately (a) pain and local oedema, and (b) deterioration of the penicillin at room temperature.

(5) The patient is not confined to bed but to the length of his cable. He can sit at the bedside and, since

TABLE II—CALCULATION OF BLOOD-PENICILLIN LEVEL FROM BACTERIOSTATIC LEVEL

| Bacteriostatic level (completely bacteriostatic dilution indicated by the sign -) | | | | | | | | Amount of penicillin present per ml. of serum | |
|---|-----|-----|-----|-----|-----|-----|------|---|---|
| 1/1 | 2/3 | 1/2 | 1/3 | 1/4 | 1/6 | 1/8 | 1/12 | When the sensitivity of the test organism in serum is between 0.016 and 0.02 unit per ml. | When the sensitivity of the test organism in serum is between 0.02 and 0.033 unit per ml. |
| - | + | + | + | + | + | + | + | (0.016 + to 0.03 -) = 0.023 (±0.007) | (0.02 + to 0.048 -) = 0.034 (±0.014) |
| - | - | + | + | + | + | + | + | (0.024 + to 0.04 -) = 0.032 (±0.008) | (0.03 + to 0.064 -) = 0.047 (±0.017) |
| - | - | - | + | + | + | + | + | (0.032 + to 0.06 -) = 0.046 (±0.014) | (0.04 + to 0.096 -) = 0.068 (±0.028) |
| - | - | - | - | + | + | + | + | (0.048 + to 0.08 -) = 0.064 (±0.016) | (0.06 + to 0.128 -) = 0.094 (±0.034) |
| - | - | - | - | - | + | + | + | (0.064 + to 0.12 -) = 0.092 (±0.028) | (0.08 + to 0.192 -) = 0.136 (±0.056) |
| - | - | - | - | - | - | + | + | (0.096 + to 0.16 -) = 0.128 (±0.032) | (0.12 + to 0.256 -) = 0.188 (±0.068) |
| - | - | - | - | - | - | - | + | (0.128 + to 0.24 -) = 0.184 (±0.056) | (0.16 + to 0.384 -) = 0.272 (±0.112) |

dose, calculated by proportion, which would have been necessary, in twenty-four hours, to maintain a level of 0.02 unit of penicillin per ml. of serum at a body-weight of 140 lb.

The values obtained from the three-hourly test results in patients on the same dose were combined after adjusting for a standard body-weight of 140 lb., and the resultant blood-penicillin curves are shown in fig. 3.

In view of the small number of patients and the range of experimental error in the slide-cell test, the results shown in table I and fig. 3 indicate that, in patients under continuous injection of penicillin, the blood-penicillin level becomes constant after a "building-up" period, does not vary appreciably in different individuals on the same dose, and is directly proportional to the dose and inversely proportional to the weight.

TECHNIQUE OF SLIDE-CELL TEST

Before giving penicillin we obtained sufficient serum from the patient for use, undiluted, as the diluent in the serial doubling dilutions of all assays to be performed in his case. The test was performed only once a day—not immediately the specimen was taken. The sensitivity of the test organism (N.C.T.C. 6571 A) was determined daily.

From each patient, at three-hour intervals for forty-eight hours, 0.5-ml. samples of blood were collected in capillary tubes made from lengths of glass tubing (3 mm. internal diameter) drawn off and sealed at both ends in lengths suitable for centrifuging. The tubes were stored vertically at 4° C until centrifuged immediately before the test; we could detect no reduction in the penicillin content of specimens stored in this way up to thirty hours. The specimen was well mixed, and immediately afterwards volumes of 25 c.mm. were removed with a micropipette and placed clockwise round 6-in. petri dishes selected for flat surfaces on the inner aspect of bottoms and lids. A 3 : 2 and then doubling dilution series were interpolated between dilutions in the 1 : 2 series.

The inoculum consisted of a 2 mm. loopful from a well-shaken suspension of the test organism, prepared just before the test, by inoculating 10 ml. of nutrient broth of pH 7.4 with two loopfuls from a well-shaken 10-ml. 16–18-hour broth culture of the test organism which had not been subcultured in broth more than eight times. The strain was maintained on nutrient agar slopes of pH 7.4 and subcultured once a week.

Since we desired to express the highest completely bacteriostatic dilution of the serum in terms of the number of units of penicillin per ml., it was necessary to know the sensitivity of the test organism; this varied between 0.016 and 0.033 unit per ml. in undiluted serum. A slide-cell sensitivity test in triplicate, using P.B.S. in serum in the dilutions 0.08, 0.04, 0.033, 0.02, 0.016, 0.01, and 0.008 unit per ml., was therefore put up in parallel with each day's test.

The highest dilution of the test serum showing complete bacteriostasis having been determined, the equivalent in terms of units of penicillin per ml. of serum was expressed from table II, compiled for the purpose.

ESTIMATION OF DOSAGE REQUIRED

The dose of penicillin required for any particular patient may be estimated if the resistance of the invading pathogen and the patient's body-weight are known.

The blood-penicillin levels described above indicate that a dose of 25,000 units will maintain a blood-penicillin level of 0.02 unit per ml. for every 140 lb. of body-weight. From this datum the dose required to obtain the required blood-penicillin level in any particular patient can be calculated easily by proportion. For instance, if the organism is sensitive to 0.16 unit of penicillin per ml. (eight times more resistant than the Oxford staphylococcus) in a patient with endocarditis whose weight is 7 st., a booster dose of 10,000 units followed by a 24-hour maintenance dose of 140,000 units given continuously would be required.

SUMMARY

The development of an apparatus with which penicillin can be injected continuously in a very small volume of diluent was prompted by the disadvantages, mainly from the patient's point of view, of the methods used for continuous injection, especially over a long period. At

the same time some difficulties, such as needle blockage and those associated with connecting tubing of any sort, have been avoided.

Blood-penicillin levels, observed in a few patients under continuous injection, indicate that the level becomes constant throughout the day and night after a "building-up" period and is directly proportional to the dose and inversely proportional to the patient's weight.

For every 0.02 unit of penicillin per ml. required in the serum, a dose of 25,000 units a day per 140 lb. of body-weight must be given.

The apparatus might be used in research on the action of other drugs.

Lieut.-Colonel A. Sachs, assistant director of pathology, India Command, suggests that, if high blood-penicillin levels were required at intermittent periods, such as those resulting from three-hourly injections of 15,000 units, a suitable gear wheel to effect this could be included in the reduction gearing system.

An application for a patent, together with a provisional specification, has been lodged at the Patent Office, and all patent rights have been assigned to the Ministry of Supply.

The apparatus is being made by Surgical Equipment Supplies Ltd., Westfields Road, N. Acton, London, W.3, to whom the Ministry of Supply have granted an exclusive licence to manufacture without payment of royalties.

We have pleasure in acknowledging the help of Brigadier F. Harris, Brigadier G. K. Fulton, and Colonel E. H. Hall, who formed and equipped the team and later directed the work. Special facilities were extended to the R.E.M.E. officers with whom we worked by Major-General D. R. Duguid, who took an active interest in our problems. For their co-operation we wish to thank Colonel D. C. M. Ettles, who commanded the hospital to which we were attached; Lieut.-Colonel J. S. Maxwell, in charge of surgical division; and Nursing Officer D. Eales, of the war wounds research centre.

The photographs were taken by Mr. E. V. Willmott, A.R.P.S., in charge of the photographic department, British Post-graduate Medical School.

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MAMMARY CYSTS AND THEIR TREATMENT

F. C. PYBUS

M.S. Durh., F.R.C.S.

CONSULTING SURGEON, ROYAL VICTORIA INFIRMARY, NEW-CASTLE-UPON-TYNE; EMERITUS PROFESSOR OF SURGERY IN THE UNIVERSITY OF DURHAM

A FAVOURABLE experience in treating hydrocele of the tunica vaginalis and cysts of the epididymis by aspiration and injection of quinine and urethane¹ led to trial of this treatment in 1934 for a mammary cyst in a patient who had previously had two removed at some years' interval. Its success justified its use in 2 further cases early in 1935, the successful results of which have been published.² A further experience of 21 cases dealt with by this method has suggested a more detailed and complete report.

Incidence

The "single" cyst, as its name suggests, may be the only mammary lesion during a lifetime. There are exceptions, however: a further cyst may develop months or years afterwards, or a cyst may develop simultaneously or subsequently in the other breast. Thus the condition is essentially different from those rarer lesions where

1. Pybus, F. C. *Brit. med. J.* 1930, i, 239.
 2. Pybus, F. C. *Lancet*, 1936, ii, 853.

multiple cysts are present, and from those associated with papillomata. It is a condition of middle age and is about equally divided between the parous and non-parous. Observation of some patients for twelve years shows that the breasts may remain otherwise normal. The presence of a single cyst therefore does not suggest the existence or necessary development of any serious disease.

The contents of such cysts are almost invariably a turbid greyish-green fluid, which leaves a brownish stain on linen. The contents of some of them have been investigated chemically by Dr. Freda Herbert, who reports that they contain mainly cholesterol, phospholipins, and a variable amount of protein but no sign of hæmoglobin or its derivatives. The amount varied from 1 to 30 c.cm., with an average of 5 to 10 c.cm. It is suggested that the contents are a liquefaction of the greyish-green greasy material which occupies the ducts of many breasts in middle age.

From a study of a table of symptoms it appears that about half the patients discover the lump accidentally, and the other half had pain or discomfort lasting from a few days to months.

The physical signs are, as might be expected, very variable. This depends partly on the size of the breast, the size of the cyst, and its situation in relation to depth and whether placed centrally or radially. Thus in a small breast a moderate-sized cyst may be visible or readily palpable as a tense, rounded, or oval swelling which appears to move about within the breast tissue but actually moves with the breast substance. In larger breasts the cyst tends to be less readily defined; and, if placed centrally, it may closely resemble a scirrhus—a central hard ill-defined lump, except for the absence of signs of infiltration or gland metastasis. In many cases the cyst closely resembles a fibro-adenoma (an uncommon tumour) and can be distinguished only by puncture.

It is only occasionally that fluctuation can be obtained, depending on size, absence of undue tension, a superficial position of the cyst, or a dome-like projection on the surface. A suitable apparatus for transillumination has not been available. Final confirmation can be obtained by puncture, when the loss of resistance of the needle on entering the cyst is characteristic and the usual fluid appears in the syringe.

Treatment

After aspiration of the contents, 1 or 2 c.cm. of quinine and urethane (*B.P.C.*) is injected. No pain is felt and there is an absence of discomfort or inflammation. No dressing or bandage is used, the cavity remaining obliterated by atmospheric pressure.

After the original report,² it was felt that aspiration alone might cure: 3 patients were dealt with in this way, and in each case the cyst filled within three months. Subsequent aspiration and injection have led to cure.

Results

Of the 24 patients treated all have remained free from recurrence for 1–12 years. In 3 cases a cyst developed in the other breast, and was dealt with in the usual way.

A further case was missed and operated on under the impression that it was an adenoma, while in 2 other cases puncture was done on lumps resembling cysts, one a chronic abscess and the other a small hard oval scirrhus.

SUMMARY

The mammary cyst can generally be recognised from the symptoms and physical signs, but puncture should be used more often as a diagnostic method.

Aspiration followed by injection of quinine and urethane can cure such cysts, saving unnecessary operations.

Knowledge that some 25% of "breast lumps" may be cured by this means may reduce the reluctance of women to seek timely advice.

SCRUB-TYPHUS VACCINE

FIELD TRIAL IN SOUTH-EAST ASIA

W. I. CARD

M.D. Lond., F.R.C.P.

PHYSICIAN TO OUTPATIENTS, ST. THOMAS'S
HOSPITAL, LONDON

LATE LIEUT.-COLONEL R.A.M.C.

J. M. WALKER

M.A., B.M.,

B.Sc. Oxfd

LATE MAJOR

R.A.M.C.

WITH the early realisation in 1943 that scrub-typhus would form a major medical problem in operations in South-East Asia, all measures likely to combat it were reviewed, and as a result work was started at the National Institute for Medical Research on the production of a vaccine. This experimental work proceeded with such vigour that the first small consignment of cotton-rat-lung vaccine arrived in Delhi in November, 1944. The experimental work leading to its preparation has been described by Fulton and Joyner (1945), and Buckland et al. (1945). This vaccine had been shown to protect laboratory animals, and it was decided, in view of the urgent need, to press for large-scale production forthwith, without waiting for the results of field trials.

Early in 1945 attempts were made to organise field trials in North Burma with the earlier experimental batches. Our rapid advance in Burma, however, followed by the withdrawal of the Fourteenth Army to India to prepare for the next phase of the campaign, frustrated these attempts.

A fresh start was made in July, 1945, on troops of a selected corps of the new Fourteenth Army, but the Japanese surrender before these left India diminished the likelihood of any adequate field trial for the following reasons:

(1) In the absence of jungle fighting, the risk of infection would be greatly reduced. An army of occupation living under relatively static conditions is rarely in close or protracted contact with the terrain associated with scrub-typhus.

(2) The use of dibutyl phthalate (*D.B.P.*), or other mite-repellent, as borne out by the experience of the Australian and American armies, profoundly diminishes the attack-rate of scrub-typhus. Repellants were now being energetically employed in South-East Asia.

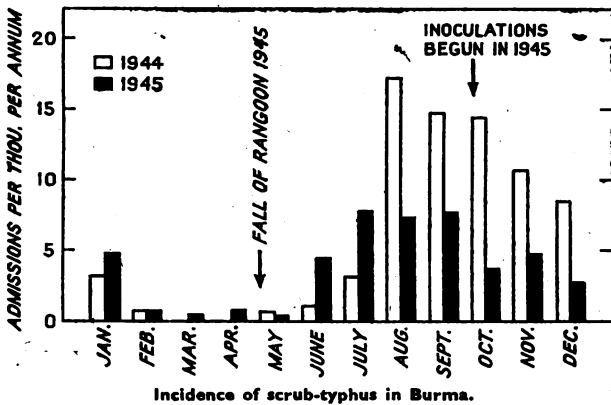
(3) The main criterion of the value of the vaccine must lie in its effect on mortality. In the Allied land forces in South-East Asia (*ALFSEA*) and the Pacific area, the case-mortality rate was about 10%; but this mortality had only occurred in troops exhausted by battle and where early treatment was difficult to obtain. Where fresh troops doing jungle training with immediate access to hospitals were attacked—e.g., in the Ceylon outbreak in 1943, and in the jungle training school in Mysore—the case-mortality was only 2%. If this were to be the figure in the army of occupation, many hundreds of cases in the inoculated and uninoculated groups would be required to provide significant data. Owing to the conditions stated above it was very doubtful if sufficient numbers of cases would arise.

This pessimistic forecast of the proposed field trial was ultimately justified by events, but it was felt that every effort at evaluation of this vaccine should be made.

METHOD OF INVESTIGATION

By this time (September, 1945) vaccine was arriving in fair amounts, and it was decided to distribute it to 10,000 troops on a controlled basis, while the remainder was allotted to Burma Command, where uncontrolled inoculation of those troops most exposed to risk was carried out.

The original plan for controlled inoculation provided that for every man receiving the vaccine there should be a control exposed to the same risk, in view of the pinpoint distribution of infected areas and possible variations in strain virulence. The size of the groups should be, so far as possible, a section of 10 men. It should be made clear that controlled inoculation was perfectly justifiable, since there was insufficient vaccine for every man. Avail-



able vaccine was never withheld. This ideal plan had to be modified in practice since commanding officers, aware of the vaccine, expected it to be given to all troops at risk. A compromise course was usually adopted, two-thirds of the unit being vaccinated, leaving a third—normally the H.Q. troops—as controls. The units chosen were those considered to be most at risk—i.e., engineer companies engaged in bridge-building and jungle clearance, drainage, &c., and infantry units engaged in patrolling, surrounding, and searching villages. In all, between July, 1945, and February, 1946, sufficient vaccine was distributed for the vaccination of over 60,000 men, though only 10,000 of these were inoculated on a controlled basis.

As recommended by the Medical Research Council, 1 c.cm. of vaccine was given on three occasions at weekly intervals. No reactions were observed, and troops were always fit for arduous training next day.

The use of D.B.P. or other mite-repellent was not withheld where it was available to units. The men had been drilled in its use in the Burma campaign; it was not considered justifiable to forbid it after the Japanese surrender.

The plan for the follow-up of cases of scrub-typhus included a special proforma distributed to all medical formations to be forwarded on completion to the director of medical services, ALFSEA. This proforma carried a list of those symptoms and signs whose presence would enable the severity of the attacks to be estimated.

RESULTS

In South-East Asia, in the period under consideration, 33 cases of scrub-typhus developed in inoculated persons. Of these, 2 were infections in research-workers in the scrub-typhus research laboratory, ALFSEA, and 31 were in troops. Of these 31 troops, 7 had received the full course of three inoculations. The remaining 24 had begun the course while actually incubating scrub-typhus, and the onset of the disease had prevented their receiving more than one or two doses.

It was thought that the effect of the vaccine might possibly be demonstrated by one or more of the following results:

- (1) A modified clinical course in inoculated persons.
- (2) Changes in the serological reactions during the course of the disease.
- (3) A fall in mortality-rate in inoculated persons.
- (4) A lowered incidence among inoculated persons.

Clinical Course in Inoculated Persons.—There were 9 cases of scrub-typhus in fully protected persons: 2 of them in research-workers, and 7 in troops. Of these 9 patients 7 had mild attacks, 1 had a severe attack, and 1 was very severely ill and nearly died. In 4 of them the duration of fever was less than fourteen days, and in 5 of them fourteen days or more. These cases gave no indication that inoculation with the vaccine had any

pronounced effect on the duration, severity, or complications of the disease.

Van den Ende et al. (1946) have described 4 cases of scrub-typhus in immunised research-workers. All the patients were severely ill, and there was little modification of the disease. The patients in South-East Asia, however, were infected by mites, whereas the cases reported by van den Ende were due to accidental infection in the laboratory and may therefore have received relatively enormous infections.

Serological Reactions during the Disease in Inoculated Patients.—A study of the case-records does not reveal any great difference in the serological reactions of the second and third weeks between inoculated and uninoculated patients.

Effect of Vaccine on Case-mortality.—The period covered by the field trial was from July, 1945, to January, 1946, inclusive. During this period the case-mortality rate in unprotected troops was 3%, whereas no deaths took place among the 33 protected persons who contracted scrub-typhus. To show that this fall in case-mortality from 3% to nil was significant, it would be necessary to obtain a series of about 200 cases in inoculated persons without a death. From this evidence, therefore, no conclusion can be drawn about the effect of the vaccine on the mortality.

Effect of Vaccine on Incidence of Scrub-typhus.—Controlled inoculation had been carried out on two divisions, and it was thought that the incidence in inoculated troops might prove to be significantly lower than that in the controls. But in the areas occupied by these two divisions scrub-typhus was much less common than was expected, only 6 cases and 3 cases arising during the period from October, 1945, to January, 1946, inclusive; the effect of the vaccine cannot therefore be assessed.

In Burma, however, the overall incidence of scrub-typhus remained fairly high. The admission-rate for 1944 and 1945 is shown in the figure. This shows the well-marked seasonal variation and the reduced incidence in 1945. This reduction was probably due to the use of D.B.P., which was started in December, 1944, and to the cessation of fighting after the capture of Rangoon in May, 1945.

CONCLUSIONS

An attempt to assess the value of the vaccine from the admission-rates in Burma leads to the following conclusions. In November and December, 1945, and January, 1946, there were 7 cases of scrub-typhus in persons who had received a full course of three inoculations. Since the average number of fully protected troops in Burma during this period was about 15,000, this is an incidence of 1.8 per thousand per annum. The incidence in unprotected troops over the same period was 3.1. This difference is not statistically significant.

The failure of the field trial to produce conclusive results is due to the low incidence of scrub-typhus in South-East Asia since July, 1945. The predominantly static rôle of our troops since that date was partly responsible for this low incidence. But a large part of the credit must go to unit commanding officers, who have throughout keenly appreciated the danger of scrub-typhus and have shown their determination to prevent it by insisting on the regular use of D.B.P. and protective clothing by their men.

SUMMARY

A field trial of scrub-typhus vaccine is described. There were 9 cases of scrub-typhus in fully protected persons, and 24 in partially protected persons.

It is impossible, on the limited evidence, to say whether or not the vaccine has any effect on the mortality or incidence of the disease.

The available evidence suggests that the vaccine has no well-marked effect on the clinical course or serological reactions of scrub-typhus.

We wish to thank Lieut.-Colonel M. H. P. Sayers, R.A.M.C., assistant director of pathology at the War Office, for his help throughout the work; and the Director-General, Army Medical Services, for permission to publish this paper.

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EPILEPSY AND HYSTERIA

D. N. PARFITT

M.D. Lond., B.Sc. Wales, M.R.C.P., D.P.M.

LATE WING-COMMANDER R.A.F.; NEUROPSYCHIATRIC SPECIALIST; MEDICAL SUPERINTENDENT, HOLLOWAY SANATORIUM, VIRGINIA WATER

THE differentiation of hysteria from epilepsy is a not unusual problem in peace-time. In war-time it arises even more often, because the epilepsy commonly met with in the Services is milder, and because strong desires to stay in or leave the Services affect the patient's description of his symptoms.

When undoubted epileptic phenomena develop, an electro-encephalogram (E.E.G.) is unnecessary, although Wassermann and other tests may be imperative. The first of the two purposes of this brief note is to emphasise that, when doubtful epileptic manifestations develop in the presence of an acceptable psychological setting and in the absence of organic changes, it is still wise to have an E.E.G., for an organic factor may be revealed, and it is well to take every precaution against mistakes in diagnosis.

In the problem cases considered here I have found the psychiatrist's reliance on psychological mechanisms more prone to be false than the neurologist's insistence on pathology. This is because hysterical symptoms often grow from an organic nidus, congenital or acquired, under the influence of psychological fertilisation. Brain lesions predispose to psychogenic symptoms referable to the brain, and a liability to occasional or frequent epileptic phenomena may be accompanied by hysterical amplification in any proportion. The difference between the two is sometimes denied and hysteria regarded as "psychic" epilepsy (Lennox 1941).

A family or personal history of neurotic traits and an intelligence less than average are common in epilepsy and hysteria. Emotion, fatigue, the menstrual cycle, and alcohol can precipitate attacks of one or the other. I have seen several youths whose epilepsy has become manifest after heavy drinking on leaving home for military service. The fluid intake may be the important factor here, however. Minor physical signs are uncommon in both epilepsy and hysteria, and although diminished or lost reflexes or slight differences on the two sides, spastic eye movements, and so on, are more often met in epilepsy they are not conclusive. A passive reliance on the doctor's opinion favours epilepsy, as does a keenness to continue service in military cases, accompanied by pleading rather than a protest, but these points are not pathognomonic. In over 50% of doubtful cases there was no history of relevant symptoms before service. The age of onset in the epileptics was 21-38 years and averaged 29 years.

Rosenberg (1943) has decried the value of the E.E.G. in circumstances of doubt, but one feels he asks too much. A report on an E.E.G. may say that there is "no evidence of —," "a possibility of —," "support

for —," or "typical of —," epilepsy. With the last three it is wiser to opinion an organic factor. "No evidence —" leaves one's opinion as before.

CASE-RECORDS

Case 1.—Man, aged 40, mental age 13 (normal 14). Unhappy in the Service. His wife and son had tuberculosis, and separation was distressing. Was bitter in the belief that boys half his age, of less ability, were promoted over his head. Complained of attacks of unconsciousness lasting 30 min.; no injuries, no incontinence, no twitching. His mother was highly strung and had similar faints under the influence of emotion. After his turns he trembled violently. He had often stopped attacks by "will-power." Yearly attacks began at 16, but the last three had been at two-month intervals. No medical or Service confirmation. The E.E.G. report was: "Typical, with bursts of fast activity quite characteristic of grand mal epilepsy."

Case 2.—Man, aged 21. He had his first attack at 14 when he saw his younger sister run over and killed by a lorry. Seven attacks followed in the next 4 years, but the succeeding 3 years were clear. On one occasion he fell and sustained mild concussion. The attacks began with tingling and numbness which started in the left foot and spread up the limb. When they reached the top of the thigh the patient fainted. He could stop attacks when walking by a tremendous effort of will, and when sitting by putting his head between his knees; but he then saw double and trembled. Attacks came on during drug therapy, and he was finally relieved, before service, by psychotherapy and hypnotism. He was a prospective member of aircrew and had recently had another attack. The E.E.G. findings of Dr. Denis Williams supported the diagnosis of epilepsy.

The second purpose of this report is to serve as a reminder of the type of case which might be dismissed as a migrainous headache, where there is nausea and sometimes a tendency to "blackout" with the pain. There were 4 such men among 20 "problem" cases, the diagnosis lying between migraine, epilepsy, and hysteria.

Case 3.—Man, aged 21. Over the last 6 months he had had severe one-sided headaches accompanied by nausea lasting up to 3 hours, brought on by wearing a steel helmet. He lost his ability to concentrate on his work, became giddy, and saw spots before his eyes. He felt himself stopping and staring for no reason and was listless after the attacks. The E.E.G. report was "Possibility of epilepsy."

It is advisable not to enlist epileptics. When they are already serving, especially if trained for work involving no danger, it is often possible to retain them, and more than half the epileptics I have seen have been so retained. Their work must not be dangerous.

The diagnosis between epilepsy and hysteria is sometimes impossible, and further evidence must be awaited. Anticonvulsive drugs are better avoided in doubtful cases.

CONCLUSION

Hysterical and migrainous symptoms are sometimes embellishments of epilepsy. An electro-encephalogram in such cases is often valuable but may not be conclusive.

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"... The other new decision is to set aside twenty State scholarships for older students who have missed a university education but have shown their qualification for one in later life. It is a small beginning, but much can be expected from it, and the provision of scholarships in this adult field should be rapidly increased. In all universities at present the merit of the ex-Service students, who are in so great a majority, is recognised as outstanding. They are resolute in study, and their responsiveness, their ready intellectual grasp, delights their teachers. No greater proof is needed of the wisdom of enabling men and women of mature mind and wide experience of life to attend the universities."—*Times*, March 28.

Preliminary Communication

MODIFICATION OF HUMAN RED CELLS BY VIRUS ACTION

AGGLUTINATION BY "INCOMPLETE" RH ANTIBODY

BOTH the virus-haemagglutination phenomenon and the "incomplete" Rh antibodies have lately received the attention of several workers.

Burnet et al.¹ have shown that the treatment of human red cells with cholera filtrate removed the receptors on the cells for the influenza group of viruses. Pickles² has shown that Rh-positive cells sensitised with "incomplete" Rh antibodies were agglutinated when cholera filtrate was added. Agglutination also took place when Rh-positive cells, previously treated with cholera filtrate, were exposed to a serum containing the "incomplete" Rh antibody and from which the panagglutinin had previously been absorbed.

In a few preliminary experiments we have confirmed the observations of these workers. It occurred to us that several points of analogy existed between the influenza group of viruses and the cholera-filtrate factor, in so far as their actions on red cells were concerned. Our experiments show that the treatment of Rh-positive cells with certain viruses modifies the cells so that they may be agglutinated by the "incomplete" anti-D Rh antibody.

MATERIALS AND METHODS

Four viruses were used: influenza A, PR 8 strain; influenza B, Lee strain; swine influenza, Shope; and Newcastle disease virus, Doyle's strain (N.D.V.).

The viruses were grown in the allantoic sac of ten-day-old chick embryos. For each virus the allantoic fluid from six eggs was collected 48 hours after inoculation and pooled.

1. Burnet, F. M., McCrea, J. F., Stone, J. D. *Brit. J. exp. Path.* 1946, 27, 228.
2. Pickles, M. M. *Nature, Lond.* 1946, 158, 880.

The virus titre * of each was determined by haemagglutination tests against human and fowl red cells, and the identity of each virus was checked by haemagglutinin inhibition tests with specific immune sera.

All preparations were bacteriologically sterile, kept at 4° C, and used within three weeks after collection.

The virus treatment of the human Rh-positive and Rh-negative red cells was carried out as follows:

To 0.25 c.cm. of virus-infected allantoic fluid was added an equal quantity of a 2% suspension of washed human red cells. The tubes were kept at 4° C for 1/2-1 hour, by which time the cells were agglutinated by the virus and had completely settled out. The tubes were then placed in a 37° C water-bath, with periodic shaking, for two hours. In this way the viruses were eluted from the red cells, which then became more or less stable in suspension. The treated cells were then centrifuged down and, after the supernatant fluid had been removed, washed once in saline and resuspended in saline to 2% strength. Cells similarly treated with saline were included as controls.

The agglutination of these virus-treated cells by an "incomplete" Rh antibody was carried out with the use of a serum diluted 1/32 which contained the "incomplete" form of the anti-D Rh antibody to a titre of 1/256 and from which the anti-A and anti-B isoagglutinins had been absorbed. A normal human serum was used as control. The tests were incubated at 37° C until the cells had settled to the bottom of the tubes, and the results were read macroscopically and microscopically.

Cells treated with N.D.V. and influenza B were usually completely stable after elution. Those treated with influenza A and swine influenza were usually only moderately stable. This, however, did not interfere with the readings, as virus-agglutinated cells were very

* The haemagglutination titre of the four viruses against 0.5% red cells were:

| | Influenza A | Influenza B | Swine Influenza | N.D.V. |
|----------------|-------------|-------------|-----------------|--------|
| Human cells .. | 1/640 | 1/1280 | 1/80 | 1/80 |
| Fowl cells .. | 1/640 | 1/640 | 1/160 | 1/1280 |

AGGLUTINATION OF VIRUS-TREATED RED CELLS BY THE "INCOMPLETE" Rh ANTIBODY

| Red-cell genotype | Primary virus treatment | | | | | | | | | | | | | | |
|-------------------|-------------------------------|----|--------|-----------------|----|--------|-------------|----|--------|-------------|----|--------|--------|----|--------|
| | N.D.V. | | | Swine influenza | | | Influenza B | | | Influenza A | | | Saline | | |
| | Saline | Δ' | N.H.S. | Saline | Δ' | N.H.S. | Saline | Δ' | N.H.S. | Saline | Δ' | N.H.S. | Saline | Δ' | N.H.S. |
| Rh-POSITIVE | | | | | | | | | | | | | | | |
| O | R ₁ R ₂ | - | ++ | - | - | ++ | - | ++ | - | ± | ++ | ± | - | - | - |
| A | R ₁ R ₂ | - | ++ | - | - | ++ | - | ++ | - | ± | ++ | ± | - | - | - |
| A ₁ | R ₁ r | - | ++ | - | - | ++ | - | ++ | - | ± | ++ | ± | - | - | - |
| A ₂ | R ₁ R ₁ | - | ++ | - | - | ++ | - | ++ | - | ± | ++ | ± | - | - | - |
| A ₃ | R ₁ r | - | ++ | - | - | ++ | - | ++ | - | ± | ++ | ± | - | - | - |
| O | R ₂ r | - | ++ | - | - | ++ | - | ++ | - | ± | ++ | ± | - | - | - |
| B | R ₂ r | - | ++ | - | - | ++ | - | ++ | - | ± | ++ | ± | - | - | - |
| A ₁ | R ₂ r | - | ++ | - | - | ++ | - | ++ | - | ± | ++ | ± | - | - | - |
| A ₂ | R ₂ R ₁ | - | ++ | - | - | ++ | - | ++ | - | ± | ++ | ± | - | - | - |
| O | R ₂ R ₁ | - | ++ | - | - | ++ | - | ++ | - | ± | ++ | ± | - | - | - |
| O | R ₂ R ₂ | - | ++ | - | - | ++ | - | ++ | - | ± | ++ | ± | - | - | - |
| A ₁ | R ₂ R ₁ | - | ++ | - | - | ++ | - | ++ | - | ± | ++ | ± | - | - | - |
| A | R ₂ r | - | ++ | - | - | ++ | - | ++ | - | ± | ++ | ± | - | - | - |
| A | R ₁ r | - | ++ | - | - | ++ | - | ++ | - | ± | ++ | ± | - | - | - |
| O | R ₁ R ₂ | - | ++ | - | - | ++ | - | ++ | - | ± | ++ | ± | - | - | - |
| Rh-NEGATIVE | | | | | | | | | | | | | | | |
| A ₁ | r r | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| A ₂ | r r | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| A ₁ | r r | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| A ₁ | r r | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| B | r r | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| O | r r | - | - | ± | - | - | - | - | - | - | - | - | - | - | - |
| A ₁ | r r | - | - | - | - | - | ± | ± | ± | - | - | - | - | - | - |
| O | r r | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

Δ', serum 1/32 containing the "incomplete" anti-D Rh antibody.

N.H.S., normal human serum 1/32.

Readings under the microscope: ++, definite strong agglutination; +, definite but weak agglutination; ±, doubtful trace of agglutination; -, no agglutination.

readily redispersed when gently pipetted and spread on a 3 in. x 1 in. microscopical slide, with the result that they appeared unagglutinated when examined microscopically. Treated cells sensitised with the "incomplete" Rh antibody showed definite agglutinated clumps macroscopically and under the microscope.

Twenty-four specimens of human red cells, including 16 Rh-positive and 8 Rh-negative, have been examined so far. The results of the tests are shown in the accompanying table.

RESULTS

The strongest and most clear-cut results were obtained with the N.D.V.-treated cells. Only the Rh-positive treated cells which contain the D Rh antigen were agglutinated by the "incomplete" anti-D Rh antibody. Treated Rh-negative cells, which do not contain the D Rh antigen, were not agglutinated. With the other viruses the reactions were weaker and more irregular, variations in the susceptibility of the individual cells being noted. In general, however, it was clear that there was a gradation of activity of the four viruses, which, in the order of their strength, were N.D.V. > swine influenza > influenza B > influenza A. Irrespective of whichever virus was used, the Rh-negative cells invariably gave negative results.

Burnet et al.¹ have shown that virus-treated cells become panagglutinable in many mammalian sera. We have confirmed their results with all four viruses, using human serum. With the few normal human sera tested, however, the panagglutinin rarely exceeded a titre of 1/4. The normal human sera diluted 1/32, which were used as controls, agglutinated neither Rh-positive nor Rh-negative human cells which had been treated with viruses.

DISCUSSION

The observations of Pickles² on the effect of cholera filtrate on red cells may, as she has stated, help towards elucidating the properties of the "incomplete" Rh antibodies. In the same way these experiments may help in the understanding of virus action on red cells and of the nature of "incomplete" antibodies. At the moment nothing can be said on the mechanism of the reaction. It is interesting, however, to recall that both the viruses and the cholera-filtrate factor apparently exert three analogous sets of actions on red cells. They remove virus receptors, produce panagglutinability, and render appropriate cells susceptible to agglutination by the "incomplete" Rh antibody.

Normal allantoic and amniotic fluid from twelve-day-old chick embryos showed no similar action on cells.

As regards the possibility of a soluble component in the virus-infected fluid being responsible for the modification of the cells, filtration of the N.D.V. preparation through a 0.16 μ gradocol membrane removed both the hæmagglutinating activity and its capacity to render appropriate cells susceptible to agglutination by the "incomplete" antibody. This does not exclude the adsorption of any soluble factor by the filter.

SUMMARY

The treatment of human red cells of appropriate Rh genotype with certain viruses of the influenza group renders the cells susceptible to agglutination by the "incomplete" anti-D Rh antibody.

We wish to thank Dr. A. E. Mourant, of the Blood-Group Reference Laboratory, Lister Institute, for supplying the serum containing the "incomplete" anti-D Rh antibody.

C. M. CHU
M.B. National Medical College,
Shanghai

R. R. A. COOMBS
B.Sc. Edin.,
M.R.C.V.S.

Department of Pathology,
University of Cambridge.

John Lucas Walker Student.

Medical Societies

ROYAL SOCIETY OF MEDICINE

Laboratory Diagnosis of Virus Infections

THE pathology section of the society met on March 18, with Dr. A. B. ROSHER, the president, in the chair.

SMALLPOX

Prof. A. W. DOWNIE said that in the early eruptive stage of smallpox scrapings from a papule or the base of a vesicle smeared on a slide and stained by Gutstein's method will often reveal large numbers of elementary bodies which, while not diagnostic, are highly suggestive of smallpox. The most reliable test is the complement-fixation reaction of Craigie, using macerated crusts or vesicle fluid as antigen (6 crusts or fluid from 6 vesicles is enough) and a rabbit antivaccinial serum as antibody. The results can be reported within 24 hours. Another very useful test is the characteristic lesion on the chorio-allantoic membrane of the chick embryo, which is elicited with the scantiest material but takes 2-3 days to develop. The demonstration of antibodies in the patient's serum may be used as a late confirmatory test; but while the reaction is usually positive in smallpox it may also be positive with sera from recently vaccinated persons (such as smallpox contacts are likely to be), so it cannot be regarded as specific.

INFLUENZA

Dr. J. A. DUDGEON described the methods used for the laboratory diagnosis of influenza A and B. For the demonstration of the virus during the early stages of infection, throat garglings may be instilled intranasally into ferrets, which may or may not show clinical signs of influenza but usually develop specific antibodies. In typical virus-A epidemics the proportion of clinical takes in the ferret is high, but in mild or sporadic infections and in virus-B influenza diagnosis may have to depend on a specific antibody response. Alternatively, throat washings or sputum treated with penicillin and sulphadiazine is inoculated on to the chorio-allantoic membrane, or preferably into the amniotic cavity, of the chick embryo, which is tested after 4 days' incubation for the presence of virus, using the red-cell agglutination technique with both guinea-pig and fowl blood. Again, better results are obtained with this technique in virus-A than in virus-B infections. A significant rise in antibody titre in the patient's serum during convalescence is also a useful index to the diagnosis, using either the red-cell agglutination test or the complement-fixation reaction. Samples of blood should be taken at onset and 10-14 days later; to avoid a hæmolyzed specimen the serum should be separated as quickly as possible from the clot.

PSITTACOSIS-LYMPHOGRANULOMA GROUP

Prof. S. P. BEDSON, F.R.S., pointed to the close serological association between the viruses of psittacosis, ornithosis, and lymphogranuloma venereum, and the looser link between these and the viruses of trachoma, inclusion conjunctivitis, and mouse and cat pneumonia. These are large viruses of 150-250 m μ diameter; they stain readily and specifically, and show a developmental cycle. While direct microscopical examination is not usually possible with material from human cases of suspected psittacosis, Castenada-stained smears of the spleen or air sacs of infected birds (fulmars, pigeons, and fowls, besides the parrot family, may be affected) will often yield positive results. Virus particles can also be demonstrated in the large mononuclear cells of pus from a lymphogranuloma bubo. Mice are readily infected intraperitoneally or intranasally with sputum from cases of psittacosis, the intranasal route being particularly useful for pigeon strains; the chick embryo is also susceptible. Pus from lymphogranuloma buboes may be injected intracerebrally into mice or into the yolk-sac of the developing chick. As in other infections the complement-fixation test may be used for diagnosis in this group when it is no longer possible to isolate the virus; but the reaction is not specific, since positive results from cases of lymphogranuloma may be obtained with psittacosis-virus antigen as well as with the

homologous virus. There is the same lack of specificity with the Frei skin test.

NEUROTROPIC VIRUSES

In discussing the large group of neurotropic viruses, Dr. F. O. MACCALLUM said the most important point in laboratory diagnosis was the proper collection and preservation of material, such as cerebrospinal fluid, throat garglings, blood, and post-mortem tissue; most viruses survive best if kept at the lowest possible temperature. In the various types of encephalitis, much more common in the U.S.A. than here, and in louping-ill, the virus can rarely be isolated from cerebrospinal fluid; the most suitable material is tissue from the central nervous system, but specific antibody can usually be demonstrated in convalescence. In lymphocytic choriomeningitis, mumps meningo-encephalitis, and herpetic encephalitis the virus can most readily be recovered from cerebrospinal fluid or blood by inoculation of either laboratory animals or the chick embryo.

DISCUSSION

Dr. J. CRAIGIE, F.R.S., pointed out that vaccinia virus contained a stable (s) and labile (L) antigen, and that for the complement-fixation test rabbit serum containing the s antibody was essential. Dr. MERVYN GORDON, F.R.S., asked if an agglutination reaction might serve to distinguish lymphogranuloma from psittacosis. Prof. WILSON SMITH remarked on the epidemiological value of laboratory diagnosis in virus infections, but thought a negative reaction—e.g., in suspected influenza—had a very limited value. Prof. RONALD HARE said his experience in the isolation and identification of influenza virus in Canada had been very similar to that recorded by Dr. Dudgeon. Dr. J. M. ALSTON doubted whether the techniques described could be used at present by the clinical pathologist; and the PRESIDENT suggested that a pamphlet indicating the material required for diagnosis, and how and where it was to be sent, would be useful. In answer to a question, it was stated that antibody could be demonstrated by the seventh or eighth day of most virus infections, and probably reached its maximum titre in 2-4 weeks.

Reviews of Books

Textbook of Midwifery

(2nd ed.) WILFRED SHAW, M.D., F.R.C.S., F.R.C.O.G., surgeon-in-charge, gynaecological and obstetrical department, St. Bartholomew's Hospital, London. London: J. & A. Churchill. Pp. 649. 21s.

THIS substantial volume begins with an introduction containing some sound advice on the care of the pregnant and parturient woman; the student would be wise to read it when he has reached the last page of the book. In the section on the physiology of reproduction the anatomy and physiology are well up to date, and the text, besides being easy to read, is enhanced by beautifully clear illustrations of early ova. The section on clinical midwifery includes the physiology and management of pregnancy, normal labour, and the puerperium. The account of management of the first stage of labour is largely a detailed and careful description of how to perform a vaginal examination, and not enough is said about the management of the patient, her feeding, the avoidance of retention of urine, and many other points. The dangers of pituitary extract are discussed: Mr. Shaw believes that these have been exaggerated and that, used with intelligence and skill, it is perhaps the most useful drug in practical midwifery. In this he treads on thin ice, for subsequently 'Pitocin' is advised in the treatment of hæmorrhage in the third stage of labour, in postpartum hæmorrhage, and in the treatment of primary and secondary inertia. He successfully points out the different, and often conflicting, opinions held on various forms of treatment, but in the chapters on delivery of the breech, on the management of suspected disproportion, and on antepartum hæmorrhage, the wisdom of this policy is questionable, since it masks the valuable lead he could give from his own experiences. In his desire to be fair to others, Mr. Shaw has not

perhaps been kind enough to himself, and the book also contains much dead wood that might well be cleared away. Even mention of such things as de Ribes bag in the treatment of placenta prævia, the induction of labour by bougies, the stomach-tube, the hydrostatic bag, and the use of antistreptococcal serum in puerperal sepsis might be regarded as unnecessary in such a work as this: their place, now, is surely in a history of midwifery. In the section on the resuscitation of the baby born in white asphyxia, three illustrations of an uncovered baby being revived by artificial respiration hardly bear out his sound assertion that the guiding principle should be to avoid rough handling.

In Darkest Germany

VICTOR GOLLANZ. London: Gollanz. Pp. 128. 8s. 6d.

WITH no claims to literary form, this is a series of impressions flung together in haste and copiously illustrated. It represents the outcome of a visit to Germany last autumn, when Mr. Gollanz toured a number of the worst areas, including Düren, Aachen, and the Ruhr, and within a few weeks gathered a surprising amount of information. Much of the material has already appeared in letters to newspapers, and is reproduced in its original form. Writing with manifest sincerity, he has in the main managed to avoid sentimentality, and has obviously done his utmost to present facts rather than vague generalities.

The effect of this book must be shocking to anyone who has not become completely case-hardened. Admittedly almost everything he describes—the pallor, the hunger œdema, the "misery of boots," the families huddled together in cellars and ruins—could be paralleled elsewhere, but the whole story is one which makes unspeakably depressing reading. It would be misleading to quote single observations, since the author as far as possible keeps to the rules of good propaganda, and when he describes an incident he has observed himself usually he follows it with any relative statistics he has been able to muster. It may be objected that he tells too little of what has been done by Military Government, and too much of what has not; but it is darkest Germany he is describing, and it is his contention that much more must be done for the physical, intellectual, and spiritual needs of Germany if the coming generation is to believe that democracy holds anything better than the Nazi doctrine. However far the reader may go with the author in this belief, he cannot but be affected by the facts related, and the illustrations which, while not in any sense "horror pictures," tell the tale of day-to-day wretchedness and deprivation.

Practical Handbook of the Pathology of the Skin

(3rd ed.) J. M. H. MACLEOD, M.D., F.R.C.P., physician and director of the pathological department, St. John's Hospital for Diseases of the Skin, consulting physician for diseases of the skin, Charing Cross Hospital; I. MUENDE, M.B., M.R.C.P., physician with charge of pathological department and lecturer at St. John's Hospital. London: H. K. Lewis. Pp. 415. 50s.

Atlas of Histopathology of the Skin

G. H. PERCIVAL, M.D., PH.D., F.R.C.P.E., Grant professor of dermatology, University of Edinburgh, physician to the skin department, Royal Infirmary, Edinburgh; A. MURRAY DRENNAN, M.D., F.R.C.P.E., professor of pathology in the university, pathologist to the infirmary; T. C. DODDS, F.I.M.L.T., laboratory supervisor in the department of pathology of the university. Edinburgh: E. & S. Livingstone. Pp. 494. 75s.

THESE two works are complementary. In the new edition of the *Handbook* there has been very little alteration of the text of the second edition, which was almost a complete revision of the first. It is still the standard work on the subject. The *Atlas*, on the other hand, is something quite new, being a splendid collection of 376 first-class coloured photomicrographs, covering a very wide range of skin diseases. The text has been kept to a minimum. Both works are intended for dermatologists, pathologists, and postgraduate students, and an excellent plan for study would be to use them side by side.



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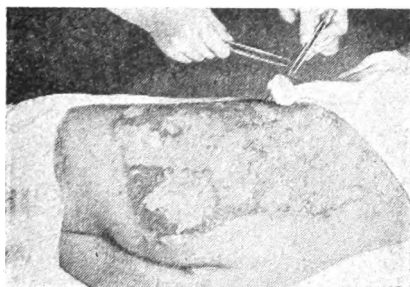


Fig. 1

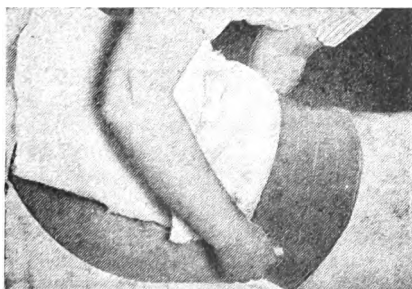


Fig. 2

CASE HISTORY—The patient, a young man, was admitted to hospital, having been burnt by an electric blanket. The raw area measured 162 square inches. Excision of the burnt area was performed on the same day. Tulle gras (Jelonet) was applied. Fixation by Gypsona plaster of Paris bandages applied over the whole area, abdomen and thigh. The patient was given a blood transfusion. Seven days later, the affected part was covered with thin razor grafts from both thighs and a pressure dressing of Elastocrepe applied. Fixation was again secured with Gypsona plaster of Paris.

The patient was discharged to duty 7 weeks later.

The details and illustrations above are of an actual case. T. J. Smith & Nephew Ltd., Hull, manufacturers of Elastoplast, Elastocrepe and Jelonet, are privileged to publish this typical instance of the use of their products with success in the belief that such records will be of interest.

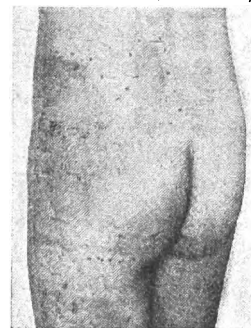
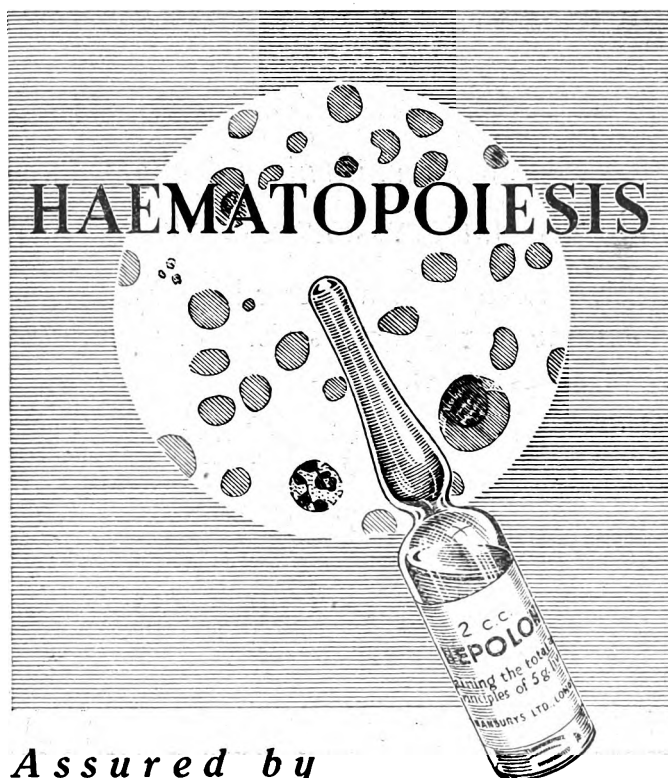


Fig. 3



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THE LANCET

LONDON: SATURDAY, APRIL 12, 1947

Leprosy in Britain

THE sensational treatment by the lay press of the periodical reports of cases of leprosy in this country is based on the popular tendency to regard such cases as a social problem of the first magnitude and their immediate incarceration as imperative to the public welfare. The unreasoning fear which a diagnosis of leprosy engenders dates from the Middle Ages. In actual fact the chances of dissemination under our modern conditions of life are negligible. It was estimated before the war that there were 250 lepers in the British Isles, and this number has doubtless been augmented by the influx of immigrants from the endemic areas during the last decade. Yet no autochthonous case of infection in Britain has been reported for many years.

Leprosy was at one time common throughout Europe and in this country, but it began to decline in Europe about the fifteenth century; and it has shown no sign of re-establishing itself in Britain in spite of its repeated reintroduction from the tropics and subtropics, where it still flourishes. Our freedom from serious infection can be ascribed to the improvements in personal hygiene and sanitation, and the better standards of housing and of living, with the consequent diminution in child infection. Leprosy is not a highly infectious disease, and the long and intimate association of susceptible persons with an infective case is necessary for the continuance of the disease. Adults are refractory to infection, and probably the majority are immune to leprosy; but children are less resistant and may acquire it from close and protracted contact with "open" cases.

Only a small proportion of cases of leprosy are potentially infective to others. The clinical forms of the disease may broadly be divided into the neural and the lepromatous types, of which the former greatly preponderate in the endemic areas. These neural cases may ultimately suffer from the crippling lesions and deformities associated with secondary nerve changes; but they are not infective to others, since bacilli can rarely be recovered from them and then only in very small numbers after repeated and painstaking search. Such spectacular "closed" cases are of no potential danger to the community. In lepromatous leprosy, on the other hand, which may be difficult to diagnose until the disease is well advanced, the diffuse or nodular lesions on skin and mucous membrane harbour many bacilli. These are "open" cases and the patients are therefore potentially infective to others. In the endemic areas such lepromatous cases constitute but a small minority of the total; but it is their close association with susceptible persons, particularly with children, under squalid conditions, which is largely responsible for the maintenance of the disease in a community. In this country simple regulation of the domestic life of patients with this form of leprosy should be all that is necessary to remove the slight risk of their transmitting the infection to others. Experience

has shown that sufferers from leprosy in this country are eager to cooperate fully in their treatment and in measures to prevent the spread of the disease. In rare instances where this is not the case some compulsion might be necessary, but there is no justification for indiscriminate compulsory segregation of all leprosy patients.

While leprosy is insignificant as a social problem in the British Isles, it remains an acute medical one. Treatment is not yet satisfactory, but the prospect of more specific chemotherapeutic remedies is growing brighter. Under the existing medieval attitude to the disease it is virtually impossible to admit a known or suspected case of leprosy to any British hospital or other institution except the one small voluntarily maintained leprosy colony in the south of England. Even a brief stay in hospital for the treatment of some incidental medical or surgical ailment cannot be arranged; and this, together with the needless stigma traditionally attaching to the disease, renders the patient's plight indeed pitiful. Refused employment, ostracised by society, and debarred from hospital facilities, he loses the faith and hope which are essential for his recovery. All he asks is for a more enlightened understanding.

Lymphocytic Meningitis

THE clinical picture of meningitis with an excess of lymphocytes in the cerebrospinal fluid may result from infection by yeasts (torulosis), trypanosomes, spirochaetes (syphilis, relapsing fever,¹ and Weil's disease), the tubercle bacillus, and viruses. The viruses which more commonly affect other systems predominantly, the most important being those of mumps, glandular fever,^{2,3} infective hepatitis,⁴ atypical pneumonia,⁵ and psittacosis, may at times cause a meningeal reaction so that the case presents as one of lymphocytic meningitis. The essentially neurotropic viruses of anterior poliomyelitis and herpes zoster cause lymphocytosis in the cerebrospinal fluid and often produce clinical signs of meningitis; in some epidemics of poliomyelitis cases occur where the whole course of the disease is that of a lymphocytic meningitis without clinical evidence of involvement of anterior horn cells, and these are usually considered to be abortive cases of poliomyelitis.

In 1924 WALLGREN⁶ described six examples of lymphocytic meningitis in children which he considered to be a separate disease entity and called acute aseptic meningitis; the main characteristics were a fairly sudden fever with symptoms and signs of meningitis, a sterile cerebrospinal fluid containing an excess of lymphocytes, a good prognosis, and absence of complications. The aetiology was obscure until ARMSTRONG and LILLE,⁷ investigating the cause of the St. Louis encephalitis epidemic of 1933, discovered a previously unknown neurotropic virus which could be transmitted to mice and monkeys and was quite distinct from the virus which caused the outbreak of encephalitis. Little was known of the clinical history of the case from which the virus was

1. Scott, R. B. *Lancet*, 1944, ii, 436.

2. Tidy, H. *Ibid.*, 1946, ii, 819.

3. Schneider, T., Michelson, D. A. *S. Afr. med. J.* 1947, 21, 57.

4. Waring, J. *Brit. med. J.* 1943, ii, 228.

5. Holmes, J. M. *Ibid.*, Feb. 8, p. 218.

6. Wallgren, A. *Acta paediatr., Stockh.* 1924-25, 4, 158.

7. Armstrong, C., Lille, R. D. *Publ. Hlth Rep., Wash.* 1934, 49, 1019.

first isolated; but subsequent work⁸ showed that the clinical picture in man was that of a lymphocytic meningitis similar to that described by WALLGREN, and in view of the intense congestion of the choroid plexus seen in infected animals the disease was named benign lymphocytic choriomeningitis. The virus was subsequently isolated from cases in England⁹ and elsewhere, and it was found that a few patients showed clinical evidence of involvement of the brain, spinal cord, and cranial nerves besides the meningitis. It seemed probable, however, that other neurotropic viruses might cause a similar clinical picture, and accounts of two recent small outbreaks bear this out. In this issue Dr. JENNINGS describes 22 cases with clear clinical evidence of meningitis or encephalitis, admitted to one hospital in north-west Middlesex between March and November, 1946. In these there was a lymphocytosis in the cerebrospinal fluid and recovery was the rule, while in several there was involvement of cranial nerves, especially the facial, and three showed signs suggestive of involvement of the spinal cord and one of the cerebellum. In some cases a Paul-Bunnell test was done and it was always negative, which is important in view of TDY's² recent suggestion that glandular fever may be the cause of many cases of lymphocytic meningitis. Attempts were made to isolate the causative virus from the blood and cerebrospinal fluid in some of the cases by inoculation into various animals, without success. KIBBE and BEADENKOFF¹⁰ have described 23 similar cases admitted to an American army hospital near Myitkyina in Burma during June, 1945; there was no evidence of involvement of the cranial nerves, brain, or spinal cord in this group, and all recovered. Extensive virus studies were carried out in these Burmese cases: virus neutralisation tests for the Armstrong virus were negative in the 19 samples tested, and the complement-fixation test was negative in 18 and anticomplementary in 2 samples; similar tests from random cases were also done for the viruses of mumps, St. Louis encephalitis, Japanese (type B) encephalitis, W. Nile type encephalitis, and dengue, and these were all negative.

It appears that benign lymphocytic meningitis can be caused by many different viruses, some known and others not yet isolated. Further elucidation of the problem will require close collaboration between clinicians and workers on viruses, so that blood and cerebrospinal-fluid samples can be obtained at the right stage of the disease for animal inoculation and virus neutralisation and complement-fixation tests. Judging from the clinical picture, the disease process is not necessarily confined to the meninges, and the brain, spinal cord, and cranial nerves may at times be involved; but pathological studies in man are largely lacking, owing to the benign course of the disease. The mode of transmission is still uncertain and may perhaps differ with different viruses. ARMSTRONG suspected that mice act as a reservoir of infection, and his extensive virus neutralisation tests in Washington showed that in 45% of houses infested with mice the animals had been infected with the virus of lymphocytic choriomeningitis. He suggested

that the virus is conveyed from mice to man by insect bites, but this has not yet been proved. It may be significant that six of the Middlesex cases came from houses in which there were mice. The domestic cat might also repay investigation. But the widespread presence of antibodies to the choriomeningitis virus in the sera of normal people in the U.S.A. suggests that human carriers are at least one source of infection.

Treatment of Early Syphilis

THE assessment of new treatments for a chronic disease like syphilis must await the passage of time and the careful compilation of statistics. During the late war the prevalence of this disease in the Allied Forces, and the difficulties of ensuring continued attendance, led to the adoption of shorter and more concentrated schemes of treatment, at first with frequent injections of arsphenoxide, and later, as it became plentiful, with penicillin. Since then some valuable information has been gained, but the place of penicillin in treatment and the best methods of using it are still undefined. Doubts raised by early failures have led British clinicians to supplement penicillin therapy with injections of neoarsphenamine and bismuth, though this cautious procedure will inevitably complicate and delay the final assessment.

Syphilis in the rabbit, though very different from that in the human, may give valuable clues to the reaction of *Spirochaeta pallida* to remedial drugs. EAGLE et al.¹ found that the effectiveness of sodium penicillin against syphilis in the rabbit varied greatly with the method of administration. They used different batches of commercial penicillin, without regard to possible differences in their spirochaeticidal activity due to varying proportions of the several types of penicillin. When injections were given four-hourly an increase in the number of injections, and thus in the duration of treatment, greatly reduced the total dose of penicillin required for cure. With eight injections the necessary dose was 80,000 units per kg. body-weight; but this fell to 1600 units/kg. with twenty injections, and to 360 units/kg. with fifty injections. When injections were given twice daily for four days the curative dose was 30,000 units/kg.; but it fell to 1770 units/kg. if the treatment was extended to eight days. By giving a fixed number of injections and varying the interval between them it was found that much the same dose was required whether injections were given four-hourly, twice daily, or once daily. Injections given so often as to produce a cumulative effect on the blood-level of penicillin were therapeutically less efficient, suggesting that much of the penicillin was being wasted. If the duration of treatment was fixed, effectiveness increased in direct ratio to the number of injections. Thus in a four-day period, with injections once daily, twice daily, and four-hourly, the curative doses per kg. were 50,000, 20,000, and 1600 units. The conclusion reached was that the effectiveness of penicillin depends on both the tissue concentrations and the time during which these are maintained, but that the time factor is much the more important. Many small injections over a long period were more effective than a few large injections over a short period. Injections

8. Armstrong, C. *Bull. N.Y. Acad. Med.* 1941, 17, 295.
9. Findlay, G. M., Alcock, N. S., Stern, R. O. *Lancet*, 1936, 1, 650.
10. Kibbe, F. W., Beadenkopf, W. G. *Bull. Johns Hopk. Hosp.* 1946, 79, 365.

1. Eagle, H., Magnuson, H. J., Fleischman, R. *Bull. Johns Hopk. Hosp.* 1946, 79, 168.

once daily seemed as effective as those given four-hourly, but there was some evidence that the optimum interval between injections might be eight to twelve hours. If these results are applicable to the treatment of human syphilis, it seems that sodium penicillin may be injected once or twice daily without loss of efficiency. The factors concerned are the length of treatment, the number and frequency of injections, and the total dose of penicillin, in that order of importance. Methods of injection which delay the absorption of penicillin will presumably have the same effect as an increase in the number and frequency of injections.

HELLER² has tried to assess the results in early human syphilis of fourteen different methods of rapid treatment, including penicillin alone in varying dosage; penicillin and arsphenoxide, with and without bismuth; and arsphenoxide by intravenous drip or by multiple injections, with and without bismuth. The results were observed after twelve to fifteen months, and in spite of varying standards of observation and tests some important findings emerged. The stage in the disease at which treatment was begun was of great importance, the results for primary syphilis being considerably better than those for secondary syphilis and for cases which had already relapsed. Six schemes of treatment employed penicillin alone, the dosage being 600,000 units in eight days (10,000 units three-hourly), 1,200,000 units in four days (40,000 units three-hourly), 1,200,000 units in eight days (20,000 units three-hourly or 40,000 units six-hourly), and 2,400,000 units in eight or four days (40,000 or 80,000 units three-hourly); and there was little difference in the results obtained. When smaller doses of penicillin were combined with varying amounts of arsphenoxide the effects were much the same; but the addition of bismuth improved the results; and HELLER concludes that any method of penicillin treatment will probably benefit from the addition of bismuth. The proportion of failures in primary syphilis seems to have varied from 15% to 25% with most methods of treatment, but the best results were obtained when treatment was begun while the serum reaction was still negative. For secondary syphilis the results were even less satisfactory. With methods employing penicillin alone or in combination failures varied from 41% to 51%. Much the most effective treatment for this stage was arsphenoxide given by intravenous drip for five days; but this was dangerous treatment, giving a death-rate of 1 in 140 cases, compared with 1 in 1873 with multiple injections of arsphenoxide, 1 in 4312 with penicillin combined with small amounts of arsphenoxide and bismuth, and no deaths with penicillin alone. STERNBERG and LEIFER³ have studied the case-records of 1400 soldiers of the United States Army treated for early syphilis between June, 1944, and February, 1945. All received 2,400,000 units of sodium penicillin in aqueous solution, sixty injections of 40,000 units each being given three-hourly for seven and a half days, without additional therapy. Of these patients, 84% remained under observation for over nine months after treatment, and the proportion of successes at this stage, as estimated by absence of clinical signs and negative blood-serum reactions, was 98.3% of 517 cases of seronegative primary syphilis, 96.5% of 462 cases of

seropositive primary syphilis, and 89.9% of 199 cases of secondary syphilis. An interesting point was the very low incidence of asymptomatic neurosyphilis in patients treated by this method: the cerebrospinal fluid was examined after treatment in 719 patients, in only 5 of whom was it abnormal.

Some of this evidence is conflicting, and taken as a whole it sheds little light on this difficult problem. Doubt as to the precise content of the penicillin used in these studies, in terms of the four crystalline penicillins which it is now known to contain, adds to the general confusion. It is clear that judgment must be reserved; rapid methods of treatment are still in the experimental stage and must be used with the utmost caution. Much could be learnt from a systematic follow-up of the many patients treated in the Services with penicillin alone; their records are available, and most of the men could be traced. Such an investigation would be worth the expenditure in time and money.

Annotations

MENTAL HEALTH AND CRIME

MUCH has been said and written during the last two decades about the increase of crime and delinquency. The gravity of the problem is admitted to be increasing; the attempts to deal with it constructively seem quite inadequate. Dr. J. R. Rees, in his Clarke Hall lecture delivered at Lincoln's Inn on March 26, contributed several sound ideas from his recent experience as chief psychiatric adviser to the Army. He was impressed by the great decrease in sickness and crime which followed the systematic drafting of dull men (of whom the Army received more than its fair share) into manual-labour units. When they were given work entirely within their competence, and friends of their own intellectual level, they became happy and healthy, and contributed much to the Army's effort. Nearly 30% of the whole population, Dr. Rees estimates, are mentally backward, chronically neurotic, or emotionally handicapped. If, he suggests, these "weaker brethren," who commit an unduly high proportion of all the crime, could be put to work and properly led, much adult crime would be prevented.

As a starting-point for the attack on the basic social problem of selfishness, marriage guidance is probably, Dr. Rees thinks, about as good as any other; for clearly if couples married more wisely, they would be better adjusted parents, they would want and love their children, and they would provide happier homes. More and better youth clubs, training for and within industry, vocational guidance, and (on the penological side) better trained and younger magistrates familiar with an enlightened prison system—these are some of the reforms from which he would hope to see a solution grow. There is, in his opinion, plenty of knowledge on which to work, but he emphasises the need for research and for much better co-ordination of the existing knowledge. Whether his suggestion of a Royal Commission is a good one is, however, open to question. A well-chosen Royal Commission would certainly carry weight, but by the time it published its results the situation might have changed out of recognition. There would, moreover, be no certainty or even probability that the Government of the day would act on its findings. The Criminal Justice Bill of 1938, which everyone admitted went a substantial way in Dr. Rees's direction, is still on its shelf. There is no ready-made answer to the problem.

Dr. Rees said, quite rightly, that all crime is a sign of some personality and character disorder, whether it

2. Heller, J. R. jun. *J. Amer. med. Ass.* 1946, 132, 258.

3. Sternberg, T. H., Leflor, W. *Ibid.*, 1946, 133, 1.

consists of murder and robbery, or of more respectable offences like income-tax evasion, use of electric current during prohibited hours, or driving too fast in built-up areas. What he did not mention at all was the contribution of society itself to crime. Crime is correctly defined as an infraction of law; we are only just beginning to realise that both the law and the infraction may be symptoms of a collective character disorder for which we are collectively responsible. Our collective shortcomings are partly responsible for the present tangle of restrictive regulations with their infinite number of new offences; they have also, by binding upon the weaker brethren burdens they are unable to bear, made inevitable much of the crime which is now beginning to cause us discomfort and anxiety. The problem of crime, while it certainly calls for examination of the offender and his circumstances, calls even more loudly for an examination of the social order against which he offends.

THE MULTIPLICATION OF COAGULATION FACTORS

THE orthodox faith of blood coagulation, based on the four agents, thromboplastin, prothrombin, calcium, and fibrinogen, has been able to survive repeated and determined heretical attacks because it offers the simplest explanation of those facts with which the average physiologist is familiar. It is now becoming clear, however, that only as a framework can it continue to exist. Despite the notorious difficulty of obtaining reproducible results in this field of research it is apparent to even the most conservative that modern findings require a considerable elaboration of the old theory, or a new theory altogether. So far the tendency is to try to fit new facts into the old framework, though to some it may seem that the resulting structure is becoming a little unstable. The additions are in the form of "new factors." Some of these are thought to oppose the action of the accepted clotting mechanism, as, for instance, the antithromboplastin described by Tocantins,¹ which he considers to be present in excess in hæmophilia, and a similar, possibly identical, inhibitor studied by Feissly.² On the other side of the balance a number of agents have been added by the recognition of the complex nature of factors previously stated to be simple. Thromboplastin is thought to consist of an enzyme (kinase) and a co-factor of lipoidal nature related to cephalin or lecithin.³ Kinase itself is probably derived from an inactive precursor in the plasma, studied under the name of "plasmakinen" by Laki.⁴ Several workers have come to the conclusion that prothrombin is a complex of at least two components,⁵ and even fibrinogen has not preserved its undivided identity.

Now, distinct from these fission products of the old clotting factors, come the new "factors v and vi" described by Owren in our columns last week. The evidence that he puts forward must be accepted as being strongly in favour of the existence in normal plasma of an accessory to thromboplastin and calcium essential to their proper action on prothrombin. In his present communication the evidence for "factor vi" is less convincing, but will no doubt be presented in full later.

The existence of an additional factor of the type postulated by Owren had already been suggested by the work of Fantl and Nance⁶ in which they found that, while highly purified preparations of prothrombin could be only slowly converted to thrombin by thromboplastin

and calcium, the addition of prothrombin-free plasma resulted in a great acceleration of the reaction. Whether, as seems likely, these findings can be explained on the same basis as those of Owren only future work can determine. In any event a fresh impetus to research on blood coagulation has been given by Owren's observations, and, as always, a new discovery may have unexpectedly wide and exciting results. The case of factor v deficiency he describes is obviously an example of an extremely rare condition, but its intelligent investigation has shown once again how important human material can be to the experimentalist, a fact often ignored in academic circles. It provides, too, still another example of how increasing knowledge appears to reveal an almost infinite complexity underlying even the simplest biological process.

And yet, in this particular instance of blood coagulation, the intricacy seems almost too lavish. Do all these factors, whose number now runs into double figures, really exist in the blood for the express purpose of controlling the occasional conversion of fibrinogen to fibrin, or do they, under other names, take part in other and more continuous metabolic processes? Or is it, perhaps, that one's dissection of the dynamic whole creates a series of static artefacts?

DOCTOR DEMAND IN A HEALTH SERVICE

WHEN everyone can get medical advice without paying directly for it, what increase may we expect in the demand for doctors' aid? Sound planning for a new health service requires some estimate of the amount of professional attention people will want; and this problem has been studied in Canada, now also engaged on tentative plans for universal State-aided medical care.

Although it would be unwise to apply generally to this country the experience of a particular town in Eastern Canada, yet the results of a morbidity survey made some time ago by Richter¹ in two Nova Scotian communities are certainly relevant. This survey covered a year's record of the services given by the local doctors in Glace Bay, a typical mining town, and Yarmouth, a non-industrial town in the same area. There were differences in the age-sex composition, and the economic and industrial background of the populations, but the most important difference was in the method of providing for medical care. In the mining town a contributory insurance scheme assures treatment by general practitioners, hospital care, operations, drugs, and dressings for each worker and his dependants. In the rather more affluent Yarmouth the fee-per-service system operates, the usual charges being \$2 (10s.) for a surgery consultation and \$3 (15s.) for a visit. The contributory scheme had been in operation in Glace Bay for about 80 years, and the level of demand had become stabilised. Records were kept of the number of professional services rendered by the practitioners in each town to all members of the communities during the 12 months of the survey, and comparisons between the incidence-rates of treated illnesses were then made. Clearly such comparisons were complicated by the occupational, economic, and demographic differences of the two populations, but some of the results which were relatively unaffected by these difficulties are significant.

In both communities two-thirds of the services were given to the workers' dependants, but an important difference was revealed: under the insurance scheme the larger families—with eight or more members—had twice as much medical care as families of the same size had under the fee-for-service régime. It appears then that, when assured provision is absent, the larger

1. Tocantins, L. M. *Amer. J. Physiol.* 1943, **139**, 265.
 2. Feissly, R. *Helv. med. Acta*, 1944, **11**, 177.
 3. Leathes, J. B., Mellanby, J. *J. Physiol.* 1939, **96**, 38P; Macfarlane, R. G., Trevan, J. W., Attwood, A. M. P. *Ibid.*, 1941, **99**, 7P.
 4. Laki, K. Studies from the Institute of Medical Chemistry, University Szeged, 1943, vol. III, p. 5.
 5. Quick, A. J. *Amer. J. Physiol.* 1943, **140**, 212; Nolf, P. *Arch. int. Pharmacodyn.* 1945, **70**, 5; Feissly, R. *Schweiz. med. Wschr.* 1945, **75**, 696.
 6. Fantl, P., Nance, M. *Nature, Lond.* 1946, **158**, 708.

1. Richter, L. The Effect of Health Insurance on the Demand for Health Services. *Canad. J. Econ. polit. Sci.* May, 1944, p. 179.

families get less than their share of medical service. Further results also indicate that where economies have to be made the children suffer most because of the financial loss entailed by continued sickness in breadwinner or mother. Generally, the "treated illness" rates at all ages were appreciably higher among the insured population; presumably this does not necessarily reflect any real difference in the incidence of disease but rather an increased readiness to seek a doctor's advice. A cynic might attribute this alacrity to a very human desire to get one's money's worth for one's contribution, but there may be a widespread belief that prompt attention to minor ailments is a preventive of serious disability. Under the insurance scheme common colds, tonsillitis, minor injuries, and digestive upsets are much more often treated by doctors than under the other system. There are differences, too, in the character of the services provided; for the insured patients their doctors made more home visits and dispensed twice as many drugs and four times the number of dressings prescribed by their counterparts in the other town. Home visits, which are more expensive under a fee-for-service system, were much more frequently made to sick children in the mining town.

From all this, those charged with the provision of medical man-power and supplies for our new health service may reasonably infer that the removal of economic restraint may entail a rise of perhaps 50% in the demand for professional attention. For the general practitioners, whose numbers cannot increase in step with this demand, this will mean even heavier calls upon their time and patience—a consideration which might be taken into account in the forthcoming negotiations. Against this, of course, must be set the possibility that readier access to the doctor's care for apparently trivial illness may give fresh scope for the prevention of more serious developments. The balance between sound preventive medicine and merely harassed overwork is very finely set, and much will depend both on the technical and clinical assistance made available and on the good sense of the public.

CONTINUOUS PENICILLIN APPARATUS

THE discomfort of repeated intramuscular injections in the administration of penicillin has stimulated many ingenious minds to contrive apparatus which will maintain a continuous and accurate dosage in small bulk. Most of these depended on hydrostatic principles and were constructed essentially of a calibrated glass tube connected to the injection needle by a necessarily long length of rubber tubing. Unfortunately, however, penicillin may deteriorate on protracted contact with rubber, and such bedside apparatus is in any case easily upset and very temperamental. Attention has therefore turned towards mechanical devices. Professor Fleming's team adapted a clock, deprived of its hands, to drive down the plunger of a syringe, but rubber tubing was still used to connect the syringe to the patient. In this issue Major Bowie and Captain Borcar describe the Secunderabad apparatus, which has the precision workshop of R.E.M.E. behind it. Rubber tubing is eliminated by strapping the syringe to the patient's thigh at the site of injection, using a flexible speedometer-cable to connect the piston mechanism with an electric motor. A rather similar apparatus, designed by Dich and Jensen, was described¹ by P. J. Dragsted, of Copenhagen, to the Danish Society of Internal Medicine in April, 1946. The Danish apparatus is self-contained and driven by clockwork, so that the patient can move about freely without disconnecting the apparatus; the clockwork is silent and runs without attention for 24 hours. The same technical difficulties have occurred to both inventors. However well the syringe plunger seems to fit the barrel there is

a tendency for it to leak under continuous pressure. Dragsted advises lubrication with liquid paraffin, while the Secunderabad apparatus is fitted with a plunger of "resilient material" which can be expanded by a tightening device. Another common problem has been to allow for some movement of the intramuscular needle on the fixed syringe. Although this is not shown in their diagram, the Danes say that a short rubber connexion may if necessary be inserted between the nozzle and the needle. In the Secunderabad apparatus an ingenious spring-coiled needle solves this problem but raises others of cleaning and replacement. The syringe appears to be easily removed for recharging in the Danish model, so avoiding the complexity of a three-way tap and recharging syringe.

While clinicians continue to think it important to keep blood-penicillin levels constant there is likely to be a demand for apparatus such as these. If accuracy, ease of maintenance, and simplicity in operation are the criteria, the published descriptions suggest that the Dich-Jensen has some slight advantages over the Secunderabad.

INDUCED VITAMIN DEFICIENCIES

THE investigator who wants to study specific vitamin deficiencies in human subjects finds his material hard to come by. Natural deficiencies are almost always multiple, and the grosser ones usually arise in remote places, such as prisoner-of-war camps, enemy-occupied countries, or the less-frequented parts of the tropics. When his work seems of national importance he may be allotted volunteers—Servicemen or conscientious objectors, perhaps—but otherwise he must rely on himself, his colleagues, or his students, none of whom will relish deprivations extending over years. The late war was remarkable for the painstaking studies made among (and by) prisoners-of-war in the Far East; but there again the deficiencies were multiple and uncontrolled by the investigators.

In the United States Horwitt and colleagues,¹ working for the National Research Council, have studied induced vitamin deficiencies in the inmates of a mental hospital over 2½ years. One group of patients were subjected to a mild chronic thiamine plus riboflavine deficiency over the whole period, and in a second group a more acute deficiency was induced. An obvious drawback to the experiment was that these patients could not be guaranteed to have a normal vitamin metabolism—presumably many of them were schizophrenics, whose metabolism in many fields is grossly deranged. The 36 male patients studied fell into two age-groups of 58–78 and 24–42 years. Each age-group was divided into three classes, A, B, and C, so that each class consisted of 7 old and 5 younger patients. Class A received a daily diet containing 2200 calories and sufficient vitamins except thiamine (400 µg.) and riboflavine (900 µg.). Class B had the same diet with 6 mg. of thiamine and 1.3 mg. of riboflavine added. Class C were the controls, on the usual hospital diet. The clinical effect of the diet in class A was at no time more than minimal. There was some dulling of interest and restriction of activity, but psychological tests were satisfactorily performed. The skin of some of the younger subjects became thinner, making them look older than they were, and some drying, thinning, and wrinkling of the lips was noted. Within nine months from the beginning of the deficient diet, an abnormally high level of lactic and pyruvic acid was found in the blood in response to a standard exercise after ingestion of a standard amount of glucose. This abnormality persisted throughout the experiment.

At the beginning of the third year of the experiment class B were given a daily diet containing only 200 µg. of thiamine and 800 µg. of riboflavine. Within three months their levels of blood lactic and pyruvic acids after the

1. *Nord. Med.* Jan. 31, p. 288.

1. Horwitt, M. K., Liebert, E., Kreisler, O., Wittman, P. *Science*, 1946, 104, 407.

exercise test rose higher than those of class A. Shortly afterwards clinical symptoms developed, either acutely or subacutely. These included a non-pitting œdema of the facial skin, especially of the eyelids, without any œdema of the legs; budding of the blood-vessels into the cornea with plexus formation; decreased vibration sense in the legs; and emotionally some loss of inhibitory control with an exaggeration of psychotic symptoms. There were wide individual differences in the time it took for symptoms to develop and in their intensity. Those who took a long time to develop symptoms on the whole had mild ones. In general the young withstood the deficiency best. Recovery was immediate when an additional 6 mg. of thiamine a day was given.

CERVICOBRACHIAL SYNDROMES

Prof. René Leriche lately remarked¹ that there are still a number of unclassified vasomotor syndromes in the arm. He describes, for instance, one of inadequate vasoconstriction marked by paræsthesiæ, redness, and swelling in the fingers, worse in warm weather, and immediately relieved by lying down. He regards this as similar to the condition sometimes seen in the legs after sympathectomy for hypertension, in which vasoconstrictor tone is lost so that the peripheral circulation cannot adjust itself to changes of position. If this is the explanation it is a little odd that stellate block should be the right treatment; but Leriche believes that this corrects any existing sympathetic imbalance and is not to be regarded as merely the antidote to vasoconstriction.

In the causation of the various syndromes of the erect position Leriche attaches some importance to compression of the neurovascular bundle in the gap between scalenus anterior and medius, and he suggests that the significance of congenital anomalies of the lower cervical transverse processes is possibly that they allow the insertion of scalenus medius to encroach further forward, thanks to its additional origin, so narrowing the gap still more. In costoclavicular compression Leriche holds the unorthodox view that the subclavius is partly responsible, and he advises section of this muscle, or crushing its nerve, in addition to a routine anterior scalenotomy. He does not mention partial resection of the first rib for this condition, though others find it essential in severe cases. His general conclusion, however, will be widely acceptable—one should not diagnose Raynaud's disease or acroparæsthesia until postural causes have been entirely excluded; and here the patient's history of his trouble provides the most valuable guide.

At a discussion on pain in the arm at the Royal Society of Medicine on Feb. 4 there was pretty general agreement that brachial neuritis is usually an ill-founded diagnosis (though acute infective radiculitis is a genuine and common entity), and that as a rule a mechanical factor can be found. Telford and Mottershead,² who have made a systematic investigation of the costoclavicular syndrome at operation, in the dissecting-room, and experimentally in normal students, do not believe that costoclavicular compression is as ubiquitous in these cases as some writers make out. Their observations have shown that forcible depression of the shoulder widens rather than narrows the costoclavicular interval, and they maintain that the disappearance of the radial pulse which often occurs with this movement has nothing to do with the clavicle but is due to squeezing of the axillary artery between the heads of the median nerve. All surgeons may not agree with these conclusions of Telford and Mottershead, but their combination of anatomical investigation with the experimental clinical approach is the right way to tackle this problem, which still possesses undiscovered facets. Two of their observations are certainly valid. The knifelike anterior edge of the scalenus medius is as capable of damaging the neurovascular bundle as is the

anterior scalene. And there are a multiplicity of mechanical and postural factors to be considered, several often operating in the same case.

THIOUREA DERIVATIVE AS RAT POISON

SOME of the thiourea derivatives are highly toxic, and one has proved a useful rat poison. Richter¹ found that phenyl thiourea was as lethal as strychnine to rats though not very poisonous to man. Owing to its taste, however, it was not very acceptable to the rats as bait; so a search was instituted for a substitute. The final choice fell on a derivative, alpha-naphthyl-thiourea, a blue-grey powder, which clings easily to dry or wet surfaces, is very stable, and lasts some years without deteriorating, air and light not affecting it. Its melting-point of 184° C allows it to be used in hot places. It is practically insoluble in water. Rats seem unable to distinguish any difference between poisoned bait and that not poisoned, when both are laid together.

To be effective as a poison for rats, alpha-naphthyl-thiourea (ANTU), which is recommended by the Ministry of Food,² must be consumed in a large enough dose (8 mg./kg. of body-weight). Repeated sublethal doses have no cumulative action; on the contrary, they may produce some tolerance, which may last 30-40 days. The toxicity of ANTU is greater to small mammals than to large mammals, and greater to carnivores than to herbivores. Among rats the toxicity is greatest to *Rattus norvegicus* (the brown rat) and least to *R. alexandrinus*, whereas *R. rattus* (the black rat) occupies an intermediate position. The toxicity to mice is about the same as to the brown rat. Domestic animals are equally susceptible, but the effects are minimised by vomiting (an action which rats are said to be unable to perform³). To poison man, ANTU would have to be swallowed in a large quantity: no case of poisoning has so far been reported among makers or users in America, where fifty tons have been distributed to 150,000 farms. Nevertheless, precautions should be taken, such as colouring bait containing ANTU, laying the bait in sites inaccessible to children and pets, and washing the hands after handling the bait.

ANTU acts only after ingestion. Contact with the skin is harmless, but if it is sprinkled on the rats' runs they can be poisoned by licking it off their paws. The poison produces an intense pulmonary œdema, due to increased permeability of the capillary walls. McClosky and Smith⁴ have reported fatty degeneration of the liver of the "nutmeg" type. A characteristic sign of poisoning is a lowered body-temperature. Like the other members of the thiourea group, ANTU in repeated small doses interferes with the action of the thyroid hormone.

ACCIDENTS TO CHILDREN

VIOLENT deaths of children might be supposed to have increased with the growth of motor transport; and, indeed, from 1911 to 1944 there was a slight but steady rise in deaths from violence among those between the ages of 5 and 15. The overall picture, however, is not so dark, for Dr. A. H. Gale⁵ has lately published figures showing that the death-rate from all kinds of violence, per 100,000 living, has fallen from 130 in 1851-60 to 67 in 1940-44 in children under 5, from 54 to 35 in those aged 5-10, and from 93 to 21 in those aged 10-15. The numbers at risk were about the same in the years chosen. He has analysed child deaths in 1870 under various headings—such as deaths on railways, in mines, from burns and scalds, drowning, and suffocation—and has compared them with deaths from similar causes in 1942. The change for the worse in traffic accidents is outstanding, only 443 fatal accidents in children under 15

1. Richter, C. P. *J. Amer. med. Ass.* 1945, 129, 927.

2. See *Lancet*, 1946, ii, 950.

3. Bayley Bustamante, G. *Prensa méd. argent.* 1946, 33, 2550.

4. McClosky, W. T., Smith, M. I. *Publ. Hlth Rep., Wash.* 1946, 60, 1101.

5. *Mon. Bull. Min. Hlth, P.H.L.S.* February, p. 29.

1. Leriche, R. *Pr. méd.* 1946, 41, 569.

2. Telford, E. D., Mottershead, S. *Brit. med. J.* March 15, p. 325.

having been caused by horses and horse-drawn vehicles in 1870, against 1087 fatal accidents caused by motors in 1942. On the other hand, better legislation for the care of children is reflected in the fall of deaths in mines: 124 boys aged 10-15 and 10 younger boys died in the mines in 1870, whereas in 1942 only 4 children in all died in "mines and quarries," one of them being a girl under 5. Probably those 4 children were all playing near quarries or old shafts, and were killed accidentally by falls. Gale's tables, indeed, show a sudden decline in deaths from violence in children aged 10-15 from the decade 1851-60, when it was 93 per 100,000 (77 boys, 16 girls) to the decade 1861-70 when it fell to 45—less than half. Below the age of 10 the fall was less dramatic, and it seems certain that legislation to ease the lot of children in industry must be the explanation. Gladstone was forcing his reform Bills on a reluctant Parliament, and public opinion was being influenced by such widely differing books as *Oliver Twist* (1838) Engels's *Conditions of the Working Class in England* in 1844, Mrs. Gaskell's *Mary Barton* (1846), and Kingsley's *Water Babies* (1862).

Deaths from suffocation of children under 5 are still high, having fallen from 947 in 1870 to only 539 in 1942, when there were, in addition, 176 deaths of newborn children from lack of care. Birth injuries cannot be compared in the two groups, since the term evidently had a different meaning in 1870. Deaths on railways fell from 125 to 38, and deaths from drowning (apart from bathing accidents) from 875 to 447. Burns and scalds compete most nearly with traffic accidents as a cause of death, for though they have fallen from 1739 to 513 the number of such preventable accidents is still much too high. Dr. Leonard Colebrook, F.R.S., reminded us not long ago that in the five years 1935-39 6516 people in England and Wales died from burning accidents, and 2825 of these were children; more than 90% of these deaths were due to burning and scalding in the home.⁶ Bad housing and overcrowding, old-fashioned grates around which children play for lack of space elsewhere, ill-designed fireplaces, inadequate fireguards, and inflammable clothes combine to produce this terrible waste of life. When non-fatal accidents, many of which lead to loss of function or at best severe scarring, are also taken into account the price of our general carelessness is seen to be appallingly high. In a recent letter⁷ Colebrook advocated a simple guard for electric fires, which, if widely used, could remove or make negligible at least one important cause of fatal accidents.

LOCAL APPLICATIONS TO PREVENT DENTAL CARIES

ATTENTION has lately been focused on the organic portion of the enamel as the primary site of attack in dental caries. It has been suggested that organisms travel along this organic material until the dentine is reached, and that blockage of the organic paths should check the carious process. In the United States B. Gottlieb has claimed good results from a technique based on this hypothesis. He first applies a 1% solution of 'Naccanol,' which seems to be a wetting agent intended to decrease the surface tension and facilitate better penetration; then a 5% solution of silver nitrate is painted on and left for a minute before precipitation is produced with a saturated solution of calcium chloride. This precipitation is intended to prevent the black stain otherwise found where silver nitrate is applied. A British United Press report says that fairly frequent applications of the solutions are necessary. Now that the formulæ of the solutions have been divulged it will be interesting to see whether further experiments bear out the early somewhat startling claims.

BONES IN THE BANK

A "bone bank," perhaps the first of its kind, has been set up at the Geisenger Memorial Hospital, Pennsylvania.¹ Dr. Leonard Bush, head of the orthopaedic department, has explained that surplus bone from such operations as osteotomies can be preserved indefinitely at a temperature of 10° F, and it will provide material for chip grafts, so eliminating one stage of the grafting operation. The value of a bone bank must depend on the kind of material available for storage, and this is likely to be limited to fragments which are partly compact and partly spongy. For filling in defects after trauma or the excision of tumours or cysts, these fragments will be quite satisfactory; for, though heterogenous skin grafts² or nerve grafts³ are unsuitable for transplantation after storage, on account of the foreign protein reaction they excite, with chip grafts it is a matter of indifference whether the bone survives or not. On the other hand, the special properties of living cancellous bone and of massive rigid cortical grafts will still make it desirable to obtain these from the patient himself.

THE CALL-UP

IN the spirited debate at the second reading of the National Service Bill the Minister of Labour explained that any young man training for a trade or profession is to have the option of serving either before or after his apprenticeship; doctors and dentists would, he suggested, be called up usually about the age of 25, though study for higher qualifications would be accepted as grounds for deferment up to the age of 29. He emphasised, however, that no young man who is liable and medically fit will be exempted; the burden is to be the same for all. None will quarrel with this arrangement on grounds of equity. Nevertheless, it may be questioned whether the ruling should be narrowly applied to doctors. The doctor's contribution to the Forces is his trained skill; though there is a particular knack in applying this skill in the Services, it is basically the same skill that he exercises in civilian practice. The trained doctor, like the trained soldier, can be rapidly prepared for war service, and we suggested on March 22 (p. 375) that the whole of his term of national service should not necessarily be spent in the Armed Forces. The Forces may be hard put to it to employ usefully the 2000 or so men who qualify each year; on the other hand, there is great and growing need for medical men in the civilian and other official services, notably in the Colonies.

There is no reason why doctors, more than any other group, should be excused national service. There is, however, every reason, in the present scarcity, for employing them where they are most needed.

CAMBRIDGE APPOINTMENTS

THE appointments to the honorary staff of Addenbrooke's Hospital announced on March 28 mark a further step in the development of the Cambridge postgraduate school of medicine.⁴ Prof. R. A. McCance (head of the department of experimental medicine), Prof. J. S. Mitchell (radiotherapeutics), and Prof. H. A. Harris (anatomy) become physicians to the hospital; Prof. H. R. Dean consulting physician; and the readers in the departments of bacteriology, medicine, and morbid histology assistant physicians. As an academic quid pro quo 17 members of the staff of the hospital have been recognised as lecturers of the university.

Lord MORAN has been re-elected president of the Royal College of Physicians of London.

1. British United Press report.
2. See *Lancet*, 1943, ii, 449.
3. *Ibid.*, p. 671.
4. See *Ibid.*, 1946, ii, 836.

6. *Ibid.*, October, 1946, p. 214; see *Lancet*, 1946, ii, 833.
7. *Lancet*, March 22, p. 386.

Special Articles

DUTCH BLOOD-TRANSFUSION SERVICE DURING THE GERMAN OCCUPATION

J. SPAANDER

M.D. Amsterdam

*From the Central Laboratories, Netherlands Red Cross,
Amsterdam*

In 1939 the imminence of a European war made it necessary to extend the blood-transfusion donor panel in Holland and to prepare for an emergency transfusion service. During the Spanish civil war the treatment of severe casualties with stored blood had proved very promising, and experiments on the storage of blood were started with great enthusiasm in Holland.

In the university clinics of internal medicine at Amsterdam (director, Prof. J. G. G. Borst) an apparatus for blood-transfusion was devised which could be used for taking, storing, transporting, and giving blood aseptically. To gain experience, transfusions with stored blood were performed in five leading hospitals in Amsterdam. Many difficulties, especially in discovering the right kind of glass for the bottles, had to be overcome. However, when on May 10, 1940, the Germans launched their surprise attack and the Dutch Army went into action, 60,000 voluntary donors were ready, and stored whole blood could be sent to the field ambulances and surgical centres immediately.

It was obvious that under German occupation the military blood-transfusion service could not carry on. Yet it was clear to every true patriot in Holland that the forced surrender to the German Army was not the end of the fight. So we had to switch over to a civil transfusion service to prepare secretly for a possible fight for liberation later. The complete equipment of the blood-transfusion service was handed over to the Dutch hospitals through the Netherlands Red Cross. The bottles were prepared in the central laboratories of the Red Cross blood-transfusion service in Amsterdam and delivered to the hospitals. After use the apparatus had to be collected and brought back to the laboratories for sterilisation and refills. Thus many Dutch surgeons and physicians became familiar with blood-transfusion and aware of its advantages in the treatment of shock.

One of our major difficulties was the complete lack of foreign scientific papers, especially English and American. Sometimes, however, we got information, unnoticed by the German censor, through Switzerland and Sweden, and B.B.C. broadcasts told us of the splendid results achieved with dried plasma in the North African and Sicilian campaigns.

UNDERGROUND ACTIVITIES

In spite of strict German control we managed to build a hidden plasma-drying plant in the autumn of 1943. The difficulties in getting machines and materials were manifold. The separator for producing the plasma came from Sweden, together with some "confidential remarks." Several Dutch factories helped us by making the required equipment from raw materials intended by the Germans for their own use.

Thus we managed to prepare 6000 complete sets of dried plasma in 1944. They were divided among several hospitals in Holland, especially in centres where we expected bombing or fighting. In the battles of Nijmegen and Arnhem some hundreds of sets of dried plasma were at hand for resuscitation. The special ambulances of the blood-transfusion service drove as near to the front as possible to provide Dutch civilians and underground forces with plasma and blood-transfusion equipment. Only the day before the liberation of Breda and Hertogenbosch our cars arrived there with plasma and apparatus. During their trips our vans were exposed to machine-gun fire from fighters patrolling over the main

roads, but the protection of the Dutch tricolour and the red-cross sign on top of the cars enabled us to continue our duties.

When in September, 1944, many men of the British airborne division from Arnhem were conveyed to Apeldoorn, we succeeded in passing the German sentries and gave the British soldiers the blood-transfusions they urgently needed. Yet some days afterwards the Gestapo intervened and swept aside our humanitarian work.

The Germans continually tried to involve us in their war effort. We became suspicious, with good reason, when they appealed to our generosity. Only when the donor was sure that his blood could not be given to a German was he willing to help. When it became known that blood was being sent to the British soldiers in Apeldoorn, in no time people queued outside the hospital ready to give their blood.

DURING THE LIBERATION

With the approach of the Allied Armies the difficulty in maintaining our services became more acute. In September, 1944, the northern part of our country became isolated from the southern part, and the hospitals in Brabant and Limburg had to rely on their own stock of blood-transfusion equipment.

The Germans stopped all traffic to break the railway strike, so it became extremely difficult to get our cars to the hospitals. In March and April, 1945, only the hospitals in the neighbourhood of Amsterdam could be provided with blood-transfusion sets, which were delivered by bicycle, the cars being requisitioned by the Germans.

Gas works and electricity works were obliged to close down because of shortage of coal. Again we appealed successfully to our friends the Dutch manufacturers. From their hidden stocks we fetched an electricity generator with a Diesel engine, while the German demolition squads were blowing up the cranes of the Amsterdam docks. From the same source we got oil and petrol, hidden in municipal dust-carts. In a German gas-filling station our cylinders were filled with coal-gas by a reliable Dutch workman, the empty ones being added to the German cylinders. In this way we had enough gas at our disposal for the laboratory. We hastily erected a small boiler, which was run on coal from German war stores. Many difficulties, many risks had to be faced, but we managed to carry on.

Meanwhile starvation became more and more intense, and everyone tried to find a little more food than the 400 g. of bread and 1000 g. of potatoes allowed per week. Even in this respect we were able to help our employees, owing to the support of many friends of our service. When in May, 1945, the first food-flying squadrons arrived at Schiphol and dropped their parcels the men of our laboratory helped to gather the food. They were allowed to eat from tins that had fallen to pieces. I shall always remember the look of satisfaction on their faces when they came back after a day's work!

AFTER THE LIBERATION

Very soon after the liberation we resumed our work on an almost normal scale. The cars, requisitioned by the Germans, were still in Amsterdam, and immediately after the German surrender we gathered the remnants together. After some weeks the cars were ready for use again, and on July 17, 1945, we were able as before to visit every hospital in Holland once a month.

In the meantime people in the southern part of the Netherlands had prepared themselves to give their blood for the starving population of western Holland. Every week hundreds of bottles of blood were prepared in the hospitals of Brabant and Limburg and sent to the central Red Cross laboratories in Amsterdam. From here the blood was distributed to the hospitals in Haarlem, the Hague, Rotterdam, &c.

These times are now past, and life is getting less difficult every day, and so is our work. Today nearly every hospital in Holland makes use of the blood-transfusion equipment of the Netherlands Red Cross. Each hospital is visited once a month by the vans of the Red Cross blood-transfusion service to supply them with sterile blood-transfusion sets and dried plasma.

It is very important always to use one standard apparatus, prepared under rigorous control in one and the same laboratory. This makes it possible to prevent nearly all pyrexial reactions after transfusion, which were formerly so common, and it enables us to collect all the transfusion records from the whole country for statistical analysis, a procedure of great value.

In spite of five years' isolation we can now claim that the blood-transfusion service in Holland is not inferior to those in other countries.

SERVICE PSYCHIATRY

In 1942 an expert committee was appointed by the Government to investigate and appraise the work of psychiatrists and psychologists in the Services, and to consider its application to other purposes. This committee was composed as follows:

Sir Wilson Jameson, chairman; Surgeon Vice-Admiral Sir Sheldon Dudley; Air Marshal Sir Harold Whittingham; Lieut.-General Sir Alexander Hood; Lord Moran; Prof. F. C. Bartlett; Prof. D. K. Henderson; Prof. Aubrey Lewis; Prof. A. W. Wolters.

In March, 1943, Sir Wilson Jameson resigned owing to pressure of other duties, and was succeeded in the chair by Sir Francis Fraser.

Their report,¹ dated Jan. 31, 1945, has now been published, and their main findings are summarised below.

WORK OF PSYCHOLOGISTS

The systematic study of the thought and behaviour of humans, the committee consider, can be applied practically to the handling of personnel in all phases of their Service careers, from recruitment through training to readiness for active operations; and this is increasingly recognised at all levels of Service organisation. Experience and tradition accumulated during the war should be preserved and applied in the Services during peace-time.

Psychologists have been mainly engaged in developing methods of personnel selection, so that officers and men could be put to appropriate tasks; in improving methods of training and of assessing proficiency; in assisting in design of weapons and equipment; in studying the psychological aspect of operational problems; and in developing statistical methods for dealing with their material. Much of this work has grown directly from studies made in the 1914-18 war, and from the work of the Industrial Health Research Board, which was first set up in 1918 under the Medical Research Council. Service psychologists have also joined with psychiatrists and experts in other fields to advise on interviewing technique and the use of questionnaires, on the use of drugs and vitamins, on job analysis and conditions of work, and on fitness of personality in candidates for various Service duties.

In the Navy psychologists are assisted by technical and clerical staff. The technical staff, mostly W.R.N.S. of high capacity with previous experience as teachers or welfare officers, are trained for a fortnight in the giving of tests. A few male officers are also used, being trained specially in the technique of interviewing, and in the use of oral trade-tests. In the Army the auxiliary staff consists of personnel selection officers and sergeant testers. The officers have a month's training in job analysis, vocational selection, assessment of educational level and occupational experience, and in interviewing technique. Sergeant testers get two or three weeks' training in the nature and use of tests, and must be able to test and score. In the R.A.F. the auxiliary staff are W.A.A.F. clerks who have had four weeks' training and passed an examination.

Differences in the three Services make it impossible to develop the same type of psychological arrangements in each; the pattern must develop to suit the Service; but shortage of trained psychologists in all the Services

prevented expansion at the time when the report was written. The committee feel that the universities might be used more fully for laboratory research into Service problems.

They note that, since on demobilisation Service men and women recover their civil rights, the disclosure of Service data about them must be very carefully considered, especially since findings applying to Service situations do not apply directly to employment in civil life.

They recommend that all officers during training should be instructed in the psychological aspects of their work; that psychologists should be represented on scientific and advisory committees and other bodies concerned with personnel; that the senior psychologists should form an inter-Service committee to discuss developments and research; and that psychologists should be observers at operations or battle exercises. They also suggest directions in which psychological work might be extended, including selection of officers for special duties, design of syllabuses, assessment of proficiency in Service occupations, design of reports on training progress and operational efficiency, opinion surveys, and publicity in the fields of recruitment and hygiene.

WORK OF PSYCHIATRISTS

Service psychiatrists have worked mainly on prevention. They have helped to devise measures to avoid waste of time on the training of people likely to break down, and have studied ways of preventing breakdown and improving morale by placing people in appropriate jobs, with responsibility suited to their intelligence and temperament. Early recognition of symptoms and early treatment have made recovery possible for many patients, who were then allocated to suitable work in the Services or in civil life.

Service psychiatry is naturally based on civil psychiatry. Conscription brought into the Forces many unsuitable people: between a third and a half of all medical invalids, men and women alike, are discharged from the Services on psychiatric grounds—an incidence of 4-10 per 1000 of the average strength per annum. Between a quarter and a third of these have served less than a year. Those who break down in this way show a much higher concentration of ominous signs—such as poor occupational record—than those who do not break down.

In the Navy most psychiatrists now have experience of conditions at sea, and after several months of training begin serving as juniors under a senior Naval psychiatrist. Army psychiatrists, after four weeks' initial training during the war, were posted for four weeks to a field force unit. They were then apprenticed to an area psychiatrist, and their suitability for various types of military psychiatric work assessed. They have no responsibility for treatment or disposal until they have had at least three months' training in the special conditions obtaining in Army psychiatry. In the R.A.F. neuropsychiatric specialists are attached, on entry, to the Central Medical Establishment, for training, and are subsequently sent to a neuropsychiatric centre where they get practical experience under a Service specialist. While in training they spend a period of two or more weeks attached to a station from which squadrons are operating.

Since the aim of Service psychiatry is to make full use of human resources, it gives first place to preventive measures. The psychologist applies selection tests, designed to assess general ability and special skills and aptitudes; the psychiatrist assesses fitness of personality for Service duties; and experience has shown that the methods used give reliable results.

The committee recommends that psychiatrists and psychologists should continue their work of selection, classification, training, and maintenance of mental hygiene and morals; and that better methods should be developed for keeping out of the Forces those who are unsuitable. Better training of those responsible for referring candidates to psychiatrists is needed, while medical officers of units should have more instruction in the handling of psychiatric problems, and officers of units in the maintenance of morale. More psychiatrists than are at present available are needed in the Services, and arrangements should be made, the committee consider, to train suitable medical officers for the purpose. Senior psychiatrists, like senior psychologists, should have some common meeting-ground where they can discuss the procedures developed in each Service.

1. The Work of Psychologists and Psychiatrists in the Services. London: H. M. Stationery Office. Pp. 94. 2s.

Reconstruction

PILLARS OF HEALTH

FROM A CORRESPONDENT

THE Government promise an indefinite period of hardship before our standard of living can be secured. During this period we must distinguish between luxuries and necessities.

Under the National Insurance Act the State has provided comprehensive protection against many of the economic hazards of life—sickness, unemployment, and the infirmity of age. It has taken an important step towards removing the reproach that children are the principal cause of poverty. These are measures of the utmost value in preventive medicine, and it would be tragic if any campaign for retrenchment were to whittle down any of the benefits of this class.

PROMOTION OF HEALTH

By providing security, National Insurance indirectly befriends health. It provides conditions favourable for healthy living even in adversity. Housing, too, is a long-term insurance policy for health, and in the present shortage we cannot afford to forgo one item in its programme. Comfort in the home has a higher health value than tobacco, alcohol, and gambling, although tobacco and alcohol might possibly stake a claim as adjuncts to preventive medicine in an anxious and disordered world. The key to comfort is warmth and the means to warmth is fuel. Children derive no benefit from tobacco, alcohol, and gambling, but warmth is for them a necessity.

There is no absolute shortage of fuel; we can get it if we are prepared to sacrifice other things that we need less. The tragedy of the situation lies in the fact that we waste most of the fuel we have, by inefficient heating appliances and our failure to conserve heat by proper insulation of our dwellings and our heating systems. Comfort should be placed in the forefront of our struggle for health, and the Government ought to take steps before next winter to insist on good insulation and efficient heating appliances, and to give a high priority to domestic fuel at the expense of non-essential industry. Home-keeping is an essential national industry, and hot water and space-heating are vital to the health of the family, especially at the extremes of life.

The first condition of health is security, and the second is warmth. We have been cold too long.

The next essential for health is food in sufficient quantity and of good quality. In this respect we have been fortunate during the war years. Paradoxically enough, we shall be faced with a greater risk of sub-nutrition when food becomes more plentiful, because the unwise and the ignorant will be free to reject nutritious foods and to fill their bellies with windy substitutes. Here the Education Act of 1944 may be our safeguard. The Provision of Milk and Meals Regulations, 1945, establish a school meals service in which "every dinner shall be adequate in quantity and quality so as to be suitable as the main meal of the day for the pupil, shall be well prepared and cooked, and shall be served decently and in good condition."

For the crown of these legislative achievements one naturally turns to the National Health Service Act, to find what it does for the promotion of health. The result is disappointing. The word *health* is used many times, but in most places it seems to be thought synonymous with the prevention or treatment of sickness. A special feature of the plan is the establishment of "health centres"; but if the Government intends that these shall do no more than offer space and facilities for general practice, health promotion will be neglected and we shall

have a sickness service. Comfortable words in statutes and statements about the family doctor being "health adviser to the families under his care" do not make a health service. A doctor does not become a teacher by light of nature; he has to learn teaching method.

Nevertheless a well-conceived nation-wide plan for healing the sick can do much to prevent illness and to restore the sick to working capacity. A programme of immunisation against certain common infections will no doubt become part of the service; the study and practice of physical medicine must surely lead to more effective treatment of the chronic rheumatic conditions which make so many lives a misery; and the adoption of mental illness, tuberculosis of the lung, and other deprived children of medicine into the family of general clinical practice should go far to heal the breach between prevention and treatment. If the axe falls, these services ought to be shielded from the blow, and the livelihood of those who take part in them must be secured.

WHAT IS NEEDED

The four pillars of a health service—towards which the Government and people should bend all their efforts in the interests of economy in man-power and money—are:

1. Family security, as provided in our schemes for National Insurance.
2. Housing, to provide space, warmth, and comfort for family life.
3. Food, adequate in quantity and quality.
4. The establishment of real health centres offering scope for promoting the health of families through educational and social activities.

Medicine and the Law

An Admission of Negligence

THE case of *Baldwin v. Lord and others*, decided at Manchester assizes last month, is a happily unusual example of the sort of accidents which can occur in hospitals and elsewhere and which afterwards seem inexplicable. A patient was admitted to the Oldham Royal Infirmary in 1945 in order that a piece of bone from his leg might be grafted into his right wrist. The operation was duly performed, but somehow it happened that the tourniquet, which should have been removed from the leg before the patient left the operating-theatre, was allowed to remain for eleven hours. Blood-transfusion was tried, but the plaintiff collapsed and died. His widow gave evidence at the trial that the deceased had complained of great pain and had tried to get up in order to take the bandage off his leg. A nurse, it was suggested, had omitted to take notice of the complaint.

The widow sued the managers of the infirmary and the two surgeons concerned in the operation. The defendants admitted liability; it was indeed a perfect instance of such a prima-facie case of negligence as would put upon the defendants the onus of proving that they were not at fault. The claim came into court, therefore, merely as a dispute on the amount of damages. Mr. Justice Singleton awarded £4000 with costs to the widow. The deceased had two daughters, aged 14 and 8; out of the total sum awarded, the judge allocated £450 to the former and £600 to the latter.

"... The need for education in nutrition has been steadily gaining recognition. The popular education of war-time has but made more obvious the general lack. Now the demand is for education in schools, in youth welfare centres and in adult education classes, but the question is not always asked: Who is to teach? ... It might be expected that the nursing and medical professions would be able to help, but the teaching of nurses depends on the education of the medical profession and, of medical schools, only a few provide systematic instruction in nutrition."—*Nutr. Abstr. Rev.* Jan. 1947, p. 497.

In England Now

A Running Commentary by Peripatetic Correspondents

I ALWAYS admired men like Owen who from a chip of bone deduced the mighty moa; so when this "thank you" letter from the best-loved Englishman of all time fell into my hands I tried to reconstruct the mood in which he wrote it.

Victory Dec. 28th 1803.

MY DEAR MACAULY

I have to return you many thanks for all your kindness for sending me milch goats or milch sheep but as they lose all their milk before they get to the Victory I beg that you will not give yourself the trouble and expence of sending me any more. After the Battle I may have an opportunity of thanking you in person for all your kindness and attention. My dear Mac: Your much obliged

NELSON AND BRONTE

Alex. Macaulay Esq.

The three words in italics show the thought that was to remain aggressive and dominant in his mind for a score of months yet; but underneath this, underneath his habitual courtesy, I think I detect a certain irritability not to be wondered at in a man who left his ship only three times in 27 months and then on the King's business and for less than an hour each time.

The ship was watering off Maddalena and a light wind blew off sea, when suddenly the Admiral smelt a smell—a lusty, loathly smell. "Dammit, what's that?" Sniffing like a hound, he prowls round the busy ship and finds in the bowels thereof a miserable cluster of goats or sheep or both. "Who's supposed to be looking after these?" The wind increases and there is a threat of thunder in the voice. There is much running and scurrying and finally the amateur goatherds are fetched from their watering duties. "Are you supposed to be looking after these animals? Then why don't you? They stink." Quite a breeze is blowing now. "In any case what are they here for?" One of the chorus of sailors murmurs the word "milk." "Milk? Milk! I haven't seen any milk for six months. What d'you do with it? D'you drink it?" The chorus say the animals are dry when they come aboard. "Then what to purple Providence are we enduring this insanitary..."

Half a gale is blowing when an officer comes up. "Mr. Blank. Who is responsible for sending these fetid...?" "A Mr. Macaulay, Sir, sent them as a gift to you, Sir." "O, that fellow! What's he think we are—a purple pound!" Breeze subsides as Admiral retires muttering, but springs up again for a moment when he turns back. "Mr. Blank. Did anyone write and thank Mr. Macaulay?" "No, I don't think so, Sir." "Good Heavens, the manners of the rising generation..." Cabin door slams, pen swivels into action. "Turn the ship into a purple pound—poor brutes—how the devil d'you spell Macaulay?"

But perhaps other Lancelots will construe differently.

* * *

"Would THE LANCET like to hear what goes on in your waiting-room?" asked M, an ex-Serviceman home from a sanatorium. "They might," I said, "Jot it down and we'll try it on them."

I always feel embarrassed when I open the surgery door, he wrote, because one momentarily takes the stage. The eyes seem to penetrate through one, and their owners seem to be asking, "What's wrong with him? Doesn't seem much." I must confess that, when I am one of the audience, I in turn become a scrutineer. I find the other occupants more interesting than the weeklies that lie on the table. Some sniff, some cough, some look at the floor deep in thought, others look straight ahead; some just sit and twiddle their thumbs; very few bring a book or even a paper to read. Some look very ill, others the picture of health. But you cannot judge a book by its cover, and the same may apply to patients. You can travel by train from one end of England to the other and never hear a word from your fellow passengers; not so in the waiting-room. Perhaps illness makes the whole world kin, but here we all seem anxious to explain our aches and pains to one another—maybe just as a preliminary canter before we appear

before the doctor. Anyway a great deal of sympathy is expressed; whether genuine or not it is hard to say.

Last evening I sat between two middle-aged ladies, one of whom had a small boy with her. When the doctor called out "Come in" a comfortable shuffle went round the waiting-room, which seemed to say, "Now we won't be long." The first patient to go in was a girl. As soon as she had disappeared the lady on my right leaned across me and whispered to the lady on my left that the girl was going to have her first baby. How she had found this out I do not know. Lady no. 2 replied in a voice for all to hear, "Blimey! Wait till she is like me and 'ad nine of 'em, and reared the lot, four in the Army now." And her whole body shook with merriment. She looked round the waiting-room as if for approval. None was forthcoming, so she turned to her neighbour again, asking, "What's wrong with you, dear?" Some lip talk followed that I sensed rather than heard. I felt my face getting redder, but luckily the doctor called for the next patient. Two people got up at once, an old man and a young woman. "It's my turn next," said the old man. "It certainly isn't!" exclaimed the young woman. All eyes were on the actors. How was it going to end? The old man, though keeping up the argument, was craftily advancing bit by bit nearer the doctor's open door. A sharp "Come in" from the doctor gave the old man his chance. He was through the door like a two-year-old, leaving the young lady standing.

My two companions were soon at it again. Now it was number one's turn to ask "What's wrong with you, dearie?" "Nothing wrong with me," said no. 2, "I've brought Alfie along. He was climbing over some railings and slipped and cut 'is arm. As if I 'adn't enough trouble. Take yer coat off Alfie, and let the lady look at yer arm." Alfie proceeded to do so. He had a couple of pieces of sheet tied round the wound, and his mother began to unwrap them, but no. 1 stopped her. She didn't want to see any gory sights: she would faint if she looked at it. So Alfie was told to put his coat on again and not make such a noise, or how could the doctor listen to people's chests?

"'e's a proper little devil." (Alfie's mother again.) "I blame the pictures and wireless for a lot of it. The other day a letter come for my eldest girl from 'er sweet-heart. (She's getting married shortly.) I put it on the mantelshelf until she got 'ome from work. After 'is nibs here had gone to school I 'appens to glance up at the mantelshelf and to me 'orror the letter'd disappeared. I was in a rare old stew, thinking at that very moment he'd be showing the letter to 'is mates. You know how courting couples write to one another? When 'e come back from school I 'ad 'im by the ear before he got in the gate. 'Did you take your sister's letter off the mantelshelf?' I asks 'im. 'Let go me ear an' I'll tell yer,' he says. I lets go and he tells me he'd put it under the stair-carpet for a bit of fun. Said William on the wireless does them sort of tricks, and never gets biffed. The little monkey. I don't let 'im listen in to 'Just William' any more."

"Next please," called out the doctor, and Alfie and his mother departed. They were so long that some of the patients began to mutter "How much longer is he going to be?" "I've been here half an hour already." (We are all a bit impatient these days.) At last they came out, Alfie looking every bit the hero. "'ad his arm dressed without a tear," his mother was quick to tell us, and with a cheery "Good night all" she passed out into the night.

* * *

Is it true that dogs can't distinguish one colour from another, and therefore live in a neutral-tinted world? And how would you prove it?

At a recent meeting of our family, Colin (8) proposed that the dog should be asked to gaze into a small box where coloured counters could be suddenly substituted for one another. (Me: And how would you know whether the dog noticed the change? Colin: You'd see whether its eyes moved.) Margaret and I, following Pavlov, thought the dog might be trained to distinguish between (a) pieces of meat, and (b) pieces of 'Plasticine' looking like meat but of a different colour. (Colin: The dog would smell the meat. Me: We'd wait till the dog had a cold.) But the winning answer came from Robin (7)—"Get inside the dog and look out."

Letters to the Editor

SOCIAL PATHOLOGY

SIR,—The excellence of the first two-thirds of your leader of March 29 made the defects of the last paragraph conspicuous. Such an admirable appreciation of the theory of social pathology deserved a better discussion of its practice.

Apparently there is still lacking a proper understanding of the individual's relationship to society. If he were in society in the sense in which he may be in the bus or the train which carries him to his daily work, the reasoning of your last paragraph might be sounder. But in addition to being in society he is of society, and it is a dangerous fallacy to assume that we need merely study the health of the individual "against a wider background." What society does to the individual and what the individual does and is in society are inseparable, so that social medicine requires not only social pathology but social physiology, social diagnostics, and social therapeutics, each of which will deal not only with the health and sickness of the individual as a member of society but with the health and sickness of society itself. It seems clear that the physician whose starting-point is the old conception of disease as a clinical entity in a biological individual has a long road to travel and much to unlearn before he is a true practitioner of social medicine. Professor Crew, who suggests the inclusion of the anatomy, physiology, and pathology of society in the very beginning of the medical curriculum, offers not only a realistic method but a shrewd commentary on medicine in the past.

There are, of course, "elder statesmen" of public health who see social medicine as something bounded by the limits of the routine which they have long practised. But there are clinicians who decry social medicine as a dangerous new fad and others who see it as a "racket" which it may be expedient to capture. If your feeling that social medicine cannot grow out of "traditional public health" is based upon knowledge of the former, I would but suggest that there are panes of glass in both rows of houses! The importance of the public-health service in the establishment of social medicine lies in the fact that it is already a part of social physiology and social therapeutics; it may not be the whole of social medicine, but it has a larger social-medicine content than any other branch of medical activity.

Most disturbing of all the implications of your last paragraph is the suggestion that public-health officers would turn social medicine into "a science of herd management," a suggestion which must be based upon ignorance of present tendencies in public health. I have had exceptional opportunities of contact with, at any rate, the middle and younger generations of my public-health colleagues, and I have been forcibly impressed by the extent to which "human medicine" guides and is practised in public-health work. It is quite true that we make use of group techniques, for social groups are society's organs; but we are fully aware of the individual in the group, just as we are aware of the group which contains the individual.

I have suggested elsewhere that the essential feature of social medicine is that it contains a philosophy of health—a "social discipline" complementary to the "academic discipline" which Professor Ryle has found in it. Let us select our social physicians in accordance not with whence they come but with where they are going. The acceptance of the right philosophy of health is, clearly, the fundamental qualification. If that is present, the reformed clinician and the enlightened public-health officer can be coequal partners in social medicine—so long as they have the integrity to realise and admit that neither of them holds the whole in his own two hands.

JOHN D. KERSHAW.

Public Health Department, Colchester.

SIR,—In King's College Medical School, Newcastle-upon-Tyne, the Nuffield department of industrial health is already attempting to practise many of the precepts so ably preached in your leading article of March 29. Its laboratories are within the medical school, and its beds, through the generosity of the two physicians concerned, are contained within the clinics of the pro-

fessor of medicine and the senior honorary physician. It is to be hoped, however, that the interest of social pathology will not turn away too quickly from what you describe as "the old concern . . . with the mechanical environment of man." There is still a great field for study here along the lines of war-time personnel research, for much of preventive industrial medicine, especially the study of fatigue and accidents, is a mixture of applied physiology and engineering; and nowhere, indeed, is this more obvious than in the medieval conditions found in coal-mining.

This department itself studies individual patients, and moreover has sat down not only alongside physicians but (almost literally) alongside those much tougher nuts—surgeons. For in Newcastle the doors of the rooms of the professors of surgery and industrial health face each other across a narrow passage, and a plan has already been drawn up for the joint study of a condition usually considered to be purely surgical.

On the staff of the department is a lady almoner who brings to the bedside information both about the domestic lives the patients lead and the places where they lead them; and at the bedside, too, this is welded on to the equivalent knowledge of where the patient works, which is gathered if necessary by a factory visit. This material is set out in one specially designed note folder, thus enabling the department to abide by the terms of reference which it has set itself—namely, to study and to teach the triple and reciprocal relation between health, job, and social state. Moreover, the close connexion between these three is maintained in the ward, in the outpatient department, and in teaching, which takes the form of an informal discussion, usually of a single case, between a clinical member of the department, the lady almoner, and not more than eight students. Here the whole emphasis is placed upon the patient's history, and the aetiology and management of his or her condition. As part of the course in general medicine, every Newcastle medical student attends eight of these discussions and a few—but very few—lectures.

Field studies and statistical techniques are important research procedures, but they have little place either at the bedside or in the alteration of the emphasis in the future doctor's training. This very necessary reorientation will surely come about much more commonly, in the future as in the past, by a new inspiration which will arise from within hospital practice. This will then help social and industrial medicine to serve both the individual patient and student in some way like the experimental method outlined above.

Our department, begotten by war-time experience out of hospital medicine, and staffed by a team whose ages range from 35 to 21 years, has indeed followed Professor Ryle's lead; but at the same time it is attempting to develop an approach to medicine which will fit the needs of an industrial society such as that of the North East of England.

Medical School, King's College,
Newcastle-upon-Tyne.

R. C. BROWNE.

POSTOPERATIVE PULMONARY EMBOLISM

SIR,—While agreeing in general with your leading article of March 22, I should like to refer to one problem, the solution of which does not seem to you to be satisfactorily settled. What should be done when very early thrombosis has been revealed by pain on palpation of calf muscles or hyperextension of the foot?

My own experience, gained by observation of 300 cases of proven thrombosis and backed by exactly similar results from several other Swedish clinics, tends to show that these cases are very effectively treated with heparin in rather large doses for 4-5 days. After that time all symptoms of thrombosis have usually subsided and the patient may be allowed out of bed. In no single case have we seen an extension of the thrombotic process after heparinisation was started. Even in more advanced cases in which, in addition to the process in the calf veins, there was a long and freely waving thrombus in the femoral vein, no harm arose from the use of heparin. We have never seen such a clot break off and form an embolus once proper heparin therapy was instituted.

Accordingly, the American practice of vein ligation is not at all favoured in Sweden. In fact it is felt that every

case in which there might be indications for ligation is much better treated with heparin, which acts just as quickly and effectively but does not involve destruction of a large and valuable blood-vessel.

Prophylactic heparin treatment is employed only in very exceptional cases. The present trend is all towards very early diagnosis followed by intensive heparinisation.

General Hospital, Mariestad,
Sweden.

GUNNAR BAUER.

STEVENS-JOHNSON SYNDROME

SIR,—We were interested in the articles of Dr. Nellen and of Dr. Murray in your issue of March 15, and in your annotation of March 22, for we have had under our care a female patient suffering from this syndrome.

A woman, aged 30, was admitted to this hospital as an emergency on Jan. 3, 1946. For some days she had felt rather ill, having some vulval irritation, and 3 days before admission a rash had appeared on both hands and feet; on admission this rash was papular on the dorsal aspects of the extremities, the eyelids were inflamed, and there was some vaginal discharge. She had anorexia, a sore throat, and scalding on micturition, but no other symptoms, and no enlargement of lymphatic glands or other abnormal physical signs.

During the next few days the rash spread over the whole body, becoming vesicular, with some bullæ several inches in diameter. The rash involved the eyelids, mouth, gums, and vulva, and there was well-marked œdema of these parts; severe conjunctivitis also developed.

Temperature fluctuated between 99° F and 102° F, settling around 99° F on Jan. 8 and becoming normal 3 days later. The pulse fluctuated between 90 and 120 per min., becoming normal on Jan. 14.

Blister fluid was sterile, and throat swabs negative for Vincent's organisms, diphtheria bacilli, and hæmolytic streptococci; the only other significant finding was a mild polymorphonuclear leucocytosis (86% of 10,800 white cells per c.mm.). Treatment with sulphamezathine, and systemic and local penicillin did not seem to affect the condition materially.

The lesions crusted and disappeared by Jan. 17, leaving no mark; and there was no residual corneal involvement.

A diagnosis of erythema multiforme bullosum was reached on Jan. 7; but it is of interest that the house-physician sent for one of us saying he had admitted a case of smallpox.

The special interest in this case lies in the fact that the patient was female and was 5½ months pregnant on admission. The disease did not influence her pregnancy, for she gave birth to a healthy daughter on April 13, 1946, and both are very well at the time of writing.

The David Lewis Northern
Hospital, Liverpool.

R. D. HOTSTON
H. S. PEMBERTON.

ANKYLOSING SPONDYLITIS AND FLUOROSIS

SIR,—Dr. A. M. G. Campbell, in his interesting review of 25 cases of ankylosing spondylitis (March 29), makes no mention of fluorosis, though your own pages have contained at least three articles on the subject in the last thirteen months.

I was entirely ignorant of the condition until I met Dr. T. Ockerse in Pretoria early last year and heard of his original work¹ in associating stippled teeth and ankylosing spondylitis with the water-supply in 805 endemic areas in the Union of South Africa. Your leading article last year (1946, ii, 835) said that "in at least one or two areas in England where dental fluorosis occurs, osteochondral changes in the vertebræ have been discovered" and Lyth's paper (1946, i, 233) showed clearly how this happens in certain parts of China. Ockerse states that chronic endemic dental fluorosis occurs in "practically every country in the world" and illustrates its association with "bamboo spine" by clinical photographs.

Ankylosing spondylitis is so disabling and distressing a condition that it would be a great step forward if something better than mere symptomatic treatment could be found. Its possible association with fluorosis in this country does suggest an opportunity for useful research, and perhaps the young orthopædic surgeon

1. Ockerse, T. D.M.D. Thesis, Government Printer, Pretoria, 1944.

is the man likely to see most examples of the disease. The general aspect of the subject was surveyed by Murray and Wilson in your issue of Dec. 7, 1946, and they gave a bibliography which should be a useful starting-point for any orthopædic investigator.

London, W.1.

ERIC I. LLOYD.

MARRIAGE GUIDANCE

SIR,—Dr. E. F. Griffith's interesting article of Feb. 1 shows that getting married is a serious undertaking concerning which a large number of considerations ought to be taken into account, eugenic, physical, and psychological.

One question of much social significance arises from his article. I would like Dr. Griffith to tell us whether he believes that love, as ordinarily understood, is a proper basis for successful marriage. A great deal, of course, has been written on the theme, much of it, however, in my opinion, vitiated by sentimentality.

Wilde makes a character in one of his plays remark that being in love is really no excuse for getting married. Freud, in the course of his researches, many years ago described love as an abnormal state of mind—an excellent starting point for a serious discussion of the subject.

London, W.1.

FREDERICK DILLON.

COMPRESSION OF MEDIAN NERVE IN CARPAL TUNNEL

SIR,—I fear Dr. Russell Brain (March 29) has misread my letter (March 22): I advocated immobilisation primarily as a diagnostic measure. In ulnar neuritis due to friction at the elbow the diagnosis is usually relatively certain, and I quite agree that early operation is indicated.

In conditions such as the costoclavicular syndrome and compression of the median nerve at the wrist the diagnosis is often much less certain. Under these circumstances improvement following immobilisation provides valuable confirmatory evidence of local pressure on the nerve.

In some cases immobilisation appears to give permanent relief; if symptoms recur, then the nerve should be explored and, with the reasonable certainty that there is local pressure, exploration should be thorough.

Liverpool.

R. ROAF.

DOCTORS' SALARIES

SIR,—The Misses Gorst and Corbishley (March 29) find that £2 10s. a week is sufficient on which to feed two persons. In so far as the necessities of life are concerned they are extravagant. Common hospitality, however, has to be taken into consideration; and if the doctor of the future is going to take no part in intelligent discussion and social intercourse during his leisure hours, then the standard of British medical practice, which is already in jeopardy, is doomed to fall.

I should also like to point out that an assessment of the doctor's salary at ten times that of the average worker reflects a sad lack of arithmetical ability.

ANOTHER CHIEF ASSISTANT'S WIFE.

SIR,—How curious the confusion of faith revealed by your young lady communicants beneath this heading! Working-class solidarity prompts them not only to degrade their professional aspiration to that of the artisan but to shake their minatory fingers at me because I do not choose to do likewise. "How dare he spend so much!"

I have no doubt that it is possible to live, after a fashion, and in canteens, upon the sum with which one of them nourishes her husband and herself; I merely do not regard it either as praiseworthy or desirable. And the strange thing is that if they were the wives of miners or of lorry-drivers neither would they. They would be screaming and fighting for higher wages, less work, more privileges, nylon stockings, and turkey.

The fact is of course they are attuned to their age as I am not; and, when and if these young persons qualify to practise our profession, the Government they doubtless helped to elect will be gladdened, perhaps, by two new embryo Summerskills shrilly denouncing, *ex capella*, the

decadent frivolity of Camembert before the proletarian virtues of rat-trap.

When the Spanish Republicans seized the pretty ladies on the beach at St. Sebastian, and forced them, clad in dungarees, to clean out the military stables, they admirably symbolised their ugly and envious pretensions. And your correspondents, formidable in their voluntary dungarees, may expect to find me, a little hungry (but that, at all events, *malgré moi*), warmed in the last rays of the long Edwardian afternoon, firmly upon the opposite side of the barricades.

CHIEF ASSISTANT.

TOXICITY OF THIAMINE

SIR,—In your annotation of Feb. 8 (p. 223), you have misquoted our findings regarding the anaphylactic nature of thiamine toxicity in rabbits. We have definitely stated¹ that anaphylaxis played no part in the toxicity of intravenous thiamine in rabbits. However, the rest of your discussion should be widely circulated among the medical profession to call their attention to the fact that thiamine can cause fatalities in high doses (50–100 mg.). Further, these toxic manifestations of the drug can occur regardless of the site of injection but are more often seen after rapid intravenous injections. The physician should remember that doses of 50–100 mg. of thiamine by injection are not utilised to any great extent and are rapidly excreted by the body. Also such injections call into play the pharmacological properties of the drug and not its vitamin properties. T. J. HALEY.

E. S. Miller Laboratories Inc., Los Angeles, U.S.A.

SOURCE OF THE RED CELLS

SIR,—In connexion with your leading article of March 29, which mentioned my preliminary note,² I should like to emphasise again that, although the changes described are very conspicuous in a traumatised muscle they may also be readily demonstrated in *normal* (uninjured) active muscles.

The controversy whether erythropoiesis is intravascular or extravascular is by no means settled, as can be seen from even the brief discussion of the question in Whitby and Britton's textbook,³ where, by the way, the conclusion is just opposite to that in your article. Besides, the "erythrogenic" capillaries of Doan are regarded by a number of workers^{4,5} as tissue spaces between the fat cells of the marrow. Quite recently Schleicher⁶ found that "the prevalent view that erythrogenic capillaries exist in the bone-marrow of man . . . could not be verified."

Sterile morphological controversy still flourishes, as far as the problem of the normoblast nucleus is concerned. You express agreement with Fieschi and Astaldi,⁷ whose findings in bone-marrow cultures did not contribute anything basically new to this particular problem. On the other hand Leitner⁸ advocates karyolysis, although the work of Fieschi and Astaldi (at least its greater part) is known to him. La Cour⁹ suggests that the nucleus disappears owing to loss of its staining properties. Another group of workers^{10,11} describe erythrocytes budding off from "mitroid erythroblasts." It is remarkable that only the last group are able to substantiate their views with photomicrographs, although the process is admittedly observed in certain conditions only, and seems to represent a rather vestigial phenomenon.

In his comprehensive review of the subject of bone-marrow cultures Bloom¹² tersely observes: "Tissue cultures of this tissue have been very disappointing from the hæmatological point of view, for the cells of the marrow do not continue to form granulocytes and red blood cells."

Department of Anatomy,
University of Birmingham.

S. H. WAJDA.

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ESTIMATION OF PENICILLIN IN SERUM

SIR,—I was interested to read the paper by Sir Alexander Fleming and Dr. Smith (March 29, p. 401) in which they describe their micro-method of estimating penicillin in blood-serum, based on the one published by J. Fielding in the *British Medical Journal* of Jan. 25. Since Fielding's paper appeared we have been using as our culture medium 1% glucose in peptone water with Andrade's indicator; serum was omitted. For simplicity and consistent results in penicillin assays and sensitivity tests this appears to be the best thing we have come across yet.

We use a simple modification of the micro-technique for assays. The doubling dilutions of the serum, starting at 1:2, are prepared as usual on paraffin slides and inoculated with the Oxford staphylococcus. These are introduced into sterile Dreyer's tubes with a Pasteur pipette. A total of four drops for each dilution is used—two drops of serum and two drops of glucose peptone water and the indicator. Each tube is sealed with a pellet of 'Plasticine,' placed in a Dreyer's rack, and incubated overnight. The results compare favourably with the macro-technique and the end-point is much more easily read than with the capillary-tube technique.

Birmingham United Hospital.

M. J. PIVAWER.

THE G.P.'s PENSION

SIR,—Since no word comes out of the secret conclaves of the Negotiating Committee, and none is to be expected until some cry of triumph or excuse for defeat announces the shape of things to come, it seems well that doctors should be enlightened as to one at least of the rods in pickle for them. I refer to the question of pensions for general practitioners. It has long been a claim of the Medical Practitioners Union that pensions should be given, but we certainly did not expect that they would be so arranged as to give the administrative branches better chances and higher pensions than general practitioners. It is not surprising that draft regulations should contain clauses which threaten to produce unforeseen hardships, but I will deal now with something much worse—i.e., with regulations which responsible officials of the Ministry refuse to modify in spite of obvious hardships, with regulations whose ill results must therefore be deemed to have the Minister's approval.

The general intention of the draft regulations on superannuation is to impose upon the new service those Civil Service rules which have been in operation for many years and, on the whole, satisfactorily. One of these rules ordains that the "remuneration" upon which pensions are to be based shall be average remuneration over the last three years of service. These years are, of course, in the case of an administrative officer, the three years in which his earnings have been highest. This rule would not be fair in the case of general practitioners because their later years are often less prosperous than those of middle life, and it is right that it should be varied. The variation proposed (and, indeed, insisted upon) is that the remuneration of general practitioners shall be based upon the average of all their years of service, and this is obviously unfair to them. The suggestion that they also should be entitled to take the average of their three best consecutive years has been utterly rejected.

Again, it is to be noted that the administrative officer, entering the service at the age of 18, and beginning to contribute towards his pension at once, can get in 47 years before the retiring age of 65. His pension is thus potentially larger than any the general practitioner can hope for—i.e., the average of his best three years multiplied by 47, in place of the average of all years (good and bad alike) multiplied by 40 or less. Yet the administrative officer brings nothing to the service except his schooling, no special degree or qualification; he works much shorter hours; and he takes virtually no responsibility—certainly not the responsibility for life or death, happiness or misery, which is the daily burden of the general practitioner.

Finally, it is to be noted that, for pension purposes, the general practitioner may reckon only the receipts from State general practice—i.e., from his capitation fees, less a deduction for expenses. Although the Act provides that he must have opportunity for doing certain

work for local health authorities—i.e., immunisation and vaccination—the proceeds will not count towards pension, nor will they earn him an independent pension from the local authority. This refusal to reckon in all remuneration from every branch of the national service suggests a complete misunderstanding of the general practitioner's worth and work, and is apparently decided upon only to facilitate the work of accountants along familiar lines.

The fact that the Ministry refuses to recognise that there is any shadow of impropriety in treating general practitioners in this manner is of particularly ill omen and assuredly threatens the smooth operation of the new service. The Medical Practitioners Union is not represented upon the Negotiating Committee, nor does it usually see eye to eye with the British Medical Association, but it certainly looks as if it may be forced to urge upon its members an attitude not very different from that of the latter body, although for different reasons. No-one wants to see doctors on strike; but if we general practitioners are to be deliberately treated as of less account than administrative officials in Whitehall and elsewhere, and if even reasonable representations are to be turned down as those above mentioned have been, then the strike is bound to come and the very best that can be hoped for is an unhappy and therefore inefficient service.

GORDON WARD

Sevenoaks. Vice-President, Medical Practitioners Union.

OVERSEAS APPLICATIONS FOR APPOINTMENTS

SIR,—My *Lancet* comes direct, without forwarding either in the United Kingdom or in India. The issue of Jan. 18 arrived on March 1. In the advertisement columns of that issue are listed 172 appointments for which a last date of application is stated. The distribution of these dates is interesting:

| | |
|--|----|
| "Immediately," "at once," "forthwith" or "as soon as possible" | 45 |
| Between Jan. 20 and Jan. 31 | 61 |
| " Feb. 1 and Feb. 10 | 39 |
| " Feb. 11 and Feb. 20 | 12 |
| " Feb. 21 and Feb. 28 | 6 |
| " March 1 and March 10 | 5 |
| " March 11 and March 20 | 2 |
| " March 21 and March 31 | 2 |

172

Thus only 4 of these 172 advertisements could have been answered in time by doctors serving in India.

I did not wish to apply for any of these posts, and can therefore write without personal bitterness. But so long as these remain typical figures I hope you will not allow it to be suggested in your pages that doctors serving in the Forces overseas are given a fair opportunity to apply for jobs.

India. MAJOR, R.A.M.C.

ASCORBIC-ACID METABOLISM OF BANTU SOLDIERS

SIR,—I have read the paper by Professor Kekwick, Dr. Wright, and Dr. Raper (March 29) with some interest since just ten years ago R. E. Bernstein and I produced "a study of the vitamin-C nutrition of healthy Europeans, Bantu mine recruits, and scorbutic Bantu subjects" in the *South African Journal of Medical Science* (1937, 2, 37). Our conclusions were substantially the same, as the following summary indicates.

1. On a vitamin-C-restricted diet the hourly and daily excretion of vitamin C by Europeans, who ordinarily took large amounts of the vitamin, was much higher than that of healthy Bantu mine recruits.
2. On giving test doses of ascorbic acid the Europeans studied showed an immediately accelerated excretion, and within the following 24 hours eliminated the greater proportion of the added vitamin; the Bantus gave no such response as their tissues retained the added vitamin. This indicated that the Bantu was far less saturated than the European.
3. The highest degree of unsaturation was found in scorbutic subjects, judging both from their daily excretion and from their response to added vitamin C.
4. The bodily store could be saturated in the healthy Bantu by addition of vitamin C in large amounts to his diet.
5. It was concluded that the difference between the bodily saturation of European and Bantu and the greater liability

of the latter to scorbutic conditions depends on difference in dietary intake of vitamin C and not to any physiological peculiarity in the Bantu.

Our investigation was less extensive than that of Professor Kekwick and his colleagues, for in those days it was difficult and expensive to get ascorbic acid in South Africa. We noted, however, in general conformity with their results, that one apparently healthy Bantu mineworker required nearly 3 g. of ascorbic acid to increase his excretion to a level comparable to that of Europeans.

Department of Human Anatomy, Oxford. J. S. WEINER.

SERVICE MEDICINE

SIR,—In his letter of April 5 "R.A.F. Medical Officer" states that a Service medical officer should be an officer first and a doctor second. Fortunately, he implies that this is necessary only in preventive medicine. I repeat, fortunately, for if this dogma is adhered to in treatment the result is deplorable. It leads to such abuses as the patient having to "parade" sick irrespective of his condition; the patient lying "to attention" in bed whilst the C.O. of the hospital does his round; and to attempts to over-rule clinical decisions by superior rank. Such things happened but very rarely in the war-time medical service of the R.A.F., but they are the results of medical officers being officers first and doctors second. If he is not to betray the Hippocratic oath a medical officer must always be a doctor first and an officer second; and in my experience the personnel were best handled by those who followed this principle.

EX-R.A.F.V.R. MEDICAL OFFICER.

THE CURRICULUM

SIR,—I hasten to congratulate Professor Zuckerman and his colleagues in the University of Birmingham for having adopted so boldly a scheme for the reintegration of anatomy and physiology (March 29, p. 395). It is a policy which we in this university favour strongly, though for the time being we are testing it, not in the whole preclinical curriculum, but in one or two of its sections—i.e., special senses and neurology. We shall watch with interest the Birmingham scheme in the hope that we also shall be able to adopt one on similar lines.

It is perhaps worth recalling that the principle involved finds favour with the General Medical Council and is expressed in the latest recommendations as to professional education by the phrase "... throughout the period of preclinical studies every effort should be made to secure close correlation between Anatomy and Physiology."

Two points of criticism of the Birmingham scheme come to my mind; and doubtless these will be met if, in the light of experience, they prove to be well founded. The load of dissection allotted to the first term appears to be very heavy, coming as it does at a time when students are introduced to a new subject involving a complicated and difficult terminology; and one would have thought in general that they are more fitted to undertake a more intensive burden of dissection at a somewhat later stage of the curriculum, possibly in the second or third terms. This excessive load probably arises from what would be my second criticism, that to a course of the type envisaged six terms rather than five should have been allotted. The additional term would permit a more leisured approach to the highly important subjects of anatomy and physiology, and would provide more time for greater development of lectures and lecture demonstrations in the coördinating series.

Apart from these minor criticisms I feel sure that medical educationists throughout the country will await with interest further news of the results of the Birmingham scheme.

Medical School, King's College, Newcastle-upon-Tyne.

R. B. GREEN.

During March the Voluntary Hospitals Emergency Bed Service, which is run by a joint committee of the King Edward's Hospital Fund and the Voluntary Hospitals Committee, dealt with 1541 cases on behalf of doctors and hospitals. This is an increase of 90% over March, 1946, and brings the total for the first quarter of 1947 to 4265.

Parliament

ON THE FLOOR OF THE HOUSE

THE House adjourned on April 3 for the Easter recess, which will give Ministers and M.P.'s a chance of sitting back and taking stock of the shape of things to come—and things already past.

During the spring and summer the country must build up a reserve of 10 million tons of coal, to add to the existing reserve of 5 million, for the essential margin of safety is 15 million tons. It is going to be a tight squeeze, and the domestic consumer will be asked to make a substantial contribution by voluntary saving. But the Government, despite some opposition, have announced that they are ready to buy coal from abroad if it can be provided from some source that will not upset our friends in Europe.

Shortages are general in Europe, and indeed in most parts of the world which have been in the war. Our own, although it is unpleasant to face the facts, have been smaller than those of many countries both among victors and vanquished. Food continues to be short in many countries, but still no major world epidemic has shown itself, though tuberculosis in some countries has reached high figures. Does the absence of a world epidemic indicate a higher general level of food-supply than in the period 1918–21, or is it due to better distribution of food, or to more efficient medical services in the world as a whole? The answer is important in view of the Budget, for on taxation depend prices and subsidies and hence to some extent the general level of nutrition.

The Budget will be opened on April 15, the day the House meets after the recess. Will the Chancellor be able to reduce the general level of income-tax, or to raise the limit of exempt income, or to exempt any part of overtime earnings from tax? And shall we be able to maintain food subsidies at the rate of £400 million a year?

Another way to economise would be by reducing the strength of the Armed Forces. The Government have fixed a figure for the run-down to March, 1948. The T.U.C. ask that this level shall be reached by Dec. 31, 1947. And it is probable that this is the kind of limit in which economies may be possible. Otherwise, in this period of change from war to peace organisation, while we are trying to make the United Nations the foundation of a long and perhaps permanent peace, drastic cuts in military expenditure will not be possible. And so long as this period of uncertainty lasts so long will our military commitments and all our shortages and those of other nations continue.

The shortages do not, however, extend to plans for world rehabilitation. The F.A.O. mission for Greece have published a report which, if applied, would put Greece on her feet and make her self-supporting. Yet the plan would cost only 100 million dollars, or about a quarter of the proposed American loan to Greece, which would be largely spent on military expenses. And if Greece with its unsteady economy can be put on its own feet so can any part of Europe. More will be heard of the F.A.O. proposals, but they were published in Washington and are not yet available here. A speed-up in this respect would be of great advantage.

MEDICUS, M.P.

FROM THE PRESS GALLERY

The Age of the Call-up

In moving the second reading of the National Service Bill in the Commons on March 31 Mr. G. A. Isaacs, Minister of Labour and National Service, said that the age of calling-up was to be between 18 and 26. The usual call-up age would be 18, but the extra age-limit had been put in to allow the Ministry to make deferments. There was a provision to allow young men who applied to be called up from the age of 17½. This provision had been made to enable young men going up to a university, or to some other training course, to come out of the Forces a little earlier to start their university or other scholastic careers. There was also a variation for doctors and dentists. In normal circumstances doctors and dentists would be called up round about the age of 25; but there would be many who were taking specialist courses; and when a man asked for an extension his call-up might

be postponed up to the age of 29. That had been done to meet the needs of the professions, so that men would get their additional training. The arrangement was also of advantage to the Services, because they would have within their ranks men with higher qualifications to assist in the professional work of the doctors and dentists in the Forces.

After two days debate an amendment for rejection, moved by Mr. RHYS DAVIES from the Labour benches, was negatived by 386 votes to 85, and the Bill was then read a second time. The Government are now considering reduction of the period of service from 18 months to 12.

QUESTION TIME

Regional Hospital Boards

Mr. W. M. F. VANE asked the Minister of Health whether he was satisfied that the five days given for the consideration, in his department, of the representations which he had invited to his draft proposals for regional hospital boards in December, 1946, was sufficient; whether he was aware that no acknowledgment was received by Westmorland county council to their criticisms of his proposals until five weeks after the publication of S.R. and O. no. 2158; and whether he would ensure that such treatment of responsible local authorities by his department was not repeated in future.—Mr. JOHN EDWARDS replied: The Minister reviewed personally all comments received. The resulting order was published, with notices in the press, on the day it was laid. This seemed a reasonable way of indicating the decision to all who had commented. No discourtesy was intended by the absence of separate replies to all by letter.

Care of the Aged

Mr. GEORGE THOMAS asked the Minister whether provision would be made under his new health scheme for special hostels to cater for old-age pensioners who were bedridden.—Mr. EDWARDS replied: The care of all the aged who are sick will be a matter for the new health service. The care of those who need care but are not sick will be dealt with in further legislation.

Recruitment of Nurses

Mr. PETER FREEMAN asked the Minister how many extra nurses had been obtained this year as a result of his recent appeal; whether the present position was satisfactory; and what further steps were contemplated.—Mr. EDWARDS replied: Over 1000 persons, including 600 qualified nurses, assistant nurses, and midwives, have taken up employment in hospitals as a result of the recent appeal for part-time staff in London. Many more are needed, and recruitment measures are being continued and extended.

Doctors in the R.A.F.

Mr. SOMERVILLE HASTINGS asked the Secretary of State for Air what peace-time conditions in the R.A.F. made necessary a 30% increase in the medical personnel over war-time strength.—Mr. PHILIP NOEL-BAKER replied: Since the end of the war the R.A.F. has taken over some hospital work from the Army; it now depends largely on short-term medical officers, who must start by sharing their work with an experienced man; the numbers on each station have decreased, but medical officers are still required. Nevertheless, as I said last week, I share the anxieties expressed, and I propose to consider the matter again. Mr. HASTINGS: Is the Minister convinced that the conditions which he has described warrant such a heavy increase as 30% over war-time strength?—Mr. NOEL-BAKER: I think that they more than explain the increase. Whether we ought to have made a greater effort to reduce below the level which we have now reached is exactly the question which I am going to reconsider with other Service Ministers. Mr. L. D. GAMMANS: Is it true that there is a 30% increase as compared with war-time?—Mr. NOEL-BAKER: Yes, sir. The rate was 2.29 per 1000 in May, 1945, and it is now 3.03. The Army have gone down a little and the Navy have gone up a little. All are substantially above the agreed rate.

"Medical Conscripts"

Mrs. AYRTON GOULD asked the Minister if he was aware that young medical officers, who were called up as soon as they were qualified, were posted to isolated camps where they could get practically no clinical experience and there was little work of any kind for them to do; that often they remained in these posts for a year or more; and if he would see that after the

first six months every medical conscript should serve the rest of his time under conditions that would provide the necessary experience to enable him to fill a civilian post in his profession efficiently on his release.—Mr. NOEL-BAKER replied: I understand that doctors have at least six months' work in hospital after they are qualified and before they are called up for the R.A.F. Many of them are then posted to stations, some of which, no doubt, are isolated; but it is in the stations that most of the medical work of the R.A.F. is done. All general hospitals in the R.A.F., however, organise regular clinical meetings, to which medical officers of surrounding stations are invited. In this way most of our doctors can improve their knowledge if they feel that their ordinary work does not give them experience enough.

Mrs. GOULD: Is the Minister aware that a number of these medical officers have been posted to isolated stations for over a year, where they have not yet had half an hour's work a day to do, and in some cases have never had the opportunity of performing any sort of clinical work which could not have been done by a child of ten?—Mr. NOEL-BAKER: If my hon. friend will give me particulars of special cases I will see if there is anything I can do.

Incidence of Venereal Disease Among Troops

Replying to a question, Mr. F. J. BELLENGER stated that the number of cases of venereal disease reported and treated amongst British troops in the United Kingdom during 1946 was 3.3%.

Public Health

Rising Birth-rate in England and Wales

In the last three months of 1946 the birth-rate in England and Wales, 20.5 per 1000, was the highest of any December quarter since 1921; the rate for the same quarter in 1945 was 15.3. The Registrar-General, who gives these figures,¹ also reports a death-rate in the quarter of 11.3 per 1000, compared with 11.4 for the same quarter of 1945. The infant-mortality rate was 44 per 1000 related live births—7 below the average rate for the fourth quarter of the ten preceding years.

For the whole year the birth-rate was 19.1 per 1000, the highest since 1923. The approximate reproduction-rate for the year—1.102—exceeds by 10% that required to maintain the population; this is the first time since 1922 that the rate has reached replacement level. Infant mortality, 43 per 1000, was the lowest ever recorded in this country, being 2 per 1000 below that in 1944, the previous lowest.

Smallpox

During the week ended April 5 smallpox has been diagnosed at Scunthorpe, Lincs, and Doncaster, Yorks, in circumstances suggesting association with the recent outbreak at Grimsby. At Bilston, Staffs, the importation of smallpox from India is suspected. At Stepney one secondary case infected in Mile End Hospital was sent to hospital on March 21, since which there have been no further notifications.

At Scunthorpe an unvaccinated platelayer, aged 35 years, living in a common lodging-house, developed a rash on March 22 and was removed to an infectious diseases hospital on the 25th diagnosed as chickenpox. On April 1 laboratory examination suggested smallpox which was confirmed clinically next day, when the man was removed to Laceby Smallpox Hospital. Contacts not recently vaccinated are numerous, and secondary cases are already due to appear; one has been removed on suspicion. Two men who absconded from Grimsby while under surveillance as contacts stayed at the lodging-house at Scunthorpe at a material time. A few crusts were found on one and have been sent for laboratory examination. It is not improbable that other unidentified and itinerant contacts have moved on to other common lodging-houses, so special vigilance should be exercised.

At Doncaster an assistant master at a preparatory school, vaccinated 13 years previously, developed a rash on March 27 and was removed to Doncaster Smallpox

Hospital on the 31st. Modified smallpox has been confirmed. Fortunately this patient is believed to have been confined to his residence from the date of appearance of rash and is unlikely to have infected his pupils, who must, nevertheless, be under surveillance. The source of infection is unknown; but a link with Grimsby, through another absconding contact there, is suspected.

At Bilston the infection seems to have been imported by a soldier. This man, vaccinated in infancy, in 1944, and in 1946, left Agra on Feb. 17 for Karachi by train and thence travelled by air via Cairo and Marseilles to Heath Row, where he arrived on the 22nd. He reached Bilston on the 23rd. He developed fever on March 2 and a few spots on March 5. Subsequently, his mother, vaccinated in infancy, became ill on March 19 and developed a rash on the 23rd. Another unvaccinated contact sickened on March 23 and developed a rash on the 25th. Initially chickenpox was diagnosed, but variola virus has been cultured and there is now strong suspicion of smallpox. The rashes, reported to be superficial and centripetal, have given rise to considerable difficulty in diagnosis.

Infectious Disease in England and Wales

WEEK ENDED MARCH 29

Notifications.—Smallpox, 1; scarlet fever, 1317; whooping-cough, 2263; diphtheria, 254; paratyphoid, 3; typhoid, 5; measles (excluding rubella), 10,780; pneumonia (primary or influenzal), 1025; cerebrospinal fever, 115; poliomyelitis, 7; polioencephalitis, 0; encephalitis lethargica, 1; dysentery, 85; puerperal pyrexia, 141; ophthalmia neonatorum, 83. No case of cholera, plague, or typhus was notified during the week.

Deaths.—In 126 great towns there were no deaths from enteric fever, 1 (0) from scarlet fever, 3 (1) from diphtheria, 21 (1) from measles, 25 (2) from whooping-cough, 74 (10) from diarrhoea and enteritis under two years, and 38 (3) from influenza. The figures in parentheses are those for London itself.

The number of stillbirths notified during the week was 286 (corresponding to a rate of 26 per thousand total births), including 38 in London.

Obituary

ROBERT GEORGE BANNERMAN

M.D. EDIN.

Dr. R. G. Bannerman, who died on March 26, was born in Edinburgh in 1891 and educated at George Watson's College and the University of Edinburgh. He graduated in arts in 1910 and in medicine with first-class honours four years later. As a student he had a distinguished career, winning Vans Dunlop scholarships in 1911 and 1912 and serving as president of the Royal Medical Society of Edinburgh. For a time he was assistant to the professor of pathology in Edinburgh and during the 1914-18 war he served as a captain in the R.A.M.C. On demobilisation he was appointed assistant pathologist to the Royal Sussex County Hospital at Brighton. Later, while holding a grant from the Medical Research Council, as assistant M.O. at the English Sanatorium at Montana and at the Children's Hospital, Alton, he studied the biological action of light. He also held appointments as pathologist at the Royal Northern Infirmary, Inverness, the Miller General Hospital, Greenwich, and the Paddington Green Children's Hospital. His published work included papers on the fate of tubercle bacilli in human plasma and on the clinical significance of blood platelets. In 1939 he rejoined the R.A.M.C. and was for a time attached to an anti-aircraft brigade near Bristol. In 1940 he returned to his laboratory, and a colleague with whom he worked in the early years of the war writes: "R. G. B. was a shy man who eschewed publicity and ambition—yet he could look back on a busy life in which he had made a substantial contribution to the science of pathology, notably in hæmatology. With those who were afflicted he had a gentle touch and warm sympathy. A cultured man with an appreciation and understanding of literature and music, he was also an effective teller of stories of his student days in Edinburgh."

1. Registrar-General's Return of Births, Deaths, and Marriages for the December Quarter, 1946. H.M. Stationery Office. 6d

HAROLD MUIR EVANS

M.D. LOND., F.R.C.S.

Dr. H. M. Evans, who died at his home at Beccles in Suffolk on March 28, was a doctor whose practice among the fishermen of Lowestoft had led to the study of marine biology, and his work on the physiology of venomous fish won him recognition within and without medicine. He read papers before the Royal Society; University College elected him to their fellowship; and the Royal College of Surgeons under a special by-law to theirs.

Born at Richmond, Surrey, in 1866, he was educated at Bute House, University College Hospital, London, and the University of Berlin. In 1889 he took the Conjoint qualification and the following year his M.B. After serving for two years as medical officer for the Cape Government Railways on the Bloemfontein Vaal River extension he returned to London to become registrar at the Central London Throat and Ear Hospital, and in 1893 he took his M.D. He then settled in practice at Lowestoft, and joined the staff of the Lowestoft and East Suffolk Hospital as surgeon; during the 1914-18 war he served as surgeon specialist in casualty-clearing stations with the rank of major. His pleasantly written books, which even at their most technical retained a tang of the sea, included a *Short History of the Thames Estuary, Brain and Body of Fish*, and in 1943 *Sting-fish and Seafarer*.

Dr. Evans married in 1896 Miss Violet Reid, of Hanworth, and they had two sons and a daughter.

Mr. ARTHUR W. DOWN, founder of Down Bros. Ltd., the surgical instrument makers, died at Croydon on April 2, in his 95th year. He entered the surgical instrument industry in 1866, and was actively interested in the control of his firm from its foundation in 1879 until the last few days of his life.

Births, Marriages, and Deaths

BIRTHS

- ALEXANDER.—On March 27, in London, the wife of Dr. Alfred B. Alexander—a son.
 BROWNE.—On April 5, in London, the wife of Mr. Denis Browne, F.R.C.S.—a son.
 CLYDE.—On April 1, at Surbiton, the wife of Dr. J. O. Clyde—a son.
 DALE-BUSSELL.—On March 27, at Newmarket, the wife of Dr. A. P. Dale-Bussell—a son.
 FOSTER-SMITH.—On April 6, at Westcliff-on-Sea, the wife of Dr. G. C. Foster-Smith—a son.
 HALL.—On March 27, at Eastbourne, the wife of Surgeon Lieutenant Derek Hall, R.N.V.R.—a son.
 MCSWEENEY.—On March 30, at Hove, the wife of Dr. M. P. McSweeney—a son.
 MARSHALL.—On March 29, at Sutton, the wife of Dr. J. K. Marshall—a daughter.
 MORRISON.—On March 27, at Isle of Sheppey, the wife of Dr. J. Neill Morrison—a son.
 PATON.—On March 26, in London, the wife of Dr. Ian Paton—a son.
 RICHARDS.—On April 4, at Cardiff, the wife of Mr. R. D. Richards, F.R.C.S.—a son.
 STEVENS.—On March 26, at Maidenhead, the wife of Lieut.-Colonel C. P. Stevens, M.B.E., R.A.M.C.—a daughter.
 SWEET.—On March 5, at Glasgow, the wife of Dr. H. S. Sweet—a son.
 TAYLOR.—On April 3, the wife of Dr. A. W. O. Taylor, of Edinburgh—a daughter.
 THURSTON.—On April 2, at Oxford, the wife of Dr. J. G. Thurston—a son.
 WALTER.—On March 29, at Windsor, the wife of Dr. K. H. Walter—a daughter.

MARRIAGES

- EDWARDS—WILLIAMS.—On March 27, at Sutton, Surrey, Errol M. Edwards, M.R.C.S., captain R.A.M.C., to Hetty Williams.

DEATHS

- BANNERMAN.—On March 26, in London, Robert George Bannerman, M.D. Edin.
 CUMMING.—On April 3, in Malta, Charles Chevin Cumming, C.B., M.B. (Glasg.), colonel, late R.A.M.C., aged 72.
 EVANS.—On March 28, at Beccles, Suffolk, Harold Muir Evans, M.D. Lond., F.R.C.S., aged 80.
 FLOYER.—On April 4, at Eastbourne, William Wadham Floyer, M.B. Lond., aged 80.
 GOURLAY.—On April 5, at Carrbridge, Inverness-shire, Charles Aikman Gourlay, D.S.O., M.D. Glasg., F.R.F.P.S., D.P.H., D.T.M. & H., I.M.S., ret'd.
 NEWLAND.—On March 28, at Cheltenham, Broderick Edward Middleton Newland, L.R.C.P.E., lieut.-colonel I.M.S., ret'd.
 PARSONS.—On March 29, Allan Chilcott Parsons, M.R.C.S., D.P.H., aged 74.
 REILLY.—On March 27, Percy George Reilly, M.R.C.S.

Diary of the Week

APRIL 13 TO 19

Monday, 14th

- ROYAL COLLEGE OF SURGEONS, Lincoln's Inn Fields, W.C.2
 5 P.M. Mr. L. R. Broster: Surgery of the Suprarenal Gland.
 6.15 P.M. Dr. W. W. Mushin: Signs of Anaesthesia.
 ROYAL SOCIETY OF MEDICINE, 1, Wimpole Street, W.1
 5 P.M. *Odontology*. Dr. P. O. Pedersen: Dental Investigations of the Greenland Eskimos.
 MEDICAL SOCIETY OF LONDON, 11, Chandos Street, W.1
 8.30 P.M. Mr. Douglas MacLeod: Endometriosis.
 WESTMINSTER HOSPITAL, Horseferry Road, S.W.1
 5 P.M. (Meyerstein lecture theatre.) Clinico-pathological demonstration of two cases of hypertension: (1) periarteritis nodosa; (2) tumour of adrenal.

Tuesday, 15th

- ROYAL COLLEGE OF PHYSICIANS, Pall Mall East, S.W.1
 5 P.M. Dr. J. Purdon Martin: Consciousness and its Disturbances. (First Lumenleian lecture.)
 ROYAL COLLEGE OF SURGEONS
 6.15 P.M. Dr. C. Langton Hewer: Physiology of Anaesthesia.
 ROYAL SOCIETY OF MEDICINE
 9.30 A.M. *Neurology with the Société de Neurologie de Paris*. Sir Hugh Cairns, Dr. Honor Smith, Dr. C. Worster-Drought, Dr. W. D. Nicol: Penicillin in Neurology.
 5.30 P.M. General meeting of fellows.
 8.5 P.M. *Pathology*. Dr. J. E. McCartney: Impressions of American Laboratories.
 CHELSEA CLINICAL SOCIETY
 7 P.M. (South Kensington Hotel, 41, Queen's Gate Terrace, S.W.7.) Mr. Duncan Fitzwilliams: Sir Thomas More and Utopia.
 SOCIETY FOR THE STUDY OF ADDICTION
 4 P.M. (11, Chandos Street, W.1.) Dr. W. R. Bett, Dr. H. Crichton-Miller, Dr. Denis Hill, Dr. H. Pullar-Strecker, Dr. H. J. Shorvon, Dr. J. Yerbury Dent, Prof. R. C. Browne, Dr. G. R. A. de M. Rudolf: The Uses of Amphetamine.
 EUGENICS SOCIETY
 5.30 P.M. (Burlington House, Piccadilly, W.1.) Dr. Linfor Rees: The Physical Constitution in Mental Illness.
 INSTITUTION OF MINING AND METALLURGY
 5 P.M. (Royal Institution, Albemarle Street, W.1.) Major-General A. J. Orenstein: History and Prevention of Tuberculosis. (Julius Wernher lecture.)

Wednesday, 16th

- ROYAL COLLEGE OF SURGEONS
 3.30 P.M. Dr. James Craigie, F.R.S.: Relationships of Virus and Host-cell.
 5 P.M. Prof. R. V. Bradlaw: Tumours of the Jaws.
 6.15 P.M. Dr. E. A. Pask: Anoxia.
 CONFERENCE ON SILICOSIS
 10.30 A.M. (at the Royal Institution). Silicosis, Pneumoconiosis, and Dust Suppression in Mines. (Opening session.)

Thursday, 17th

- ROYAL COLLEGE OF PHYSICIANS
 5 P.M. Dr. J. Purdon Martin: Consciousness and its Disturbances. (Last Lumenleian lecture.)
 ROYAL COLLEGE OF SURGEONS
 5 P.M. Prof. B. W. Windeyer: Radiotherapy in the Treatment of Cancer.
 6.15 P.M. Dr. T. C. Gray: Curare.
 ROYAL SOCIETY OF MEDICINE
 9.30 A.M. *Neurology with the Société de Neurologie de Paris*. Prof. T. Aljouniane, Dr. Clovis Vincent: Cerebral Edema.
 BRITISH INSTITUTE OF RADIOLOGY, 32, Welbeck Street, W.1
 8 P.M. Prof. R. Sievert: Dangers and Protection in Radiological Work. (Siltvanus Thompson lecture.)
 UNIVERSITY OF EDINBURGH
 5 P.M. (Physiology classroom.) Dr. Douglas Guthrie: The Historical Foundation of Medicine.

Friday, 18th

- ROYAL COLLEGE OF SURGEONS
 6.15 P.M. Dr. John Gillies: Anaesthesia in Neurosurgery.
 WEST LONDON MEDICO-CHIRURGICAL SOCIETY
 7.15 P.M. (South Kensington Hotel, 41, Queen's Gate Terrace, S.W.7.) Dr. William Sargent, Mr. Harvey Jackson, Dr. Spencer Paterson: Physical Treatment in Psychiatry.
 FACULTY OF RADIOLOGISTS
 2.30 P.M. *Therapy*. (Royal College of Surgeons.) Dr. L. M. Shorvon, Dr. W. M. Court Brown, Dr. Frank Ellis: Constitutional Effects of Radiation.
 HEBERDEN SOCIETY
 5 P.M. (11, Chandos Street, W.1.) Dr. Graham Weddell: The Structure of Striate Muscle in Relation to its Function.

Saturday, 19th

- TUBERCULOSIS ASSOCIATION
 11 A.M. (King George V Sanatorium, Godalming.) Demonstrations.
 2 P.M. Dr. James Watt, Mr. J. E. H. Roberts, Dr. W. E. D. Moore: Complications following Adhesion Section.
 3.45 P.M. Miss M. Sheehan: Employment of Tuberculous Staff.

Dr. H. A. Krebs, whose name appeared in the list of new fellows of the Royal Society (*Lancet*, March 29, p. 419), is professor of biochemistry in the University of Sheffield (not Leeds) and honorary biochemist to the Royal Sheffield Infirmary and Hospital.

Notes and News

BUREAU OF INTERNATIONAL MEDICAL CONGRESSES

AT a preparatory conference, held in Paris in March under the auspices of UNESCO, 13 representatives of international congresses and associations in medical science, together with a representative of the interim commission of the World Health Organisation and a representative of the World Medical Association, arranged for the summoning of a conference in October to create the permanent Bureau of International Medical Congresses. The bureau is to coördinate the international congresses of medical science, and to serve as a channel for material aid from UNESCO to them. It is also hoped to establish an International Council of Medical Science to advise UNESCO on questions referred to it by the Economic and Social Council.

The following directives laid down by the general conference of UNESCO on scientific activities may be taken as basis for the work of the bureau:

To assist scientific work of international significance by grants-in-aid and the sending of scientific and technical assistance by means of personnel on missions to national institutions. Amongst the kinds of assistance given would be support of type-culture collections (bacteria, algae, fungi, genetic mutants) with a view to the preparation of a world catalogue of the strains maintained.

To investigate the improvement of the circulation of scientific literature.

To facilitate the travel of scientists across national boundaries. To keep the people of all countries informed as to the bearing of scientific discoveries on international problems.

To investigate the possibilities of setting up new international scientific laboratories and observatories.

To investigate the feasibility of smaller projects, such as the creation of international stockrooms for pure substances not commercially available—e.g., radioactive isotopes and pure-line strains of laboratory animals.

The following delegates to the preparatory conference will serve on the committee organising the conference: Dr. Cavaillon, Professor Maisin, Dr. Martínez Báez, Prof. E. Bezaçon, Prof. A. Gigon, and Dr. Léopold Mayer. Dr. Kenneth Soddy (National Council for Mental Hygiene) will also serve on the committee.

A JOURNAL ON CARE OF CHILDREN

THE Council of Associated Children's Homes have published a new quarterly review, *Child Care*, which promises to be useful to those interested in the welfare of homeless children. The council represent Dr. Barnado's Homes, the Catholic Child Welfare Council, the Church of England Children's Society, the National Children's Home, the Jewish Board of Guardians, and other similar societies. One of the council's chief aims is to foster training schemes for child-care workers, and they have, since the publication of the interim report of the Curtis Committee (on the subject of such training), founded a new training college at Sutton Coldfield. The new journal, under the editorship of the Rev. John W. Waterhouse, vice-principal of the National Children's Home, contains an article by Miss Myra Curtis setting out the main aspects of home life which are important to the child—personal affection, stability, opportunity, and the sense of belonging to a small friendly group of people—and which those given the task of caring for homeless children must seek to replace. The journal, which is well arranged and produced, should make it easy for the great and small voluntary agencies engaged in this important work to share ideas and study old and new aspects of their task in the light of both inside and outside opinion.

GIFTS TO HOSPITALS

As a result of the amendments made in the House of Lords the provisions in the National Health Service Act governing hospital endowments differ considerably from those set out in the Bill. The Hospitals Association has now published a memorandum¹ explaining how donors can ensure that the hospital of their choice may retain their gifts under the new service. In the will or deed of gift, the memorandum points out, it must be made clear that the gift is to be treated as a capital fund separate from the general funds of the hospital. But should a donor wish to help a hospital with its maintenance charges during the interim period the income of such a gift may be used for this purpose until the appointed day. After that date the hospital management committee would be free to use the whole fund, both capital and income, for purposes

1. Obtainable from the British Hospitals Association, 52, Green Street, London, W.1., price 3d.

other than general maintenance connected with their group of hospitals, including the hospital indicated by the donor. Suggested forms of words for use in making gifts, which have been prepared by Chancery counsel, are included in the memorandum.

HOSPITAL LIBRARIANS

THE Library Association have introduced a specialist certificate for hospital librarians in their final examination. The syllabus for the certificate is divided into two parts—the first dealing with the patients and the hospital and the second with the librarian and his equipment for the work.

At a course of lectures given to prepare candidates for this new qualification the lecturers included Dr. O. W. Roberts, medical superintendent of Dulwich Hospital, Mrs. Mackenzie, lecturer to the Royal College of Nursing, Mrs. Paget Cooke, who is in charge of the library at St. Bartholomew's Hospital, Captain J. E. Stone, consultant on finance to King Edward's Hospital Fund, and Mrs. Askwith, who is in charge of the patients' library at the Middlesex Hospital. Members of the course also visited Guy's Hospital and the Middlesex Hospital to see the conditions of the work.

PNEUMATIC BONE-SAW

THE new pneumatic bone-saw produced^{*} by Desoutter Bros. Ltd. is not a reversion to the rather cumbersome pneumatic tools of the twenties but a product of the factory bench. It is very light and easy to handle; it has a pistol grip, and the speed is controllable from zero to 2500 r.p.m. by a trigger control resembling the throttle of a motor-car. The cost, £15 10s., is low for such an instrument, and the construction is simple. The saw has to be sterilised by hot air, and it works from compressed-air cylinders with a reducing valve. Trials in all kinds of bone surgery confirm that it is a very good tool indeed.

University of Oxford

An election of two members of the board of the faculty of medicine will be held on June 3.

The electorate consists of all Oxford graduates in medicine who are members of convocation. Nominations will be received up to 10 A.M. on Wednesday, May 14, by the secretary of faculties, University Registry, Oxford, from whom further particulars may be had.

University of London

Dr. Alfred Schweitzer has been appointed reader in experimental physiology at University College, and Dr. J. R. Gilmour reader in morbid anatomy at the London Hospital medical college. Both will take up their appointments on Oct. 1.

Dr. Schweitzer graduated in medicine at Cologne in 1932 and took his Ph.D. Lond. in 1940. Since 1943 he has been lecturer in physiology at the University of Leeds. While working in the department of physiology at the Middlesex Hospital in 1941 he published, jointly with Buttle and Kekwick, an experimental evaluation of blood substitutes in the treatment of hemorrhage. He obtained his D.Sc. Lond. last week.

Dr. Gilmour, who qualified in 1931 from the London Hospital, took his M.R.C.P. in 1933 and two years later was awarded a scholarship of the Grocers' Company. In 1936 he was appointed junior assistant director of the Bernhard Baron Institute at the London Hospital. His published work includes papers on the anatomy of the parathyroid gland, intranuclear inclusion in the genital tract, and erythroblastosis fetalis.

University of Manchester

Dr. C. S. D. Don has been appointed lecturer in medicine and Mr. D. S. Poole Wilson lecturer in urological surgery. The department of industrial health will in future be described as the Nuffield department of occupational health, and the following have been appointed lecturers in the subject: Mr. Thomas Bedford, D.Sc., Dr. S. B. Davis, and Dr. Alice Peters.

Royal College of Physicians of London

On Tuesday and Thursday, April 15 and 17, at 5 P.M., Dr. J. Purdon Martin will deliver the Lumleian lectures at the college, Pall Mall East, S.W.1. He is to speak on Consciousness and its Disturbances considered from the Neurological Aspect.

Royal College of Surgeons of England

On Wednesday, April 16, at 3.30 P.M., Dr. James Craigie, F.R.S., will deliver an Imperial Cancer Research Fund lecture at the college. He will speak on Relationships of Virus and Host Cell with reference to Latent and Cryptic Infections.

Applications are invited for election to the office of Hunterian professor, Arris and Gale lecturer, Arnott demonstrator, and Erasmus Wilson demonstrator for the ensuing year. Applications must be made in proper form by April 28, and particulars may be had from the assistant secretary.

University of Birmingham

Mr. Lancelot Hogben, D.Sc., F.R.S., Mason professor of zoology at Birmingham, has been appointed to the chair of medical statistics in the university.

McGill University

On March 11 the honorary degree of D.Sc. of McGill University, Montreal, was conferred on Prof. John Ryle, of Oxford.

Royal College of Obstetricians and Gynaecologists

On Wednesday, May 14, at 5 P.M., Dr. Linton Snaith will deliver the Blair-Bell lecture at the college, 53, Queen Anne Street, London, W.1. He is to speak on Tubal Occlusion.

British Association for the Advancement of Science

Sir Howard Florey, F.R.S., will deliver the Radford Mather lecture at the Regent House, Cambridge, on Friday, May 2, at 5 P.M. His subject is to be Penicillin and other Antibiotics.

Royal Sanitary Institute

At a meeting, to be held at the institute, 90, Buckingham Palace Road, London, S.W.1, on Wednesday, May 14, at 3 P.M., Dr. W. H. Bradley, a senior medical officer of the Ministry of Health, is to open a discussion on the Control of Smallpox.

Faculty of Radiologists

Dr. Gordon E. Richards, of Toronto, will deliver the Skinner lecture before the faculty on Friday afternoon, May 16. His subject is to be the Place of Surgery and of Radiotherapy in the Management of Mammary Cancer. The annual meeting of the faculty will be held at Birmingham on June 27 and 28.

London Jewish Hospital Medical Society

On Thursday, April 17, at 8 P.M., at the West London Synagogue, Seymour Place, W.1, Lord Rothschild, Ph.D., will deliver the annual oration. He is to speak on the Problem of Fertilisation. Admission is limited to members and those eligible for membership.

British Association of Urological Surgeons

The annual general meeting of the association will be held in Glasgow on Friday and Saturday, June 13 and 14. The provisional programme includes a discussion on the Treatment of Serious Tumours of the Bladder, to be opened by Mr. Clifford Morson, the president. Further information may be had from the secretary, 45 Lincoln's Inn Fields, London, W.C.2.

Harveian Society of London

The council of the society has selected as the subject for the Buckston Browne essay for 1948 the Mental and Physical Effects of Pain. The prize is open to all doctors registered in the British Isles or Dominions who are under 45 years of age. Essays must be submitted by Oct. 1, 1948. Further particulars may be had from Sir Cecil Wakeley, 14, Devonshire Street, London, W.1.

Watts Eden Fellowships

Dr. T. Watts Eden, who died on Sept. 22, has left two sums, each of £10,000 free of duty, to found, after the death of his widow, two travelling fellowships. The first fellowship, which will be administered by the Royal College of Obstetricians and Gynaecologists, is to encourage the study of obstetrics and gynaecology, and the second, to be administered by the Royal College of Physicians, the study of infancy and early childhood in health and disease.

Australia Wants More British Nurses

British nurses wishing to emigrate to New South Wales are to be given priority in the allocation of passages. The New South Wales minister for immigration is reported by B.U.P. as saying that of the 900 berths available for migrants in 1947, 350 will be allotted to women coming out to work in mental and other hospitals.

Morgan E. Williams Bequest

Grants from this fund will be available to doctors and others engaged in medical work resident in the county of Glamorgan who wish to travel abroad on short visits of medical interest. Applications should be made to the secretary of the Welsh National School of Medicine, 10, The Parade, Cardiff.

Naval Medical Compassionate Fund

A meeting will be held at 3 P.M. on Friday, April 25, at the Medical Department of the Navy, 64, St. James's Street, London, S.W.1, to elect six directors of the fund.

Course on Reablement

The British Council for Rehabilitation is holding a course at Nottingham on April 29, 30, and May 1. The speakers will include Mr. S. A. S. Malkin, Mr. J. P. Campbell, Dr. G. F. Keatinge, Mr. E. A. Nicoll, and Dr. T. A. Lloyd-Davies. The council's address is 32, Shaftesbury Avenue, London, W.1.

Institute of Hospital Administrators

The annual conference will be held at the Royal Pavilion, Brighton, next week-end, April 18-20. On the 19th, at 10 A.M., Sir Arthur Rucker, deputy secretary to the Ministry of Health, will speak on Hospital Administration in the New Health Service, and at 2.30 P.M. Mr. B. Lees Read on Financial Implications of the Act. The offices are at Tavistock House North, Tavistock Square, London, W.C.1.

Education of Blind Children

At a meeting of the school medical service group of the Society of Medical Officers of Health, to be held at the Civic Hall, Leeds, on Wednesday, April 30, at 2.20 P.M., Mr. D. D. Stenhouse Stewart, F.R.C.S., and Mr. J. Lumsden, of the Ministry of Education, will open a discussion on the Education of Blind and Partially Sighted Children. The meeting has been arranged at the request of the Minister of Education's advisory committee on handicapped children.

Foreign Awards

The following awards have been made to R.A.M.C. officers:

UNITED STATES

Legion of Merit.—Major-General SIR HENRY TIDY (commander), K.B.E., D.M. Oxfr.; Colonel D. C. CHEYNE, C.B.E., M.C., M.D. Aberd. *Bronze Star Medal*.—Colonel H. H. KENSBOLE, D.S.O., M.R.C.S., L.D.S.; Major W. G. H. ALLEN, M.D. Durh.; Major A. D. ROBERTSON, M.B. Glasg.

Medal of Freedom with Bronze Palm.—Major G. A. G. PETERKIN, M.B.E., M.B. Edin.

NETHERLANDS

Bronze Lion.—Captain J. W. LOGAN, D.S.O., M.B. Glasg. *Bronze Cross*.—Lieut.-Colonel T. D. V. SWINSCOW, M.R.C.S.; Major C. J. LONGLAND, F.R.C.S.; Captain DAVID WRIGHT, M.C., M.B. Glasg.

Return to Practice

The Central Medical War Committee announces that Mr. Charles Gray, F.R.C.S., has resumed civilian practice at 19, Harley Street, London, W.1 (Langham 2579).

Appointments

ALLEN, E. H., M.R.C.S., D.M.R.E.: asst. radiologist, Royal National Orthopedic Hospital, London.

BRADMORE, ROSEMARY, M.B. Edin.: temporary asst. M.O., Kensington.

DAVIES, I. G., M.D. Lond., M.R.C.P., D.P.H.: M.O.H. and schools M.O., Leeds.

DORNHORST, A. C., M.D. Lond., M.R.C.P.: senior asst. to medical unit, St. Thomas's Hospital, London.

GREENE, RAYMOND, D.M. Oxfr, M.R.C.P.: physician, Royal Northern Hospital, London.

HARMAN, J. B., M.D. Camb., F.R.C.P., F.R.C.S.: asst. physician, Royal Cancer Hospital (Free), London.

O'DONNELL, R. F., B.Sc., M.B.N.U.I.: pathologist, East Ham Memorial Hospital, London.

St. Mary's Hospital for Women and Children, London:

CULLOTY, TIMOTHY, M.R.C.S., D.M.R.E.: radiologist.

DIMSON, S. B., M.D. Lond., M.R.C.P., D.T.M. & H.: asst. physician.

GORDON, ISAAC, M.D. Lond., M.R.C.P.: asst. physician.

LEWIS, BEATRICE, M.D. Lond.: skin physician.

LUMB, J. R., M.B. Durh., B.H.Y., D.P.H., D.M.R.E.: radiologist.

Medical Board (Silicosis and Asbestos Scheme, 1931):

Medical officers:

BREBNER, ALLAN, M.B. Aberd.

BULLEID, J. H., M.R.C.S.

CAMPBELL, A. M., D.S.O., O.B.E., M.B. Glasg.

MCGOWAN, R. M., M.B. Glasg.

MACNAIR, R. A. C., M.B. Edin.

ROWLAND, E. M., M.R.C.S.

Colonial Service:

BURNS, J. C., M.B. Belf.: M.O., Malaya.

CANNON, D. A., B.Sc., M.B. Glasg., D.T.M. & H.: senior pathologist, Nigeria.

EVANS, W. J. M., M.B. Lond.: M.O., Tanganyika.

HARVERSON, E. S., M.B. Lond.: M.O., Nigeria.

HOAR, C. E. W., M.B. Lond., D.C.P.: pathologist, grade B, Trinidad.

McLINTOCK, J. S., M.B. Glasg.: M.O., Malaya.

SNODGRASS, R. J., F.R.F.P.S.: deputy director of medical services, Fiji.

WILLIAMS, W., B.Sc., M.B.: M.O., Uganda.

RECOVERY FROM STARVATION

R. O. MURRAY

M.B.E., M.B. Camb.

LATE LIEUT.-COLONEL R.A.M.C.

DURING the final stages of the war in Europe Allied troops overran many concentration camps and liberated a vast number of prisoners suffering from starvation, which had caused the death of many others before relief arrived. Among the survivors disease was rampant, typhus and tuberculosis being extremely common, and famine diarrhoea almost universal.

Sandbostel concentration camp, which was captured on April 29, 1945, contained over 8000 male political prisoners, mostly Russians and Poles, but representing also many other nationalities and almost every occupation. While most had been of the unskilled labouring type, there were several of high intelligence and great experience. Nearly all were young to middle-aged adults, but a few adolescent boys and elderly men were included. They had been in captivity from six months to six years.

The camp was appallingly overcrowded, about 850 men occupying huts intended for 120. There was virtually no sanitation, and the universal diarrhoea soon caused fouling of the entire area. The daily rations were reported to have consisted of 140 g. of bread, extremely coarse and of poor quality, two half-litre bowls of soup, and a small amount of margarine. The value of this diet is estimated at not more than 500 calories. There was no fair system of distribution, and the greatest share was often obtained by those with the greatest strength.

After liberation about 2000 were considered to be fit to proceed directly to a displaced persons' camp after cleansing and without admission to a medical unit. The remainder were placed under medical care as rapidly as possible. The receiving medical units, expanded to the utmost and provided with all available assistance, soon became grossly overcrowded. To relieve them a convalescent camp was opened on May 12. It is on observations carried out at this camp that this paper is based.

In the circumstances only the barest medical investigations could be carried out, but records were kept of the body-weight of each patient on admission and on discharge, and of the amount of food consumed, with a view to their subsequent correlation. It was hoped that these would provide some information about the speed of recovery and the optimum constitution and amount of the diet to be given to patients recovering from advanced starvation.

Starvation has been investigated in the past both experimentally and in famines, but very few inquiries have been made into the process of recovery in the human adult, and those that have been made deal with individual cases in professional fasters or laboratory workers.

Lipscomb (1945), working at Belsen, used for this purpose three graduated diets for different stages during the process of recovery from starvation. The first had a low value of 800 calories, with a large milk content; the second 1700 calories; and the third 3000 calories.

Leyton (1946), who investigated the effects of slow starvation while himself a prisoner-of-war, considers that the prognosis for recovery from starvation is excellent, provided that no concomitant organic disease is present, and notes that Russians under his care ate everything available without any ill effects.

ADMINISTRATION OF THE CONVALESCENT CAMP

From the first it was appreciated that the patients would require both physical and psychological care. However, such large numbers were involved, because the

order to accommodate up to 1000 had been received, that individual care, except in the case of the sick, had to give way to the production of the best possible conditions for the majority. It was made clear to the patients that the camp was under military discipline, even though this was reduced to a minimum. Since all patients were typhus contacts, it was decided to confine them to camp during the period of convalescence.

On arrival the patients were dusted with D.D.T., informed of the method by which the camp was operated, and allotted, by nationalities, to huts, where each man was provided with stretcher, pillow, and blankets and issued with toilet essentials. Next day they were medically examined and weighed. This was periodically repeated until they were finally weighed and re-examined on the day before discharge.

It was arranged with the dispatching medical units that all patients should be ambulant and free from diarrhoea before admission for convalescence. As a result nearly all patients had received from two to three weeks' treatment between liberation and convalescence.

Meals were served at 8 A.M., 12 NOON, 3.30 P.M., and 7 P.M. Eating-utensils and tables were kept scrupulously clean. The dining-rooms were light, airy, and cheerful. Though mess tins only were at first available, these were superseded as soon as possible by crockery. All this was done as part of a general plan to introduce into the surroundings an atmosphere of civilisation.

CONDITION ON ADMISSION

General Condition.—Despite the treatment they had received before admission nearly all the patients presented the same picture both mentally and physically. Apart from the universal desire for food, and the truly voracious appetite they displayed, they were utterly apathetic, dull, and submissive. They conversed hardly at all between themselves, did not express any emotion, and appeared to have little interest in life. Very few wanted to write letters or communicate in any way with the outside world. A cheerful remark would often be met by a completely vacant stare, and carelessness of dress and habit was the rule. At this stage they were all amenable to the very moderate discipline imposed, and almost no initiative whatsoever was shown. This total lack of interest was particularly noted among those who had been only a short time under medical care.

Great changes, however, were observed after a few days. Meal-times became noisy, often with complaints of insufficient food or of petty thieving. Vast quantities of food were consumed, and, if a meal could not be finished, an attempt would be made to smuggle out the remainder. Initiative returned and was particularly directed to methods of obtaining more food, despite the very large diet. Many showed a highly developed form of cunning in this respect, the most notable effort being the theft of a calf from a neighbouring field. This animal was introduced into the camp and slaughtered, and the patients began to eat the meat raw. When this was stopped, and some scraps of meat were buried, the patients waited until they were free from supervision and then recovered and ate the meat. In the early stages these people could not believe that any meal in the future could be anticipated with confidence. Meanwhile all amenities, such as pianos, indoor games, and literature, were eagerly asked for, a small orchestra was formed, and later on games of football were played.

Physical Condition.—Gross emaciation was usually seen, due both to loss of virtually all subcutaneous fat and to extreme wasting of muscle. The absorption of subcutaneous fat made the skin hang in loose folds, particularly on the buttocks, which came to be recognised as the first site in which generalised wasting of tissue became apparent. In advanced cases the anus became clearly visible between the tubera ischii, and owing to the

absorption of the circumanal fat some degree of rectal prolapse was common.

Wasting of muscle was shown in its most striking form in the glutei and in the muscles of the limbs. Usually the loss of tissue was most pronounced in the lower limbs, in the gluteal area, and over the vastus medialis on the inner side of the thighs; in the upper limbs the wasting was seen mainly in the deltoid muscle, the biceps, and the flexors of the forearm. In advanced cases, however, the loss was so great that no real selective

TABLE I—ANALYSIS OF DIETS

| No. of days | Type of diet | Protein (g.) | Fat (g.) | Carbo-hydrate (g.) | Total calories |
|-------------|--|--------------|----------|--------------------|----------------|
| 9 | High-fat | 330 | 356 | 853 | 8255 |
| 3 | Additional carbohydrate | 263 | 217 | 943 | 6964 |
| 12 | Relative high-fat (average of foregoing) | 313 | 329 | 877 | 7938 |
| 10 | High-carbohydrate | 278 | 224 | 1048 | 7518 |
| 22 | Over-all average | 297 | 281 | 955 | 7747 |

action could be observed. Wasting was less well marked in the muscles of the abdominal wall, and the fat over the upper part of the rectus sheath was often retained. In the back the thoracic spinous processes and the scapulae became unduly prominent. The degree of facial emaciation was not necessarily related to the wasting in other parts.

The skin was often dry, scaly, and covered with sores, many of which had originated from scabies. All hair had been shaved from the patients' bodies.

No gross vitamin deficiencies were observed, and no famine oedema was seen; hence the weights on discharge are not influenced by a pathological increase in fluid.

THE DIET

The extraordinary appetite displayed was first appreciated when bitter complaints about the inadequacy of the diet were made during the first days. At this time the Army 'Compo' ration was in use, having an average value of 3600 calories. It was then resolved that every effort must be made to satisfy the patients' appetites so long as no harmful effects developed. "The danger of stuffing a starving man is notorious" say Hutchison and Mottram (1936), and this principle was kept strongly in mind.

The increase in diet began on May 17 and was continued until June 7, a period of twenty-two days. In addition to food supplied by the Army, further supplies of potatoes were obtained, and dairy produce was requisitioned from local farms. The last source of supply ceased on May 26, when all such produce was ordered by Military Government to be supplied to the medical units handling cases directly out of the concentration camp.

As a result of this order the fat content of the diet was considerably reduced, but this reduction was to some extent compensated by an increase in carbohydrates. There were thus two periods in the investigation in which the average constitution of the diet shows considerable variation. These will be arbitrarily referred to as the high-fat period, from May 17 to May 26, and the high-carbohydrate period, from May 27 to June 7.

Despite the considerable increase in the diet that resulted from these measures, the cry for more food continued almost to the end; but during the latter part of the high-fat period the demand, especially from Russians and Poles, was for more carbohydrate, particularly in the form of bread and potatoes. The average consumption of fat per head of population in normal times by the Russians and Poles is about half that of Germany or Great Britain. The same is true of the

Japanese and Italians, for the general level of poverty was such that cereals were a compulsory replacement for fat, which is the most compact form of fuel we possess. Morgulis (1923) remarks that Irish and Bavarian peasants, accustomed to a bulky diet of bread and potatoes, suffer greatly when put on a small quantity of highly nourishing food. Though this agrees with the present findings, he says in the same paragraph that the habitually underfed are much discomforted when given a sufficient diet, and concludes that appetite and subjective feeling are unreliable guides in the matter of nutrition. Experience in the present case did not coincide with these views. Patients certainly appear to have regarded the highest hospital diet, of 3000 calories, as inadequate, since great objection was raised by those readmitted to hospital at the prospect of returning to this scale of diet.

Table I shows the diets and their calorie values. The average value of the diet during the high-fat period was 8255 calories, and during the high-carbohydrate period 7518 calories, whereas the average for the whole period was 7747 calories. Though both diets are extremely large, they proved to be adequately balanced. The fat content in the first period, however, judged by the subjective reaction, was almost certainly higher than necessary. Every effort was made to check the amounts of food used, and every meal was carefully supervised. Measurements of the swill showed that, when about 800 patients were being fed, only about a bucketful a day was going to waste from the meal-tables.

Fig. 1 shows the calorie value of the daily diet and of the protein, fat, and carbohydrate constituents. This cannot be absolutely accurate, because some food was inevitably carried over from day to day in the kitchens. The figures were obtained by making an accurate daily check of all food provided and dividing the total by the number of patients being fed. Allowance was made for the peeling of potatoes.

Typical diets from each of the two periods were as follows:

| Items | High fat High carbo- fat hydrate (oz.) (oz.) | Items | High fat High carbo- fat hydrate (oz.) (oz.) |
|------------------------------|---|--------------------|---|
| Fresh meat (with bone) | 14 — | Sugar | 2 1/2 3 |
| Preserved meat .. | — 13 | Potatoes | 42 48 |
| Brown bread .. | 28 36 | Tinned vegetables | 1 1/4 7 |
| White bread .. | — 6 | Flour | 1 3/4 1 3/4 |
| Eggs (8 = 1 lb.) .. | 4 4 | Oatmeal | 2 — |
| Cooking-fat .. | 1/2 1/2 | Dried egg | 1/3 — |
| Cheese | 1/2 1 3/4 | Dehydrated soup | 1 1/4 — |
| Cream cheese .. | 16 — | Cereals (dried) .. | — 1 3/4 |
| Butter | 2 1/2 1 3/4 | Bacon | — 1 3/4 |
| Margarine | 1 1/2 — | Fresh milk (pints) | 1 3/4 1 3/4 |
| Jam | 1 1 3/4 | Coffee | 4/5 — |
| | | Tea | — 1 1/2 |

Analysis g.

| | High fat | High carbohydrate |
|--------------------|----------|-------------------|
| Protein | 319 | 295 |
| Fat | 400 | 228 |
| Carbohydrate | 763 | 984 |
| Sugar | 73 | 86 |
| | 836 | 1070 |
| Calories | 8442 | 7669 |

The daily diet also included salt 1/2 oz., pepper 1/100 oz., mustard 1/100 oz., and two compound vitamin tablets. Seven cigarettes were allowed daily.

An explanation is necessary for the large quantity of cream cheese shown in the high-fat period. This local dairy product was plentiful, and was served on the bread at each of the four meals. Though little was left,

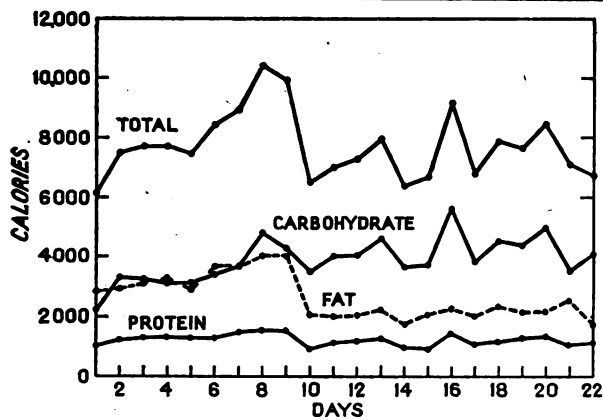


Fig. 1—Calorie values of daily diets and constituents thereof.

complaints were frequent. The analysis of this item, calculated from standard tables, may be a source of error, since the fat content of the milk used in its manufacture was variable. This cheese sours very rapidly, but the free fatty acid, to which the rancid taste is due, is a powerful agent in the promotion of hydrolysis and absorption of fat. This effect, together with the possibly beneficial action of rancid cheese on the intestinal flora, may have caused a disproportionate rise in weight among those patients who consumed their full ration.

The very high calorie value of the diet finds its nearest comparison in a report of Woods and Mansfield (1904) where lumbermen consumed a diet of an average value of 8083 calories daily, containing 164.1 g. of protein, 387.8 g. of fat, and 982.0 g. of carbohydrate. The lumbermen, however, in contrast to our patients, were taking extremely active exercise.

The large diet was very well tolerated. No vomiting and very few cases of lenteric diarrhoea were reported. Certainly at this stage in treatment it seemed perfectly safe to satisfy the subjective desire for food to the utmost. The question arises whether too great precautions were taken in the early stages of treatment when considerably smaller diets were used. Though an initial period of invalid feeding is desirable, particularly to allow the gastro-intestinal tract to recover its function, it appears that this should not be continued, unless there are definite contra-indications to a more substantial diet, for more than a few days at the most. After this the subjective desire for food should be regarded as the safest guide. Though this is contrary to general opinion, Leyton (1946), investigating a very similar field, came to the same conclusion. The great and rapid improvement in both physical well-being and mental health in the vast majority of cases was due largely to the adoption of this principle.

VARIATION IN BODY-WEIGHT

The convalescent camp accommodated patients from May 12 to June 9, during which period 1393 patients were admitted. Of these, 98 were returned to hospital, many going reluctantly. Weight records were kept in 930 of the remaining cases during the diet-observation period (May 17 to June 7) and on June 8, when no record was made of the diet. Thus weight records were made on twenty-three successive days.

In 45 cases weight was either stationary or lost. Of these, 9 were Frenchmen, who were evacuated to a hospital in France by air while still very weak. The weight of the remaining 36 averaged 55.7 kg. Many of these were sent for radiological examination of the chest as possible cases of pulmonary tuberculosis. The congested conditions in the hospitals were such that those who were not definitely shown to be suffering from a demonstrable lesion were returned to the camp. Possibly, however,

the lack of gain in weight may have been due to occult tuberculosis.

The weight records of the 885 who did gain weight, however small the gain, were used to ascertain the average weight on admission and the rate of recovery of body-weight.

Average Body-weight.—On admission, the body-weight averaged 54.2 kg. Starling (1930) gives 70.3 kg. as the average weight of an Englishman. If this is taken as a criterion, the average degree of wasting was 23% of the original body-weight. (It is equally true to say that 30% of the starved body-weight must be gained to allow recovery to the original weight.)

Mollison (1946), at Belsen, found that the average weight of 18 men who were strong enough to stand on the scales was 44.0 kg., and that of 11 women 35.3 kg. Some of these had known their weight previously, and in these cases the average loss of original body-weight was 38.8%. From these figures it is deduced that the average male weight before starvation was 71.9 kg.; hence the adoption of Starling's figure appears reasonable.

Rate of Weight Recovery.—This was investigated by taking groups of patients according to periods of observation from two to twenty-three days. Subjects who could not be observed for two days or more were excluded from the series. The percentage gain in starved body-weight per day of observation was calculated in every case, and the average for each observation period was taken. The results have been plotted in fig. 2. The number of subjects for each period of observation is shown in the background to give an index of reliability. From the plotted figures a smooth curve was drawn to indicate the rate of weight recovery. A decrease in this rate corresponding to increased length of the observation period is demonstrated.

Since each figure represents the average gain over the number of days in question, it is clear that this graph does not indicate the rate of recovery in an individual patient. With the use of the smooth curve in fig. 2 this was calculated for the average patient of 54.2 kg. by the following method. The expected gain over two days was plotted. This was subtracted from the expected gain over three days, the difference giving the gain for the third day, which was then also plotted. This total was then deducted from the total anticipated gain over four days, thus giving the actual gain for the fourth day. This procedure was continued to give the curve shown in fig. 3. A reduction in the rate of gain is observed after the first week. Thereafter a fairly

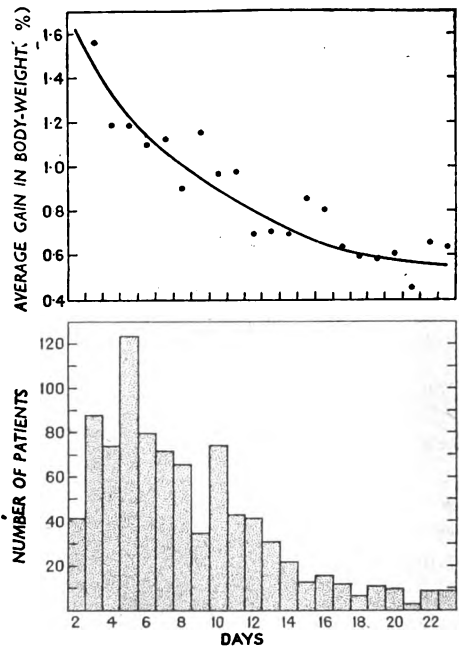


Fig. 2—Speed of weight recovery. Above, average daily gain for each observation period, expressed as percentage of starved body-weight. Below, histograms denoting number of patients in each observation period.

constant, though smaller, rate of gain appears to be maintained.

Examination of this graph of the average patient shows that the weight gained during the first six days is equal to that gained in the following seventeen days, and that 58% of the total gain in weight during the twenty-three days takes place during the first week. If the rate of gain of weight is continued in the way suggested, recovery to the weight of 70.3 kg. might be expected after about seventy-five days.

Effect of Refeeding in Different Weight-groups.—The body-weight records obtained were also used in investigating the effect of refeeding in different weight-groups. The degree of starvation postulated can only be regarded as a mean, since all degrees of starvation were found among the released prisoners. It seemed justifiable to consider the lower weight-groups, despite normal variations, as having been exposed to greater starvation than those in the higher weight-groups. Accordingly the rate of weight recovery among the different categories was investigated. The lightest of these included the few patients whose initial weight was less than 40 kg. and the heaviest those whose weight was more than 70 kg. Between these limits groups were taken at 5 kg. intervals. The results are shown in table II. A striking difference in the rate of weight recovery is observed, the lower weight-groups making a greater rate of gain and over a longer period than the higher groups. It is particularly interesting to compare the average gain per cent. of the original body-weight for each group with the same figure for the whole series for the corresponding time, in each instance, the latter being obtained from the smooth curve in fig. 2.

These results demonstrate clearly that the high diet, demanded by the cry of nature, had definitely beneficial results, rapid response being shown by the gain in weight. This gain is especially pronounced during the first week of high-diet refeeding. Clinical confirmation is found in the absence of ill effects and in the fact that, at the end of this period of a week, most patients were considered sufficiently well recovered to be discharged.

RELATION OF DIET TO SPEED OF WEIGHT RECOVERY

The size and constitution of the diets and the rate of weight recovery having been examined, an attempt

TABLE II—WEIGHT GAINS IN DIFFERENT WEIGHT-GROUPS

| Weight-group (kg.) | No. of patients | Av. period of observation (days) | Gain in body-weight | | Av. daily gain % of body-weight | Av. gain % of body-weight for whole series in same period* |
|--------------------|-----------------|----------------------------------|---------------------|-----------------------------------|---------------------------------|--|
| | | | Actual (kg.) | Percentage of starved body-weight | | |
| Below 40 | 11 | 9.5 | 4.5 | 12.2 | 1.28 | 0.93 |
| 40-44.9 | 52 | 11.3 | 5.3 | 12.4 | 1.10 | 0.84 |
| 45-49.9 | 156 | 8.7 | 5.0 | 10.5 | 1.21 | 0.97 |
| 50-54.9 | 265 | 8.7 | 5.1 | 9.8 | 1.13 | 0.97 |
| 55-59.9 | 217 | 7.1 | 4.4 | 7.7 | 1.00 | 1.07 |
| 60-64.9 | 119 | 7.0 | 4.3 | 6.9 | 0.99 | 1.08 |
| 65-69.9 | 55 | 6.9 | 4.5 | 6.6 | 0.96 | 1.08 |
| Above 70 | 10 | 7.3 | 4.1 | 5.6 | 0.77 | 1.06 |

* Calculated from fig. 2.

was made to relate the results obtained. It was desirable to ascertain whether greater gains of weight were made during the high-fat period or during the high-carbohydrate period.

To obtain figures for weight recovery during the high-fat period it was necessary to include patients who had had a further three days on the high-carbohydrate diet.

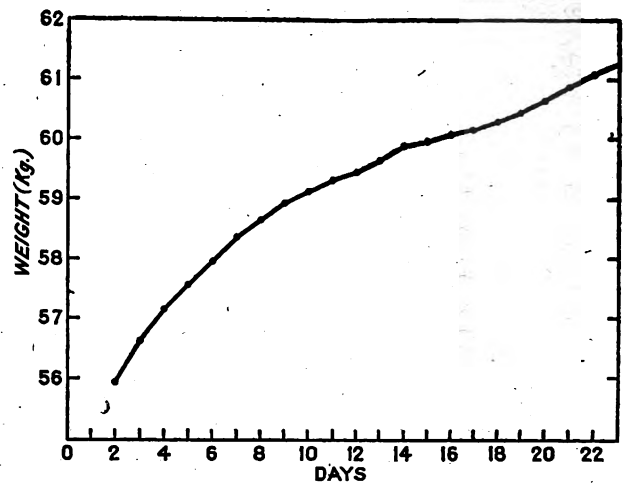


Fig. 3—Average weight of patients during refeeding period.

This was necessary because, when the involuntary change of type of diet took place, it was impossible to arrange accommodation elsewhere for patients who had attained the degree of recovery compatible with discharge. The first twelve days of the period, on the first nine of which the high-fat diet had been given, and on the last three of which the high-carbohydrate diet had been given, were therefore taken together as a relative high-fat period.

The diet during this period had an average value of 7938 calories a day; of these, 16.2% were derived from protein, 38.5% from fat, and 45.3% from carbohydrate (table I). Observed for an average of 8.5 days, 152 patients gained at the average rate of 1.07% of body-weight a day. The equivalent for this period in the whole series is 0.98% (fig. 2).

The high-carbohydrate diet had an average value of 7518 calories a day; of these, 15.2% were derived from protein, 27.7% from fat, and 57.1% from carbohydrate. Observed for an average of 5.3 days, 475 patients showed an average gain of 1.19% of body-weight a day. The equivalent for this period in the whole series is 1.20% (fig. 2).

The relative high-fat diet had a calorie value 5.5% greater than the high-carbohydrate diet, and a greater rate of gain with the diet of higher value is observed. This is surprising, because it was not thought possible that these large quantities of food could be fully utilised by the body. It seemed particularly unlikely, even allowing for the abnormal condition of the patients, that the 356 g. of fat fed during the earlier period could be fully absorbed. However, the only real test of fat-absorption—analysis of the faeces—could not be carried out under the prevailing conditions.

Almost equally good gains in weight were recorded with a diet poorer in fat and richer in carbohydrate. It is interesting that during the period when more fat was being given in the diet than may have been assimilated the subjective desire was for more carbohydrate.

It is likely that all, or very nearly all, the protein was absorbed to make good the great tissue loss. All the meat in the diet was eaten, like everything else, but this item never became a subject for complaint. Chittenden (1907), who advocated a reduction in the protein content of the normal diet, advised a high-protein content in the treatment of malnutrition.

SUMMARY

The convalescent from starvation whose gastrointestinal tract has begun to recover its function, often shown by the cessation of diarrhoea, and who is not confined to bed, displays a very great desire for food.

The use of a diet of high calorie value to satisfy this appetite seems to be justified.

A study was made of 930 men who had been liberated from German concentration camps and had received initial hospital treatment for two to three weeks. The average degree of wasting at the start of the investigation was estimated to be 23% of the original body-weight.

More than 95% of the patients gained weight quickly, and advanced greatly towards the full recovery of health on rich diets of between 7500 and 8000 calories daily. No untoward effects developed, and it is considered that the optimum constitution of such a diet should be 225 g. of fat, which contributes largely to the recovery of weight; 275 g. of protein, to provide for the regeneration of the wasted tissues; and 1000 g. of carbohydrate.

The results suggest that the greatest benefit from such a diet arose in the first week and was in proportion to the amount of starvation.

Measures to encourage mental rehabilitation are desirable, since, despite the initial complete lack of interest in the surroundings, the mental and moral inertia soon gives way when weight increases. In fact, the patient's interest in his surroundings is a good indication of the degree of recovery.

My thanks are due to all ranks of 3 Field Dressing Station and 49 Field Surgical Unit for their assistance in this investigation; and also to Prof. H. A. Harris and Dr. Ian Murray for their advice and criticism in connexion with the preparation of this paper.

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FOLIC ACID IN THE TREATMENT OF THE SPRUE SYNDROME

L. S. P. DAVIDSON

M.D. Edin., B.A. Camb., F.R.C.P., F.R.C.P.E., F.R.S.E.

PROFESSOR OF MEDICINE

R. H. GIRDWOOD

ELIZABETH M. INNES

M.B. Edin., F.R.C.P.E.,
M.R.C.P.

M.B. Edin., M.R.C.P.E.

ASSISTANT IN THE

LECTURER IN MEDICINE

DEPARTMENT OF MEDICINE

UNIVERSITY OF EDINBURGH

REPORTS by Garcia Lopez et al. (1946) on the treatment of tropical sprue, and by Brody and Gore (1946) and Dalton et al. (1946) on the treatment of coeliac disease, have told of the excellent response that may result from the administration of folic acid. The present report is primarily concerned with the hæmatological changes in 10 cases of the sprue syndrome after treatment with synthetic folic acid. A short account of the effects of treatment on the clinical features and the absorption of fat is also included.

A fat-balance test carried out according to the method of Cooke et al. (1946) was done on all adult patients except cases 2 and 4, where it could not be undertaken for reasons given below. A similar test, in which 50 g. of fat was given daily for 3 days, was done on 17 adult controls and showed a percentage absorption ranging from 91.3% to 98.5%, mean 95.4%. Since no information was available about fat-balance tests in infants, a daily intake of 25 g. of fat was arbitrarily selected. The percentage absorption of fat in normal infants given this amount was found to be the same as in normal adults given 50 g. daily. Before folic acid was tried, all the

adult patients had been treated for long periods with a high-protein low-fat diet and parenteral liver without attaining normal blood figures. Special diet and iron had been equally unsuccessful in the hypochromic anaemia of coeliac disease. The hæmatological and clinical findings and the results of the fat-balance tests before and after treatment with synthetic folic acid are given in tables I and II. The hæmoglobinometer used in this investigation gave a reading of 100% at 13.8 g. per 100 ml.

TROPICAL SPRUE

Case 1.—A man, aged 59, first had attacks of diarrhoea while in Sumatra in 1916; sprue was diagnosed in 1932. During the past twelve years he had frequent relapses of diarrhoea with pale frothy stools. In 1933 examination of a stool showed total faecal fat 52% (split 63%, unsplit 37%), and many fatty crystals. An oral glucose-tolerance test gave an abnormally flattened curve.

The patient developed a psychotic depressive state in 1933 and was admitted to a mental home for treatment. He was discharged in 1934 and was unable to work during the next twelve years.

He was readmitted to a mental hospital in May, 1946, with an exacerbation of depression. Because of the fatty diarrhoea he was transferred to our ward for treatment with folic acid in August, 1946.

On admission he was passing 7 pale frothy loose stools a day. Total fat in dried stool 31.5%; fat-absorption 48.7%. He was extremely depressed, but otherwise his general condition was good. There was histamine-fast achlorhydria. Sternal puncture showed the marrow to be normoblastic, with an increase of early and intermediate normoblasts.

After a control period the patient was given 100 mg. of folic acid intramuscularly, followed by 20 mg. daily intramuscularly from the 2nd to the 21st day of therapy, and then 20 mg. by mouth from the 22nd to 36th day.

The rise in the blood-count was slight and macrocytosis persisted; there was no improvement in fat-absorption; but there was a dramatic and rapid effect on the diarrhoea, a reduction of abdominal distension, and a gain in weight and appetite. The patient's mental state was not improved.

The next case was selected for study for the specific purpose of ascertaining whether folic acid would correct the macrocytic blood picture, which in our experience is not uncommon in the sprue syndrome even when the Hb level is 100% or more, and often does not respond to large amounts of parenteral liver extract.

Case 2.—A man, aged 35, who had been in Egypt in 1935-36, had attacks of diarrhoea, with pale yellow loose stools, from 1943, when he was on service in North Africa. In 1944 he began to feel very weak and developed a sore tongue. He was admitted to a casualty clearing station in Italy in 1945, when his red-cell count was 1,640,000 per c.mm. and Hb 59%; the marrow was megaloblastic. There was no response to injections of liver extract, but the blood-count improved after blood-transfusion and the administration of liquid liver extract by mouth. The patient was evacuated to the United Kingdom still complaining of weakness and flatulence. The stools continued to be pale and loose, and sprue was diagnosed. Injections of liver extract were given during 1945-46.

He was referred to us as an outpatient and not admitted to hospital owing to extreme shortage of beds. At the start of treatment he was having one or two greasy but formed motions daily. His general condition was good. Red-cell count 4,160,000 per c.mm., Hb 100%, colour-index (c.i.) 1.2, mean corpuscular volume (m.c.v.) 103.4 μ , mean corpuscular hæmoglobin concentration (m.c.h.c.) 32.1%.

Folic acid was given by mouth in a dosage of 20 mg. daily for 30 days. The red cells remained macrocytic despite a slight but definite rise in the blood-count.

Case 3.—A woman, aged 70, developed sprue while in India in 1931. During the past fifteen years she had continuous treatment with special diet, injections of liver extracts, and supplements of vitamins, in different places. During this time she had numerous severe relapses, and her health was never satisfactory.

When she came under our charge she was having 2 or 3 bulky pale motions daily. Total fat in dried stool 37.7%; fat-absorption 71.4%. Her general condition was very poor,

TABLE I—EFFECT OF FOLIC ACID ON CLINICAL STATE AND ON FAT-ABSORPTION

| Case no. | Sex and age (yr.) | Before or after folic acid | No. of stools daily | Character of stools | Chronic atrophic glossitis | Weight (lb.) | Sense of well-being | Appetite | Abdominal distension | Fat-absorption (%) | Total fat in stool (% of dried weight) |
|----------|-------------------|----------------------------|---------------------|--------------------------|----------------------------|--------------|---------------------|------------|----------------------|--------------------|--|
| 1 | M 59 | B | 7 | Pale, frothy, loose | + | 117 | Poor | Poor | ++ | 48.7 | 31.5 |
| | | A | 1 | Formed | + | 128 | Impr. | Impr. | + | 41.2 | 39.7 |
| 2 | M 35 | B | 1-2 | Greasy, formed | - | 139 | Norm. | Good | - | .. | .. |
| | | A | 1-2 | Greasy, formed | - | 139 | Norm. | Good | - | .. | .. |
| 3 | F 70 | B | 2-3 | Pale, bulky, semi-formed | + | 79 | Poor | Poor | ++ | 71.4 | 37.7 |
| | | A | 1 | Formed | + | 81 | Much impr. | Much impr. | + | 89.6 | 34.25 |
| 4 | F 59 | B | 3-5 | Loose, pale, frothy | + | 90 1/2 | Poor | Poor | + | .. | 34.0 |
| | | A | 1 | Formed | + | 92 | Much impr. | Much impr. | - | .. | .. |
| 5 | F 37 | B | 3-4 | Pale, loose | + | 65 | Poor | Poor | - | 76.0 | 25.4 |
| | | A | 1 | Formed | + | 86 | Impr. | Impr. | - | 77.1 | 19.1 |
| 6 | M 50 | B | 1-2 | Formed | + | 92 | Poor | Poor | + | 75.7 | 32.4 |
| | | A | 1-2 | Formed | + | 99 | Impr. | Impr. | - | 75.8 | 30.66 |
| 7 | M 69 | B | 2-3 | Pale, bulky, loose | + | 127 | Poor | Poor | + | 78.3 | 34.5 |
| | | A | 1 | Formed | + | 127 | Impr. | Impr. | - | 80.2 | 33.0 |
| 8 | F 3 1/4 | B | 2-4 | Pale, bulky | - | 24 | Poor | Fair | ++ | 69.6 | 32.8 |
| | | A | 2-4 | Pale, bulky | - | 21 | Worse | Worse | ++ | .. | .. |
| 9 | M 1 10/12 | B | 2-4 | Pale, fatty | - | 15 1/2 | Poor | Fair | ++ | .. | .. |
| | | A | 2-4 | Pale, fatty | - | 15 1/2 | Impr. | Fair | ++ | .. | .. |
| 10 | F 17 | B | 1 | Formed | - | 77 1/2 | Fair | Fair | - | 70.0 | 27.0 |
| | | A | 1 | Formed | - | 79 | Fair | Fair | - | 72.0 | 27.0 |

with pellagrinoïd skin and a well-marked tendency to bruise and bleed. The marrow was normoblastic.

Folic acid was given by mouth in a dosage of 20 mg. daily for 30 days. The macrocytic anæmia was unchanged, but fat-absorption improved, and there was a rapid and dramatic improvement in the frequency and character of the stools, and in the patient's feeling of well-being. After she left hospital she ceased taking folic acid and had a severe clinical relapse without any change in the blood-count.

Case 4.—A woman, aged 59, lived in India in 1916-20, during which period she had one brief attack of diarrhœa, with pale stools. She had no looseness of the bowels after leaving India until July, 1946, when diarrhœa began again. Thereafter she often had 6 or 7 loose frothy pale stools daily. She also had heartburn, flatulence, and bouts of vomiting, and lost 1 1/2 st. in weight in six months. Sprue was diagnosed, and she was treated with diet and parenteral liver without improvement.

In view of the long time which elapsed between the patient's leaving India and the development of steatorrhœa in Great Britain, it is debatable whether she was a case of tropical sprue or of idiopathic steatorrhœa.

In 1947 she was seen in a private nursing-home, where intensive investigations were impracticable. Free hydrochloric acid was present in her gastric juice, and the fat content of a dried specimen of stool was 34%. Red-cell count 3,480,000 per c.mm., Hb 80%, c.i. 1.1. Folic acid was given by mouth in a dosage of 20 mg. daily for 21 days.

The macrocytic anæmia was not improved, but there was a rapid improvement in the patient's general condition indicated by a better appetite, loss of the abdominal distension, and control of the diarrhœa.

IDIOPATHIC STEATORRHEA

Case 5.—A woman, aged 37, was admitted to hospital with fatty diarrhœa and megaloblastic anæmia refractory to injections of a potent liver extract.

At the start of folic-acid therapy the total fat in the dried stool was 25.4%, and fat-absorption 76.0%. The patient was having 3 or 4 pale loose stools daily, and her general condition was poor. A test-meal showed free hydrochloric acid. The bone-marrow was megaloblastic. The red-cell count was 1,370,000 per c.mm., Hb 40%, c.i. 1.5, white cells 7800 per c.mm., packed cell volume 19%, M.C.V. 138.7 c.µ., M.C.H.C. 28.9%, reticulocytes 3.5%.

Folic acid was given by mouth in a dosage of 20 mg. daily for 10 days, and thereafter 10 mg. daily for 19 days.

The reticulocyte-count began to rise on the 4th day, reaching a peak of 38.6% on the 6th day. On the 29th day the red-cell count was 3,590,000 per c.mm., Hb 72%. This rise was considered highly satisfactory and fully up to the standard

obtained in a classical case of pernicious anæmia with an equivalent initial erythrocyte-count treated with parenteral liver extract. Coincidentally with the blood changes her clinical state improved remarkably.

Continuation of folic-acid therapy for another 19 days, however, did not increase the number of red cells. Accordingly it was given for a further 17 days and supplemented by three injections of 4 c.cm. of 'Anahæmin.' This also did not improve the blood findings, the red-cell count on the 65th day of treatment being 3,680,000 per c.mm. while the blood picture remained macrocytic. Treatment with proteolysed liver ('Hepamino') was then begun, and this resulted in a rise of 1,000,000 red cells per c.mm. in 14 days, and the restoration of the M.C.V. to normal.

The hematological results of treatment with folic acid in this case must be assessed as unsatisfactory despite the excellent initial response, since the blood picture was not restored qualitatively or quantitatively to normal. There was no improvement in fat-absorption, but a rapid and dramatic improvement in the diarrhœa and the patient's general health.

Case 6.—A man, aged 50, had been under our care with fatty diarrhœa for 4 1/2 years before the present admission to hospital, the number of stools commonly being 8-10 daily, sometimes watery, sometimes pale and bulky.

He had had a severe dermatitis of hands, feet, and face for over two years, and this had resisted all forms of therapy. He had been unable to work for over a year because of general weakness.

On admission he had 1 or 2 formed motions daily; total fat in dried stool 32.6%; fat-absorption 75.7%.

A test-meal showed free hydrochloric acid. On three occasions the marrow was found to be preponderantly normoblastic, though an occasional megaloblast was also present. He had a moderate degree of macrocytic anæmia which was entirely resistant to parenteral liver therapy.

The patient was given folic acid by mouth in a dosage of 20 mg. daily for 28 days.

The red cells increased by 1,080,000 per c.mm. in 28 days, and the M.C.V. was restored to the upper limits of normal. Fat-absorption was unchanged. Clinical improvement was definite, and most remarkable of all was the coincident alleviation of the dermatitis, which had almost completely disappeared at the end of treatment with folic acid.

Case 7.—A man, aged 69, served in the Regular Army from 1896 to 1920, and was in India in 1901-06, where he had an attack of acute bacillary dysentery but no other diarrhœal disease. In 1914, when in this country, he developed diarrhœa with loose pale stools. Since then he had frequent exacerbations of these symptoms, sometimes associated with sore tongue. He was admitted to hospital in 1940 with a megalob-

blastic anæmia, and pernicious anæmia was diagnosed. Treatment with potent preparations of liver extract did not restore the blood to normal. During the next 4 years diarrhœa recurred at intervals. Since his general condition was poor he was readmitted to hospital in 1944 for further investigation. Free hydrochloric acid was found in the gastric juice, and the fat-content of the dried stool was 35%. Steatorrhœa was diagnosed. Whether the case should be classified as tropical sprue or idiopathic steatorrhœa is debatable.

Since 1944 the patient has been under observation and has continued to have loose pale stools, usually 2 a day, but more during exacerbations.

He was again admitted to hospital in January, 1947, when folic-acid therapy was begun. At this time he was having 2 or 3 pale loose very bulky motions daily.

On admission the fat in the dried stool was 34.5%; fat-absorption 78.3%. There was considerable œdema of the ankles, and his general condition was poor. Sternal puncture showed a predominantly normoblastic marrow with many early and intermediate normoblasts.

After a control period the patient was given 20 mg. of folic acid daily by mouth. His general condition improved rapidly, and a free diuresis (6600 c.cm. in 48 hr.), associated with disappearance of œdema and with loss of weight, occurred on the 6th and 7th days of treatment. A gain of about 900,000 red cells per c.mm. and 24% Hb took place in 16 days. Despite continued treatment with folic acid for a further 10 days the blood-level remained about stationary and the blood picture macrocytic. There was no change in fat-absorption, but there was a rapid and dramatic improvement in the frequency and character of the stools and in the patient's general feeling of well-being.

COELIAC DISEASE

Case 8.—A girl, aged 3 years 3 months. At the age of 2 years steatorrhœa began, followed by progressive loss in weight and deterioration in health. On Oct. 29, 1945, the red-cell count was 4,000,000 per c.mm., Hb 65%, c.i. 0.81. Treatment with diet, liver injections, iron, and vitamins A, C, and D led to a steady improvement. Six months later there was a severe relapse which was attributed to discontinuation of dietetic restrictions. The patient was readmitted to hospital in very poor health with the clinical picture of cœliac disease. A moderate hypochromic anæmia was present (table II). Sternal puncture revealed a normoblastic marrow. At the

start of folic-acid therapy the patient was passing 2-4 pale bulky stools daily; total fat in dried faeces 32.8%; fat-absorption 69.6%, compared with 95.2% in a control infant of the same age.

She was given 10 mg. of folic acid by mouth daily for 18 days. The blood-count and clinical condition were unchanged, so the dose of folic acid was increased to 20 mg. daily for the next 14 days, again with no improvement.

In view of the low colour-index a further 21 days' treatment with folic acid was given and supplemented with ferrous sulphate gr. 3 daily. At the end of 53 days' treatment with folic acid, the hæmoglobin level was lower than it had been before treatment. Moreover a clinical relapse started about the 40th day of the treatment which was sufficiently severe to prevent the fat-balance test being repeated.

The hæmatological and clinical results of treatment with folic acid in this case were entirely unsatisfactory. (tables I and II).

Case 9.—A boy, aged 1 year 10 months, who first suffered from vomiting, followed by diarrhœa, at the age of 13 months. He was admitted to hospital severely ill, and cœliac disease was diagnosed. Treatment with a low-fat diet, iron, and vitamins led to some improvement. Six months later, however, he was still grossly emaciated, weighing about 15 lb. He vomited often and passed many pale frothy stools daily. It was impossible to carry out a fat-balance test because he could tolerate only traces of fat in the diet.

When folic-acid therapy was started he was passing 2-4 pale fatty stools daily. The anæmia was hypochromic and moderately severe.

Treatment with folic acid began with 10 mg. daily by mouth; but the blood-count was unaltered after 12 days so the dose was increased to 20 mg. daily for 18 days, and was continued for a further 17 days at 10 mg. daily.

After 47 days' treatment with folic acid, supplemented during the last 22 days by ferrous sulphate gr. 1½ daily, the red-cell count was lower than when treatment started. The Hb level remained unchanged. There was no change in the appearance or frequency of the stools and no significant gain in weight or reduction in abdominal distension, but the infant showed some general subjective improvement and began to take an interest in his surroundings.

The hæmatological and clinical response to folic acid was unsatisfactory.

TABLE II—EFFECT OF FOLIC ACID ON ANÆMIA ASSOCIATED WITH THE SPRUE SYNDROME

| Case no. | Before or after folic acid | Hæmoglobin (%) | Red cells (millions per c.mm.) | C.I. | P.C.V. (%) | M.C.V. (c.µ) | M.C.H.C. (%) | Folic acid mg. daily and other treatment | Days of treatment |
|----------|----------------------------|----------------|--------------------------------|------|------------|--------------|--------------|---|-------------------------|
| 1 | B | 78 | 3.3 | 1.2 | 34 | 103 | 31.3 | 100 i.m. | 1 |
| | A | 88 | 3.7 | 1.2 | .. | .. | .. | 20 i.m. 20 oral | 2-21 22-36 |
| 2 | B | 100 | 4.16 | 1.2 | 43 | 103.4 | 32.1 | 20 oral | 1-30 |
| | A | 118 | 4.63 | 1.3 | 50 | 108 | 32.6 | .. | .. |
| 3 | B | 78 | 3.22 | 1.2 | 34.5 | 107.1 | 31.3 | 20 oral | 1-30 |
| | A | 78 | 3.3 | 1.2 | 34.5 | 104.5 | 31.2 | .. | .. |
| 4 | B | 80 | 3.48 | 1.1 | .. | .. | .. | 20 oral | 1-21 |
| | A | 74 | 2.85 | 1.2 | .. | .. | .. | .. | .. |
| 5 | B | 40 | 1.37 | 1.5 | 19 | 138.7 | 28.9 | 20 oral | 1-10 |
| | A* | 72 | 3.59 | 1.0 | 36.5 | 101.7 | 27.2 | 10 oral | 11-20 |
| | A† | 80 | 3.68 | 1.1 | 36.5 | 99.2 | 30.1 | 10 oral | 22-65 |
| | | | | | | | | 'Anahæmin' 4 c.cm. i.m. Fer. sulph. gr. 6 t.i.d. | 48, 52, 65 38-65 |
| 6 | B | 90 | 3.42 | 1.3 | 41.5 | 121.3 | 29.9 | 20 oral | 1-28 |
| | A | 96 | 4.5 | 1.1 | 43.5 | 96.7 | 30.4 | .. | .. |
| 7 | B | 72 | 2.68 | 1.3 | 32 | 121.3 | 30.9 | 20 oral | 1-26 |
| | A‡ | 96 | 3.52 | 1.4 | 40 | 113.6 | 33.1 | .. | .. |
| | A§ | 100 | 3.75 | 1.3 | 43 | 114.7 | 32.1 | .. | .. |
| 8 | B | 68 | 4.03 | 0.8 | 34.5 | 85.6 | 33.0 | 10 oral | 1-18 |
| | A | 52 | 4.33 | 0.6 | .. | .. | .. | 20 oral Fer. sulph. gr. 3 daily | 19-53 32-53 |
| 9 | B | 56 | 5.23 | 0.5 | .. | .. | .. | 10 oral | 1-12 |
| | A | 52 | 4.38 | 0.6 | .. | .. | .. | 20 oral 10 oral Fer. sulph. gr. 1½ daily | 13-30 31-48 26-48 |
| 10 | B | 75 | 4.1 | 0.9 | .. | .. | .. | 20 oral | 1-20 |
| | A | 81 | 4.4 | 0.9 | .. | .. | .. | .. | .. |

* 29th day of folic acid treatment
 † 65th " " " " "
 ‡ 16th " " " " "
 § 26th " " " " "

Case 10.—A girl, aged 17 years, who had had coeliac disease since the age of 2 years. On admission, in May, 1946, she had well-marked rachitic deformities; her height was 62½ in. and her weight 5 st. 7½ lb. Red-cell count 1,800,000 per c.mm., Hb 30%. The bone-marrow was normoblastic. She was treated with blood-transfusion, proteolysed liver, a low-fat diet, and vitamin supplements, and was discharged from hospital with a red-cell count of 3,650,000 per c.mm., Hb 70%.

She was readmitted to hospital on July 23, 1946, for the purpose of determining the effect of folic acid on the absorption of fat and on the anaemia. The blood-count had been stationary for several weeks before the start of folic-acid therapy. Folic acid was given for 20 days, the daily dose being 20 mg. by mouth. This treatment was ineffective in improving significantly the blood-count or the capacity to absorb fat.

DISCUSSION

Clinical Effects

Table I clearly indicates that folic acid is a reliable therapeutic agent for the alleviation of certain clinical features of the sprue syndrome in adults. Excluding case 2, who was selected for a particular haematological study and whose general condition was satisfactory in other respects, the other adult patients (cases 1, 3, 4, 5, 6, and 7) all showed an excellent clinical response. Diarrhoea was completely controlled within a few days of starting treatment, and the patients all noted a rapid improvement in appetite and sense of well-being.

In contrast to these satisfactory clinical effects in adults are the unsatisfactory results in the patients with coeliac disease (cases 8, 9, and 10). We were particularly disappointed with these findings in view of the excellent results published by Dalton et al. (1946). Their two cases of coeliac disease had a megaloblastic bone-marrow, a finding which is exceptional in coeliac disease and whose significance is discussed below.

Fat-balance Test

Fat-balance tests were carried out before treatment with folic acid in 7 out of the 10 cases recorded in table I. In all cases the test showed a failure of fat-absorption as compared with controls. In 6 cases the test was repeated after treatment with folic acid had been completed. Only in case 3 did treatment improve fat-absorption as assessed by this test. There appeared to be no correlation between improvement or lack of improvement in fat-balance tests and improvement or lack of improvement in the clinical or haematological results of treatment. Thus cases 1 and 5 showed dramatic clinical improvement and cases 5 and 6 showed an excellent initial or terminal haematological response, and yet their percentage absorption of fat was unaltered. Though the diagnostic value of this test is undoubted, its prognostic value is still uncertain.

Haematological Aspects

The published reports show that a macrocytic anaemia is often present in tropical sprue and idiopathic steatorrhoea, whereas in coeliac disease a hypochromic anaemia is more common. Since most of the reports were published before the introduction of sternal puncture as a routine diagnostic procedure, the proportion of patients with genuine megaloblastic blood formation cannot be assessed. There appears, however, to be sufficient evidence to show that when a severe anaemia—i.e., an erythrocyte count below 2,000,000 per c.mm.—is found in adults with the sprue syndrome, not only is the blood picture macrocytic but the bone-marrow is generally megaloblastic. This also appears to be true of some patients with coeliac disease.

During the past year we have investigated 33 adults with the sprue syndrome. The anaemia was usually only moderate (mean red-cell count about 4,000,000 per c.mm.). The blood picture was usually macrocytic, as judged by the stained film, the high colour-index, and the high M.C.V.; and the bone-marrow was normoblastic. The macrocytosis was presumably determined by the

increased numbers of early and intermediate normoblasts present. These patients had received treatment with high-protein low-fat diets, supplemented with liver injections and vitamins, for months or years before we saw them.

The degree of macrocytosis which may be present in the sprue syndrome when the red-cell count is 4,000,000–5,000,000 is an interesting and striking feature which is rarely seen in our experience in cases of classical pernicious anaemia with similar blood-counts who have received adequate liver therapy. We have found the anaemia associated with the sprue syndrome to be particularly resistant to all forms of treatment, including the injection of both purified and crude liver extracts, and the administration of iron and vitamins. Our hope that folic acid might supply the answer to this therapeutic problem does not appear to have been fulfilled, judged by the unsatisfactory haematological responses obtained in 9 out of 10 patients reported in this paper. Accordingly we suggest that, since neither parenteral liver extract nor folic acid may be effective in restoring the blood picture to normal, some other haematinic factor, as yet unidentified, is required. That this factor may be present in liver is suggested by our findings in case 5, in which a rise of 1,000,000 per c.mm. in the red-cell count followed 14 days' treatment with proteolysed liver (hepamino) after the count had been stationary for 37 days on folic acid.

The unsatisfactory haematological responses which we report are in striking contrast to the results obtained by Spies et al. (1946) and by Garcia Lopez et al. (1946) in cases of tropical sprue in Cuba. These workers laid down definite criteria for the selection of patients, one of which was that the marrow should be megaloblastic. Only one of our patients had a classical megaloblastic marrow at the start of folic-acid therapy, and it was in this one case that we obtained the most dramatic initial haematological response. Cases 6 and 7 both had typical megaloblastic marrows when we first saw them several years before the present investigation. The bone-marrow immediately before the start of folic-acid therapy was mainly normoblastic but contained many nucleated red cells intermediate in appearance between megaloblasts and normoblasts. We attributed this appearance to the preceding course of injections of liver extract, which had produced a partial maturation of the megaloblast series without restoring the blood-count to normal. In cases 6 and 7 folic acid completed the transformation to normoblastic blood formation and produced a rise in the blood-count of about 1,000,000 red cells per c.mm.

The Cuban series included only cases with an initial red-cell count of less than 2,500,000 per c.mm., whereas the red-cell count in our series at the start of folic-acid treatment was, with one exception, about the same as that recorded by Garcia Lopez et al. (1946) at the end of folic-acid therapy. The mean red-cell count at the end of treatment with synthetic folic acid in the 18 cases of tropical sprue recorded by Garcia Lopez et al. was 4,073,000 per c.mm.; whereas in a random series of 13 cases of tropical sprue and 20 cases of idiopathic steatorrhoea seen by us the mean red-cell counts after treatment with diet, liver injections, and vitamins, but without the administration of folic acid or proteolysed liver, were 4,162,000 and 3,912,000 per c.mm., respectively. These mean figures are not significantly different from that of the Cuban series ($t = 0.36$, $P = 0.75$; and $t = 0.79$, $P = 0.43$, respectively).

Another point noted by Garcia Lopez et al. (1946) was that their patients had eaten for long periods a diet deficient in essential food factors, particularly first-class protein and the vitamin-B complex, and that infection and infestation of the alimentary tract was commonly present. In contrast, no evidence was obtained that our patients had been taking an unsatisfactory diet before

the onset of the sprue syndrome, and after the diagnosis had been made and before the start of folic-acid therapy they had been given for months or years a high-protein diet with supplements of vitamins.

In other words, the patients in the Cuban series appeared to be suffering from both a direct and a conditioned nutritional deficiency, whereas in our patients the deficiency was solely conditioned by a failure in absorption or utilisation. Accordingly it is doubtful whether the cases of the sprue syndrome reported by Garcia Lopez et al. should not be classified as examples of primary nutritional macrocytic anaemia, and whether dietary deficiency, supplemented by infection or infestation of the alimentary tract, had not led to intestinal changes causing diarrhoea and steatorrhoea. A vicious circle would thus be created leading to superimposition of a conditioned dietary deficiency on a direct dietary deficiency. One of us (R. H. G.) has seen many cases of severe malnutrition and anaemia in Indian troops stationed east of the Brahmaputra river in India and Burma. These men had suffered from many years of malnutrition before joining the Army, and during the jungle fighting, where supply difficulties were extreme, they suffered from diarrhoea, sometimes watery, sometimes fatty; avitaminosis, chiefly of the B complex; and anaemia, which was sometimes normoblastic but was frankly megaloblastic when anaemia was severe.

In idiopathic steatorrhoea and coeliac disease in this country, we suggest that the steatorrhoea is not primarily due to dietary deficiency or infection but results from an abnormality of the bowel, genetic (constitutional) in origin and leading to jejuno-ileal insufficiency and steatorrhoea. In keeping with this hypothesis is our finding of a familial history of steatorrhoea in some of our patients, the most striking example being a family in which five members have the syndrome.

If the abnormality of the intestinal tract is a genetic character, how is it that the syndrome displays itself sometimes in infancy and sometimes not until adult life? It is possible that, associated with the gene(s) primarily responsible for the condition, there are modifying genes and special environmental factors—e.g., infection of the alimentary tract, dietetic indiscretions or deficiencies, climatic variables, and unaccustomed and excessive physical effort—which so influence the action of the principal gene(s) that in some instances the syndrome is expressed in the infant as coeliac disease, whereas in others it appears only in the adult.

That these suggestions are not unreasonable is indicated by a consideration of the closely allied condition, Addisonian pernicious anaemia. It is widely accepted that the primary cause of this disease is an abnormality of the stomach, genetic in origin, leading to achlorhydria and, with advancing years, to a failure in production of intrinsic factor and finally to a megaloblastic anaemia.

If this hypothesis is true, it is not surprising that the results of folic-acid therapy in idiopathic steatorrhoea and coeliac disease in this country may be far less striking than those obtained in patients with the sprue syndrome in whom long-continued pre-existing dietary deficiency and intestinal infection and infestation are significant features.

Though there is good reason to believe that folic acid will give dramatic results in the treatment of megaloblastic anaemia in the sprue syndrome, there is little published evidence to show that folic acid alone will invariably restore the red cells qualitatively and quantitatively to complete normality. In the 18 cases recorded by Garcia Lopez et al. (1946) 15 were given folic acid for periods ranging from 60 to 152 days. Of these only 4 attained a red-cell count of 4,500,000 per c.mm., and none reached a level of 5,000,000 per c.mm.

It may be that, after the marrow has changed from megaloblastic to normoblastic as a result of folic-acid

therapy, some other missing factor is required to enable the erythropoietic mechanism to function normally.

SUMMARY

Folic acid was given to 10 patients with the sprue syndrome. In 9 cases the haematological response was considered unsatisfactory, in that this treatment either produced no significant rise in the red-cell count or failed to restore the blood-level and haematological picture to normal.

Diarrhoea was controlled and clinical improvement resulted in the 7 adults suffering from tropical sprue or idiopathic steatorrhoea. In contrast, no significant benefit was observed in the 3 patients with coeliac disease.

Folic acid did not improve fat-absorption, as estimated by fat-balance tests, in 5 out of 6 cases of the sprue syndrome.

Our results are compared with those of other workers.

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CARE OF THE URINARY TRACT IN PARAPLEGIC PATIENTS

REVIEW OF 82 CASES

HUGH DONOVAN

M.B. Birm., F.R.C.S.

SURGEON TO THE BIRMINGHAM UNITED HOSPITAL

THE experience gained in the treatment of 82 paraplegic soldiers in the Midland Regional Spinal Unit is here reviewed.

Almost all the men arrived with a suprapubic cystostomy of the high type—i.e., a fistula about 5 cm. above the pubis. In two patients this leaked, especially when the man lay on his face. The cause of the relaxed wound was evidently the poor condition of the patient, and possibly there was also a trophic element. Improvement in general health led in all cases to healing of the fistula round the tube and cessation of leakage.

BLADDER DRAINAGE

Since phosphatic incrustations were liable to form on the tube head, we changed the tube at weekly intervals. The Malecôt type was preferred to the de Pezzer, as being easier to withdraw and giving better drainage. We took special care to prevent the tube from playing in and out of the bladder, because this must carry in infection and probably damages the trigonal region. Too small a tube is easily blocked—a serious accident, often leading to ascending pyelitis. Size 28 Charrière was our standard. Some care is needed in reintroducing the tube, and the direction of the track must first be ascertained in each case. On one occasion the tube was pushed into the peritoneal cavity instead of into the bladder; fortunately the disaster was retrieved. We now teach ambulatory patients to care for their suprapubic apparatus and to wash out their bladders. We tried the Millin type of drainage bag, but the slightly greater pressure needed was too much for the paralysed bladder, and we had to go back to the leg bag.

Tidal Drainage

This was begun enthusiastically. Home-made apparatus of various kinds gave way rapidly to the Wells's type; and when, after some months, we received about

a dozen of these, mounted on stands, we hoped that our difficulties were on the way to solution. But eventually we decided, not only that the urines were more cloudy, but also that pyrexial attacks were probably commoner with all methods of bladder drainage other than the direct simple one of leading the suprapubic tube into a bedside bottle. With regret, and after extensive trial, we gave up a double-channelled suprapubic tube which allowed continuous-drip irrigation of the bladder, because the exit channel was apt to become blocked.

While tidal drainage or continuous irrigation was the routine we tried many different lotions. The naked-eye appearance of the effluent mixture of urine and lotion seemed to be a reasonable guide to their effect. After trying proflavine (in various dilutions), potassium permanganate, 'Surfen,' and "solution G," we preferred the last; but more recently, for routine bladder lavage four times a day, we have been using 1 in 5000 neutral proflavine.

URINARY ANTISEPTICS.

The flora of the drained bladder seems singularly constant. Again and again the laboratory report was *Bact. coli*, *Strep. faecalis*, *B. proteus*, and *Ps. pyocyanea*.

We have taken reports on the urine of 19 patients at Barnsley Hall and 4 in the Queen Elizabeth Hospital for review. At Barnsley Hall *B. proteus* was reported present 34 times, *Ps. pyocyanea* 58 times, *Bact. coli* 137 times, non-haemolytic streptococci 71 times, and other organisms twice. At the Queen Elizabeth Hospital *Bact. coli* was reported 19 times, *Ps. pyocyanea* 9 times, *B. proteus* 5 times, enterococci 4 times, staphylococci 4 times, non-haemolytic streptococci 6 times, and various other organisms, such as monilia and diphtheroids, occasionally. Again it was usual for three or four organisms to be present together; and when the four common organisms were entrenched in the bladder they seemed rarely to disappear; occasionally one or other would not be reported for a few tests, but would reappear later.

It is noteworthy that some organisms do not flourish, and that the flora remains so constant and restricted.

Some ureters were catheterised, and there are records of 7 cases: *Bact. coli* was present alone in 5, in 6 it was present with other organisms; and the 7th was sterile. This finding supports the known invasive property of this organism in the urinary tract. *Strep. faecalis* is probably not highly pathogenic, and perhaps the same can be said of *Ps. pyocyanea*.

We began with the administration of a sulphonamide in small doses (0.5 g. t.d.s.), and were disappointed to find pyrexial attacks extremely frequent. As emerged later, the organisms, including the varieties of *Bact. coli*, were insensitive to sulphonamides when tested in the laboratory. Since we suspected that the small doses used routinely would allow an insensitive strain to survive, we made a practice of changing to another sulphonamide if a pyrexial attack developed; but even so, the results were disappointing. Mandelic acid also proved unsatisfactory; it did not seem to control pyrexial attacks, and it tended to upset the stomach. The soil matters more than the seed, and, in the treatment of the spinal patient, fresh air, blood-transfusions, and tasty food are of supreme importance.

Finally, we formed the following opinions:

- (1) Penicillin was by far the most successful substance for ending a pyrexial attack.
- (2) Ammonium chloride, grains 15 four times a day in capsules, was the best routine urinary antiseptic, the pH of the urine being repeatedly checked and kept in the region of 5.
- (3) For unexplained pyrexia lasting more than three or four days it was well to carry out pyelography, or else cystoscopy, with an injection of indigo-carmin, so that an obstructed upper urinary tract could be excluded. Where excretion of indigo-carmin was delayed, or there was evidence of dilatation of the ureter in the intravenous pyelogram, we inserted an indwelling catheter into the affected ureter, unless a stone shadow was revealed, in which case we undertook ureterolithotomy.

PYREXIAL ATTACKS

Bouts of pyrexia were common, especially in the earlier months. The first problem was diagnosis, for bedsores were almost constant, and sometimes there were other wounds or incidental diseases, such as diphtheria, infective jaundice, or pulmonary tuberculosis. Often in the absence of clear evidence it was necessary to presume the presence of pyelonephritis.

The urine from the bladder was always infected yet sometimes almost clear to the naked eye. The kidneys were rarely, if ever, tender unless obstructed or the site of gross cortical or perinephric abscess. Indeed, since surgical intervention was not indicated except for these complications, we came to regard the absence of spontaneous pain and of tenderness as a strong reason for persisting in medical treatment. This last conclusion was not reached at first, because a patient injured above the level of the D10 might be expected to have an insensitive kidney and perhaps an insensitive kidney bed. It is usually held that the sensory innervation of the kidney is from D10-D12. One patient (sensory level D6) complained of deep-seated pain below the right costal margin, and on investigation nothing abnormal was found except dilatation of the right kidney pelvis and ureter. In this kidney stone was detected some months later. In another patient (sensory level D10) the left kidney became tender when a perinephric abscess formed.

In spite of these two clinical observations we did not rely solely on the abovementioned rule but also sought to exclude an obstructed infected kidney by either excretory urography or cystoscopy with injection of indigo-carmin. We did not often find that a presumed pyelonephritis led to delay in the excretion of indigo-carmin; nor did we find, as some writers have maintained, that in such cases the ureter was always dilated. We usually made one or other of these investigations if pyrexial attacks did not respond to medical treatment.

CLOSURE OF THE BLADDER

Writers on the care of the bladder in the paralysed patient, at any rate immediately before the 1914-18 war, did not sufficiently emphasise how easy and desirable it is to close the bladder in the paraplegic patient. The sensation he has when the bladder is full may not be the normal sense of bladder distension—it may be only a tight feeling in the lower abdomen—but it may be sufficient to warn him that micturition is imminent. It evidently ascends in the sympathetic cord, and these afferent impressions are said to enter the cord as high as D6. One patient, injured in the region of D3, whose cord is grossly damaged, nevertheless has sufficient warning of impending micturition to be able to catch his urine in a vessel and to keep dry. Thus a patient with an intact micturition centre in the cord can often develop satisfactory automatic micturition with sufficient warning to enable him, in suitable circumstances, to dispense with an incontinence apparatus. The result of closure is that the urine becomes much cleaner to the naked eye, and its flora usually becomes simplified, indeed in many cases only a single organism persisting—e.g., *Bact. coli* or (as in one of our cases) *Ps. pyocyanea*. It may be possible to eradicate infection completely, but in the single case in which this was achieved in an automatic bladder, relapse followed. Once the bladder has been satisfactorily closed, pyrexial attacks may cease, and the man's morale is greatly improved; in fact, this type of automatic micturition should be established whenever possible. On the other hand, if a patient is completely bedridden—for example, as a result of a low cervical lesion—he may be easier to nurse with a suprapubic tube, especially if he has no bladder sensation. In women, too, it may be better to retain the suprapubic tube, though my experience of such cases is not very great. There does not seem,

however, to be the same urgency to drain the paraplegic female suprapubically; the short urethra is not liable to slough, and she is spared the danger of epididymitis. Cystoscopy of one or two such cases after several weeks' drainage did not reveal any untoward changes at the bladder-neck or the trigone.

When deciding whether the patient can achieve automatic micturition we have found the following signs helpful:

- (1) Does he pass urine during bladder lavage or when the suprapubic tube is temporarily obstructed?
- (2) Does he pass urine and empty the bladder during cystometrograms studies at any reasonably low pressure?
- (3) Do the muscles in the legs respond to faradism? (At one point we tried to study the faradic response of the bulbocavernosus muscle, but it is a difficult and unsatisfactory muscle to stimulate electrically, and so we have been content to assess the faradic response of the muscles of the legs and feet.)

An unexplained and unexpected finding has been that in some patients wounded comparatively high—e.g., D6—whose leg reflexes have been absent from the beginning, there is no faradic response in the lower limbs. Probably in no case of this type have we succeeded in establishing automatic micturition; and, since voluntary control of the abdominal muscles has gone, it is clearly impossible to empty the bladder by straining.

In the patient whose cauda equina is injured, we have, as Watkins (1936) pointed out, an entirely different problem. Some of these patients can keep fairly dry and empty or partly empty the bladder by regular voluntary straining; no doubt residual urine is often or always present. In such cases we have found that considerable leakage of urine is likely, and that in every case the ureters are somewhat dilated. This is bound to harm the patient, and in one case was associated with deterioration of health and with pyrexia; hence we have thought it wise to defer closure of the bladder during the first two years of the man's paralysis, lest any recovery in the nervous system might be hindered by this depression of his vitality. Some patients have come under our care whose bladders have already been closed, or have never been drained, and it was in these that a dilated upper urinary tract was constantly found.

One patient with a cauda-equina injury (L5) raised special problems.

He came under our care because he appeared to suffer intense pain from his suprapubic tube, especially when he bent to a sitting position. His bladder was so much contracted that, when we tried to obtain a cystometrogram, the radio-opaque medium ran straight up his ureters after only a few cubic centimetres had been introduced into his bladder. Adequate cystoscopic study of the bladder was almost impossible.

It seemed likely that at some stage he had had severe infection, with sloughing of the bladder. After discussion with him we decided to attempt to punch away the region of his external sphincter, so that he would drain constantly through his penis into an apparatus. This was done, and the low pressure afterwards required to run lotion from the urethra into the bladder proved that the obstruction was removed. His bladder was then closed, and remained closed for three months; but unfortunately the obstruction at the urethra seemed to return, he became pyrexial, his previously dilated ureters dilated still further, and eventually his suprapubic wound burst open again.

This case is related because, though the treatment failed, its underlying plan may be correct: with a cauda-equina bladder the proper course may be to remove permanently the obstruction to urination in the region of the triangular ligament, and to allow the penis to drain into a urinal. Later it may be possible to restore some type of voluntary control by one of the well-known methods (using the gracilis muscle or a fascial sling from the rectus muscle). We hope to be able to explore this method further.

Watkins (1936) has suggested that the obstruction in these cases is due to some natural elasticity of the triangular ligament. Certainly it is unlikely to be due to innate tone in the external sphincter, for this has a somatic supply akin to that supplying the external sphincter ani, which in these cases is relaxed and patulous. Nor is the obstruction valvular, for the same pressure (60–90 cm. of water) is needed to force it from whichever direction the attempt is made—from the bladder via the suprapubic tube or down the urethra. Finally, there is no reason to suppose that any elastic or fibrous tissue presses on the urethra at this spot. The problem remains unsolved, but it is hard to escape the conclusion that there is considerable tone in the external urethral sphincter.

STONE FORMATION

Stones formed in 24 patients. In 6 of these the calculus was vesical; in 2, calculi of bladder and upper urinary tract were present together; in 14, stones formed in the upper urinary tract alone.

We recognised from the beginning the importance of preventing stone formation, and the renal tract was always radiographed every two months. Instructions about fluid intake became more explicit as time went on, and soon an intake-and-output chart was kept for all patients. They co-operated well, and the average output is now about 130 oz. per man per day. An extra ration of tea was provided, and beer, too, helped. The position of patients was changed frequently. Lying prone for long periods, in the treatment of sacral bedsores, did not seem to predispose to stone formation.

We tried in all patients to secure a urine of pH 5–5.5. For this purpose ammonium chloride gr. 15 was given in a capsule or chocolate-coated tablet four times a day, and in addition in most cases a high-acid-ash diet was ordered. As a rule the suprapubic tube was changed weekly because it quickly becomes encrusted—often after even this short period. A straight suprapubic tube seems less likely to become encrusted than a self-retaining one.

In one case vesical calculi formed in spite of tidal drainage with solution G, and in several cases they did not dissolve when the solution was used for six weeks. Only in one case, in fact, did it cause stones to dissolve, and these were small—1–2 cm. in diameter. Of the others, the stone was crushed in 5, evacuated through a cannula in 1, and was left alone in 1; this last patient died of renal sepsis and had calculi in both kidneys. Stones have not recurred in any of our cases after litholapaxy.

Vesical calculi are becoming rarer: presumably the routine care given is proving effective. Two cases which came under our care recently were on tidal drainage for many months up to the crushing of the stone, and this may have actually helped the formation of the calculi, which are presumably less likely to develop in the constantly empty bladder. No special flora seems to be associated with the formation of stone.

The stones were easy to crush, and the suprapubic fistula was not inconvenient, for the expanded end of the self-retaining catheter readily occluded the sinus and allowed the bladder to be distended. The only complication was a long pyrexial attack in one patient, in whom the intravenous pyelogram after the litholapaxy showed widely dilated ureters and kidney pelvis; in a few months these contracted to normal. It seemed probable that the vigorous compression of the evacuator dilated the ureters, and in later cases the bulb was compressed very slowly and gently.

Renal and Ureteric Calculi

In 16 cases renal or ureteric calculi were found. In 7, renal calculi developed while the patients were under our care, but in the last year we have found renal calculi in only 3 patients. In 1 of these the stone may have been present before admission; in another it formed while the patient was undergoing orthopaedic treatment in another ward.

There is no apparent connexion between stone formation and the level of the paralysis. A stone developed in

one patient who had sterile urine and normal micturition. This man had a single kidney, as had 4 other patients of the unit. Recumbency is probably a major factor in causing stones, but the incidence of stone among paraplegics is higher than among patients recumbent for, say, fracture of the femur. An infected urinary tract is presumably an important accessory cause. Stones can form rapidly, in a matter of weeks, and are of several kinds.

One type, perhaps less common than others, forms a cast of the calices and pelvis; probably such stones are soft and pultaceous, and relatively easy to dissolve; they may disappear when the patient gets up. In 2 of our cases stones of this kind disappeared with acid therapy. Multiple discrete rounded or faceted stones seem to be less responsive to solvents.

If a stone lodges in the ureter, operation is generally needed; but in one case a stone was broken and extracted at cystoscopy by means of a Councill stone extractor. This patient micturated normally, and his urine was not infected. Operation on the kidney for stone has only been undertaken twice, both patients being severely ill from renal infection. Possibly we have been too conservative in the treatment of renal calculi, but we have tended to treat these patients conservatively in every way. In one case solution G, run into the renal pelvis for several weeks, caused the disappearance of two small residual calculi, but calculi formed again after removal of the tube.

CYSTOSCOPIC EXAMINATION

Sensation in the anterior urethra has been demonstrated with lesions below and including the level of L5, but this needs further confirmation. Certainly a patient with a cauda-equina lesion causing bladder paralysis may still require a local anaesthetic because of pain sensation in the penile urethra. The posterior urethra has been found sensitive in patients with lesions as high as L1 at least. The state of the internal urethral orifice bears no relation to the site of the lesion; it is generally closed, unless the suprapubic tube has been allowed to become blocked. Much basal oedema is common, and the ureters are often difficult to find, but patient search is usually rewarded eventually, even if intravenously injected indigo-carmin fails to appear. It seems likely that swelling and oedema can result from the suprapubic tube playing in and out of the bladder and pressing on the bladder base; so we take particular care to prevent this play and to keep the expanded head up against the anterior wall of the bladder. In default of good arm veins we found injection of indigo-carmin into the corpora cavernosa an excellent way of getting the dye into the circulation. Excretion seems equally rapid.

CYSTOMETROGRAMS

Though scores of cystometrograms were made, they were not of any great practical value. They record some interesting facts about the bladder, but they do little to show the site of the lesion, or the degree of functional recovery. A recovered bladder or an automatic bladder may empty itself at a physiological pressure when filled during the test, but usually the patient has already emptied his bladder during lavage or when sitting up with the suprapubic tube clamped, thereby forestalling cystometrographic study of his progress. For studying bladder sensation at known pressures, and as a method of observing any tendency to contracture of the bladder at known pressures, the cystometrogram has some value. It may, however, mislead, for we have seen cases in which a bladder may be closed and normal micturition result, though the cystometrogram, done a few days before, showed no micturition with a pressure of 60 cm. of water. No doubt the act of micturition results from a slowly developing increase of bladder pressure, and not from a sudden one. In normal people the desire to

micturate is not felt during physical effort, though this may suddenly increase the pressure in a bladder which is partly filled.

EXCRETORY UROGRAPHY

The first problem has been to decide what effect the nervous injury might have on the upper urinary tract. Smith and Strasberg (1943) stated that affections of the spinal cord did not alter the pyelographic appearance of this part of the tract. Harris (1935) indicated that renal sympathectomy also left the pyelograms unchanged. Underwood (1939) established that sympathectomy probably increased the tone of the renal pelvis.

Our paraplegic patients, however, had the vagal supply to the kidney intact; and it is difficult to say to what extent sympathetic control is altered, wherever the lesion in the spinal cord may be. A study of excretory urograms suggests that in clinically complete lesions, both of the cord and of the cauda equina at various levels, there is no recognisable change in the pictures so long as the bladder is drained. Study of a great number of pyelograms raises a suspicion that the tone of the pelvis is increased, but this cannot be regarded as certain. This is not to say that we did not find dilatation of the upper urinary tract in many cases, which have been grouped as follows:

- (1) Dilatation from stone in the ureter.
- (2) Dilatation from obstruction of the suprapubic tube, probably in some cases of only a few hours' duration.
- (3) Dilatation after litholapaxy.
- (4) Dilatation after closure of the bladder in patients with cauda-equina lesions.
- (5) A group of unexplained cases of moderate dilatation of ureter.

Study of excretory urograms seems to show that dilatation of the upper urinary tract is much more likely to develop in patients with cauda-equina lesions than in those with lesions in the spinal cord. At first sight this might seem to be due to the fact that a spinal-cord lesion will produce an automatic bladder which will empty itself, and therefore not develop high intravesical pressure; but, as already noted, this deduction is not entirely correct. It can probably be taken that in a patient with a cauda-equina lesion the ureters dilate extremely readily—e.g., after a few hours' retention. This dilatation appears to subside completely after further drainage.

SEXUAL FUNCTION

This has not been investigated. It might be possible for a wife to be impregnated by a paralysed husband whose lower spinal centres were active, even if he were completely paralysed in the mid-dorsal region. The possibility of artificial insemination from the husband should also be borne in mind; for it might bring great consolation and enrich the nation with the offspring of gallant men.

SUMMARY

This review of the care of the urinary tract in the paraplegic patient supports early suprapubic drainage of the bladder, but condemns tidal drainage.

An acid and fluid régime for the prevention of calculi is outlined, and two-monthly X-ray examination of the renal tract for stone is advised.

The importance of closure of the bladder is emphasised, and guiding principles are suggested.

Radiology of the urinary tract, urinary infection, cystometrograms, and some physiological phenomena are discussed.

I wish to record my admiration for the devoted nursing given to these patients under the care of Sisters Tolbee, Truesdale, and Whitehead.

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BILATERAL CONGENITAL DISLOCATION OF RADIAL HEAD

R. K. MAGEE

M.D. Toronto, F.R.C.S., F.R.C.S.C.

MAJOR R.C.A.M.C.

BECAUSE of its rarity and possible medicolegal significance the following case seems worth recording.

A man, aged 27, was admitted to hospital twenty-four hours after sustaining an injury to his left elbow by being thrown from a motor-cycle.

On examination there was swelling of the left elbow, with tenderness over the outer condyle. Flexion was limited to 90°, and extension was 15° less than normal. Pronation and supination were painful and limited to half the normal range.

Radiography revealed a dislocation of the head of the radius, without any fracture of the ulna or other bone (see figure). The head of the radius could be felt prominently under the swelling, and on supination and pronation it seemed not only to rotate on its long axis but also to move through a small arc round the ulna, and it could not be reduced. There was no shortening or other abnormality of the ulna.

Close questioning revealed that the patient had always had some limitation in flexion of both elbows, being unable to



Lateral radiogram of left elbow, showing congenital dislocation of head of radius.

bring the finger-tips closer than 3 in. away from the shoulders. He had had slight pain in the elbows that had been diagnosed as arthritis. Radiography of the right elbow showed a condition similar to that of the left elbow—namely, a deformity of the head of the radius, which is rounded and has lost its cup-shaped articular surface. The head is bent forward and displaced forward, and the normal radial articular facet of the ulna is absent.

The radiogram shows this case to be one of bilateral congenital dislocation, which is rare. In some reported cases it had been of medicolegal importance to establish that the dislocation was congenital and not traumatic.

Watson Jones¹ states: "Traumatic dislocation of the head of the radius unaccompanied by other injuries is practically unknown. It is almost invariably associated with a fracture of the upper shaft of the ulna."

This patient will recover his former range of movement and will require no specific surgery, unless arthritis justifies excision of the head.

I am grateful to Major R. M. Hall, R.C.A.M.C., for the radiogram.

1. Jones, R. W. Fractures and Other Bone and Joint Injuries, 1941, Baltimore, vol. II, p. 506.

TOXIC EFFECTS OF THIOUREA, THIOURACIL, METHYL THIOURACIL, AND AMINOTHIAZOLE IN THYROTOXICOSIS

MARGARET E. MORGANS

M.B. Lond., M.R.C.P.

ASSISTANT, MEDICAL UNIT, UNIVERSITY COLLEGE HOSPITAL, LONDON

SINCE Astwood (1943) first described the treatment of thyrotoxicosis with thiourea, abundant evidence has accumulated to show that the disease can be controlled by this and allied drugs (Cookson 1945, Himsworth 1943, 1944, Joll 1944, Nussey 1944, 1946). If these drugs had no toxic effects, their administration would probably be generally accepted as the treatment of choice. However, no preparation has yet been found which controls thyrotoxicosis and is entirely devoid of toxicity. It therefore seems desirable to assess the relative toxicity of the various preparations now available.

Agranulocytosis is the most serious and for practical purposes the only fatal toxic effect of the thiourea group of drugs. In the U.S.A., Moore (1946) found agranulocytosis in 19 (1.8%) out of 1091 cases, and Van Winkle et al. (1946) in 142 (2.5%) out of 5745 cases. The fatality-rates from agranulocytosis in the two series were 0.5% and 0.4%. All clinicians agree that a leucopenia may develop and that these drugs depress the level of granular cells of the blood. However, Perrault and Bovet (1946) and Bastenie and Tagnon (1946) claim that a related compound, aminothiazole, does not depress the level of these cells.

Other complications described include drug fever, rashes, petechiae, glandular and splenic enlargement, joint effusions, and conjunctivitis (Cookson 1945, Eaton 1945, Himsworth 1943, 1944, Joll 1944, Newcomb and Deane 1944, Nussey 1944, St. Johnson 1944).

Pericarditis and heart-block were reported by Bain (1945); jaundice by Sloan and Sloan (1944), Kahn and Stock (1944), Paschkis (1944), and Gargill and Lesses (1945); and lesions resembling periarteritis nodosa by Gibson and Quinlan (1945).

Nausea, vomiting, and halitosis were observed by most writers in the early stages of treatment with thiourea. Swollen submaxillary glands were reported by Gargill and Lesses (1945) and by Williams and Clute (1944), and enlargement of the thyroid gland by Himsworth (1943) and Donald and Dunlop (1945).

In the investigation reported here the preparations tested and the number of cases in which each was used were as follows:

| Preparation | Chemical Composition | No. of cases treated |
|-------------------|---|----------------------|
| Thiourea | $\begin{array}{c} \text{NH}_2 \\ \\ \text{S}=\text{C} \\ \\ \text{NH}_2 \end{array}$ | 7 |
| Thiouracil | $\begin{array}{c} \text{NH-CO} \\ / \quad \backslash \\ \text{S}=\text{C} \quad \text{CH} \\ \backslash \quad / \\ \text{NH-CH} \end{array}$ | 49 |
| Methyl thiouracil | $\begin{array}{c} \text{NH-CO} \\ / \quad \backslash \\ \text{S}=\text{C} \quad \text{CH} \\ \backslash \quad / \\ \text{NH-C} \quad \text{CH}_3 \end{array}$ | 23 |
| Aminothiazole | $\begin{array}{c} \text{S-OH} \\ // \\ \text{NH}_2-\text{C} \\ \backslash \\ \text{N-OH} \end{array}$ | 13 |

During the first three weeks, thiourea was given in the dosage of 3 g. daily as three doses of 1 g. The first

TABLE I—EFFECT OF FOUR THIOUREA DRUGS ON GRANULAR CELLS DURING THE FIRST THREE WEEKS OF TREATMENT

| Drug | Thiourea | Thiouracil | | Methyl thiouracil | Aminothiazole |
|--|----------|--------------|--------------|-------------------|---------------|
| | | 1.0 g. daily | 0.6 g. daily | | |
| No. of cases | 7 | 29 | 20 | 23 | 13 |
| Average initial level of granular cells per c.mm. | 4700 | 4400 | 4400 | 4400 | 3300 |
| Average change of level of granular cells per c.mm. from initial levels: | | | | | |
| End of first week | .. | -370 | -970 | -1000 | +230 |
| End of second week | .. | -250 | -850 | +180 | +300 |
| End of third week | -560 | -40 | -340 | +50 | +100 |
| Proportion of cases showing depression of absolute granular-cell count of 1000 per c.mm. from initial levels | 14% | 31% | 30% | 39% | 38% |

29 patients treated with thiouracil were given 1 g. daily in five divided doses. The remaining 26 patients on thiouracil, those on methyl thiouracil, and those on aminothiazole received 0.6 g. daily in three divided doses. In these doses all the drugs appeared equally effective in the control of the thyrotoxicosis. Maintenance dosage varied according to the requirements of the patient, and with thiouracil, methyl thiouracil, and aminothiazole was usually 50–100 mg. daily. With thiourea the usual maintenance dose was 1 g. daily or twice daily.

INCIDENCE OF TOXIC EFFECTS

The assessment of the relative toxicity of the four drugs was made in the first eight weeks of treatment, because after that time toxic manifestations are so rare that insufficient were available for comparison.

Agranulocytosis may be arbitrarily defined as a fall in the granular-cell count to below 500 per c.mm., with or without infection. No case was seen while under treatment with any of these drugs during the first three weeks of heavy dosage, but 2 fatal cases were seen later.

Case 1.—A woman had received 65.2 g. of thiouracil in fifty-three days. This abnormally large dosage was used because the patient had had previous iodine treatment and appeared resistant to thiouracil.

Agranulocytosis developed on the fifty-third day after starting treatment with thiouracil and when the patient had been taking 0.6 g. daily for the previous sixteen days. No other drugs had been taken.

About fourteen days before thiouracil was stopped the patient had a furuncle in his nose, and a week later developed a whitlow. Terminally he had bronchopneumonia and a lung abscess.

The total white-cell count was 1500 per c.mm., with no granular cells. Marrow puncture showed that the *agranulocytosis* was of the non-maturation type. A blood-count before the patient left hospital showed no greater depression of granular cells than appears usual during treatment with the thiouracil group of drugs.

Case 2.—A woman reported to her private doctor with pneumonia and *agranulocytosis*, having taken 23.8 g. of thiouracil in thirty-six days (initial treatment was 1 g. daily for three weeks, and subsequently 0.2 g. daily). No details of marrow findings were available, but no granular cells were seen in a blood smear.

Both these cases of *agranulocytosis* occurred while the larger doses of thiouracil were being used, but with subsequent dosage no case has been encountered. This gives an incidence of 2.1% for the whole series, which agrees with the findings of Van Winkle et al. (1946). Both of our patients, however, died, so the fatality-

rate was also 2.1%, whereas the fatality-rate from *agranulocytosis* in the corresponding American series was only 0.4%.

Leucopenia (granular cells less than 1500 per c.mm.) was seen in only 4 cases during the first eight weeks. Of these, 3 were treated with thiouracil, 2 with 1 g. daily, and the other with 0.6 g. daily, and the fourth with methyl thiouracil. Severe *leucopenia* was not seen under treatment with thiourea or aminothiazole. A depression of the level of granular cells by 1000 or more per c.mm. was seen in many cases with all these drugs during the first three weeks. This period may be taken for comparison of this effect, since dosage in the four groups was comparable during this time. Excluding the thiourea group, where the number of cases is very small, the remaining three drugs depressed the granular cells with equal frequency.

Table I shows the effect of the different drugs on the average granular-cell count during the first three weeks of treatment. The greatest fall appeared at the end of the first week, with a gradual improvement towards the end of three weeks. This fall was greatest in the methyl thiouracil series. Perrault and Bovet (1946) and Bastenie and Tagnon (1946) claim that aminothiazole has no depressant effect on the granular cells. If the average figure in our 13 cases is considered alone there was no fall; but in two of them the granular-cell count was halved during the first three weeks, and in 38% of them the absolute granular-cell count was lowered more than 1000 per c.mm. from initial levels. In view of these findings and the relatively small number of cases in the series of Perrault and Bovet (1946) and Bastenie and Tagnon (1946) we feel that aminothiazole cannot be said to have no depressant effect on the granular cells. It has further serious drawbacks to its use which will be described below.

The incidence of other complications is shown in table II.

Drug fever, developing usually about the tenth day, was most common in cases treated with thiourea. The next highest incidence was among those treated with aminothiazole, and the lowest in those treated with thiouracil and methyl thiouracil.

Rashes, which included urticarial, erythematous, and maculopapular types, were seen most often with aminothiazole and were usually accompanied by fever. They

TABLE II—TOXIC EFFECTS OF FOUR THIOUREA DRUGS DURING FIRST TWO MONTHS OF TREATMENT

| Drug | Total cases treated | Agranulocytosis | Leucopenia* | Fever | Rash | Petechiae | Enlarged glands | Enlarged spleen | Joint effusions | Pericarditis | Thyroid gland enlargement | Nausea | Haltosis | Salt taste | Myalgia | Jaundice | Conjunctivitis |
|---|---------------------|-----------------|-------------|-------|------|-----------|-----------------|-----------------|-----------------|--------------|---------------------------|--------|----------|------------|---------|----------|----------------|
| Thiourea 3.0 g. daily | 7 | 0 | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 7 | 6 | 0 | 0 | 0 | 0 | 4 |
| Thiouracil 1.0 g. daily | 29 | 2 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0.6 g. daily | 20 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Methyl thiouracil 0.6 g. daily | 23 | 0 | 1 | 2 | 0 | 0 | 3 | 0 | 1 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Aminothiazole 0.6 g. daily | 13 | 0 | 0 | 6 | 5 | 0 | 1 | 0 | 0 | 0 | 0 | 3 | 3 | 1 | 3 | 2 | 0 |

* Leucopenia—granular cells below 1500 per c.mm.

were less common with thiourea, and none was seen with thiouracil or methyl thiouracil.

Petechiae, without thrombocytopenia, were seen only during treatment with thiouracil and not with any other drug.

Enlarged lymph-glands were most common with aminothiazole, less common with methyl thiouracil, and never seen with thiourea or thiouracil.

Preliminary Communication

USE OF A TOURNIQUET TO PROLONG THE EFFECT OF PENICILLIN

Splenic enlargement was not observed. *Joint effusions and pericarditis* were noted in 1 case treated with methyl thiouracil about the forty-second day of treatment, when the dose was still 0.6 g. daily.

Heart-block was not observed. *Toxic jaundice* was seen only with aminothiazole. It developed in 2 patients, 1 of whom was gravely ill.

Conjunctivitis was seen with thiourea only. *Nausea and vomiting* occurred in all cases treated with thiourea and in some treated with aminothiazole, but not with either of the other two drugs.

Halitosis was noted most often in patients receiving thiourea and occasionally in those receiving aminothiazole. It was not noted with thiouracil or methyl thiouracil. One patient taking aminothiazole noticed a salt taste in the mouth.

Enlargement of the thyroid gland was seen in one patient treated with thiourea, and in one treated with methyl thiouracil. Both of them showed signs of overdosage.

COMMENTS

Thiourea is to be avoided in the treatment of thyrotoxicosis in view of the high incidence of unpleasant side-effects and because it definitely depresses the level of granular cells in the blood. Though Continental workers have claimed that aminothiazole does not produce granulopenia, our results show that it may depress the granular cells. Because 2 cases of jaundice were seen among 13 patients treated, 1 being extremely ill, the use of aminothiazole was given up in this clinic. Methyl thiouracil and thiouracil both produce some depression of the white cells and in some cases leucopenia, but the incidence of other toxic effects is very low. Of the preparations now available they appear to be the drugs of choice in the treatment of the disease. Table II shows that there is no difference in the incidence of the toxic effects of these two drugs.

During the preparation of this paper supplies of propyl thiouracil have been received. Astwood and van der Laan (1945) found no toxic effects in a series of 37 cases treated with this drug. Our own experience is as yet insufficient to compare its toxicity with the other four drugs.

SUMMARY

The toxic effects of thiourea, thiouracil, methyl thiouracil, and aminothiazole during the initial phases of treatment of thyrotoxicosis are compared.

Thiourea and aminothiazole have many toxic effects and both depress the granular cells of the blood. Their use in clinical practice is no longer justifiable.

Thiouracil and methyl thiouracil are more satisfactory. Both depress the granular cells of the blood and in a few cases to a serious degree. During their use the incidence of other complications is much lower than with the other two drugs. Provided the patients so treated are carefully watched, both drugs can be used with a reasonable degree of safety.

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In the search for a device to slow down the rate of absorption of penicillin into the circulation we have studied a simple method, which gives results very similar to those obtained by the oil-beeswax preparations. This is achieved by injecting penicillin subcutaneously in an area (thighs or arms) where the venous and lymphatic circulation can be delayed by exerting a light pressure with a rubber tourniquet. This pressure must not be sufficient to induce any unpleasant sensations in the limb.

The penicillin concentration in the blood-serum was estimated by the capillary-tube method of Fleming, using streptococci, and by another method devised in St. Mary's Hospital with phenol red as indicator of growth of staphylococci. Both methods have given regular and reasonably comparable results.

The curves (figs. 1-4) show the amount of penicillin in the blood-serum (average of the results obtained with

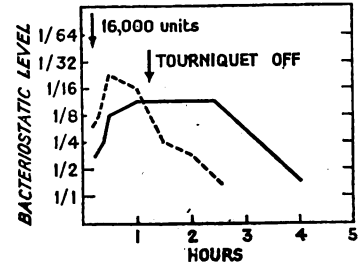


Fig. 1—Bacteriostatic levels of serum after injection of 16,000 units of penicillin with tourniquet applied (continuous line) and without tourniquet (dotted line). The curves represent the average of the results obtained with streptococci and with staphylococci as test organisms.

both methods) after subcutaneous administration. In each chart the broken line represents an experiment performed next day with the same dose in the same patient but without the tourniquet.

From these curves it appears that our method would be useful in reducing the number of injections needed

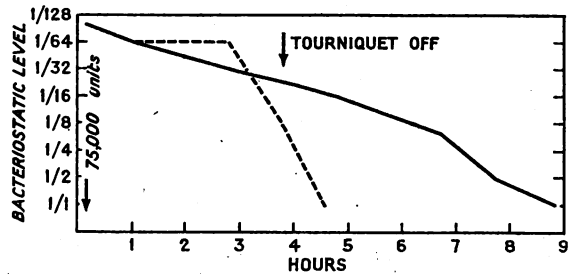


Fig. 2—As in fig. 1, but with 75,000 units of penicillin.

both methods) after subcutaneous administration. In each chart the broken line represents an experiment performed next day with the same dose in the same patient but without the tourniquet.

From these curves it appears that our method would be useful in reducing the number of injections needed

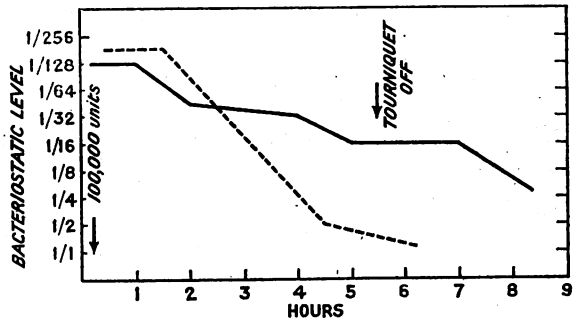


Fig. 3—As in fig. 1, but with 100,000 units of penicillin.

to maintain a constant level in the blood without increasing the daily dosage of penicillin. Fig. 4 shows that the tourniquet should not be kept on too long, to avoid a double rise of penicillin concentration, which is probably

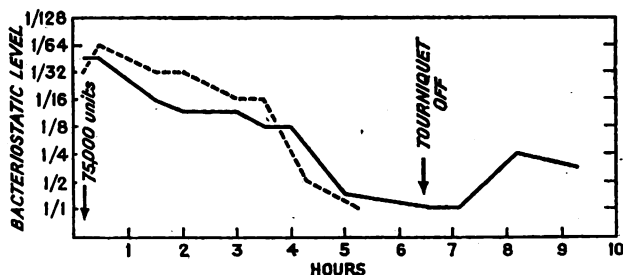


Fig. 4.—As in fig. 2, but tourniquet was taken off late, causing a double rise of penicillin concentration.

less efficient than a constant level. In our experiments the time for which the tourniquet was applied varied from an hour for injections of 10,000 units to five hours for injections of 100,000 units; it must be progressively lengthened for higher doses.

With this method of administration the number of injections can be reduced to three of 75,000 units in 24 hours or five of 100,000 units in 48 hours without letting the penicillin concentration fall below the lowest effective level. An effective concentration of penicillin during 24 hours is also to be expected after a single injection of 600,000–800,000 units.

E. CARLINFANTI, M.D.
docent microbiology and hygiene,
University of Milan.

Centre for Studies on Antibiotics, F. MORRA, M.D.
Naples.

Reviews of Books

Modern Attitudes in Psychiatry

March of Medicine 1945, no. x of the New York Academy of Medicine lectures to the laity. By IAGO GALDSTON, M.D.; JAMES H. WALL, M.D.; G. CANBY ROBINSON, M.D.; FRANZ ALEXANDER, M.D.; Colonel WILLIAM C. MENNINGER; EDWARD WEISS, M.D. New York: Columbia University Press. London: Oxford University Press. Pp. 150. 13s. 6d.

THESE "lectures to the laity" of the New York Academy of Medicine are all worth reading. Colonel Menninger tells concisely how the American Army organised its psychiatric service during the war; and if Dr. Robinson and Dr. Weiss write for laymen rather more pointedly than the others, they still have much to say that will be unfamiliar to many medical readers. The outstanding essay, however, is Dr. Alexander's on present trends and future outlook, a rewarding study for those who like definition to precede discussion. He is concerned with the "history of scientific thought" in psychiatry, and traces the progress of its "etiological orientation." Scientific psychiatry began, he says, when mental changes were correlated with neuropathological conditions, and it was possible to adopt the hypothesis that some neuropathology would be found in all psychiatric conditions. This was first put forward somewhere in the eighteenth century and was in its heyday in the first decade of the twentieth. In the meantime, Freud had introduced his new and revolutionary idea that psychological disturbances had psychological antecedents. This paved the way for the stage which psychiatry is now reaching—the anthropological:

"This cultural point of view sharpens our eyes for detecting in the kaleidoscopic variety of emotional disturbances the common features determined by the milieu to which every person growing up in the same society is exposed. . . . Psychiatry is concerned not only with therapy but also with prevention. Large scale prevention is essentially a problem of education which requires a keen understanding of prevailing culture patterns."

The whole essay is in a sense a tribute to Freud, but not to Freud as the repository of revealed truth. It is not even because of Freud's own contribution that Dr. Alexander puts him among the great, but because

he was the first explorer in a new territory into which others can now follow and journey far beyond the reach of the pioneer.

Physiologie pathologique et traitement chirurgical des maladies artérielles de la vaso-motricité

RENÉ LERICHE, professor, Collège de France. Paris: Masson. Pp. 304. Fr. 230.

Thromboses artérielles

R. LERICHE; with the collaboration of IVAN BERTRAND, director of the institute of neurobiology at the Salpêtrière. Paris: Masson. Pp. 534. Fr. 600.

IN the field of vascular disorders few people have had wider experience than Leriche. His interests have been both surgical and pathological, and his experimental work is widely known. In his two latest books, clinical methods have been supplemented by oscillometry, whose limitations he recognises, and arteriography, examples of which illustrate the text. More precise measurements by, for instance, plethysmographic or skin-temperature methods have not been attempted.

The books report his lecture courses for 1943 and 1944, and the first volume includes sections on burns and frostbite, "shock," hypertension, arterial spasm, and the Raynaud phenomenon. There are general preliminary chapters on arterial and capillary pathology. On the surgical treatment of essential hypertension—a subject of much interest at the moment—he has little to contribute, contenting himself with recording the results obtained in America by White and Smithwick. In England, where Raynaud's phenomenon is regarded, according to the teaching of Lewis, as due to hypersensitivity of the digital vessels to cold, readers may be surprised to find stellate ganglion damage, demonstrated histologically in sections reproduced in the text, held responsible for the disease.

The second volume, of more interest to the surgical reader, deals with arterial thrombosis after trauma, with the Volkman contracture, with arterial disease in thrombo-angiitis obliterans, diabetes, and old age, and with coronary thrombosis; case-histories illustrate the author's points, but surgical treatment is discussed without much detail. Leriche advocates unilateral adrenalectomy at an early stage of Buerger's disease—a measure based on histological abnormalities found in the suprarenals at autopsy, and on animal experiments by his colleagues. Both he and Opiel claim promising results in arresting the disease.

A long and informative section is given up to penicillin and streptomycin in the 1946 YEAR BOOK OF GENERAL THERAPEUTICS (Chicago: Year Book Publishers. London: H. K. Lewis, pp. 443, 21s.), edited by Dr. Oscar W. Bethea. Advances in sulphonamide therapy are also fully reviewed, and there are sections on thiouracil, the treatment of malaria and syphilis, vaccines, anaesthetics, and drugs acting on the circulatory and autonomic nervous systems.

Dr. Everts A. Graham, in his introduction to the 1946 YEAR BOOK OF GENERAL SURGERY (Chicago: Year Book Publishers, London: H. K. Lewis, pp. 679, 21s.), draws attention to accounts of Crafoord's operation for coarctation of the aorta, and Blalock's operation for the relief of pulmonary stenosis in blue babies. Other subjects covered are the use of penicillin in the treatment of appendicitis and of brain abscess, operations for idiopathic dilatation of the oesophagus, and advances in anaesthesia.

The nutrition panel of the food group of the Society of Chemical Industry invited 32 scientists interested in food to read papers on different nutritional problems before its members. These papers were revised and brought up to date by their authors, edited by Mr. A. L. Bacharach and Mr. T. Rendle, and published, with an introduction by the late Sir Joseph Barcroft, F.R.S. (THE NATION'S FOOD, London: Society of Chemical Industry, pp. 349, 18s.). Here is everything a dietitian, a scientific caterer, and a physician needs to know about the chemistry and physiological values of the nation's food. There is, moreover, a considerable amount of "fine confused feeding" for the market-gardener, the stock-breeder, the cook, and the (earnest) politician. Altogether this is a book to be commended.

THE LANCET

LONDON: SATURDAY, APRIL 19, 1947

Grouping of Hospitals

VERY soon the new regional hospital boards will be appointed and will have to face the problem of forming hospitals into groups under the care of hospital management committees. "The object in forming a group," said the London survey,¹ "is to provide a pool of accommodation and treatment facilities which can be used as a single whole. The specialist medical staff should be common to all the units in the District Hospital group, and nursing staff should also be common, particularly for the purpose of training. In planning the coördination of the service, the first step is to determine the units to be included in the group; the second is to determine which inpatient and outpatient services can most efficiently be provided at the various units and how special branches should be allocated between them." These are most desirable objects, and clearly a large measure of grouping must be undertaken if they are to be achieved. Nevertheless it is worth recalling that at the time when the surveys were made the conception of regional organisation had not been developed; and some of the purposes for which grouping was then recommended might now be more easily achieved through regional influence on such matters as distribution of consultant staff and location of specialist units. Moreover these surveys, invaluable though they are, took little account of two practical issues which have since become much more prominent—namely, the extreme shortage of nursing staff in many hospitals and the urgent demand for decisions on priorities for development. These are two aspects of one problem which cannot be dissociated from any decisions taken in regard to the grouping of hospitals.

The nursing problem is without exception the most critical with which the regional boards will have to contend, and it would be folly to proceed with grouping of hospitals before examining the effect this grouping is likely to have on the recruitment and retention of nursing staff. As we have already noted,² many local-authority hospitals are proving unable to attract and retain sufficient nursing staff to keep their beds open, and the number of beds in use is therefore tending to fall rather than rise. Inclusion of such deficit hospitals in a group which contains a teaching hospital should tend to ease their situation, since generally speaking the tradition and reputation of the voluntary teaching hospitals is such that they should be able to enlarge their schools and take over the staffing of all the hospitals in their group. But where the local-authority hospital, by virtue of its size, becomes the major

unit of a group, and decides to unify the nursing staffs under its control, the result may be very different and perhaps disastrous; for there is no solid ground for supposing that girls who are at present willing to work in the small voluntary hospitals, because of the "homely atmosphere," will be forthcoming if control passes into the hands of the large ex-local-authority neighbour, whatever new flag it flies. When discussing projects for expansion of existing hospitals or for erection of new ones it is well to recognise that they are primarily contingent not on money, or on labour, or on the organisation of medical staff, but simply on securing nurses. Until the decline in the nursing staff of the local-authority hospital of today has been arrested and reversed, expansion is likely to be limited to those hospitals—often quite small—which can get nurses and can keep them. Approval of plans for extension must depend primarily on the ability of the hospital in question to find its complement.

The surveys provide material on which the regional boards can work; but the surveyors could not give each hospital an opportunity of stating its point of view at all fully, and more information will in fact be required before the new boards can be sure of grouping all their hospitals in the way best suited to their area. Estimates for expenditure, however, will need to be submitted next autumn in anticipation of the appointed day in April, 1948, when hospitals will become an Exchequer responsibility; and since the management committees will be responsible for preparing these estimates there seems at first sight to be no way of escaping early demarcation of the groups they are to manage. The only alternative which appears feasible is that some of the existing hospital committees might be given, temporarily, the functions of hospital management committees—without prejudice to any future arrangements in regard to grouping which the board may think desirable. This would have the merit of enabling the boards to proceed at their own pace, and get to know the personnel and facilities of the various hospitals under their care, which would put them in a better position to judge the probable repercussions of any proposed grouping and alteration in function. In some cases the advantages of an immediate merger are of course overwhelming, but in others there is grave risk of friction and misunderstanding: there are places where the best results might be obtained in the first instance by unification of the medical staff and cross-representation of lay personnel, and others where some considerable time must elapse before it is clear where a unit would best fit into the new scheme. The main—and serious—objection to postponement of grouping is the position of the local-authority hospitals, which cannot continue to be run by their present owners yet seldom have committees qualified to accept responsibility for their management. But would it be impossible, where it appears desirable for a local-authority hospital to remain for the time being outside a group, to appoint an interim committee to manage it?

The case for avoiding a rigid time-table is reinforced by the desirability of experiment. It has often been said that if a group is to provide a complete range of general and specialist services (including maternity, infectious diseases, and chronic sick) it may need

1. Gray, A. M. H., Topping, A. Hospital Services of London and the Surrounding Area, 1945.

2. *Lancet*, Feb. 1, p. 181.

something like 1000 beds. In practice, however, the size of the group has to depend largely on the hospitals and specialists available, and the kind of locality in which they are placed: in some areas 1000 beds might be provided by one or two hospitals; but in others six or seven might have to be grouped together, and the advantages of the 1000-bed unit might be outweighed by the disadvantages of remote control. It is perhaps significant that the latest and most thorough of the American surveys—that made in Michigan—concludes that 750 beds is the maximum size for a general hospital if the management is to remain flexible and human. Have we any firm reason for supposing that 1000 beds will constitute a better unit than 750?

The Unburied Body

SINCE the snow melted there have been appeals for volunteers to search for dead sheep on some of the uplands whence water flows into our city reservoirs. The authorities concerned seem to have avoided alarmist remarks about the prospect of serious contamination of water-supplies from this source, but the public is perhaps unduly disposed to regard the unburied body, whether of animal or man, as a menace to health. Whenever, for example, there are reports of deaths in the mass, with delayed disposal of corpses, the newspapers speak of the likelihood of consequent epidemics of infectious disease. It may be worth considering, therefore, how far this risk is real.

Nobody, of course, except on grounds of necessity in an emergency, would defend the practice of non-disposal of the dead; but the danger that it causes to health may easily be exaggerated. Neither the older literature nor the reports of recent incidents in Europe, India, and the Far East provide evidence that the open exposure of collections of bodies to advanced putrefaction has in itself been responsible for any outbreak of infectious disease; nor, so far as we know, has disease attacked people burying bodies thus exposed. Confusion has undoubtedly arisen sometimes from the fact that when conditions are so bad that people no longer dispose of the dead there is usually a simultaneous failure of social organisation generally. Whether the massive death-roll has been due to famine, or epidemic disease, or both, the arrangements for feeding the population, preventing disease, and treating the sick have broken down in face of a crisis. With lowering of hygiene and loss of morale, conditions have deteriorated to a point where the dead lie unburied—the last state being a result of the first. The starving or sick wander, vainly seeking aid; they crawl from place to place until forced by weakness to remain in one spot, where they die. With gradual loss of self-respect their discharges are scattered without consideration; so if, as often, they are suffering from an intestinal infection, they can foul ground, pollute waters, and infect everything they touch with rich cultures of pathogenic bacteria. In this condition they remain indifferent to the thousands of flies which help to disseminate infection. Nevertheless, though such a state of affairs is evidently dangerous, it does not follow that the dead are themselves a source of danger.

When death overtakes the body, coliform and other intestinal organisms begin to invade the tissues, where

they rapidly overgrow and crowd out the more delicate gram-negative pathogenic bacteria. Immediately after death from typhoid the spleen and mesenteric glands may yield pure cultures of *Bacterium typhosum*, but a few hours later this organism can be recovered only by highly selective technique, and later none but the putrefactive bacteria will be found. Much the same sort of result is obtained with the intestinal contents in salmonella or dysentery infections. Most of the experimental work on the viability of intestinal pathogens has been concerned with voided discharges, where the organisms are present in relatively high concentration, and it has been proved that in a hot dry atmosphere and in sunlight the life of the gram-negative pathogenic bacteria is short. *Shigella sonnei* may live for several days in faeces in the laboratory, but exposed to the drying air and hot sun of the tropics its viability is much reduced. Similarly the vibrios of cholera may remain alive for many days if they reach water, but the thin stools from a cholera patient are rendered non-infective within an hour or so if allowed to dry quickly in sunlight. Subjected to anaerobic conditions within the dead body the vibrios of cholera die out very quickly, leaving the field to putrefactive organisms from the intestine. The speed with which the latter invade the tissues varies to some extent according to the disease responsible for the death but mainly according to the surrounding temperature. Tropical conditions lead to very rapid multiplication of the putrefactive bacteria, and very shortly after death the original infective processes are completely masked by contaminating organisms. In temperate or cold climates the march of events is retarded, and the resistance of the gram-negative intestinal pathogens to cold makes it easier to recover them post-mortem. ZLATOGOROFF¹ in 1904 was able to cultivate *Pasteurella pestis* from the buboes of cadavers frozen for over 100 days, whereas with temperatures of about 100° F in Egypt the post-mortem diagnosis of plague in sporadic cases was only possible when the material was obtained very soon after death. Plague, typhus, and cholera are all diseases liable to cause mass death, in which the handling of the newly dead requires special precautions. Particular care is also needed in handling anthrax. In cattle this disease always terminates as a septicæmia and frequently in an abrupt and acute form so that groups of animals may be found dead or dying on the ground, which may be further fouled by infective discharges escaping from the orifices after death. Owing to the formation of spores in these discharges the soil may remain infective for many years, and of all diseases anthrax is the one where it is most necessary that the body should be disposed of without delay and by methods other than simple burial.

It is clear, therefore, that there is some danger from spread of infection from collections of exposed dead. But this danger (apart from animals dying of anthrax) appears to be no greater, and usually much less, than that attached to the same group during their life. In the tropics failure to dispose of the dead adequately may result in more revolting and nauseating conditions than are seen in cold climates, but the risk to public health is actually smaller there.

1. Zlatogoroff, S. J. *Zbl. Bakt.* 1904, 36, 559.

Radiophosphorus

PHYSICISTS like Sir JAMES CHADWICK¹ make it clear that artificially produced radioactive elements prepared in atomic piles will soon be readily obtainable for the treatment of disease. Two questions at once arise: for what conditions is such radioactive treatment useful, and how is the "dose" to be controlled?² It will be some time before facts and figures are gathered; but one of these elements—the isotope of phosphorus, known as radiophosphorus or P³²—has been on trial in the United States for 10 years, and Reinhard et al.,² who have reviewed the subject, show that a good deal of information has been gained about its uses and limitations.

The P³² used was prepared in the cyclotron, which produces much smaller quantities than the atomic pile. The isotope loses radioactivity by giving off beta rays of high energy that affect surrounding tissue, and in so doing is transformed to stable sulphur. Its half-life is 14.3 days—i.e., the radioactivity of a dose is down to half in 2 weeks, a quarter in 4 weeks, and so on. This is a convenient rate of decay, short enough to enable results to be controlled, yet long enough to ensure the protracted radiation of tissues which is important if, as has been suggested, cells are affected only during mitosis. Studies of the fate of P³² in the body showed that it is rapidly taken up by both red and white blood-cells within the first 24 hours; the red cells lose their P³² after 48 hours, but leucocytes retain their quota for a very long time, mainly in the nuclei. The tissues that take up most P³² are bone-marrow, lymph-nodes, liver, and spleen; leukæmic tissues take up much more than normal tissues. Many, but not all, forms of neoplastic tissue selectively absorb radiophosphorus. The degree of cellularity influences the uptake—for instance, in Hodgkin's disease the uptake of P³² decreases with increasing fibrosis of the lymph-nodes—because P³², like normal P³¹, is built into nucleoprotein; so the tissues multiplying fastest take up most P³². Since the presence of much P³¹ reduces the uptake of P³², in therapy the proportion of P³¹ should be kept as low as practicable. Unfortunately with P³², as with other lethal substances, the difference between the concentrations in neoplastic and normal tissue is not wide enough to allow the former to be destroyed without affecting the latter; if enough P³² were given to destroy all the leukæmic cells, the tissues producing red cells and platelets would also be fatally affected.

Radioactive phosphorus was first used for treatment in 1936; and, since the results were published by LAWRENCE³ in 1939, reports on the treatment of over 400 patients have appeared. REINHARD and his colleagues find that only 140 of the reports are sufficiently detailed for analysis, but by adding 155 cases of their own they have data from nearly 300 patients to draw on. The radiophosphorus was used in the form of dibasic sodium phosphate in an isotonic solution (15 mg. Na₂HPO₄ per c.cm.). The initial activity of such a solution was 0.20–0.40 millicuries per c.cm.; it gradually lost activity, but could be

used until 0.04–0.05 millicuries per c.cm. was reached. Small frequent intravenous injections were given in preference to doses by mouth; the initial dose was 0.1–2.5 millicuries, and treatment was at first given two or three times a week. When the oral route was used the doses were larger, since only about 75% of the dose is absorbed. For comparison with X-ray treatment it has been calculated that if 1 millicurie of P³² is retained for 24 hours by a 70 kg. adult, the effect will be equivalent to 0.6 röntgens of whole-body radiation. The dose was carefully controlled by watching changes in the peripheral blood; in leukæmias with high white-cell counts, and in polycythæmia, the aim was to restore the blood-count to normal. In other diseases control was not so easy; in malignancy and Hodgkin's disease treatment was continued until blood changes suggested that bone-marrow activity was depressed; leukæmic patients without a raised white-cell count received doses similar to those found effective in the commoner type; in a few patients serial bone-marrow punctures were used. The dose required to bring about a given effect varies greatly from patient to patient, even in clinically similar stages of disease. The dose must therefore be carefully controlled and adjusted to the response in every case.

The best results have been in polycythæmia vera. A first course of 3.5–4.0 millicuries is given, and then no more for 3 months; if symptoms are severe blood is withdrawn by venesection, because 30–60 days elapse before the P³² dose effectively lowers the red-cell count. After 3 months, if the count is above 6 million per c.mm., a second course of 1–3 millicuries is given, and some patients need a third course 3 months later. By then a remission is invariably present and no treatment is given until a relapse occurs; remissions last for some time (the longest was 33 months); only 8 out of 21 patients needed more than one course of treatment. ERF⁴ has confirmed these findings: he quotes the cases of polycythæmia treated in five different American clinics; 124 had satisfactory remissions, 11 were unsatisfactory, and 5 died; the longest remission after one treatment was 5 years. He notes that iron, or large amounts of red meat or liver in the diet, can stop a remission. In chronic myeloid leukæmia treatment greatly relieved the symptoms, reduced the size of the spleen, and produced a remission in the anæmia. During treatment the proportions of myelocytes and myeloblasts in the blood fell, just as with X-ray treatment. Several patients have had remissions lasting a year or more. Difficulties arose in adjusting the dose; an initial dose of 1–2 millicuries was followed by four doses of 0.5–1.0 millicurie at 3 or 4 days' interval, and then 0.5–1.0 millicurie was given weekly until the leucocyte-count fell to 30,000 per c.mm. The blood-count must be carefully observed throughout, because it is impracticable to adjust the dose on a body-weight basis. P³² did not affect acute relapses or typical acute forms; nor, oddly enough, did it reduce enlarged lymph-glands which had resisted X-ray treatment. In lymphatic leukæmia P³² gave less satisfactory results: a similar treatment scheme somewhat improved signs and symptoms, but not so much as in myeloid leukæmia; no patient obtained a remission lasting as long as a year, one

1. *Lancet*, March 15, p. 315.

2. Reinhard, E. H., Moore, C. V., Bierbaum, O. S., Moore, S. *J. Lab. Clin. Med.* 1946, 31, 107.

3. Lawrence, J. H., Scott, K. G., Tuttle, L. W. *Int. Clin.* 1939, 3, 33.

4. Erf, L. *Blood*, 1946, 1, 202.

case completely failed to respond, and some had to have blood-transfusions for the anæmia. Monocytic leukæmia did not respond at all, and patients with multiple myelomas obtained only insignificant relief. In Hodgkin's disease and lymphosarcoma the results were poor compared with those of radiation. A few patients with other forms of malignancy; such as carcinoma of the breast and gall-bladder, and malignant melanoma, were given P³² without any effect.

A technical difficulty in radiophosphorus therapy is the estimation of activity in terms of millicuries. At present different laboratories obtain widely different figures—for instance, the activity of a sample of P³² was estimated as 100 microcuries at one laboratory and 240 microcuries at another. As KRAMEN points out in an appendix to REINHARD'S article, this difficulty has led to discrepancies in the recommended dosages of P³². A definite standard of

measurement is vitally important with so active a substance.

Radiophosphorus, then, can be said to have proved superior to other measures only in polycythæmia vera and chronic myeloid leukæmia; in these conditions the results seem to last longer than with X-ray therapy, there is no radiation sickness, and the treatment is more comfortable for the patient. There is no evidence that P³² prolongs life any more than X-ray treatment does. The disadvantages of radiophosphorus are its scarcity, which one hopes is temporary, and the fact that it must be used soon after manufacture, the lack of an agreed standard for measuring its activity, and the need for careful individual control during treatment. Such radioactive materials are clearly going to be useful, but this is another set of therapeutic agents that can be safely used only in specially equipped clinics and are outside the province of the general practitioner.

Annotations

THE GENERAL PRACTITIONER'S PENSION

LAST week Dr. Gordon Ward wrote us a letter condemning the proposal to pay pensions to general practitioners according to the number of years they have spent in the National Health Service and their average income during all those years. He compared their treatment unfavourably with that of the lay administrator, whose entry to the Civil Service at an earlier age gives him more years of service, and whose pension is based on his income during his last three years, when his salary is at its highest. Readers may well have wondered how such a proposal came to be made. The truth is that while there is no difficulty, and ample precedent, in arranging superannuation for anyone paid on an agreed salary scale, it has hitherto been deemed impracticable to devise a satisfactory scheme for people whose income fluctuates from year to year in response to factors not easily assessed actuarially. Once, therefore, the Government conceded that the remuneration of the general practitioner in the new service should be not solely, or even mainly, by salary, but should chiefly accrue from a continually changing number of capitation units, it was not surprising that difficulties and anomalies arose. In fact it was more surprising that the Government still felt able to attempt any superannuation scheme at all for general practitioners.

Dr. Ward's point about length of service has long been a grievance of medical officers in local-government work, who feel that they are penalised vis-à-vis their non-medical colleagues whose superannuation has perhaps accrued from the day they left school and came to learn their profession in the council's employ. Though the fact that the doctor reaches his office some ten years later, after a long and expensive undergraduate and post-graduate training, may be partly offset by relatively higher remuneration in the junior years of employment, the anomaly remains a cause of irritation. This could best be overcome if it were possible to establish that the unavoidable time-lag was compensated by allowing bonus years, counting for superannuation, to be added at intervals to those actually served by the doctor.

As for the period over which the average remuneration should be assessed for pension purposes, Dr. Ward agrees that the usual Civil Service practice of taking the final three years would be unfair, because for the general practitioner these are often years of waning earnings. Unfortunately his alternative suggestion, that the average of the three best consecutive years should be taken, could scarcely be accepted officially: to the Government actuary it must conjure up visions of doctors working

for three hectic years to establish their claim to maximum superannuation, and thereafter steadily decreasing their load, secure in the knowledge that this will in no way affect their pensions. It seems inevitable that if the pension is to vary with earnings it will have to be based on the average over a wide period. Hence, if we do not accept the Government's proposal to take the average of the whole of the doctor's working years it might be best to argue in favour of the average of those years when the doctor may be expected to be working at optimum capacity—excluding his first years before he becomes established, and the last years before his retirement when he would ordinarily be accepting fewer new commitments.

Among his strictures Dr. Ward does not mention the disastrous effect these new provisions might have on any attempt to preserve present partnerships or promote group practice. Many doctors wishing to work together in the new service, and enjoy the advantages of group practice, will want to find ways of sharing expenses and remuneration on a partnership basis—ways which will not interfere with mutual aid, or with their encouraging and "feeding" a newcomer to the group. If, however, not only their present remuneration but their future pension prospects are to depend directly on the numbers of patients on their individual lists, competition for patients is bound to be intensified, and the whole concept of group cooperation wrecked. We have always held that so far as general practice was concerned the test of success of the new service would be its ability to provide better conditions of practice—more cooperation between practitioners, opportunities for "graded specialism" with the wider use of diagnostic aids, and the sharing of ancillary help. Rather than have all these ends jeopardised by an ill-conceived pension plan, it might be better to leave the general practitioner outside the superannuation scheme altogether, adding enough to his remuneration to enable him to provide, by insurance or other forms of saving, for his own and his family's future.

REVIEW OF SILICOSIS

IN his Julius Wernher lecture to the Institution of Mining and Metallurgy on April 15, Major-General A. J. Orenstein, F.R.C.P., said that the important cause of silicosis is silica dioxide. With the exception of asbestos under certain conditions of handling in manufacture, the silicates produce a less deadly pneumoconiosis; the suggestion that 'Sericite' (hydrated aluminium and potassium silicate) is the principal cause has not been substantiated. Silica damages the lung not as was once thought mechanically, but through slow solution. Animal experiments show that the smaller the particles

the greater is the danger; this is at least partly due to the more rapid solubility of small particles, but another reason is that they remain longer in the air. Attention must be directed to minimising dust, especially fine dust; and there is some doubt as to the ability of water to remove the dangerous very fine particles from the air. On this point it is difficult to obtain convincing results; on the Witwatersrand gold mines it would take about thirty years to obtain suitable data, and there would be grave difficulty in the psychological reaction to a reversal of the accustomed wet-drilling routine. In practice, removal of dust by suction at the drilling orifice does not offer a satisfactory solution, at least in the Witwatersrand mines. At ore bins filtration has proved effective. Sprays deal partly with blasting dust, but its danger must be further neutralised by ventilation and by keeping miners away until the air is freed from dust and toxic fumes.

The place of aluminium in prevention is still undecided; the position has been fairly expressed in the joint report by the Council on Industrial Health and the Council on Pharmacy of the American Medical Association, which indicated that though in animal experiments aluminium has provided effective prophylaxis against the toxic action of relatively pure quartz, this does not necessarily hold for silicosis in man; the general use of aluminium, the report added, should be delayed until full trials have been completed, particularly in view of the known capacity of amorphous hydrated alumina to foster tuberculosis.

As regards aluminium in the treatment of silicosis, said General Orenstein, it is difficult to accept that any substance can reverse established fibrosis, though it may influence resolution of very early silicotic changes, before fibrosis is established. Subjective relief, or even improvement in breathing and general well-being, are poor criteria. "I would join Gardner and the American Medical Association in cautioning against reliance on any method of prevention which would push even ever so slightly into the background dust prevention and dust removal. Need I say then how much more blame-worthy we should be if we allowed the mischief to happen and pinned our faith to a cure?"

PANEL LISTS

UNDER the pressure of war the regulations governing insurance practice were relaxed to allow principals to accept 500 patients beyond the ordinary maximum. Last January this concession was withdrawn; so the basic numbers now acceptable are, as before the war, 2500 for a principal (5000 for two partners, of whom one may have up to 3000) and 1500 for an assistant. Since 1938, however, the Minister of Health has approved, where necessary, percentage increases beyond this maximum, in view of the increment through the extension of the scheme to include juveniles who have reached school-leaving age. He has lately reaffirmed his willingness to receive applications both on this score and in the light of the increase, from 1942, of the income limit from £250 to £420, as well as for other special reasons. The increase normally granted for juveniles is 5%, and if a further 5% is conceded for the raised income-level doctors with the basic 2500 will again have nearly the 3000 patients permitted during the war.

It was hoped that the pre-war maxima, without increases, could be restored because the load arising from war-time extension of N.H.I. could now be transferred to doctors coming out of the Forces. This aim was abandoned for several reasons: (1) few panel doctors have in fact anything like the maximum permitted number of patients, and those with the largest lists usually work in highly industrial areas where most other doctors are reluctant to settle; (2) patients, it is said, attach themselves less to a doctor than to a particular

surgery, and are unwilling to go to doctors newly arrived in an area; (3) the surplus patients would not provide a living for incoming practitioners; and (4) it is not worth disturbing the patients by insisting on their transfer at a time when the new service is only twelve months away. Not everyone will be convinced by this reasoning, which has won the day; strict adherence to the pre-war maximum would have provided employment in assistantships for at least some demobilised doctors until they found their place in the new service; and a few, having worked for a time in the industrial areas where the need is greatest, might have decided to stay there, thus making for a much-needed balance.

ARTIFICIAL INSEMINATION

THE Public Morality Council did a useful service last year in bringing together doctors, clergy, and lawyers to discuss temperately the difficult subject of artificial human insemination. The purpose of the conference (a report of which has now been published¹) was not so much to reach conclusions as to uncover implications. Among the clergy there were speakers from the Church of England, the Roman Catholic Church, and the Free Churches; medical speakers included Dr. H. P. News-holme, Mr. Kenneth Walker, F.R.C.S., Dr. William Brown, Dr. Mary Barton, Dr. Joan Malleon, and Mr. J. V. O'Sullivan, F.R.C.O.G.

In discussing the moral aspects of the practice, all the clergy were able to accept the principle of artificial insemination of the wife by the husband's semen, provided this was obtained from the vaginal pool after normal intercourse. The Church of England speaker was even willing to concede that, in his own opinion, where there was no other practicable alternative, the production of semen for the purpose by masturbation need not be condemned on moral grounds. All the clergy, however, found the principle of artificial insemination with donor's semen to be morally objectionable.

The legal drawbacks, some of which may not have been fully appreciated by doctors, were well set out by Mr. J. P. Ashworth. He made it clear that the signed statement of consent, usually obtained by the doctor from both the husband and wife before insemination with donor's semen (A.I.D.) is performed, is likely to be worthless legally. A better safeguard of the doctor would be some more formal type of consent, for example an oath; but few couples, he felt, would be willing to go before a commissioner of oaths on so personal a matter. Then, if the husband is registered as the father of the child, he and the mother are making a false statement under the Perjury Act, and could be prosecuted. Again, Mr. Ashworth had little doubt that the child is legally illegitimate, and questions of inheritance might turn on this. An assurance from the couple that no third party is interested cannot possibly be adequate, because legacies and bequests might be made later by relations ignorant that the child was illegitimate; and this might mean loss to other beneficiaries. Finally, there is the danger that, where several children in a neighbourhood are fathered by the same donor, some of them may later meet and marry; indeed, the danger of such incestuous matings cannot be wholly excluded, since the doctor must make a point of keeping the name of the donor secret.

Psychological difficulties between husband and wife, or arising in the child, were only superficially considered. Dr. Mary Barton drew attention to the resentment and frustration which a wife who knows herself capable of bearing a child may feel towards an infertile husband. Presumably this dissatisfaction could not be wholly relieved by a donor-pregnancy, but several of the medical speakers were confident that such a pregnancy usually has the effect of restoring harmony between the husband

1. Artificial Human Insemination. London: Heinemann. Pp. 81. 3s. 6d.

and wife, and has in some cases prevented a marriage from breaking up. Of long-term effects on the children it is clearly too early to speak.

The doctors agreed that the cases in which donor insemination might be considered form only a very small proportion of all cases of subnormal fertility, which in many couples can be treated successfully in other ways. Dr. Margaret Hadley Jackson, who was not present at this conference, has found occasion to advise A.I.D. less than 40 times at an infertility clinic where more than 900 patients have been treated in eight years; about half of these 40 patients conceived as a result of the measure. Dr. Mary Barton is reported to have said that she and her colleagues had "had only about 300 children conceived by this means," over a period of five years—a number which seems large rather than small if Dr. Jackson's experience is a guide.

TREATMENT OF STARVATION

OUR knowledge of the effects and treatment of starvation has increased immeasurably during the last few years. The scanty data available in the early years of the late war have been shown to be largely inaccurate. The first fact which surprised many was the rarity of specific deficiency diseases in Europe when all food was scarce and a severe shortage of vitamins was to be expected. The cause of this appears to be twofold. First, starvation or semi-starvation lowers the metabolic processes and the requirement of vitamins and other essential nutrients. Secondly, in Europe, the shortage of food led to the introduction of breads of high extraction and an increased consumption of all types of vegetables, resulting in a proportionately higher intake of vitamins and mineral elements such as iron than are found in more refined normal diets. Some nutritionists had foreseen this and had realised that the problem of reinstatement would be mainly one of calories.¹ Conditions were different among prisoners in the Far East, where the inadequate food was also appallingly deficient in vitamins, so vitamin deficiency diseases were rife. In European concentration camps, on the other hand, what was encountered was simple gross starvation. There was comparatively little famine oedema, but severe diarrhoea was so common as to lead to the diagnosis of bacillary dysentery; mental apathy and physical lethargy were intense, yet people on the verge of starvation were often so finicky about their food as to refuse to eat what they disliked. In other respects—the extreme loss of fat and muscular tissue, the lowering of the hæmoglobin and plasma-protein levels, and the high incidence of tuberculosis—the effects had been expected.

The greatest change has been in our views on treatment. On theoretical grounds, it had been believed that a valuable measure in the early stages of the treatment of severe cases was the parenteral administration of protein hydrolysates.² There was some evidence from India to support this belief.³ But it was soon found that only in a very few cases, where it was impossible to feed the patients by mouth, were these preparations useful.⁴ In almost all patients excellent results in the initial stages of treatment were obtained by oral feeding, and skim milk was better for this purpose than the usually very unpalatable protein hydrolysates. Lipscomb⁵ gave skim milk, sugar, salt, and compound vitamin tablets for 3 or 4 days. This diet, which provided about 800 calories daily, was followed by one of about 1750 calories and finally by one of 3000 calories daily. The

results reported by Dr. Murray in this issue suggest that, at least after the initial stages, a much higher calorie intake than 3000 is advisable. When his patients were seen, 2 or 3 weeks after liberation, they were still some 23% below their normal weight and still apathetic and dull. Within a very short time on a diet of the enormous calorie value of nearly 8000 daily they improved greatly. They gained over 2 kg. in weight in one week and continued to gain rapidly, though at a decreasing rate, for the whole of the 23 days during which they were observed. The most surprising feature was the tolerance which the patients showed to this huge intake. Not only were there no apparent ill effects but the rate at which they gained weight suggests that the diet was very well utilised.

Would it have been possible to give diets of such magnitude earlier? It is said⁶ that in the first stages of treatment large amounts of food are harmful and may actually cause death. Yet Leyton⁶ observed that Russian prisoners often ate large meals in the earliest stages of recovery with no untoward effects. It seems likely that, at any rate after the first few days, large diets such as those used by Murray would have accelerated recovery. The most encouraging lesson of Murray's experience, however, is that once improvement begins it normally leads to an uneventful and complete recovery.

GOOD NEIGHBOURS

THE help which the British War Relief Society of the U.S.A. gave us from 1939 to 1945 was as varied as it was discerning, and the record of what these Friends in Need⁷ did for us shows how American resource and kindness matched our changing wants. Nothing was too big—fleets of tea cars, mobile canteens, grants and equipments for clubs, rest-homes, hostels for tired workers, nurseries for evacuees, and equipment for hospitals. But equally nothing was too small—seeds for allotments, sweets in the pocket of a child's frock, crutches for orthopaedic patients who would otherwise have had to stay in bed, and innumerable toys. As a final and permanent gift the society has left us with the new surgical block at the Queen Victoria Hospital Plastic Surgery and Jaw Injury Centre at East Grinstead.

BETTER LIMBS

ARTIFICIAL limbs, even the best of them, will always fall short of the real thing; and perhaps the worst disaster for the limbless would be the development of stereotyped patterns on which it was thought no improvement could be made. So far is the Limb Fitting Centre of Queen Mary's Hospital, Roehampton, from this sterile and complacent state that a new research department has been established there; and on March 25 a meeting was arranged to demonstrate recent designs and appliances. Dr. John Craft discussed problems of suspension of artificial legs. For women, with disarticulation at the hip, or with above-knee or below-knee amputations, the limb can be suspended best, he finds, from a corset instead of from the old pelvic belt. The corset is made on ordinary lines, but laced up the back, and the limb is held by an elastic strap in front and another behind. Patients wearing such limbs were able to show that they are well retained, and that the stump does not tend to leave the socket when the wearer sits down. A shaped belt is now being used for men, instead of the pelvic band, and this, like the corset, has the advantage that the wearer can dispense with shoulder-slings. On a recent visit to Germany, Dr. Craft found the suction-socket almost universally used, and he is reviving this device here. The socket closely fits the stump, and a valve at

6. Leyton, G. B. *Ibid.*, 1946, ii, 73.

7. Friends in Need. Prepared by the Central Office of Information. H.M. Stationery Office. Pp. 76. 1s. 6d.

1. Drummond, J. C. Sir Jesse Boot Foundation Lecture. University College, Nottingham, 1946.

2. Magee, H. E. *Proc. R. Soc. Med.* 1945, 38, 388.

3. Narayanan, E. K., Krishnan, K. V. *Indian med. Gaz.* 1944, 79, 160. Krishnan, K. V., Narayanan, E. K., Sankaran, G. *Ibid.*, p. 158.

4. Vaughan, J. *Proc. R. Soc. Med.* 1945, 38, 395.

5. Lipscomb, F. M. *Lancet*, 1945, ii, 313.

the side allows air to leave but not to enter; the partial vacuum thus produced holds the limb firmly in place. This works well, enabling the wearer to do without suspension from the pelvis, as various patients demonstrated. Further experiments on these lines are planned. Light elbow crutches, which can be taken to pieces for packing, are another German device which have advantages over English patterns. The Ministry of Pensions standard tool-holder for attachment to artificial arms is well known, and can be used for digging, working with tools, and batting at cricket; but the research department are also studying new designs for mechanical hands and fingers. The problems of the bath-tub have always puzzled the man who has lost both arms, because artificial limbs are damaged by water. A simple covering for the stumps, made of rubber, has now been made and fitted with a device to which a shaving-brush and razor can be fixed.

German surgical measures include the Sauerbruch cineplastic amputation,¹ and the Krukenberg operation by which the forearm bones are made to act like a pair of pincers.² Prof. T. P. Kilner, discussing the results—which were demonstrated by a group of patients brought over from Germany—said that the amount of training necessary before either kind of stump could be used properly was so great that a man with a single arm amputation would seldom bother with it, preferring to use only his sound arm. For those who have lost both limbs, the Krukenberg procedure makes an appliance unnecessary and gives a good powerful grip; he thinks it useful and worthy of further consideration.

Sir Charles Darwin, F.R.S., chairman of the Ministry of Pensions standing advisory committee on artificial limbs, remarked that the versatility of the natural hand and arm are such that an infinite number of substitutes can be explored; and not only many mechanical problems of the artificial hand but problems in the training of other muscles in delicate control are still unsolved. The difficulties are such that the committee favour the development of new mechanical appliances rather than any attempt to reproduce finger movement faithfully. Several such appliances were demonstrated, including a nailbrush with two rubber suckers on the back; stuck on any flat surface, this can be used on the sound hand. Patients who joined in the discussion urged that these and other simple and helpful devices should quickly be made available to the limbless.

PREVENTIVE ASPECT OF REABLEMENT

So much has been written about fitting the disabled into useful employment that many people now regard reablement from the single standpoint of the resettlement in industry of those who are permanently crippled by injury or disease. In a lecture given recently at the Royal Empire Society, Mr. H. E. Griffiths said that on visiting Poland he found that interest centred almost entirely on the possibility of fitting amputees for suitable work; and the same attitude was noticeable at the International Red Cross Conference last October.

This limited view of reablement is unfortunate. In tuberculosis, for example, its rôle is partly to ensure appropriate occupation for the man or woman permanently handicapped by the disease, but far more to prevent or limit permanent disability by effective treatment and aftercare. The same is true of all potentially disabling disease and injury, and it is the preventive aspect of reablement with which doctors are chiefly concerned.

An illustrated booklet³ just issued by the Ministry of Health gives an excellent account of what the Ministry has done to increase reablement facilities and what it hopes to do under the National Health Service. In 1939

hardly any hospitals in Great Britain were able to do all that was necessary in this line for their patients, but now no less than 204 offer comprehensive reabling treatment, including physiotherapy, gymnastic exercises, remedial games, and occupational therapy, while a further 129 already possess partial facilities and many others are making plans. The process of reablement, in both hospitals and special centres, is clearly described, and the booklet deserves wide circulation among doctors and all others whose aim is to restore health.

VELOCITY OF BLOOD-FLOW IN PREGNANCY

SOME have said that the velocity of blood-flow is decreased during pregnancy, while others believe it to be unaltered or increased. By observations every fortnight in 48 pregnant women, Manchester and Loube¹ seem to have settled the question. Estimating the arm-to-tongue time by the calcium-gluconate method, and the arm-to-lung time by the ether-paraldehyde method, they found that throughout pregnancy the velocity was within the normal limits—i.e., 9–16 sec. for the arm-to-tongue time, and 4–8 sec. for the arm-to-lung time. Nevertheless each trimester showed an increase in the mean velocity of blood-flow: thus in the first trimester 90% of the values for the arm-to-tongue time were between 10 and 14 sec., with the remainder between 14 and 16 sec.; in the second trimester only 4% were above 14 sec., with 19% less than 10 sec.; while in the third trimester 50% of the average values were under 10 sec. The practical implication is that in the latter part of pregnancy circulation-times at the upper limit of normality may suggest incipient heart-failure. The clinician cannot afford to neglect any method which may hasten the diagnosis of heart-failure in pregnancy, since the prognosis depends so largely on prompt recognition. While estimation of the velocity of blood-flow in all pregnant women is obviously not indicated, the method will be valuable in selected cases.

THE BUDGET

THE Chancellor's speech last Tuesday will do something to revive a confidence badly shaken by the economic crisis. It will be noted abroad that despite our military commitments and social expenditure we can already balance our budget and intend to do so for some years. Mr. Dalton can fairly claim that his proposals strengthen our position, both internal and external, and the only question is whether they will do so sufficiently. As he said, no other country faces so tough an external situation; and the final test of financial measures is their effect on our alarmingly adverse balance of trade. By their concessions on income-tax the Government go some way to restore incentives to harder work: the raising of the maximum for earned-income relief from £150 to £250 will incidentally be of substantial benefit to a large proportion of doctors, and the return of child allowances from £50 to £60 also diminishes the disabilities under which the middle-class parent has been labouring. If Mr. Dalton is right in hoping that increase of tobacco taxation by half will lower tobacco consumption by a quarter, he will have limited the waste of precious dollars on a commodity which we can no longer afford in such quantity. But whether such measures are really commensurate with the need remains to be seen. Before the year is out the crisis may well require more drastic action to check expenditure abroad and induce higher production at home. In particular we may have to devote much more of our efforts and resources to producing food.

WE have to record that Dr. S. Monckton Copeman, F.R.S., died at Hove on April 11 at the age of 85.

1. Magee, R. K. *Lancet*, 1946, ii, 904.

2. *Ibid.*, p. 910.

3. *The Road Back to Health: the Story of Medical Rehabilitation.* H.M. Stationery Office. Pp. 29. 6d.

1. Manchester, B., Loube, S. D. *Amer. Heart J.* 1946, 32, 215.

Special Articles

SCREENING-OUT THE NEUROTIC

H. J. EYSENCK

Ph.D. Lond.

From the Psychological Department, The Maudsley Hospital

THE experiences of the war of 1914-18 demonstrated the desirability of excluding potential neurotics from the Armed Forces, and in both world wars many different schemes were proposed for effecting such a "screening-out." But the stream of neurotics passing through neuropsychiatric hospitals showed that a selection procedure which had proved successful in the field of intelligence and special abilities failed to grapple with the more intangible problems of emotion, adaptability, and character.

These problems still claim our attention now that the war is over. The likelihood of universal military service, the need to have large forces under arms for a long time to come, and the importance of husbanding man-power in industry generally make essential the development of suitable methods of selection on the temperamental side.

The aim of these methods should not be merely the negative one of preventing the neurotic from being chosen for a position for which he is unsuitable and in which he will break down; a more positive aim might be the selection of neurotics for suitable treatment or for guidance into jobs having a low "stress" value. It is clearly necessary to have valid and quick methods for identifying the neurotic or the potential neurotic; what use may be made of the information gained depends on factors outside the competence of the psychologist or the psychiatrist.

There are two main approaches to this problem: the psychological and the psychiatric. These two approaches have at times been held to be antagonistic, and there are undoubtedly considerable differences between them in methodology and underlying philosophy. Yet, in spite of disagreements, which have at times become vocal (Rodger 1943, 1944, Gillespie 1944), it seems clear that psychology and psychiatry have complementary functions, and have everything to gain by understanding each other's points of view.

The disputes which seem to divide psychologists from psychiatrists are often due to a failure to effect such an understanding. Thus psychiatrists often claim that for screening purposes the traditional psychiatric interview cannot be dispensed with, and that objective techniques have no place as yet in this field. On the other hand, psychologists often draw attention to the subjective nature of the psychiatrist's work and claim that tests developed along traditional lines can fill this important gap.

An extreme development of the psychiatric position is seen in the American practice of having large numbers of recruits seen for five or ten minutes by a psychiatrist who pronounces on their mental fitness on the basis of this brief interview (Wittson et al. 1943). An extreme development of the psychological position would consist in the classification of recruits as "neurotic" on the basis of objective tests alone.

"Screening" is essentially a dual task. In the first place, the extremely large number of recruits or applicants has to be sifted to find as many of the problem cases as possible. As a second step, it has to be decided whether each man is likely to adjust satisfactorily or not. This final decision must be left to the psychiatrist, but the preliminary sifting can be done by means of objective psychological tests. In other words, the screening should contain two filters, the wide-mesh psychological filter, and the finer psychiatric filter.

EFFICIENCY OF PSYCHOLOGICAL FILTERS

It is possible to compare the efficiency of different psychological "filters" by statistical indices (Hunt et al. 1944, Eysenck 1945). These indices are constructed on the principle that, if a test can distinguish validly between a group of neurotics and a group of normals, its efficiency is a function of the percentage of correct neurotic identifications and of the percentage of "false positives"—i.e., normals diagnosed as neurotics. A simple but useful formula is the following:

$$\text{Screening index} = \frac{P - N}{100}$$

where P is the percentage of neurotics correctly so diagnosed by the test, and N is the percentage of normals wrongly diagnosed as neurotic by the test. The index varies between the limits of 1 (perfect discrimination) and 0 (no discrimination at all).

With this formula we can compare the efficiency of various psychological "filters," provided the populations tested are roughly similar. This condition appears to be fulfilled in a number of researches, one of which summarised work with three objective psychological tests and one American questionnaire (Eysenck 1945), another used individual interviews given by specially trained women of the W.R.N.S., and interpretations of their findings by psychiatrists (Curran and Roberts 1945), while the third made use of the "Maudsley medical questionnaire," a psychoneurotic inventory which I constructed on the basis of item analyses performed on a number of previous inventories (Eysenck 1947).

In all these researches the validating criterion of "neuroticism," against which the efficiency of the test was measured, consisted in the previous referral of the person concerned to a neurosis centre. The criterion of normality, on the other hand, was simply the failure of the person to be referred to such a centre. In other words, the normal group in each case almost certainly contained several actual or potential neurotics who would sooner or later find their way to a neurosis centre.

The results of comparing the six tests (interviewing, two questionnaires, and three objective tests) are as follows:

| Tests | Screening index |
|--------------------------------|-----------------|
| Maudsley medical questionnaire | 0.75 |
| Dark vision test | 0.63 |
| Suggestibility test | 0.55 |
| Interview | 0.38 |
| American questionnaire | 0.36 |
| Ranking Rorschach | 0.32 |

It will be seen that three of the psychological tests are superior to the interview, while the other two are only slightly inferior. All six tests show an efficiency rating which suggests that even in their present undeveloped form they might be useful in detecting potential neurotics. Since the tests in combination are likely to prove much more informative than they are in isolation, the figures present a strong prima-facie case for further work along these lines. It may also be noted that though the figures quoted cannot pretend to great accuracy in view of the fact that different populations were used in the different researches, they suggest that an objective test, such as the suggestibility test, or a questionnaire, such as the Maudsley one, which can be given in a few minutes to several people at a time, and which does not require great skill in administration or scoring, may be superior to the relatively complicated interviewing technique described by Curran and Roberts (1945).

Proof that a test discriminates between normals and acknowledged neurotics is not proof that the test would pick out the potential neurotic before his breakdown. Our evidence on this point is only presumptive. Thus, in my work at Mill Hill Emergency Hospital, I found that

the tests mentioned succeeded in differentiating the more seriously from the less seriously ill, agreeing well with the psychiatrist's opinion (Eysenck 1947). I also found that in "normal" groups these tests differentiated between the well-adjusted and the less well-adjusted. And in a large-scale experiment on R.A.F. recruits it was found that there was considerable agreement between a psychiatrist's report on the subjects' mental health and likelihood of breakdown, and the subjects' scores on the Maudsley medical questionnaire.

But the need for direct evidence on this point cannot be gainsaid. Such evidence can only be provided by large-scale follow-up studies, and it is one of the main purposes of this paper to draw attention to the need for such an extension of research.

SUMMARY

Attention is drawn to the importance of "screening" methods in military and industrial affairs, and to the necessity of co-operation between psychologists and psychiatrists in this field.

Data are presented to show that objective tests, questionnaires, and other modern techniques are comparatively successful in discriminating between "neurotics" and "normals," and it is suggested that a strong *prima facie* case exists for the inception of large-scale follow-up studies to investigate the effectiveness of these procedures in screening-out the neurotic.

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IMPERIAL CANCER RESEARCH FUND

1946-47

In his summary of the work done during the past year in the laboratories of the Imperial Cancer Research Fund, Prof. W. E. Gye, F.R.S., the director, reports developments in most of the main lines of investigation.

In the chemical field Mr. H. G. Crabtree, M.Sc., has continued his studies of the relation between carcinogenic action and sulphur metabolism. He has already shown that the induction of tumours by the application of carcinogenic hydrocarbons may be retarded by the simultaneous application of compounds interfering with sulphur metabolism, and has demonstrated that there is a parallel between the degree of anticarcinogenic and sulphur-inhibiting activity. If carcinogenic activity depends on the interaction between carcinogen and some sulphur-containing constituent of the cells, then it might be possible by the application of some endogenous sulphur-containing compound to compete with the normal interaction and so nullify it. In an attempt to bring this about Crabtree applied various thiol compounds at the same time as 3:4-benzopyrene. Several mono-thiol compounds were tested without effect. Two di-thiol compounds were tested: toluene-3:4-dithiol and 2:3-dimercapto-proprional (B.A.L.). Both these compounds are chemically extremely reactive. Unfortunately the first proved very toxic and could be used only in relatively small dosages, which were inactive. The compound known as B.A.L. could be given in quite high doses, but again no support for the hypothesis behind the experiment was forthcoming: there was no interference with the carcinogenic action of the benzopyrene.

Another aspect of the relation between cancer and sulphur metabolism is revealed by the fact that normal metabolites of the carcinogenic azo-dyes inhibit the activity of sulphhydryl enzymes. This relation seems to be in the opposite sense to that between the hydrocarbon

carcinogens and sulphur metabolism. When the two types of carcinogen were applied at the same time to mice there was no additive effect—in fact, there was some inhibition of the action of the hydrocarbon in one case, but here the azo-compound used (*o*-aminoazotoluene) was somewhat toxic.

Dr. L. Foulds's researches have provided some illustration of the hereditary factor in cancer. He has investigated the action of 2-acetoaminofluorene in different mouse strains by including the compound in the diet. The tumours which resulted differed in their site according to the sex and strain of the mice. In R3 mice tumours of the bladder were produced in males but not in females. This sex difference is not universal, since Armstrong and Bonser did not find it in CBA mice. The treated R3 females developed mammary cancers, as they do spontaneously, but the treatment appeared to accelerate their appearance.

Sidelights on the virus aspect of cancer are provided by Dr. B. D. Pullinger's study of the parts played by oestrogen and milk factor in the development of nodular hyperplasia of the breast which appears in all females of the R3 strain of mice. A subline of this strain free from milk factor was established by rearing an original family with a foster-mother from a cancer-free line. Virgin females of this subline and of normal R3 mice were spayed when 56 days old and were given one or two applications of oestrogen. After these applications there was a progressive development of the mammary glands followed by a regression. This regression in the subline free from milk factor proceeded until at autopsy their mammae were composed of shrunken ducts without any foci of acinous proliferation, while in the normally reared females there were scattered foci of adenomatous proliferation indistinguishable from those seen under normal conditions of cyclic oestrous phases or pregnancy. The result proves that the appearance of nodular hyperplasia is dependent on the milk factor.

The endocrine factors are implicated in Dr. E. S. Horning's researches. Before the war Horning had initiated an investigation into the possibility of inducing tumours of the prostate by local injections of methylcholanthrene. Tumours were readily produced but they were either sarcomas or squamous-cell cancers and quite unlike those seen clinically. The type of tumour depended on the strain of mice used: all sarcomas were produced in R3 mice and sarcomas and squamous-cell cancers in Strong A mice. Last year Horning took up this study again and was able to produce other types of prostate tumour by a development of Peyton Rous's finding that grafts of embryonal tissue mixed with carcinogen made in homozygous mice grow and develop cancerous properties. Horning found that strips of adult prostate tissue wrapped round a crystal of methylcholanthrene and implanted subcutaneously in homozygous normal mice of the same strain will readily develop into tumours. Again the type of tumour apparently depends on the type of mouse used. In Strong A mice almost all the tumours were glandular cancers, which were transplantable and showed various degrees of secretory activity. All the tumours in C3H mice were spindle-cell sarcomas. These tumours are under active investigation and obviously the method offers great possibilities for the study of the development of glandular tumours and of the direct and indirect effects on them of hormones and other agents.

Another application of the Peyton Rous technique has been made by Prof. Ida Mann, who produced cancers of the lens epithelium by mixing such tissue from young mice with methylcholanthrene and implanting the mixture into other mice of the same strain (C3H). This proves that the immunity of the lens from malignant change is not due to any immunity of the tissue itself, but probably lies in its situation in the body and its absence of blood-supply.

There have been several changes in the staff during the past year. Mr. R. J. Ludford, D.Sc., Mr. E. S. Horning, D.Sc., and Dr. L. Dmochowski have taken up appointments elsewhere. Newcomers are Dr. James Craigie, F.R.S., who should be a strong reinforcement to virus investigation; Mr. P. C. Williams, B.Sc., as endocrinologist; and Dr. C. C. Spicer as geneticist.

Reconstruction

THE HOME CONSULTANT

F. HARWOOD STEVENSON
M.D. Lond., M.R.C.P.

ONE of the objects of the National Health Service Act is to extend and improve consultant facilities, so that patients may more readily have the benefit of a specialist's opinion. In arranging this extension, however, we must avoid any unnecessary loss of valuable features of the old dispensation.

Patients unable to pay a consultant's fee have hitherto had to rely either on a hospital or on a "further opinion" given by a kindly colleague or partner of the general practitioner attending them. Even this partial service has been inefficiently distributed throughout the country—difficulties of travel and inaccessibility of outpatient departments often proving insuperable obstacles.

In the new service opportunities for full investigation of patients are to be developed by opening new consultant centres for inpatients and outpatients in areas which are badly served. But in practice the shortage of domestic and nursing staff will make it difficult to extend hospital services. Instead, would it not be possible to bring the consultant to the patient?

Today, when a person is too ill to attend an outpatient department, the general practitioner often sends him into hospital, simply because he feels uncertain of the diagnosis or the treatment. With a consultation at the right moment many of these patients could be looked after at home, which they would usually prefer, and a hospital bed would be saved.

An extension of the system of consultations at hospital also carries the danger that the public may lose what many of them have at present—a doctor with experience and ability to take responsibility, who can enable them to get the best out of the medical services which will be at their disposal. No specialist can take this general practitioner's place; and even a group of specialists, however efficient, implies division of ultimate responsibility. Care from a practitioner, with specialist advice available when necessary, is of more value to the patient, special circumstances apart, than constant specialist direction. The practitioner stands to gain both from the consultations and from his continued responsibility for the patient, and the public gains from this enlargement of his experience.

In practice home consultation works well. I have found no difficulty in collecting at the bedside whatever specimens are required for investigation. The necessary sterile containers, solutions, pipettes, &c., are easily carried, and when appropriate I take with me, in the car, a technician with a portable X-ray apparatus or Cambridge portable electrocardiograph. X-ray photographs—chest films in particular—can be taken while the consultation is proceeding and are developed on return. Specimens are examined, and a telephone conversation with the practitioner usually completes the consultation.

The administrators of the new service would realise a very large saving in hospital beds. This saving would be effected by no second-best method but by one which would maintain for the public the highest standards of general practice.

A SUGGESTION

General practitioners are busy men, and if they are to do all they might for their patients they must have opportunities for acquiring new knowledge. If a general physician were appointed as "home consultant" in each area his contacts with the local practitioners, and his experience of their needs, would enable him to act as a dean of postgraduate studies for the practitioners of the district. Part of the duties of such a

man would be to watch the literature; to arrange discussion groups, lectures, and demonstrations, by himself or by specialists; and to pass on advances of practical value to the general practitioners, refreshing their knowledge of the less familiar aspects of general medicine. He should have some beds to keep alive his own clinical ability, and the practice of direct responsibility.

Many general practitioners who fear loss of responsibility and interest in the new service would approve of appointments of this sort, and would willingly cooperate with the home consultant in a scheme designed to maintain and enhance their value to their patients.

Medicine and the Law

Workmen's Compensation—Costs of Visit to Medical Referee

IF a court orders a workman to go and be examined by a medical referee under the Workmen's Compensation Act, it is difficult to imagine that there could be any doubt of the power of the court to allow the man his travelling expenses. Yet this question, which the Act itself ought not to have left in dispute, has occupied in turn the Court of Appeal and the House of Lords and has been answered differently by these two eminent tribunals.

In 1940 a workman named Halliday was seriously injured. His employers recognised that his accident was within the Workmen's Compensation Act and they made him weekly payments on the basis of total incapacity. In 1945 they had him examined (under section 18 of the Act) by their own doctor, and soon afterwards they notified him (under section 12 (3)) of their intention to reduce the weekly payments to 15s. on the ground that the incapacity was no longer total. Halliday thereupon sent his employers a counter-notice accompanied by a certificate from his own doctor who said that the patient was not able to follow his occupation and that payment on the basis of total incapacity should continue. As the doctors differed, the employers asked the county court for an order that the matter be remitted to a medical referee under section 19 (2) of the Act for a certificate as to Halliday's condition and fitness for employment. The court made the order and the patient was required to travel some 20 miles on two occasions for the purpose of the examination. The medical referee certified him fit only for very light work. No work of this nature was found for him, and the employers went on paying on the basis of total incapacity. The county-court judge awarded Halliday the costs of his two journeys which had been undertaken in compliance with the court's order. The Court of Appeal, by a majority decision, said that the county court had no jurisdiction to award the travelling expenses, because the employers had throughout made the payments voluntarily and there had been no previous arbitration on a claim by Halliday for compensation. The House of Lords, reversing the decision of the Court of Appeal, held that there was in fact a dispute, that the matter would not have gone to the medical referee unless there had been an absence of agreement, and that the medical referee, in effect, arbitrated between the parties. Consequently the costs incidental to the reference to the medical referee were within the jurisdiction of the county court.

The country has lately been asked to sanction an increase in the number of lords of appeal in ordinary. It has not been easy to persuade the whole of the legal profession that the judicial members of the House of Lords are at present overworked. The fact that the case of Halliday v. Barber Walker & Co. has occupied no fewer than five law lords in the supreme appellate tribunal is perhaps an illustration, rather than an explanation, of the use of our judicial man-power.

Under the auspices of the British Council Sir Alexander Fleming, F.R.S., is lecturing in Vienna on penicillin, and Dr. Robert Cruickshank, director of the central laboratory of the Public Health Laboratory Service, in Poland and Czechoslovakia on the Diagnosis and Control of Infectious Diseases.

In England Now

A Running Commentary by Peripatetic Correspondents

I have just been addressing an undergraduates' club at Cambridge, and thus have renewed my slight acquaintance with that old town. The chief building is Woolworth's. On my way up from the station I asked a policeman how to get to Sidney Sussex College, and he answered "Do you know Woolworth's?" I said I expected I could find it, and he answered that the college was just beyond it on the same side. From his voice's tone it sounded as though it were an appendage to it. Later I was due to go to Girton and stood in a queue for the 106 bus that I had been informed went there; but when it came it was going in the other direction, and I asked the conductor where was the stopping-place on the other journey, and he answered "Do you know Woolworth's?" This time I could say with some pride, "Yes!" "Well," he said, "the stopping-place is just opposite."

After Woolworth's there is the Fitzwilliam museum. My two favourites there are Sir William Nicholson's "Girl with the tattered glove" and Stanley Spencer's roof-scape of some red cottages. The first is now splendidly hung in an alcoved recess. You are standing in the pre-Raphaelite room and turn your head to the right, and there you see her as a winsome little figure, luring you from the far end of the next room. Her features begin to stand out clear as you pass the arch between the rooms. You see a serious but not stern expression which changes to a smile as you approach. And then there comes a little twinkle in her mouth, first on the left side and then, as you are half way down the room, with a twitch at the angle of the right. But she never looks at you; the eyes are inscrutable, but there is no glint in them. As you come near to her the smile all fades and is replaced by an inestimable sadness. She was not smiling at you but at some happy memory before the glove was tattered or the skin, in streaks, was showing through the fur of her coat.

There is also King's College Chapel. Its wonders would be beyond description were it not marred by the screen. To see a great church, stand at the west door and look up to the east. There are some that were clearly built to be divided into two, with an inner sanctuary. Not so King's Chapel. The mind that designed that great work meant it to be viewed as a whole with a vista from end to end. And then some creature of habit persuaded the King there really must be a screen. "Every great church has one." Later the organ was put on it, and the beauty of the sound that comes from it has become a part of the beauty of the stonework. And thus the organ has become a bar to the removal of the screen. Where could they put the organ? I believe it could go underground today, and that acoustic engineers could make it echo through the building as beautifully as when I was there the other day.

I attended a post-mortem examination the other day in an undertaker's work-room, with the undertaker as an interested spectator. I was remarking on the well-marked "nutmeg" liver when an old surgeon who was present scoffed at this term and complained that we referred in our descriptions to things which these days are seldom or never seen, especially by students. Whereupon the old undertaker produced from his hip-pocket half a nutmeg which had been carefully sawn. He said that he had had this in his hip-pocket for 30 years following the prescription of a gipsy whom he consulted for his lumbago. It had been a most successful and permanent cure.

If the doctor's bride is to deal adequately with night calls she must appreciate that they differ fundamentally from those in the day, which are called messages. The message impinges on the personalities of the doctor and his wife, but the night call digs at their basic temperaments. By "temperament" I mean the way the innate neurological set-up gets cracking when a stimulus forces it to respond by getting cracking. This is pretty scientific, but you will grasp what I mean if I describe the two types of response among men when the phone (the stimulus) rings in the middle of the night. To cope with the stimulus and its effects you must know to which of the two types your man belongs.

Primary Type.—As the bedside phone bell jangles, so the nerves and muscles of this type vibrate. With a twitch, jerk, tremble, and oath he is up and at it. Then, after a momentary pause while he grinds the handpiece into the bedclothes and his breathing-rate rises from basal-sleep rate to waking speed, he slams the phone against his ear. He bellows "Hullo, YES!" As he listens he scratches himself in some out-of-the-way place and rubs one foot against the other. "Who? Where? Why, of course. Take me a short while to get along. Hot water. Soap. Towels. 'bye." He dresses, hissing through his teeth.

Secondary Type.—This sort doesn't exactly hear the bell. He reaches for the phone in a cataleptic way like a warm mamba in search of an irritant. He gets hold of the alarm clock and as the phone continues to ring he pushes the clock under the pillow and settles for deeper sleep. At this point your job is to answer the call and at the same time to keep your man awake. This is fantastically difficult, but if you fail he won't be any good for at least an hour. When you have dealt with the call



(see previous notes) flood the room with light and keep talking. This will bring him to a sitting position, whereupon you must thump his back violently, repeating with each thump, "Smith, 9, Times Square" (or whatever the address is). As like as not he will answer, "Nine squared equals eighty-one. Ninety-nine, say ninety-nine." But this is progress. He may even stagger out of bed and begin to dress; scratching his head thoughtfully all the time. He may then undress and go to bed again. In psychology this is known as regression. You have been warned and you must forestall it.

After returning from the night call each type has his own characteristics. The Primary will act according to the success or failure of his mission. If successful he will light the fires, bring you tea, keep you awake with sentences beginning, "I've always thought . . ." or recite bawdy rhymes or dawn poems according to his *Kultur*. If he has failed in some aspect of the case he will undress stealthily and, yawning manfully, return to sleep; on waking he will pretend to be as fresh as a daisy. Doctor Secondary, once he has got going, cannot be held back. On his return he will complete the case-notes, write to the *B.M.J.* or to an aunt—in fact, he will continue from where he left off the day before. He will certainly not return to the connubial couch to snatch further warmth and sleep. He does not snatch at anything. Therefore, my dear, do not be unduly miserable the first time this happens. It will only mean that you have married a Secondary Type.

Not long ago we used to think that a cell of the body, once adult, did not change much. Physiologists used to talk about endogenous and exogenous protein, as though they were quite separate; but now it seems that such a division is artificial, that all our body cells are in a state of constant flux, anabolism and katabolism without end. It is not strictly accurate to talk of individual cells, since the cell is never a finite individual even in death, but a chance aggregation of constantly changing basic chemical substances. If one follows this argument to its logical conclusion (a thing philosophers won't do, because they want to know what is logic and what is meant by conclusion), then we are priding ourselves unduly by thinking we are individuals (i.e., undivided and indivisible). We already realise that every person on this earth is dependent on others in some way, and that the aggregate is more important than the individual; but now it seems that we are closer to each other than we thought. Are we not chance aggregations of matter in constant flux? It's a sobering thought.

Letters to the Editor

HÆMOLYTIC DISEASE OF THE NEWBORN

SIR,—I read with great interest the annotation in your issue of April 5 on the prognosis in what I am sorry to see you still call erythroblastosis foetalis rather than hæmolytic disease of the newborn. I am not convinced that what Wiener himself has called the "formidable procedure" of exsanguination transfusion presents any advantages over simple transfusions with Rh-negative blood in amounts required to correct the degree of anæmia. Exsanguination transfusions would be more than justified if damage to the liver and brain could thereby be prevented, and although Wiener claims that they do prevent kernicterus there is no evidence that the products of hæmolysis ever produce such damage. Indeed, the evidence is all to the contrary; for instance, changes in the liver and brain have never been described in congenital anæmia of the newborn in which the degree of hæmolysis is greater than in icterus gravis, nor do the investigations by my colleague Dr. Baar bear out Wiener's view that these changes are due to the blocking of vessels with agglutination thrombi. The changes in these organs are almost certainly due to the action of the maternal antibody on the cells of the liver and, either directly or indirectly, on the brain-cells. It is possible that a small part of this antigen-antibody reaction occurs after birth, and therefore might be checked by exsanguination transfusion, but the greater part takes place before birth—a fact which is proved by the high proportion of stillbirths in the obstetric history of the mothers of these children, the not infrequent presence of icterus at birth, the occurrence of hydrops foetalis, and the finding by Boorman and Dodd of the Rh antigen in the foetal tissues.

Although the prognosis after treatment with Rh-negative blood falls far short of Gimson's claims for it, it is certainly better than you suggest. At the Birmingham Children's Hospital we now have records of 274 cases treated since 1931. From 1932 to 1936 intramuscular injections of serum were at first used, and later transfusions with blood in which regard was paid only to the ABO grouping in a group of 44 children with a resultant mortality-rate of 52%. From 1939 to 1941 blood-transfusions with compatible ABO groups only were given and the mortality-rate was almost unchanged, being 50.5% (66 children); but from 1942 to 1946 Rh-negative blood of the infant's blood group or of group O was used and the mortality-rate in a group of 163 children was reduced to 29.3%. Records of mortality-rates by other writers before the era of Rh-negative blood varied from 46% to 75%, and the only other series of cases treated by Rh-negative blood with which I am familiar is one by Snelling, of Toronto, dealing with 60 children. He found that his survival-rates were not increased by its use, although he has recently had excellent results in a small series of 17 cases when he gave a series of plasma "drips" in addition to the Rh-negative blood.

Clearly therefore, even when Rh-negative blood is used, the mortality is a severe one, and there is no doubt that you are right in saying that good results are only likely to come from treatment which will prevent the formation of Rh antibody by the mother or its passage across the placenta to the foetus; moreover, such treatment will also prevent kernicterus which at present occurs in a proportion, variously estimated at 5 to 15%, of the survivors.

Birmingham.

LEONARD G. PARSONS.

REST AND PROGRESSIVE RELAXATION

SIR,—Last year (1946, i, 440) you published a letter from me on the recuperative effects of rest and neuromuscular relaxation, and on the method of suggestion and deep breathing whereby relaxation may be produced.

For the sake of completeness I should now like to add that I have discovered, after many years' experience, that the maximum effect of deep breathing in producing physical and mental relaxation is attained by holding the breath for a fraction of a second after a normal effortless expiration. Holding the breath for a brief moment after inspiration is well known as a method of enhancing efficiency—e.g., in climbing—by increasing the oxygenation

of the blood; and it is a potent factor in the beneficial effect of the Yogic method of "interrupted breathing" (*pranayama*). But the beneficial effect which I have observed, in myself and in my patients, of a pause after expiration has a different physiological basis. A feeling of profound quietude, akin to if not identical with self-hypnosis, seems to be in my own case the invariable result, and may mark the progress of the neuromuscular relaxation from the voluntary muscles of the skeletal system to the involuntary muscles of the vascular, digestive, and respiratory systems, and so on to the sympathetic nervous system itself.

The method can be exceedingly potent in banishing anxiety and relieving mental and nervous tension.

London, W.1.

WILLIAM BROWN.

PLASTIC EYES

SIR,—The statement in your annotation of March 22 (p. 379) that "the iris is painted on paper and incorporated in the eye behind a layer of clear resin" must be refuted. Eyes have been, and probably still are, made in this way, but the most satisfactory results are obtained only when the eye is "all plastic" and no use is made of non-acrylic substances alien to the methylmethacrylate and invariably antagonistic to complete fusion.

Your statement that plastic eyes are somewhat heavier than glass ones needs qualifying. Plastic substances are lighter than glass, but, while a glass eye of the Snellen or reform type is hollow, the plastic eye is solid and therefore heavier. Comparison of weight between glass and plastic shell eyes, however, shows plastic eyes to be lighter. We have made hollow plastic eyes on the Snellen principle but these have many disadvantages, the chief of which is that they are not easily altered.

With regard to price it should be pointed out that the manufacture of artificial eyes made entirely of plastic bristles with difficulties which cannot be appreciated without close acquaintance with the vagaries of this comparatively new substance. It is these many vagaries and unappreciated difficulties which make the production of a plastic eye much more expensive than a glass one. Moreover, it is unfortunately a fact that much greater technical skill is required for making plastic eyes than glass eyes.

London, W.1.

THEODORE HAMBLIN LTD.

REFORM OF MEDICAL EDUCATION

SIR,—In his extremely interesting account of the revision of the anatomical curriculum at Birmingham University (March 29), Prof. S. Zuckerman says that the ventilation of the problem of the reform of medical education by the Goodenough Committee "represents the last of a series of reviews which started in 1925 with Abraham Flexner's comparative study of medical education."

This reference may possibly lead some readers to overlook Flexner's earlier and far more detailed studies of *Medical Education in the United States and Canada* (1910) and *Medical Education in Europe* (1912), which were published as Bulletins 4 and 6 of the Carnegie Foundation. These monumental studies still remain the main source of information on modern medical education considered in its historical and comparative aspects, Flexner's later *Medical Education* (1925) largely representing the essence of the earlier volumes. It is questionable whether later reviews of medical education contain any important conclusions that were not expressed or implicit in Flexner's pioneer studies, and it is perhaps worth pointing out that these studies were the work of a layman.

Another survey of earlier date than 1925 is Sir George Newman's memorandum to the president of the Board of Education—*Some Notes on Medical Education in England* (1918)—which, despite its modest title, occupies 124 pages. This was followed by the same author's memorandum to the Minister of Health, *Recent Advances in Medical Education in England* (1923).

It seems appropriate to mention also Theodor Bilroth's *Lehren und Lernen der medicinischen Wissenschaften* (1876), the importance of which may be judged from the publication nearly fifty years later of an English translation, with an introduction by William H. Welch, under the title *The Medical Sciences in the German Universities*

(1924). Theodor Puschmann's *Geschichte des medicinischen Unterrichts* (1889), of which an English translation was later published, included a comparative study of contemporary medical education extending to nearly 100 pages.

As reference to your early volumes would show, medical education in England has been the subject of active and almost uninterrupted discussion since the beginning of the 19th century. The bulky parliamentary *Report from the Select Committee on Medical Education* (1834) may be regarded as the first comprehensive English survey of its subject and as the most substantial material expression of that growing dissatisfaction with the medical curriculum which was to culminate belatedly in the Medical Act of 1858. The seamier side of medical education before the passage of the Act is depicted with great penetration and wit in the series of articles anonymously contributed by Albert Smith to the first volume (1841) of *Punch*, under the title "The physiology of the London medical student." The article (p. 201) describing a session at a crammer's class is particularly to be recommended.

The study of the literature on medical education leaves the impression that, as with medicine itself, diagnosis is usually considerably in advance of treatment, and that one of the causes of the sluggishness with which long-overdue reforms have been introduced over the past century is that there has often been a direct pecuniary interest in the perpetuation of anomalies.

In 1912 Abraham Flexner commented that in England "examination is a national industry, getting examined a national habit." Surveying the subsequent growth of special diplomas, an observer today might conclude that the equivalent of an industrial revolution has since occurred in the field of medical education.

In conclusion, the author of these remarks must confess his own lack of academic distinction and disclaim the least pretension to speak authoritatively on medical education. As a student, he found that the medical curriculum offered poor competition to other intellectual pursuits, and he contented himself with passing the qualifying examinations of two medical corporations. Any interest he may subsequently have acquired in medicine he regards as the product of self-education. In fairness to the two medical corporations through which he gained admission to the medical profession, he would insist that they are entirely innocent of any responsibility for any defects of his medical education, as he cannot recall any closer official connexion with them than the payment of examination fees and the welcome intimation that he was respectively their member and licentiate.

Worth, Sussex.

N. HOWARD-JONES.

EXPERIMENTAL TUMORIGENESIS

SIR,—Referring to your editorial of Nov. 30 on the work of Professor Lipschutz, may I call attention to my experimental studies in guineapigs antedating Lipschutz by several years? We found that intraperitoneal administration of alkaline anterior-pituitary extracts or intramuscular implantation of bits of anterior-pituitary substance produced hyperplasia and metaplasia of the epithelium of the uterine cervix, with epithelial downgrowths extending deeply into the connective tissue. Papillary tumours of the parietal peritoneum, as well as hyperplastic phenomena in the connective tissues of the tube and the uterus, were observed (*Amer. J. Obstet. Gynec.* 1934, 27, 633; *J. Obstet. Gynec.* 1939, 46, 232). The peculiarity of the structures of mesodermal origin of the female generative organs—to react to the stimulus of an overactive anterior pituitary, and in turn to the thus generated oversupply of oestrogens, with hyperplastic lesions—was duly stressed. No aetiological connexion, however, between the development of uterine fibroids and oestrogenic overstimulation seems to be clearly demonstrated.

Lipschutz's finding that many months elapsed before any hyperplastic lesions in the uterine wall occurred points to the *anterior pituitary*—which is well known to develop hyperplasia and even adenoma in the wake of long-continued administration of oestrogens—as the factor responsible for localised or universal growth phenomena in the uterine wall.

Cincinnati, Ohio, U.S.A.

J. HOFBAUER.

AMYLOID MACROGLOSSIA

SIR,—The interesting case of atypical amyloidosis described by Dr. Margaret Baber (Feb. 8), a condition first described on the Continent by Lubarsch,¹ is almost identical with a case I saw in a man, aged 53, who died from heart-failure, thrombosis, and infarction of the lungs. Almost half the heart in this case was amyloid (fig. 1). The tongue (fig. 2), oesophagus, skin, and walls of many

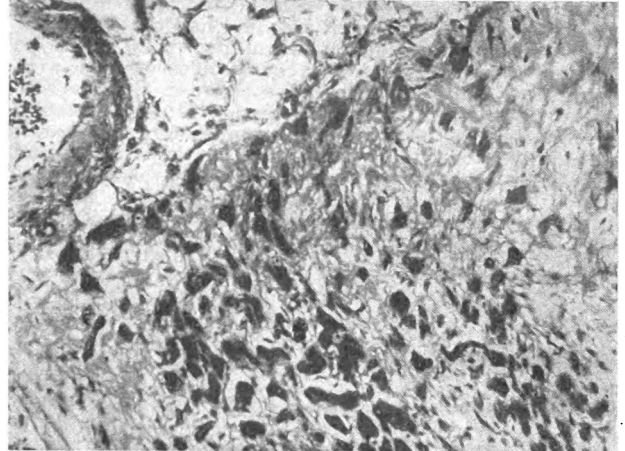


Fig. 1.—Section of heart muscle, showing amyloid deposits (grey) between muscle-fibres (black) and in the wall of a blood-vessel. (Masson $\times 115$.)

of the smaller arteries and veins were also involved, and hæmorrhages had occurred after palpation or other minor injuries to the skin.

The pathological proteins, called paraprotein by Apitz,² are produced by plasmocytoma cells. One of these proteins is the Bence-Jones protein, which is excreted rapidly in the urine. Paramyloidosis is not due to Bence-Jones proteinæmia, but the same tumour cells that produce Bence-Jones proteinuria also produce other different pathological proteins which involve the tissue of the tongue, heart, and walls of the blood-vessels, and other muscles. The plasmocytosis can be localised

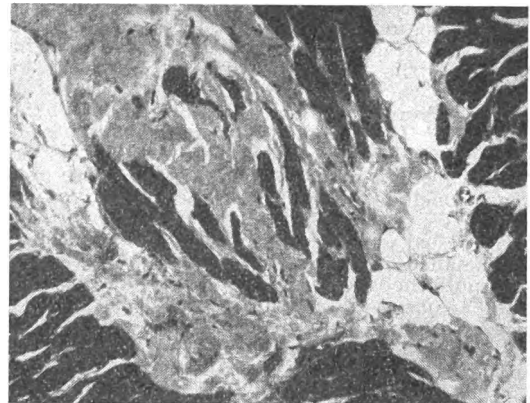


Fig. 2.—Section of deeper layers of tongue, showing muscle bundles (black) and amyloid deposits (grey). (Masson $\times 115$.)

to one or several parts of the body, as in multiple myeloma, or spread all over it, as in diffuse plasmocytosis. In some cases the tumour cells cannot be found, because the degenerated area is too small and the pathological plasma cells can occur in any part of the body and may not be recognised. This seems to have happened in Dr. Baber's case and in mine.

Luisenhospital, Aachen, Germany.

RUDOLF ENGEL.

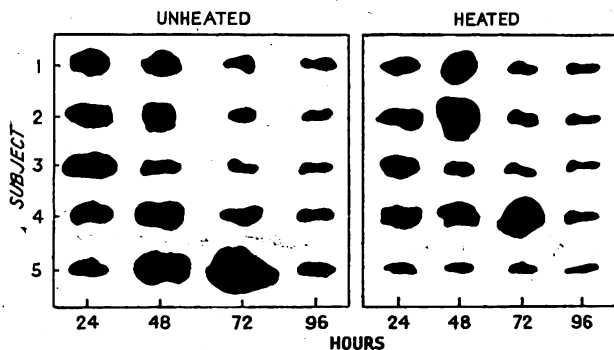
1. Lubarsch, O. *Virchows Arch.* 1929, 271, 867.
2. Apitz, K. *Ibid.* 1940, 306, 631.

REVACCINATION IN ADULTS

SIR,—Dr. J. C. Broom's paper (March 22) prompts us to report some observations made in the Middle East in 1945.

Lieut.-Colonel (now Professor) R. S. Illingworth had pointed out to us that a typical "reaction of immunity" was evoked by a heat-killed vaccine. To verify his statement a series of 20 previously vaccinated patients were revaccinated with both heated and unheated vaccine by a standardised technique with a single scratch 1 cm. in length. The response to both heated and unheated vaccines was similar in each case and had the characteristics of the "reaction of immunity." In a second series of 20 cases where the areas of erythema were plotted no constant differences between reactions to heated and unheated vaccine could be demonstrated. The figure shows the findings in 5 representative cases.

To prove that the virus had been killed, material from the same batch of heated vaccine was used to vaccinate 10 previously unvaccinated infants. In no case did a reaction occur; later these infants were successfully



Areas of erythema after vaccination with unheated and heated vaccine lymph.

vaccinated with unheated vaccine. Intradermal tests on rabbits also showed that living virus was no longer present after heating.

As calf-lymph vaccine had been employed in these experiments the agents possibly responsible for the reactions were bovine protein, contaminant bacteria, the preservative added to the vaccine, or the proteins of the virus bodies themselves. A series of 10 previously vaccinated patients were accordingly revaccinated with heated vaccine, unheated vaccine, bovine serum, and the preservative. Reactions were noted only with the first 2. Dr. Dennis, of the American University of Beirut, kindly supplied us with vaccine prepared by culture on chick-embryo membrane, the bacterial content of which was negligible. In 10 previously vaccinated patients similar "reactions of immunity" were obtained to this vaccine both when heated and unheated. From these observations we concluded that the "reaction of immunity" was an allergic response to the proteins of the virus bodies in an individual sensitised by previous vaccination.

Circumstances had prevented us from reading the relevant published work; but at this stage we discovered that similar observations had been made in 1901 by von Pirquet, who had reached the same conclusion. We therefore pursued our somewhat naïve investigations no further, believing that we had been in ignorance of facts well known to better-qualified workers in this field.

If our conclusions were correct it followed that the "reaction of immunity" in fact only indicated that the patient was immune to variola when the vaccine employed was known to be potent and viable. This explained our previous experiences of seeing patients in whom we had ourselves noted a "reaction of immunity" develop fatal smallpox within two months of vaccination.

Dr. Broom is clearly aware of the problem, but he has noted a considerable number of cases in which unheated lymph gave a "reaction of immunity" while heated lymph gave no reaction. Our experience was different from this: in a few a "reaction of immunity" was given by unheated, but not by heated, lymph; in about an equal number the reverse was noted. We attributed

these discrepancies to faults in our technique, and repetition, by producing similar reactions with both heated and unheated lymph, confirmed our view. Dr. Broom admits that the reaction to heated lymph may "closely simulate" that to unheated; we concluded that the two were indistinguishable. We share his uneasiness about certification; on several occasions we have seen the sense of security engendered by a "reaction of immunity" prove disastrously false.

London, W.1.
Leeds.

RONALD BODLEY SCOTT
R. P. WARIN.

CHEST DISEASE IN RAND MINERS

SIR,—In their letter of Feb. 8 Dr. Frazer and Dr. Walker rightly say that we have a miniature radiography plant at the Witwatersrand Native Labour Association Hospital, which has now been in operation for several years. (Like them, we consider that our miniatures are of a very high standard, as also are the large X-ray films taken to check the abnormalities seen in the miniature radiographs.) They were wrongly informed, however, that native workers suffering from phthisis may continue to work if they choose to do so. No native mine labourer found to be suffering from pulmonary tuberculosis and/or silicosis is allowed to continue working at the mines; he is compensated and repatriated at the expense of the mines. The compensation paid is, for silicosis, a sum equal to 36 times the amount of his monthly earnings, or £180, whichever of the two amounts is the greater. Similar compensation is paid for pulmonary tuberculosis where the labourer has been engaged in a dusty mining occupation for 8 or more years. Where the labourer is found to be suffering from pulmonary tuberculosis after having worked in a dusty occupation for 30 days or longer, he is given an amount equal to 20 times the sum of his monthly earnings, or £100, whichever of the two amounts is the greater.

Dr. Frazer and Dr. Walker add that "during a brief visit to the W.N.L.A. Hospital, no case of chest disease was seen." This seems strange, as we detain a large number of patients in hospital for sputum tests and other investigations. Apart from these, all patients on the mines who are suspected to be suffering from pulmonary tuberculosis and/or silicosis, after X-ray, clinical, or sputum investigation, or loss of weight, are sent to our hospital and detained here for examination by the medical officers of the Silicosis Medical Bureau, with a view to possible compensation.

Witwatersrand Native Labour
Association, Ltd., Johannesburg.

FRANK RETIEF
Chief Medical Officer.

BETTER CARE FOR THE HOMELESS CHILD

SIR,—Your annotation of April 5 suggests that there is fairly general agreement with the recommendations of the Curtis Committee. But it is in fact surprising that more written protests have not appeared from workers in public-health, medical, and educational circles considering the extent of the disagreement which exists. The largest single group of children mentioned in the report is that in public-assistance institutions. It is remarked with surprise that 60% of these children are short-stay admissions—e.g., children admitted because the mother is having a baby. To this extent the total figures are inflated, for this group can hardly be described as "deprived children." The committee consider that more accommodation for these short-stay children is badly needed, although they remark that there was ample accommodation in children's homes generally before the war. The overcrowding of the public-assistance institutions, therefore, seems to have developed with the war, when women were encouraged to send their children (even those of 2 years) into institutions while they either went to work or had a baby, and there was little warning to the mother that it might have a bad effect on the child's emotional development. The legacy of 5000 homeless evacuees tells its own tale. Some propaganda in reverse to emphasise the importance of keeping the child in its own or a relative's home where this is at all possible might now be instituted, with a quotation from the Curtis report on "the extreme seriousness of taking a child away from even an indifferent home." To a young child even two weeks is a long time.

The Government's decision to make the Home Office the responsible central department is itself remarkable, since, of the three central departments concerned, this is the only one without adequate trained visiting staff at the local-authority level.

At a guess I should say the visiting of individual children for fostering, adoption, and boarding-out will continue to be done by the same people who do it at present—namely, health visitors, school nurses, and school-attendance officers, with the added complication that for this part of their work they will apparently be responsible to the Home Office through the children's officer. The Curtis Committee propose that this officer should be an important administrative official of the council, not on the staff of any other department, with approximately 500 children under her care. As it will not be practicable for her to know and keep in touch with them all (although the personal touch is the main argument for her appointment) she will allocate groups of children to her subordinates. A boarding-out visitor is to be responsible for the supervision of 100–150 children, each to be visited at least once in three months. She is to be a superior visitor (? a psychiatric social worker)—not a mere health visitor—and this may explain why she is apparently only to do two or three visits a day. Yet health visitors have at least 1000 children to visit, and local authorities have found it almost impossible to fill vacancies because of the shortage. Are psychiatric social workers more plentiful?

Whether one agrees or disagrees in principle with the recommendations of the Curtis report the main single criticism is that it considers the matter as if in a vacuum. It ignores the fact that there is a shortage in almost every sphere of trained professional women. The inspecting staff of the central government department must be increased, children's officers must be appointed. But where will they be drawn from? Health visitors, nursery-school teachers, psychiatric social workers, matrons—all are in desperately short supply. Thus we are faced with an increase at the supervisory and inspectorial levels, with a resulting decrease in the already overworked staffs who do the spadework.

Woodford Green, Essex.

HILDA MENZIES.

SAND-FLY FEVER

SIR,—The article of April 5 by Dr. John Fleming, Major Bignall, and Captain Blades was of great interest to me as I witnessed a large series of similar cases in a military hospital in Athens during the summer of 1941.

These cases were considered not to be true sand-fly fever for three reasons: (1) the almost clock-like regularity of three days' duration which characterised the outbreak and which is not typical of sand-fly fever; (2) the absence of really severe headache, which is certainly present in genuine sand-fly fever; and (3) the absence of the well-known depression and asthenia which characteristically follow sand-fly fever.

The Greek doctors, who are used to these epidemics, have named it the three-day fever; and it was their opinion that it was not due to the sand-fly. One suggestion made at the time was that it was an abortive form of anterior poliomyelitis, of which there was a concurrent epidemic. The outbreak also coincided with the sea-bathing season.

I suggest that among cases of short-term pyrexia which tend to be labelled sand-fly fever there is a separate entity—"P.U.O., three-day type"—of whose aetiology we are at present ignorant. To label such cases sand-fly fever is to hinder progress.

Brighton.

EDWARD W. LINDECK.

SIR,—The review by Fleming, Bignall, and Blades must have evoked wistful memories in those of us who gave some minutes every summer night to hunting in the folds and corners of the mosquito-net for the elusive and diaphanous flies, only to wake on the morrow and find that quite a few had escaped our search and were now showing up all too easily by the large red blob of our blood in their bodies.

The sand-fly set us a nice problem in differential diagnosis. When a fairly large outbreak of sand-fly fever began in Greece, at a time when everybody was acutely smallpox-conscious, 3 cases of ?smallpox were admitted

to the isolation ward of our hospital. Their history was one of a three-day fever, and they showed a petechial rash, most marked over the feet, including the soles, and less marked over the legs, hands, and face. The history and the distribution of the rash were in fact reminiscent of smallpox, but the rash was quite superficial and slightly irritating and itching. Our diagnosis of sand-fly fever and insect bites, probably caused by the phlebotomus, was borne out later in this outbreak when we saw a considerable number of similar cases with petechiæ over exposed parts of the body. We never saw weal formations in the patients exhibiting petechiæ.

The admission of ?smallpox cases was of course known to our higher administrative authorities, who, rightly conscious of their responsibility, were not so easily persuaded to regard these cases lightly. There were a number of consultations with Army authorities and Greek medical notables. In fact we were much in the limelight for some days and gained an interesting experience, at the cost of some disruption of communications to our "smallpox-infested" community.

London, W.1.

P. F. MEYER.

STEVENS-JOHNSON SYNDROME

SIR,—The Commission on Acute Respiratory Diseases of the U.S. Army Medical Corps,¹ reporting 6 cases of Stevens-Johnson syndrome and inoculation studies from necropsy material of a 7th, emphasise the frequency of lung lesions closely resembling primary atypical pneumonia; in 2 of their 3 pneumonic cases cold agglutinins were present in significant titres. They cite J. H. Stanyon and W. P. Warner,² who in a series of 17 cases found non-bacterial pneumonia in 14, with 2 fatalities showing widespread pulmonary consolidation with a mononuclear-cell exudate.

The disease, which is fairly uncommon, seems to come in small epidemics. Hebra,³ who as early as 1860 noted its association with pneumonia, thought that it was commonest in April–May and October–November; and Keil⁴ reports that it is not rare in New York City during spring and autumn. That there may be no severe cases for years at a time is suggested by the absence of any example of it in Jonathan Hutchinson's *Archives of Surgery*, which are a good source of reports on unusual dermatological conditions in the 1890's.

Dr. Nellen (March 15) correctly quotes Rosenberg and Rosenberg as alleging that the first cases were described in 1822 by Alibert and Bazin. The Rosenbergs give as their source a thesis,⁵ which I have so far been unable to trace; but as Bazin in 1822 was at the tender age of 15 it seems that the Rosenbergs made a slip. Looking through Alibert's *Monographie des Dermatoses*,⁶ I did not find anything relevant to the subject; but Bazin's hydroa vésiculeux⁷ most probably relates to the condition.

Without having a special grudge against eponymous titles I feel this particular one is unwarranted. In his scholarly paper Keil⁴ discusses contributions to this subject back to 1860; perusal of it will dispel the belief that Stevens and Johnson contributed something essentially new. The Commission on Acute Respiratory Diseases also consider that this eponym has no historical justification.

None of the many terms used for it is wholly satisfactory. Hebra coined the term "erythema multiforme exudativum," all his cases having had only cutaneous manifestations. Later writers have often used terms according to the local signs (dermato-stomatitis; gingivostomatitis; atypical ulcerative membranous stomatitis; mucosal respiratory syndrome). Even the more embracing term, "muco-cutaneous fever," is not ideal, for there may be no fever and tissues other than skin and mucous membranes may be involved. Hebra's original term is still more often used than others by authors describing cases with extra-cutaneous manifesta-

1. *Arch. intern. Med.* 1946, 78, 687.

2. *Canad. med. Ass. J.* 1945, 53, 427.

3. *Handbuch der speziellen Pathologie und Therapie* (R. Virohow), Erlangen, 1860, vol. 3.

4. Keil, H. *Ann. intern. Med.* 1940, 14, 449.

5. Beaudonnet, B. *Thèse de Paris*, 1894, no. 354.

6. Paris, 1832.

7. *Leçons théoriques et cliniques sur les affections génériques de la peau*, Paris, 1862–1865; quoted by Keil.

tions; compromising on it may help to bring home that skin lesions are often only part and parcel of a systemic disease.

Bethnal Green Hospital, London, E.2. HERBERT LEVY.

SIR.—The publication of three or four communications on the so-called Stevens-Johnson syndrome will certainly stimulate interest in this condition. Some years ago, having become acquainted with the disease, I extracted the literature fairly widely; and I find that the records, including my own, cover some seventy cases, excluding others less well defined and a hundred-odd cases noted by one author in an epidemic. I have not published any account of the disease as it would be too long.

To anyone who has once seen a full-blown case the clinical picture remains unforgettable; faced with a case for the first time, the medical man will surely be baffled.

Some of my tentative conclusions, based on my own observations and a study of all the published cases, are that: (1) while perhaps the majority of cases manifesting this syndrome run true to type, there may be many variations, including for instance the condition referred to by Forman and Whitwell¹ in an article on the association of herpes catarrhalis with erythema multiforme; (2) the syndrome, which occurs more commonly in sporadic form, may also occur in small groups or even in epidemics; (3) there is often an association with some other disease, such as pneumonia; (4) recurrences are sometimes seen; (5) the so-called Stevens-Johnson syndrome belongs to or is part of the condition called erythema multiforme; (6) the evidence points to erythema multiforme and this syndrome as originating in a virus infection rather than an allergic state as has been suggested; and (7) it might be a pity if the syndrome's present designation were perpetuated. Stevens and Johnson wrote in 1922, whereas there are descriptions of the condition certainly as far back as 1896.

London, W.1.

HUGH S. STANNUS.

SIR.—Dr. Nellen and Dr. Murray by their papers have aroused considerable interest in the Stevens-Johnson syndrome, partly because they have cleared away the fog around certain rare cases and partly because they, and others, have underlined the comparative rarity of English case-reports, though in America the condition seems to be fairly well known. Because of this I would like to record a further case which at the time it was seen was diagnosed as erythema multiforme bullosum with pneumonia and rheumatic carditis.

The patient was a girl, aged 13, who had been healthy except for growing pains during 1945. She was admitted to hospital in May, 1946, under the care of Dr. C. N. Armstrong, having been ill for three days with left-sided chest pain, sweating, shivering, and general weakness. She was breathless but had no cough or sputum; and on examination she looked ill, with an increased respiration-rate and slight cyanosis. There was limited movement over the left lower chest with impaired percussion-note over both lung bases and an area of tubular breathing over the left lower lobe. A loud systolic murmur was heard at the cardiac apex. Urine was normal. The electrocardiograph showed no significant abnormality, and chest X ray showed a shadow in the lower left axillary region. Blood-count: red-blood cells 4,780,000 per c.mm.; haemoglobin 88%; colour-index 0.92; white-blood cells 11,300 per c.mm. Some sputum obtained a few days after admission showed no significant abnormality.

For the next ten days she continued, despite treatment, to run a temperature up to 103.8° F, with chest signs; then a patchy erythematous rash appeared on her arms, legs, and trunk, becoming deeper in colour, confluent, and vesicular on the limbs. Her mouth and tongue showed ulceration, and her eyes moderately severe conjunctivitis. During the next day or two the rash became bullous, and the mouth lesions more extensive. The temperature rose to 104.8° F, and the general condition deteriorated.

Five days after the appearance of the rash, her condition, which had been very poor, suddenly improved; the temperature dropped to normal, the rash gradually faded, and the skin peeled in places, leaving a mild pigmentation which rapidly cleared. The mouth lesions quickly healed, and the conjunctivitis improved. From this time on her condition

gave rise to no further anxiety, and she was discharged, cured a month after admission.

A blood-culture taken at the height of the eruption was sterile, and a chest X ray taken at the same time showed the lung fields to be almost normal, while the white-cell count was 6100 per c.mm. (polymorphonuclear cells 66%, lymphocytes 26%, monocytes 2%, eosinophils 5%, degenerate cells 1%). The urine showed no abnormality, and further specimens of sputum were negative. A further full blood examination during convalescence was normal.

Treatment with penicillin and sulphamethazine was given throughout the illness, but had no effect on the condition although it may have prevented secondary skin infection.

I saw this patient again on March 27, 1947. She was very well and had had no recurrence of the condition. Her skin, eyes, and mouth were normal. There was an apical systolic murmur, but no radiological evidence of cardiac or lung disease, and her blood-count and film were normal.

This case seems to illustrate Dr. Sneddon's statement concerning the association of the syndrome with atypical pneumonia.

R. MOWBRAY

University of Durham.

First assistant to the Department of Medicine.

ESTIMATION OF PENICILLIN IN SERUM

SIR.—In my letter last week I described a modification of the micro-method for penicillin assay, using Dreyer's tubes. The directions should read:

Starting with two drops of the serum to be assayed plus two drops of 1% glucose peptone water and Andrade's indicator, doubling dilutions are made on paraffined slides. The last two drops are discarded. (A control, of course, is put up as well.) The final two drops of each dilution are inoculated with the Oxford staphylococcus and introduced by means of a Pasteur pipette into sterile Dreyer's tubes.

Cotton-wool plugs can be used in the Dreyer's tubes, instead of sealing them with 'Plasticine,' without any noticeable diminution in the volume following incubation.

General Hospital, Birmingham.

M. J. PIVAWER.

AGE AND SEX DISTRIBUTION OF DIPHTHERIA

SIR.—In his interesting paper on diphtheria in Oldenburg, Germany, in your issue of March 29, Colonel Walker records the preponderance of female cases (especially in those over fifteen years of age) and the high incidence among adults relative to children. He says that the German medical officers of health explain both of these features by reference to artificial immunisation of children. I agree with Colonel Walker that it is questionable whether this explanation is wholly adequate.

In a study of the epidemiology of diphtheria in Dublin over a long period¹ I noted, like Colonel Walker, the preponderance of female cases. Of his 3538 cases, 2296, or 64.9%, were females. Among 6261 cases notified in Dublin in the years 1935-42, females numbered 3474, or 55.4%; and among the 1012 cases aged fifteen years and over females numbered 723, or 71.4%.

More striking, perhaps, is the high incidence found by Colonel Walker among those of fifteen years and over—60.9%. Between 1933 and 1942 the average incidence in Dublin in those of fifteen years and over was only 16.4%.

I also showed how over a period of years the incidence of the disease might steadily shift from a lower to a higher age-group, as it did between 1928 and 1937. This shift was accompanied by an increase in severity, as shown by analysis of the fatality-rates according to age-groups.

A decline in general incidence, as observed in Dublin, coincided with a decline in general severity and a shift in incidence to the lower age-group—i.e., 0-5 years. This decline in incidence happened to accompany an intensified artificial-immunisation campaign, the decline being maximal about 1941. The decline, however, was almost certainly not related to immunisation, because it could have been foreseen from the fluctuations in incidence in Dublin since 1891. Since that time there had been fairly uniform cyclical variations, with ten-yearly peaks. Further, the age-distribution of the cases in 1940-41 was comparable with that of the years 1929-32, a period before the introduction of immunisation in

1. Forman, L., Whitwell, G. P. B. *Brit. J. Derm.* 1934, 46, 309.

1. *Irish J. med. Sci.* 1943, pp. 97, 140.

Dublin. Such variations in severity and age-incidence have been observed by Deicher and Agulnik¹ and by others. They were observed even before *C. diphtheriae* was discovered.

One further point. Colonel Walker says that although diphtheria was common in Land Oldenburg during the period of observation, it did not reach epidemic proportions. He says its weekly incidence averaged about 20 per 100,000 of the population. An incidence of that order in Dublin would certainly be regarded as reaching epidemic proportions.

J. C. GAFFNEY.

School of Pathology, Trinity College, Dublin.

ANKYLOSING SPONDYLITIS AND FLUOROSIS

SIR,—Mr. Eric Lloyd's interesting letter in your last issue draws attention to the possibility of fluorosis playing a part in the aetiology of ankylosing spondylitis. Since reading Dr. Oliver Lyth's paper (*Lancet*, 1946, i, 233) I have been at pains to find anything to suggest fluorosis on examination or history-taking of cases of ankylosing spondylitis, but I have drawn a complete blank in the 15 cases I have examined since then. The last 60 cases attending this hospital have come from all parts of the United Kingdom; nearly all were town-dwellers drinking the same water and breathing the same air as their normal neighbours. I have one patient with ankylosing spondylitis of thirty years' duration, but the radiological picture is not that of fluorosis. Were there an association one might expect radiological changes more frequently in the aged. At the most, fluorosis could only be one factor at work in these cases, and the reason why one man suffered while all his neighbours went free would still be lacking. And why the difference in sex incidence? The progress in the development of the bony changes differs largely in the two conditions, and most of the apparent similarities disappear on closer inspection. Nevertheless, association there may possibly be, and Mr. Lloyd has done a service in drawing attention to the fact.

Westminster Hospital, London, S.W.1. F. DUDLEY HART.

CONVALESCENT HOMES

SIR,—The convalescent-home service in this country has developed in a somewhat haphazard way, mainly outside the hospital framework, with the resulting advantage that the main emphasis is laid on the return to normal life rather than the continuation of medical treatment. But it is, perhaps, in consequence of this independence that convalescence does not, even now, receive adequate recognition as an extension of hospital treatment, but is often regarded as a pleasant but unessential extra.

The attitude of the homes themselves is not always helpful. Some, often those belonging to organisations covering large sections of the community, are reluctant to give details of the care they provide, or to allow visitors from hospitals which send them patients. They regulate the admission of patients through a committee of laymen; and they restrict stay to two weeks, irrespective of medical requirements.

The standards in some homes today are still below those laid down by Florence Nightingale in 1863, and the regimen is by no means always adapted to the mental needs of the patient, which, in the convalescent, are often as great as the physical. Use is rarely made of occupational therapy or recreation under expert supervision. Little interest is taken in the possibilities of research. Scientific knowledge about diet is the exception rather than the rule, and the services of a dietitian are rarely sought.

Many homes work in isolation without any yardstick by which to measure their standards, and without means of exchanging ideas. There is need for greater curiosity on the part of homes, but the absence of any reliable pool of information and advice has been a great drawback. Action now being taken by King Edward's Hospital Fund (*Lancet*, April 5, p. 454) to remedy this in the London area needs to be extended over the whole country. In this way standards could be raised and gaps in provision filled; whereas coercion and regimentation might well destroy many of the smaller homes, which, whatever their faults, are a valuable part of the convalescent-home service in Great Britain.

London, S.W.1.

MARJORIE L. WARD.

2. *Dtsch. med. Wschr.* 1927, 53, 825.

Public Health

Smallpox

FIFTEEN separate introductions of Asiatic smallpox occurred during 1946. Fortunately, on each occasion vaccination and surveillance of contacts brought the disease under control with remarkable speed, and only 40 persons became infected during the year.

In mid-February, after an interval of seven months, the disease again appeared, and since then 33 cases have been notified up to April 15 (15 at Grimsby, 2 at Stepney, 7 at Scunthorpe, 1 at Doncaster, and 8 at Bilston). The disease was introduced from an unknown source into a common lodging-house at Grimsby, where 2 old men sickened on Feb. 13 and 16. Subsequently, 13 further cases arose, all of which were in the direct line of contact with the 2 original cases. 1 was in a man who had spent the night of Feb. 16 at the lodging-house, and subsequently developed smallpox at his home in Grimsby. 2 members of the staff of the Public-health department who had been concerned with the disinfecting of the lodging-house developed smallpox while living at home. With the exception of these 3, all the secondary cases occurred among the contacts either at the common lodging-house (4) or in the ward of the public-assistance infirmary (6) into which the original patient was unfortunately admitted. The total number of cases in this outbreak was thus 15. There were 6 deaths; the high mortality was associated with the advanced age of the patients, and in 4 with previous debilitating disease. The last case at Grimsby was removed on March 9, and the town is now believed to be free from infection.

It is probable that an unidentified contact at Grimsby infected an attendant at a hostel for seamen at Stepney; fortunately, this man was admitted early in the disease to a general hospital, where he infected only 1 patient. Since the removal of this secondary case on March 21 no further case has been notified in the London area.

The disease next appeared at Scunthorpe, 28 miles by road from Grimsby. The first patient resided in a common lodging-house where 2 contacts who had absconded from surveillance at Grimsby were staying. Initially this man was diagnosed as having varicella and he was admitted to an infectious-disease hospital. 6 cases in the second generation have been notified, the first developing the rash on April 4. They include a doctor, vaccinated in infancy only, and an unvaccinated nurse, both of whom were attending the patient; the others were residents at the common lodging-house. 5 contacts (Kenny, McGennity, Finegan, Ancliffe, and Andrews) have absconded from this lodging-house while under surveillance; their whereabouts are unknown and they may be incubating or suffering from smallpox.

There is no further information concerning the source of infection at Doncaster. The disease there, in a school-master (rash March 27, removed March 31), was detected early, and prompt vaccination appears to have prevented further spread. Surveillance of contacts has now ceased.

The above series appears to be Asiatic smallpox or moderate severity. In contrast, the disease at Bilston, Staffordshire, is said to be variola minor although it originated in India or Cairo, more probably the former. The third generation of cases (onsets April 3-9, rashes April 5-10) numbers 5, of whom 1, a woman, aged 79, died during the prodromal period. The initial case and the second generation (2), although confidently diagnosed as chickenpox until variola virus was isolated in the laboratory, remained confined to their beds from onset; and the infection is believed to be limited to a circle of relatives and friends in three households. The clinical picture has been misleading. In 2 of the patients there were less than half-a-dozen lesions, and the illness is described as being like "influenza with a few spots."

A further patient is under observation, awaiting diagnosis (April 15), at Rubery, Birmingham.

Because of the difficulties in diagnosis, and, more important, because ambulant cases of variola minor, which are sometimes relatively numerous, if missed, may bring about a wide dispersal of infection, the reappearance of mild smallpox should be viewed with apprehension,

and every effort made to detect new foci promptly. A medical officer of health should be consulted whenever there is the slightest suspicion.

From Paris it is reported that there were 32 cases, with 2 deaths, between Feb. 10 and April 2. There have lately been several cases in New York.

Control of Ice-cream

Regulations announced by the Minister of Health for the heat-treatment of ice-cream¹ are similar to those drafted last year.² Where a "complete cold mix" is reconstituted with drinking-water and nothing is added other than colouring or flavouring materials, the mixture must be converted into ice-cream within an hour of reconstitution. When any other ingredients are used the mixture must not be kept for more than an hour at a temperature exceeding 45° F before being heated to a temperature of not less than 150° F for 30 minutes or 160° F for 10 minutes; and within 1½ hours it must be cooled to a temperature not exceeding 45° F, and kept below that limit, until freezing is begun. Records from recording thermometers, where these are in use, must be preserved for at least a month. Ice-cream is not to be sold unless it has been kept at a temperature not exceeding 28° F since freezing; or if it has exceeded that temperature it must be submitted to heat treatment again. It must be protected from dirt, dust, or other contamination; and utensils must be thoroughly cleansed immediately after use, and must be kept clean.

These regulations, which are to be enforced by local authorities, become effective on May 1. From a day to be appointed by the Minister, such indicating and recording thermometers as may be required by the local authority must be used during processing and storage; the imposition of this regulation is being deferred to allow time for the purchase of thermometers. In view of the possible difficulty in obtaining equipment, proof of having ordered the necessary apparatus shall constitute a defence against charges of infringement of the cooling regulation up to May 1, 1948, provided every attempt has been made to comply as far as possible with the regulation.

The Minister has decided against imposing a bacteriological standard of cleanliness; but he commends the methylene-blue test,³ and suggests that further investigation is needed if samples consistently fail to reach grade 1 or 2.

Report on Nutrition

In the latest Ministry of Health survey of nutrition,⁴ covering the period from last October to January, 4658 people were examined. The proportion with nutrition classified as good was 92.9%, while the proportion classified as fair was 6.6%, and as poor 0.5%. These figures differ little from those at the previous survey for January-June, 1946; but the percentage rated as good is 3.2 higher than in the 24,723 people examined between June, 1942, and June, 1946. Comparison is, however, difficult, since the earlier surveys were carried out by selection in formerly depressed areas, when improvements in the national dietary from the more equitable distribution of food had been operating only a short time.

In the latest survey the incidence of folliculosis was 8.5%, compared with 15.6% for the whole of last year; while that of gingivitis was 14.7%, compared with 8.8%. Among school-children the percentage classified as nutritionally good was 90.9, compared with 92.9.

Infectious Disease in England and Wales

WEEK ENDED APRIL 5

Notifications.—Smallpox, 2; scarlet fever, 995; whooping cough, 1775; diphtheria, 184; paratyphoid, 6; typhoid, 8; measles (excluding rubella), 8343; pneumonia (primary or influenzal), 730; cerebrospinal fever, 86; poliomyelitis, 4; polioencephalitis, 1; encephalitis lethargica, 1; dysentery, 44; puerperal

pyrexia, 115; ophthalmia neonatorum, 68. No case of cholera, plague, or typhus was notified during the week.

The 2 cases of smallpox were notified at Scunthorpe and Doncaster, respectively.

Deaths.—In 126 great towns there were 1 (0) deaths from enteric fever, 1 (0) from scarlet fever, 5 (0) from diphtheria, 20 (0) from measles, 13 (2) from whooping cough, 89 (20) from diarrhoea and enteritis under two years, and 27 (6) from influenza. The figures in parentheses are those for London itself.

The number of stillbirths notified during the week was 285 (corresponding to a rate of 32 per thousand total births), including 27 in London.

Appointments

- ACFIELD, J. R., M.B. Leeds, D.O.M.S.: asst. ophthalmic surgeon, Hull Royal Infirmary.
- BARKER, H. A., M.B. Edin., D.P.H.: senior M.O., health department, and deputy medical superintendent, Bradford Municipal General Hospital.
- BIRKETT, A. N., F.R.C.S.: asst. orthopaedic surgeon, Nottingham General Hospital.
- COWAN, EMANUEL, M.B. Dubl.: asst. maternity and child-welfare officer and asst. M.O.H., Portsmouth City.
- *GIBB, ERIC, D.M. Oxid, M.R.C.P.: asst. physician, St. Bartholomew's Hospital, London.
- HOLLINGSWORTH, GEOFFREY, M.B. Edin., D.OBST. R.C.O.G., D.M.R.: consultant radiodiagnostician, Northampton General Hospital.
- JONES, C. D. F., M.B.E., M.B. Lond., F.R.C.S.: asst. surgeon, Royal Sheffield Infirmary and Hospital.
- KENDALL, DAVID, D.M. Oxid, M.R.C.P.: neurologist, West Kent General Hospital, Maidstone, and Kent County Ophthalmic and Aural Hospital, Maidstone.
- MENZIES, ALEXANDER, M.B. Edin., D.P.H.: deputy M.O.H., deputy school M.O., and deputy port M.O., Middlesbrough.
- PEAKER, MARGARET, M.R.C.S.: asst. school M.O., Middlesbrough.
- SUMMERS, T. C., M.B. Lond., F.R.C.S.: ophthalmic surgeon, King George Hospital, Ilford.
- SWEENEY, P. J., M.B. N.U.I., M.R.C.P., M.R.C.P.I.: first asst., medical department, Royal Victoria and West Hants Hospital, Bournemouth.
- Radcliffe Infirmary, Oxford:**
- PERCIVAL, R. H., B.M. Oxid, F.R.C.S.: surgical registrar.
- SHEPHERD, J. A., M.D. St. And., F.R.C.S.E.: surgical tutor.
- SMITH, F., F.R.C.S.: surgical registrar.
- Royal Albert Edward Infirmary and Dispensary, Wigan:**
- Visiting physicians:*
- GOLDMAN, H. P., M.B. Glasg., M.R.C.P.
- SUTTON, W. S., M.B. Lpool, M.R.C.P. (temporary appointment).
- Examining Factory Surgeons:**
- ARMSTRONG, REGINALD, O.B.E., M.B. Durh.: Rothbury, Northumberland.
- CAMERON, D. F., M.B. Leeds: Bulth, Brecon.
- FENN, C. M., M.B. Birm.: Llanwrtyd Wells, Brecon.
- MORRISON, E. F. S., M.O., M.B. Dubl.: Kibworth, Leics.

* Amended notice

Births, Marriages, and Deaths

BIRTHS

- CRITIEN.—On March 30, in Malta, the wife of Surgeon Lieut.-Commander G. R. Critien, R.N.—a daughter.
- MC AULIFFE-CURTIN.—On March 25, in Dublin, Dr. Maeve Kennedy, wife of Mr. J. M. McAuliffe-Curtin, F.R.C.S.I.—a daughter.
- MASON.—On April 9, the wife of Dr. A. S. Mason—a son.
- MAWSON.—On April 8, the wife of Dr. Richard Mawson—a son.
- MOWLL.—On April 5, at Surbiton, the wife of Dr. R. F. Mowll—a daughter.
- MURRAY.—On April 8, in London, the wife of Dr. R. Murray—a daughter.
- WISE.—On April 7, at Sandwich, Kent, the wife of Dr. C. S. Wise—a daughter.

MARRIAGES

- DEWAR—THOMSON.—On April 10, at Newcastle-on-Tyne, Howan Archdale Dewar, M.D., to Margaret Thomson.
- NEVIN—LEESON.—On April 8, at Winchester, Robert Wallace Nevin, F.R.C.S., to Audrey Leeson.
- ROBINSON—NIMMO.—On April 5, at Adel, Yorks, Cecil H. V. Robinson to Charlotte S. Nimmo, captain R.A.M.C.
- ROSS—HOARE.—On April 11, at Epsom, J. N. MacBean Ross, M.D., to Betty Adine Hoare.

DEATHS

- BANTING.—On April 8, at Ramsgate, Cecil Banting, M.D. Lond., F.R.C.S.
- BOWLE.—On April 4, at Bexhill, Charles William Bowle, M.B. Camb., lieutenant-colonel R.A.M.C., ret'd., aged 67.
- CARSON.—On April 12, at Richmond, Surrey, Walter Peter Carson, M.B. Dubl., lieutenant-colonel I.M.S., ret'd., aged 91.
- COPEMAN.—On April 11, at Hove, Sydney Monckton Copeman, M.D. Camb., F.R.C.P., F.R.S., aged 85.
- GODWIN.—On April 8, Herbert James Godwin, O.B.E., M.B. Durh., F.R.C.S.E., of Liss, Hants.
- LITTLEJOHNS.—On April 6, at Farnham, Surrey, Archibald Smith Littlejohns, M.R.C.S., D.S.O., lieutenant-colonel late R.A.M.C.
- MITCHELL.—On April 4, at Bridge of Allan, John Stevenson Mitchell, M.B. Edin., F.R.C.S.E.

1. Ice Cream (Heat Treatment, &c.) Regulations, 1947; and circular 69/47.

2. See *Lancet*, 1946, II, 571.

3. See *Mon. Bull. Min. Hth., P.H.L.S.*, March, 1947, p. 60.

4. Adcock, E. W., Magee, H. E., Milligan, E. H. M. *Ibid.*, p. 54.

Notes and News

HONOURING A GREAT FRENCHMAN

At the opening of the Pasteur exhibition in London on April 9, M. René Varin, cultural counsellor at the French Embassy, pointed to the spontaneous nature of Louis Pasteur's work; rather than pursue a predetermined plan he investigated, with an open mind, such subjects as were brought to him. Sir Henry Dale, O.M., emphasised the close friendship between Pasteur and his British contemporaries, and the ubiquity of his work.

The exhibition, lent by the Palais de la Découverte, Paris, will remain open at the Science Museum, South Kensington, until May 26. Such homage to the great, if it is to grip the public's attention, must catch something of its subject's personality or of the purpose and the drama of his life. With the arts it is easy; the painter lives again in the gallery and the musician at the festival. With science it is not so easy; for here the achievement is not readily sensible to the eye or ear. This exhibition shows the difficulty very clearly. The story of Pasteur's life and work is told on a series of coloured boards inscribed with variously coloured inks. The tale could be read just as well, and certainly more comfortably, from the printed page. The necessary "lift" to persuade the casual visitor to follow the story to its end, would be provided by sufficient illustrations; and these, unfortunately, are lacking. Contemporaneous photographs are not to be expected; but Pasteur lives on in his influence on our daily lives; and pictures suggesting our debt to him, even today, would have brought home, like nothing else, the measure of his greatness. The exhibition is, however, enlivened by a display of letters in his hand and by some of the apparatus he used. If only for this section, it should be visited by those not too preoccupied with the present to glance back at the great past.

University of Oxford

The George Herbert Hunt travelling scholarship for 1947 has been awarded to Mr. Selwyn Taylor, M.Ch., of Keble College.

University of Durham

On Thursday, May 29, at 5.15 P.M., at the Royal Victoria Infirmary, Newcastle-on-Tyne, Prof. G. Grey Turner will deliver the first Rutherford Morison lecture. He has chosen as his subject Rutherford Morison and his Achievement in Surgery.

Royal College of Physicians of London

On Tuesday and Thursday, May 20 and 22, Prof. R. E. Lane will deliver the Milroy lectures at the college, Pall Mall East, S.W.1, at 5 P.M. He will speak on the Care of the Lead Worker.

Society of Apothecaries of London

The honorary freedom of the society is to be conferred on Sir Stanley Hewett, and the mastery of midwifery, *honoris causa*, on Sir Allen Daley, Sir Eardley Holland, and Sir William Fletcher Shaw. The society's gold medal in therapeutics for 1947 has been awarded to F. H. S. Curd, D. G. Davey, and F. L. Rose in recognition of their combined research which culminated in the discovery of 'Paludrine.'

British Legion Rheumatology Unit

At a meeting with the Minister of Health on April 14 a deputation from the British Legion suggested that experience gained in the British Legion unit of rheumatology, which was set up last June at the Three Counties Emergency Hospital, Arlessey, Beds., showed that the rheumatic and arthritic diseases could be treated successfully. At the centre, to which Dr. C. B. Heald is consultant, no new treatment was given, but various known methods were intensively applied, and the greater proportion of patients had left the unit to return to work. The deputation therefore suggested that similar units should be set up in all hospital regions. The Minister replied that he had watched this experiment with great interest and he valued highly the constructive nature of the work done by the Legion, which had resulted in so many men returning to their normal employment. The British Legion unit, complete with staff, was to be transferred to the Royal Free Hospital, and he fully intended to encourage the provision of further units on a similar basis.

Royal College of Surgeons of England

At a meeting of the council, held on April 10, with Sir Alfred Webb-Johnson, the president, in the chair, Dr. S. S. Beare (Weybridge) and Dr. E. H. R. Altounyan (Aleppo) were elected as fellows of the college, being members of over 20 years' standing. The Begley prize was awarded to Mr. R. C. Jordan, of Cardiff.

Prof. W. E. Gye, F.R.S., and Dr. James Craigie, F.R.S., were appointed Imperial Cancer Research Fund lecturers for 1947. Mr. E. A. Crook was re-elected a member of the court of examiners. It was decided to hold an additional primary examination for the fellowship in July, 1947. The subject set for the Jacksonian prize for 1948 was Malignant Disease of the Thyroid Gland.

The category of those entitled to attend the monthly dinners was widened so as to include fellows (when elected) and licentiates in dental surgery, holders of any of the specialist postgraduate diplomas, and all postgraduate students of the college, together with their wives and guests.

The following posts were recognised for the final fellowship examination:

House-surgeon and resident officer, Demerdash Hospital, Egypt; assistant medical officer, Paddington Hospital; senior house-surgeon and supernumerary house-surgeon, Royal Buckinghamshire Hospital, Aylesbury.

A diploma of fellowship was granted to P. D. Trevor-Roper, and the following diplomas were granted, jointly with the Royal College of Physicians:

D.T.M. & H.—H. E. Al-Abed, Harry Annamunthodo, D. W. Bell, R. H. Bell, J. S. Calnan, M. V. Chari, F. G. Domajogh, A. E. Eissa, H. S. Fuller, V. V. Gharpure, D. J. Gilbert, John Harper, Leslie Jacobson, V. N. Jai, Sze-Kin Kaan, Endre Kertész, R. R. Lam, J. I. Lesh, K. H. Lim, J. P. P. Mackey, R. D. Maclean, R. C. Macleod, G. Y. Nan, M. G. Nelson, Y. H. Ng, Qaiyum Pasha, S. H. Patel, I. B. Patwari, Abdurrahman Qattan, R. V. Rele, S. C. Sanghani, A. O. Saseghon, K. S. Seal, I. H. Syed, W. J. U. Tin, J. M. Vaizey, A. J. N. Warrack, Dorothy W. Wells, J. P. F. Whelan.
D.C.H.—Esmé Abelheim, J. M. Alexander, Raymond Asquith, J. N. Berry, B. W. Beynon, D. M. Brierley, Margaret Brodigan, Janos Brody, J. C. Brown, R. W. W. Brown, Janet Cameron, W. A. B. Campbell, F. S. Carter, R. H. Canghey, Roma N. Chamberlain, N. A. Daniel, H. H. Davies, H. L. Ellis, Edith M. Evans, C. G. Fagg, D. M. Foubister, Elsie C. Gibbons, Mildred C. Green, Joan Guy, Homer Habbis, Nell Hamlin, Margaret A. Hay, Frances A. Hepburn, J. B. Heycock, Patricia E. Hingle, Aron Hölzel, J. N. Horne, Margaret E. Hughes, Joseph Jacobs, A. P. Kalra, Nora Kelly, Doreen M. King, Philip Kushlick, J. H. Lawrence, Joan M. Levett, M. E. MacGregor, Runa B. Mackay, G. F. Maggioni, S. L. Mahotra, N. M. Mann, Betty M. Margetts, Paul Maurice, Lillian Morris, P. D. Moss, E. F. Murphy, A. P. Norman, W. H. Opie, Arnold Palley, A. N. Pearson, V. R. Pickles, B. W. Powell, P. M. M. Pritchard, E. P. Quibell, Joan M. Redshaw, Attracta G. Rewcastle, Frank Rousseau, G. R. Royston, Alexander Russell, Isabel S. Smelle, Marion E. Smith, Angela M. P. Snow, Margaret H. Stanfield, J. H. Steeds, Eluned M. Steven, J. K. Steward, Marian E. Stunrock, Laura Thompson, J. P. M. Tizard, A. P. Todd, A. B. Tompkins, V. V. Tracey, G. B. R. Walkey, Pauline H. Webb, R. C. Webster, R. H. White-Jones, Liary M. Williams, D. A. J. Williamson.

London Association for Hospital Services Limited

This association, which was introduced five years ago by King Edward's Hospital Fund under the chairmanship of Sir Bernard Docker and Dr. W. Russell Brain to enable provision to be made for the cost of serious illness, is now offering the following increased benefits: an additional £1 ls. per week; cover for tonsillectomy, previously excluded; and a choice of three, instead of two, rates of subscription. Further particulars of the scheme, which was lately described in our columns (March 15, p. 352), may be had from the secretary of the association, 10, Old Jewry, E.C.2.

Travelling Fellowships in Medicine

The Medical Research Council invite applications for the following travelling fellowships for 1947-48.

Rockefeller Medical Fellowships.—These fellowships are intended for graduates resident in this country who have had some training in research work in clinical medicine or surgery, or in some other branch of medical science, and who are likely to profit by a period of work at a centre in the United States or elsewhere abroad, before taking up positions for higher teaching or research in the United Kingdom.

Dorothy Temple Cross Research Fellowships in Tuberculosis.—The object of these fellowships is to give opportunities for study or research to British subjects of either sex "intending to devote themselves to the advancement by teaching or research of curative or preventive treatment of tuberculosis in all or any of its forms." They will, as a rule, be awarded to candidates who wish to make their studies or inquiries elsewhere than in the United Kingdom. They will ordinarily be awarded for one academic year.

The fellowships carry a stipend of £525 per annum for a single fellow and £800 for a married fellow, together with allowances for travelling and incidental expenses. Applications must be lodged, not later than June 1, with the secretary of the council, 38, Old Queen Street, Westminster, S.W.1, from whom further particulars may be had.

Royal Flemish Academy of Medicine of Belgium

Prof. E. D. Adrian, F.R.S., Sir Henry Dale, F.R.S., Mr. W. Sampson Handley and Prof. A. V. Hill, D.Sc., F.R.S., have been elected foreign members of the academy.

Lund Research Fellowships in Diabetes

To encourage research in diabetes the Diabetic Association is offering whole or part time fellowships which will carry an annual salary of up to £750. A medical and scientific sub-committee will administer the fund and further particulars will be found in our advertisement columns.

St. Bartholomew's Hospital, London

The medical college is shortly to appoint a man or woman "to give practical instruction to medical students in the proper use of the social services available for children." The appointment is to be whole time and will carry a salary of not less than £450.

Irish Tuberculosis Society

A meeting of the society will be held at the Royal College of Surgeons, Dublin, on Friday, May 2, at 7.30 P.M., when Dr. G. S. Todd will speak on Collapse Therapy; Dr. William MacPhail on Rehabilitation; Dr. Morgan Crowe on Dispensary Organisation; and Mr. F. J. Henry on Surgery in the Treatment of Pulmonary Tuberculosis.

Conference on Industrial Health

The north-west area group of the Association of Scientific Workers are holding a conference on Saturday, April 26, at 2.45 P.M., at Milton Hall, Deansgate, Manchester, at which workers, management, and medical staff will discuss health problems in industry. Dr. C. Metcalfe Brown will be in the chair, and the speakers will include Prof. R. E. Lane and Dr. M. W. Goldblatt. Further information may be had from Mr. H. G. Bevan, 79, Russell Road, Manchester, 16.

Tribute to Sir Leonard Parsons

On March 28 a service of dedication was held at the Children's Hospital, Birmingham, when the babies' block was named the "Leonard Parsons block," to commemorate his services to sick children. Later at a private dinner held in his honour, Sir Leonard was presented with his portrait and an illuminated address recording the thanks of the board of management for his services to the hospital as physician and research-worker. Sir Leonard and Lady Parsons were also given a silver tea-service.

Production and Care of Laboratory Animals

On Monday, April 21, and May 12 the biological methods group of the Society of Public Analysts will hold the concluding meetings of their symposium on this subject, which opened on March 17. The meetings will take place at 6 P.M., at 1, Wimpole Street, London, W.1, and on April 21 Dr. H. J. Parish will speak on Common Diseases and Mr. N. T. Gridge-man on Records. On May 12 Dr. J. I. M. Jones and Mr. Eric Wood, F.R.D., will read a paper on Housing, and afterwards there will be a general discussion of all the subjects covered at the three meetings.

Kent Pædiatric Society

The first general meeting of this society will be held on Saturday, April 26, at 2 P.M., at the County Hospital, Farnborough, Kent, when Dr. Duncan Leys will speak on a County Pædiatric Service. The society has been formed to encourage the study of children in health and in disease, to promote the welfare of children in the county, and to afford opportunity for cooperation between members of the child-health services. Membership is open to doctors engaged wholly or partly in work among children, including general practitioners, whether resident in the county or not. The secretary is Dr. P. N. Swift, pædiatric unit, Farnborough Hospital, Kent.

British Medical Association

At a meeting of the council of the association held on April 2 a unanimous recommendation was made to the representative body that Sir Hugh Lett be re-elected president for 1947-48. The annual meeting of the association in 1948 will be held at Cambridge and Sir Lionel Whitby was recommended as president for 1948-49.

Dr. Guy Dain, chairman of the council, Dr. Charles Hill, secretary of the association, Dr. Hugh Clegg, editor of the *British Medical Journal*, and Dr. J. A. Pridham, chairman of the international relations committee, are to represent the association at the centenary celebrations of the American Medical Association to be held at Atlantic City in June of this year.

Institute of Metals

On Thursday, April 24, at 7 P.M., at the James Watt Memorial Institute, Great Charles Street, Birmingham, Dr. Neil G. Marr will address the Birmingham section of the institute on Medical Services in the Non-ferrous Metals Industry.

Change of Owner

The Minister of Health has asked all voluntary non-teaching hospitals to return to him by June 30 a statement of their assets as at Dec. 31, 1946, so that a central record may be prepared to facilitate the transfer of hospital property under the National Health Service Act. Hospitals are asked to state any conditions attaching to their endowments so that due consideration may be given to them.

A new quarterly, the *British Journal of Nutrition*, is to be published for the Nutrition Society by Cambridge University Press. It will include, as well as original work, the society's *Proceedings*, which at present appear separately. Papers for publication should be sent to the chairman of the editorial board, Mr. S. K. Kon, D.Sc., at the National Institute for Research in Dairying, Shinfield, Reading. Subscriptions (for non-members of the society) £3 per volume of four quarterly parts, or £1 for each separate part) should be addressed to the Cambridge University Press, 200, Euston Road, London, N.W.1.

Corrigendum.—Sir Adolphe Abrahams writes to point out that the diagrammatic representation of irregularity of living in his article on Chronic Fatigue (*Lancet*, 1945, ii, 421) was wrongly attributed to Richard Cabot. The figure was inspired by the frontispiece of Cabot's book *What Men Live By*, but was the work of Dr. E. J. Kepler (*Proc. Mayo Clin.* 1942, 17, 340).

Diary of the Week

APRIL 20 TO 26

Monday, 21st

ROYAL COLLEGE OF SURGEONS, Lincoln's Inn Fields, London, W.C.2
5 P.M. Mr. Rainsford Mowlem: Replacement of Skin Loss in Traumatic Injuries.
6.15 P.M. Prof. R. R. Macintosh: Anaesthesia in Abdominal Surgery.

Tuesday, 22nd

ROYAL COLLEGE OF SURGEONS
6.15 P.M. Dr. Geoffrey Organe: Anaesthesia in Thoracic Surgery.
ROYAL SOCIETY OF MEDICINE, 1, Wimpole Street, W.1
8 P.M. *Medicine.* Dr. Geoffrey Evans, Mr. A. Dickson Wright, Dr. C. Wyndham: Management of Patients with Essential Hypertension.
UNIVERSITY OF EDINBURGH
5 P.M. (University New Buildings.) Dr. C. H. Kellaway, F.R.S.: Perfusion Experiment in the Study of Tissue Injury. (Sharpey-Schafer lecture.)

Wednesday, 23rd

ROYAL COLLEGE OF SURGEONS
5 P.M. Mr. Julian Taylor: Surgery of the Anterior Cranial Fossa.
6.15 P.M. Dr. Bernard Johnson: Intravenous Anaesthesia.

Thursday, 24th

ROYAL COLLEGE OF SURGEONS
5 P.M. Sir Lionel Whitby: Blood Transfusion.
6.15 P.M. Dr. Stanley Rowbotham: Anaesthesia in Thyroid Surgery.
ROYAL SOCIETY OF MEDICINE
8 P.M. *Urology.* Mr. H. Hamilton Stewart: Treatment of Hydronephrosis associated with Abnormal Vessels.
MEDICO-LEGAL SOCIETY
8.15 P.M. (26, Portland Place, London, W.1.) Mr. David Mace, F.H.D.: Marriage Breakdown and Divorce.

Friday, 25th

ROYAL COLLEGE OF SURGEONS
6.15 P.M. Dr. W. S. McConnell: Anaesthesia in Thyroid Surgery.
UNIVERSITY COLLEGE, London, W.C.1
5.15 P.M. (Department of Pharmacology.) Mr. J. F. Danielli, D.Sc.: Cell Physiology and Pharmacology (first of six weekly lectures).
BRITISH ORTHOPÆDIC ASSOCIATION
9.30 A.M. (Washington Singer Building, University College, Exeter.) Mr. G. R. Girdlestone, Mr. Norman Capener, Mr. M. C. Wilkinson, Mr. J. P. Campbell, Mr. B. L. McFarland, Mr. J. A. Cholmeley: Surgical Treatment of Tuberculosis of Bones and Joints.

Saturday, 26th

BRITISH ORTHOPÆDIC ASSOCIATION
10 A.M. (Royal Devon and Exeter Hospital.) Short papers.
MEDICAL SOCIETY FOR THE STUDY OF VENEREAL DISEASES, 11, Chandos Street, W.1
2.30 P.M. Sir Weldon Dalrymple-Champneys: Epidemiological Control of Venereal Diseases.

SURGICAL HANDICRAFT*

Sir HENEAGE OGILVIE

K.B.E., D.M., M.Ch. Oxf'd, F.R.C.S.

SURGEON TO GUY'S HOSPITAL; CONSULTING SURGEON TO THE ROYAL BUCKS HOSPITAL, AYLESBURY

SURGERY began as a handicraft. In ancient times it was conducted by journeymen who plied their simple trade, often coupled with that of the barber, at fairs and inns. Gradually, through the vision and by the labours of a series of guilds and corporations to which this College stands in direct succession, it was elevated from a humble craft to a science and art. Within the last few years British surgery has attained a level higher than it has ever reached before; we have hitched our wagon to a star; let us see that the wheels are well planted on the road.

I speak of the craft of surgery, for the word craft retains unsullied its honourable tradition of sound work well done, whereas the word "art" is dragged down under the weight of those who claim its appellation. The hairdresser, the crooner, the juggler, the Hollywood extra, are all artists, whereas the watchmaker, the plumber, the smith, the carpenter, and the shipwright are proud to remain craftsmen. A surgeon, like a shipwright, must consider the design and purpose of the task he is about to undertake, his materials, his tools, the arrangement of his workshop, and the training of his assistants. His aim is the same, to please the customer.

The tasks we undertake in surgery are five:

- (1) We incise; to gain access to all deep regions, to drain abscesses, to remove stones, and to provide an outlet to the surface.
- (2) We excise tumours and dead or unhealthy tissue.
- (3) We repair damage; we stop hæmorrhage, close perforations, approximate fractures, suture tears, and close the incisions we ourselves have made.
- (4) We remodel, to restore form on the surface of the body, or function in its deeper structures.
- (5) We transplant, to substitute what we may for that which has been lost.

The tissues that are the material of our craft are for the most part skin, fat, connective tissue, muscle, and bone.

SKIN

Skin is the ensheathing coat, the doorway to the rest of the body. A wound is not healed till the skin is healed, nor is its sterility secure till the skin-cover is complete. Skin consists of a tough felting of connective tissue with an epithelial cover. It possesses a considerable amount of elasticity, but this elasticity varies from place to place, according to the functional needs of the part.

The elasticity of the skin is a necessary quality in the external envelope of a body that grows, moves, and constantly alters the position and contour of its component parts. A cut in the skin tends to gape. An excised Wolff graft is smaller, and the hole left behind is larger, than the pattern originally marked on the surface (fig. 1). The elasticity varies from place to place according to the functional needs of the part. Over the abdomen it is well marked, to allow room for the constantly recurring expansion of respiratory movement, the frequent distension of meals, and the occasional encroachment of babies; over the back it need not, and therefore does not, stretch to any great extent. The elasticity is graded not merely to the extent but also to the direction of the stresses. Over parts that move, the skin must be able to stretch during extension and take up the slack during flexion, to twist during rotation, and always to return to the position of rest, which for any part of the body is usually that assumed in sleep.

* Bradshaw lecture delivered at the Royal College of Surgeons on Nov. 14, 1946. 6452

But elasticity alone could not adapt the skin to the flexure surface of a hinge joint, where the tendency to shorten would make it bridge the angle during flexion and come away from the surface. This tendency is counteracted by the flexure creases which appear in the skin at all joints (fig. 2). As Wood Jones has pointed out, these creases are planes of stasis where the skin is anchored by a web of fibrous tissue that extends through the fatty layer to the deep fascia.

Incisions.—The first step in any surgical operation is an incision through the skin, and the last step is suture of the skin so that the least possible trace of the operation in altered function or visible scar remains. The patient will judge the success of the operation by the appearance of the scar rather than by what has been done beneath it.

An incision must give access for the operation that is to be performed; but, in planning it, the functions and movements of the skin in that part and the need to suture it exactly as it lay before must be borne in mind. In general, incisions should be made across lines of tension, particularly over the flexures of joints, where the movement, the elasticity to accommodate it, and therefore inherent tension are always greatest—i.e., in places like the front of the neck and the lower half of the abdominal wall (fig. 3). By cutting across lines of tension the elasticity of the skin in that line is interfered with only by the width of the inextensible scar, which with first-intention healing is measured in fractions of a millimetre rather than by its length, which always extends in inches. What is functionally desirable may not always be anatomically possible. Transverse incisions over Scarpa's triangle are excellent for any approach to the vessels, but of little value as an approach to the underlying hip-joint. Transverse incisions over the distal joints of the limbs are limited in length by the need to avoid the sensory nerves and surface veins that run longitudinally, and are suitable for small and superficial operations only. Where possible an incision should be made in a natural crease, for only where a surgical scar corresponds to a physiological one can it achieve perfection—perfect invisibility and function perfectly restored.

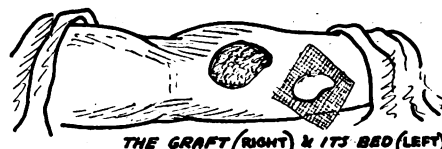
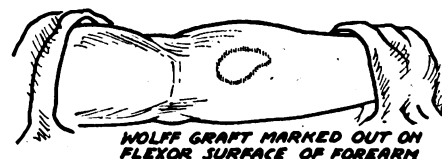


Fig. 1—Shrinkage of graft when excised.

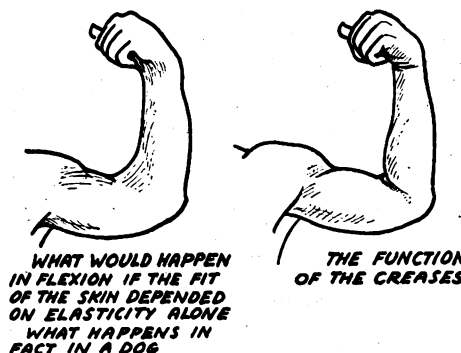


Fig. 2—Function of creases.

possible an incision should be made in a natural crease, for only where a surgical scar corresponds to a physiological one can it achieve perfection—perfect invisibility and function perfectly restored.

The incision having been planned, care must be taken before making it to ensure that when sutured the two edges shall lie exactly as before. The elastic skin over any part tends to return to the position of rest, which is not necessarily the extended and supine position of a patient on the operating-table, and, when cut, the two edges may take independent directions (fig. 4). To ensure that they are brought together by suture as they lay before incision, they must be marked by lines drawn across the site of the cut before it is made. These marks are usually made by scratches, an effective method but a crude one, for the scratches often show permanently, and being in tension lines occasionally become keloid. They should be made with a dye such as Bonney's blue, drawn in bold strokes across the skin with a poster nib.

Sutures.—In suturing, the superficial fascia as well as the skin should be brought together accurately with a

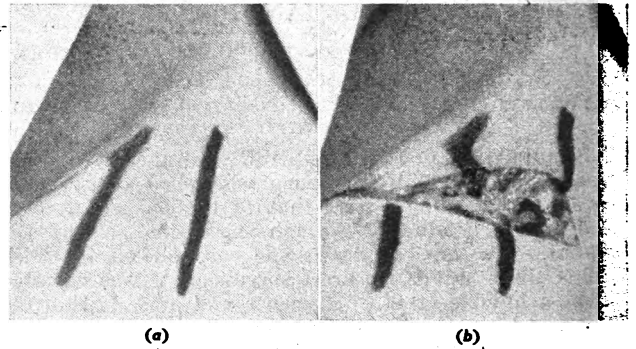


Fig. 4—Method of obtaining correct apposition of skin in suturing: (a) lines marked with dye before incision; (b) distortion of skin after incision.

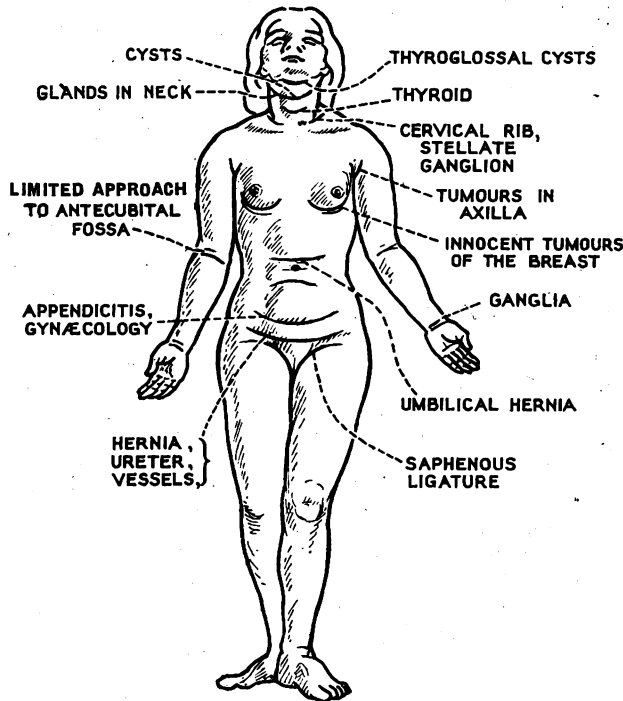


Fig. 3—Incisions.

tension that keeps them in apposition but does not interfere with their blood-supply. The same stitch cannot bring the deeper layers together as well as the superficial unless it embraces them in a wide sweep, when it will be too far from the skin edge to secure exact epithelial apposition (fig. 5A). Methods that appose the skin edges exactly, particularly Michel's clips, leave spaces in the subcutaneous layers in which infection may appear, and which in any case leave a broad band of scar tissue in the deeper layers (fig. 5B). The use of separate suture for the subcutaneous and cutaneous layers is undesirable, for fat resents buried foreign material (fig. 5C). A continuous suture is easy and rapid, but is not accurate anywhere unless it is a blanket stitch, for the material is inserted as a spiral whose coils are nowhere opposite each other, and tightening approximates the ends of the incision, not its edges (fig. 5D). The best method is probably to insert a series of tension stitches at intervals of about an inch, including all layers and piercing the skin about half an inch from the incision, and to approximate the skin by other stitches between these (fig. 5E).

Skin cannot be sterilised except temporarily and on its surface. Stitches passed through its thickness traverse the deeper layers, where sweat and sebaceous glands harbour resident organisms, and form a track along

which these organisms may spread. Infection along a stitch track is largely mechanical. Suture materials with a mesh—e.g., silk, linen, and cotton—form a wick that absorbs tissue fluids, giving not merely a path to bacteria but also food for their journey. A thick strand makes a larger hole and is likely to perforate more glands and allow more bacteria through than is a fine one. The impervious monofilament suture materials are in theory the best, and in practice they seem to give healing with least reaction and to leave no stitch marks if they are removed early. The favourites of the moment, nylon and steel wire, both have disadvantages: nylon is not very strong, and will not tie securely with a single reef knot; and steel wire can only with difficulty be prevented from kinking. Fine selected silkworm gut is hard to beat.

FAT

Fat in the body has three main purposes. First, it is a heat insulator. Man is almost unique among land mammals in using fat for this purpose. Other land mammals, indeed all warm-blooded creatures who live in the air, use the non-conducting properties of air for

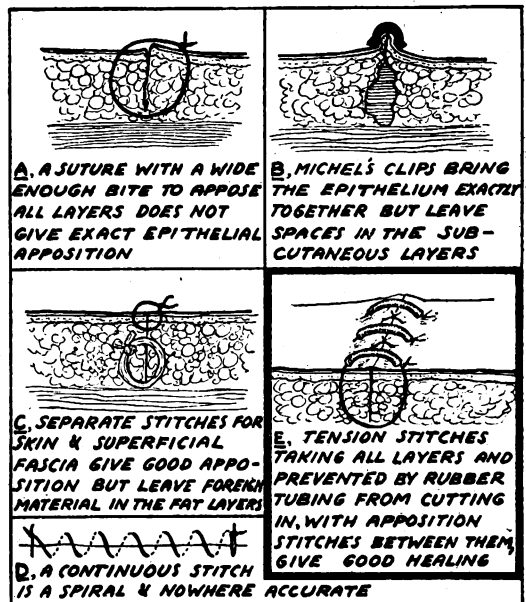


Fig. 5—Sutures.

heat protection by trapping a layer of it round their bodies in fur or feathers, and by varying the thickness of the layer to suit the needs of the moment. The human being who loses his fat loses his human appearance. The very old man or the starved child looks like a monkey.

Secondly, fat is a store of fuel to be drawn on when food is lacking.

Thirdly, fat, combining the displaceable qualities of a fluid with the permanence of a solid, is used as cushioning material, to bear weight, as over the heel and the tuber ischii, to allow structures to move or change their shape in a confined and rigid space, and to protect vessels and nerves exposed to sudden angulation near a joint.

Fat has a scanty blood-supply and therefore a poor resistance to trauma and infection. It must be treated gently, cut cleanly, not torn or undermined. The fatty layers of a wound should be drained under conditions of contamination in which more vascular tissues could be trusted. Fat is on the whole the enemy of surgical handicraft. It tends to alternate with connective tissue in the interspaces of the body, such as the subcutaneous layers and the mesenteries. Where there is little fat there is much fibrous tissue and stitches hold well; where there is much fat blood-vessels have hardly any adventitious sheath, and tear easily or slip out of ligatures, and stitches tend to cut out.

CONNECTIVE TISSUE

Connective tissue is the framework of the body, the limiting agent that draws a boundary line between one

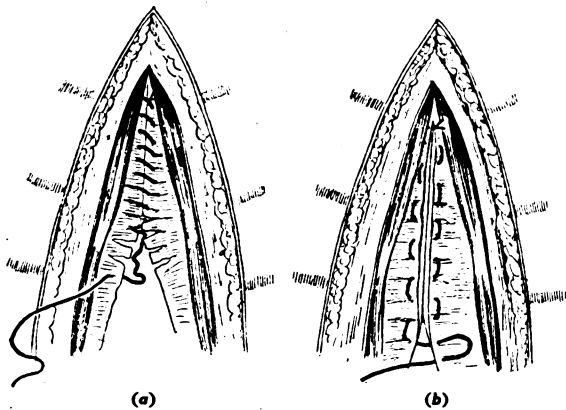


Fig. 6—Suture of posterior rectus sheath: (a) over-and-over stitch; (b) running mattress stitch.

structure and the next, the clothing agent that furnishes the uniform in which each organ serves, the strengthening agent that gives the necessary toughness to more specialised tissues. It provides the sheaths of muscles, nerves, and blood-vessels; the capsules and ligaments of joints; the envelopes of glands; the aponeuroses and tendons of muscles. It gives toughness to epithelial mucous and serous coverings and linings, whose surface cells give the special properties of lubrication, secretion, and resistance to infection. It is the only structure that holds stitches. Where there is no connective tissue, as in the brain, suture is impossible: where there is little, as in the liver and kidney, it is difficult. Connective tissue is a simple structure needing very little blood-supply. For this reason it is very viable and can be transplanted. For the same reason it has a low resistance to infection; but, since it usually occurs in thin sheets accompanying more vascular structures, it does not slough like fat. When infected it may take many months to sequestrate.

The properties of connective tissue as the basic material of surgical handicraft vary with its site and function. The derma is a felt-work, equally strong in all directions. It can and does stretch, and is therefore unsuitable for transplants where strength is desired. Tendons and aponeuroses consist of parallel fibres laid down in the line of strain and are strong in the line of their fibres but easily torn across it. The posterior rectus sheath and Poupart's ligament are examples of connective-tissue structures constantly encountered by the surgeon that

are strong in one direction only. To obtain adequate access, the posterior rectus sheath must usually be divided across its fibres, and the cut edges therefore offer very little hold to sutures, which tear out if there is any tension (fig. 6a). Here a running mattress suture (where, instead of a single stitch pulling in the line of

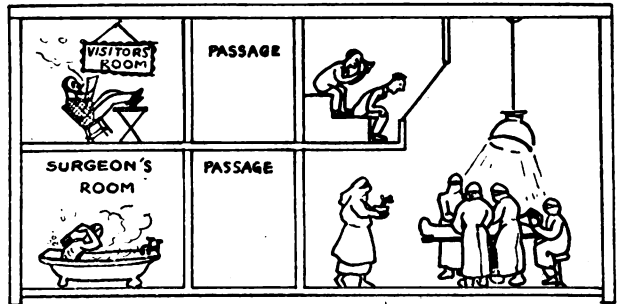


Fig. 7—Scheme for theatre and spectators.

the fibres, a loop holds a bunch of fibres securely and everts the peritoneum) is the one workmanlike method of approximation (fig. 6b). No surgeon would willingly cut across Poupart's ligament, but all must use it as the inferior anchorage of any reconstruction of the inguinal canal. For such work, living sutures, such as pedicled strips of external oblique, and transplanted strips of fascia lata, have the considerable disadvantage that their necessarily coarse calibre splits the ligament into a leash of separated fibres. For these reasons many surgeons prefer foreign suture material of finer calibre. Where aponeuroses are felted, as are the layers of the rectus sheath at the linea alba, stitches hold well. Scar tissue is usually felted and gives secure anchorage.

MUSCLE

Muscle, unlike skin, fat, and bone which are structural, is a functional tissue. Muscle which does not function because its nerve-supply is cut dies as surely as if it is deprived of blood. Muscular tissue has an abundant blood-supply on whose uninterrupted continuity its survival depends.

Free incisions into a muscle may lead to the death of a segment by cutting the vessels that supply that part;

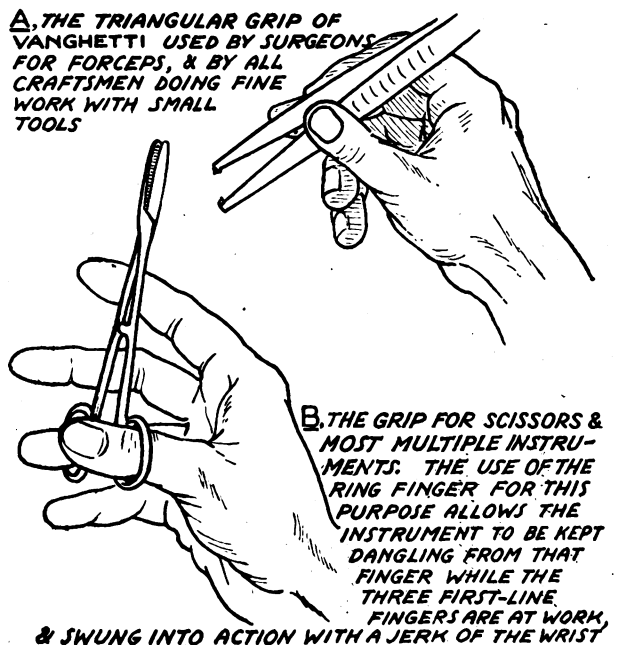


Fig. 8—Two main grips used in holding surgical instruments.

rough handling and strangulation by sutures tightly tied may do the same. On the other hand, muscle with its free blood-supply offers a high resistance to infection, and its cut surfaces heal rapidly if approximated without tension or strangulation. Septic conditions in the abdomen should therefore be approached by incisions through muscles rather than through fibrous planes. A colostomy should be brought out through muscle to avoid sepsis and fibrosis. Muscle cannot be transplanted as a free graft, but a strip whose blood-supply is preserved may be swung as a pedicled graft to fill a cavity.

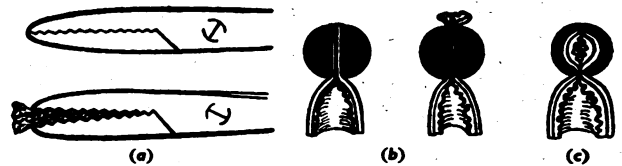


Fig. 11—Forceps blades : (a) above, forceps with blades closed ; below, forceps with blades forced apart by included tissue ; (b) hold given by blades of normal design ; (c) hold given by blades of trap-jaw pattern.

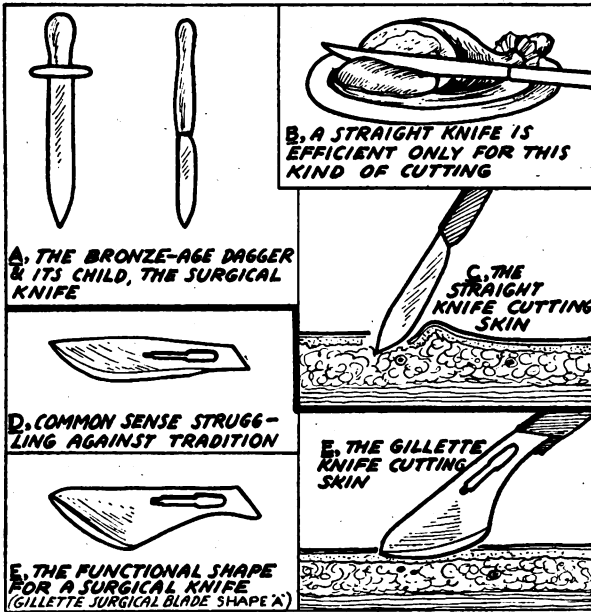


Fig. 9—Knives.

BONE

Bone is specialised connective tissue and has many of the same properties: the strength, the ability to hold fixing materials, the low blood-supply, the poor resistance to infection, the transplantability. It differs in being rigid. It cannot be bent, and a bone surface can be approximated to another surface of bone or soft tissues only if the two are a mechanical fit. Its properties are partly those of hard wood, like oak or teak, partly those of stone or concrete. Long bones and young bones are more like wood, square bones and old bones like concrete.

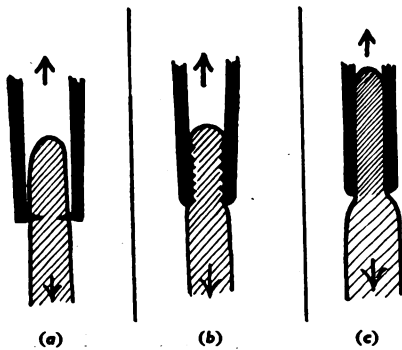


Fig. 10—Holding instruments : (a) instrument with points can grip without pressure ; (b) instrument with serrated jaws can grip with light pressure ; (c) smooth instrument can grip only with strong pressure.

OPERATING-THEATRE

These then are our main materials; what of our workshop, the operating-theatre? The design is a matter of functional needs, individual preference, and architectural fashion, but it must meet certain requirements. The air in the immediate neighbourhood of the

wound must be sterile or at least free from pathogenic organisms, and the temperature must be warm enough to conserve the body heat of the patient, yet cool enough to allow the team to work without

exhaustion. The lighting must be adequate and dirigible on the operating field from all points of the hemisphere above it.

The first essential in an operating-block is that the theatre and its annexes must be accessible only to sterile materials and "sterile" personnel, that is to the patient and the operating team. Spectators must be on another floor reached by another staircase or lift (fig. 7). This arrangement not only avoids unnecessary contamination of the air and furniture of the theatre but also gives better facilities for instruction. The spectators' gallery, sealed off from all air communication, can be brought right over the operating-table so that the visitor can look into the depths of the wound instead of over its edge, as he does when he stands beside the team, and with field glasses he can see detail as well as the surgeon can. In the near future television installed in the lamp assembly will allow any number of spectators to get the same view. The separate gallery does more than reserve the theatre for its proper purpose; it becomes part of an instruction floor where demonstrations and exhibitions can be arranged for visitors between operations.

The air on an upper floor, where theatres are usually built, is practically free from organisms. Airborne

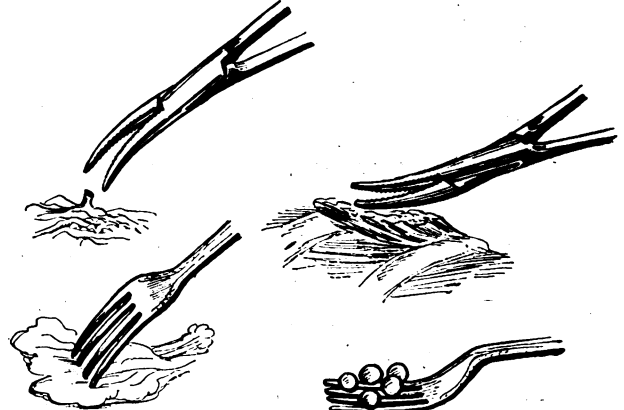


Fig. 12—A hemostat, like a fork, should be inclined so that it can be used at right angles to a surface or parallel to it.

infection comes from dust, which in turn accumulates on projecting fittings and is distributed by air currents, and from droplet infection. Fittings, such as cupboards, stoves, and shelves, have disappeared from any modern theatre, and those that remain, such as X-ray viewing screens and electric fittings, can be flush with the walls. Many of the projections that accumulate dust, and many of the air currents that distribute it, are bound up with the lighting, ventilation, and warming of the theatre. Air-conditioning, serving at one time the needs of ventilation, temperature regulation, and air purification, solves most of these problems, since pipes and hot panels disappear and air currents are diminished and predictable. Whether windows should disappear is debatable, but they probably will. Daylight is inferior to a properly designed lamp, and it cannot be laid on or varied at will. A lighting system can be exteriorised, and the only furniture that must remain in the theatre is the operating-

table, the anaesthetist's stool and apparatus, and the instrument stands.

INSTRUMENTS

In this workshop we do our tasks of incision, excision, repair, and reconstruction, and in doing them we must cut, pick up, hold, crush, fix, and join the tissues which are our materials. Special instruments are needed to cut, hold, and fix bone with its special properties; for the sake of brevity and simplicity we will leave these out and consider only the craft of soft-tissue surgery. In this we use a knife to cut skin, and scissors to cut fascia or sutures; dissecting forceps to pick up; tissue forceps for a gentle hold, and haemostats for a firm one; Ochsners to hold or crush, and needles to sew. These are our

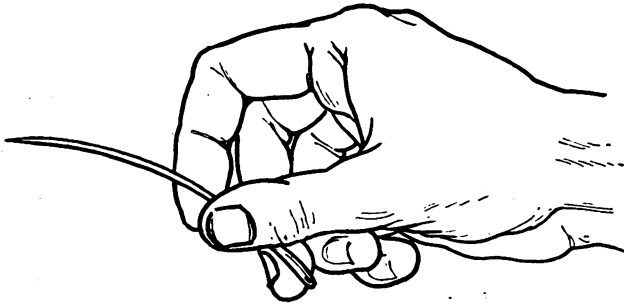


Fig. 13—Three-finger grip for hand sewing.

basic tools, though we must have others, such as towel-clips and needle-holders, and a few one-purpose tools for special jobs.

The aim of every craftsman should be to do the best work he can. Skill comes with repeated performance, and a surgeon can increase the number of times he does any particular thing either by doing everything more often or by limiting the number of things he does. The second alternative is the more practicable. He can limit the number of different instruments he uses and limit the types of movement his hands are called on to perform.

Two movements are in constant use in surgery: the opposition of the thumb to the index and medius, with which spring tools, such as dissecting forceps, are held (fig. 8A); and the abduction and adduction of the thumb opposite the radial side of the curved and fixed index, medius, or annularis, with which hinged instruments, such as scissors, haemostats, and needle-holders, are opened and closed (fig. 8B). By limiting his designs to these two movements, the surgeon can hope to make his fingers automatically dexterous; but, if he uses needle-holders that close with a whole palm grip and open with a further squeeze, or dissecting forceps that open

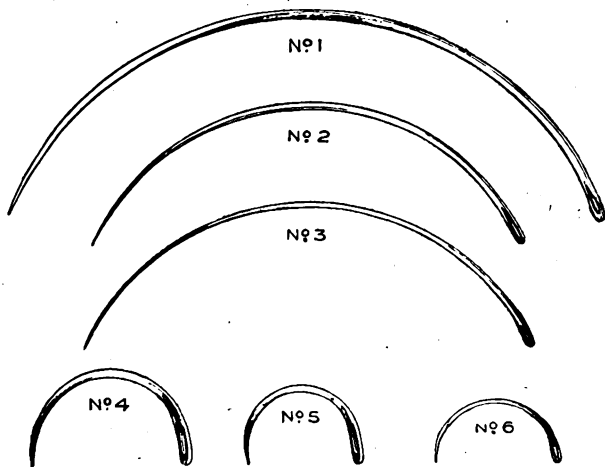


Fig. 14—Standard needles.

with pressure and close with a spring, he tends to confuse the association centres of his parietal cortex.

Having selected his design, he should decide on the pattern, weight, length, and curve of each that is most suitable to his requirements, and see that only these are given to him when he operates. To be put off with an odd assortment, to accept different patterns at different hospitals,

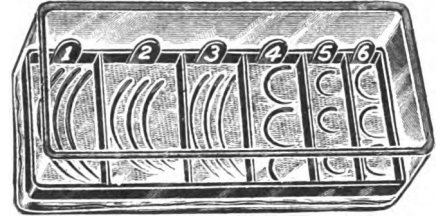


Fig. 15—Needle grid and box.

is to abandon all hope of acquiring that instinctive control of the working end of his tools that is the hallmark of a skilled craftsman.

Cutting Instruments.—Surgical knives are as traditional as the black silk scarf of the sailor, which was introduced to protect his collar from the grease on his pigtail. The shape is that of the sword or dagger, an instrument designed in the Bronze Age to stab but only occasionally to cut (fig. 9A). A knife cuts with its edge, and a straight knife should therefore be used only to cut a rounded surface (fig. 9B) raised to waist level, such as a ham, a loaf of bread, or a limb to be amputated, or to take a

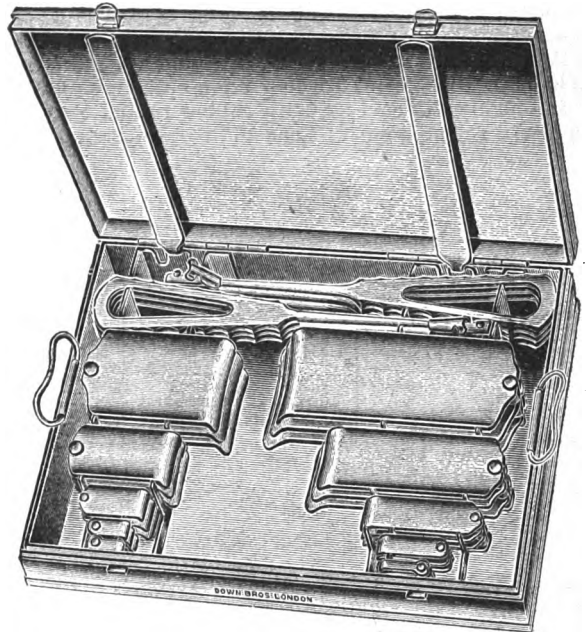


Fig. 16—Detachable retractors in case.

shaving from a flat surface in the horizontal plane, as in skin grafting. In most surgical manoeuvres the knife is held at about 30° to the surface to be cut, so that the effective edge is a short section near the tip, beyond which the point projects to an unknown depth (fig. 9C). Surgical manufacturers have tried to introduce sense without offending tradition by making a knife with a rounded belly (fig. 9D), but this is no more than a timid move in the right direction. The correct blade was designed shortly before his death by Cecil Joll, and is made by Gillette Bros.; it fits a Bard-Parker handle and, when held in the usual working position, its cutting edge is parallel to the skin (fig. 9E).

Holding Instruments.—These must pull structures out of the place in which they lie and to which they tend to return. They must therefore take a grip, which will

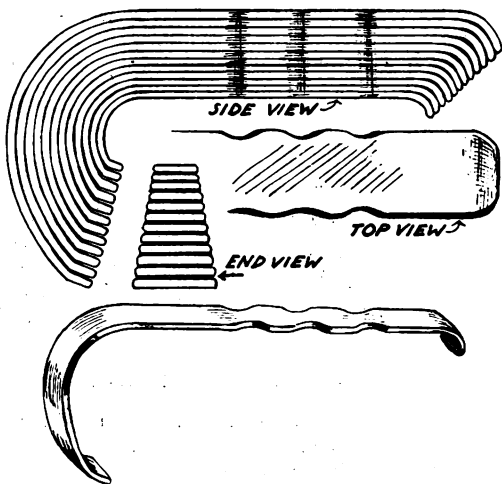


Fig. 17—Nested retractors of new design.

depend for its security either on surface friction or on contour deformation. The better the surface grip, the less need there is for deformation—i.e., for pressure. Instruments intended to hold tissues gently must therefore be able to grip their surface, or even have points to prick it (fig. 10a), for a small prick does much less harm than a wide or heavy crush. A stitch through the tongue will hold it out with little damage, a spade-shaped tongue forceps will leave it bruised for days. Intestinal clamps have been carefully designed with little ridges, like the papillary markings on a finger-tip, to hold intestine firmly without undue pressure (fig. 10b); if the blades are covered with rubber tubing they must be closed to the point of ischæmia to give the same grip

been applied to dissecting forceps, hæmostats, Mayo-Ochsners, and gall-bladder forceps.

With hæmostats we must also consider the curve. As in the knife, they should be so designed that their working end is correctly aligned when the surgeon's hand and arm are in their position to function. A hæmostat is used either for picking up small vessels, when its points are applied at right angles to a surface, or for gripping wide oozing areas, when its blades are closed parallel to a surface. For both purposes a straight instrument is wrong. A straight instrument is suitable for transmitting a push or a pull in its long axis; one that is used for more skilled purposes is given a functional inclination. An arrow, a spear, and a ramrod are straight; a scythe, a golf-club, a hockey-stick, a spoon, and a fork are curved. An aspirating needle must be straight to push and a tissue forceps or Mayo-Ochsner to pull, but a hæmostat should have a curve or angle of about 30° on its blade, to make it suitable, like a fork, for application in either plane (fig. 12).

Sewing Instruments.—Sewing is one of the most important tasks in surgery and, for a man, one of the most difficult. It is therefore one in which the surgeon must at the outset select his methods and his instruments, so that he may by repetition ultimately come within reasonable distance of the skill with which his wife darns his socks.

First he must decide whether he intends to be a hand sewer or a user of needle-holders. Every surgeon must be prepared to work with a small curved needle and a needle-holder in inaccessible places. Many, particularly those who have the whole-time service of an expert theatre team, prefer to use a needle-holder for all sewing, since it uses the same movement, a half-turn of the wrist, all the time.

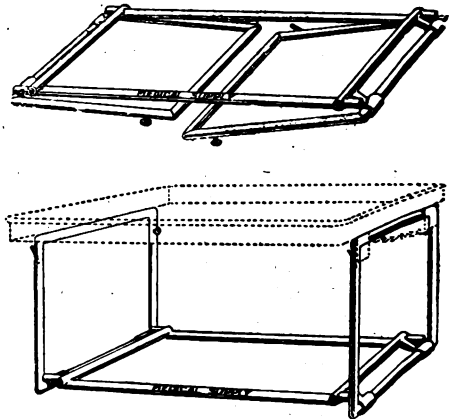


Fig. 19—Folding stand for tray.

The man who prefers interrupted sutures likes to work with a needle-holder. The surgeon who works with a continuous suture prefers sewing with his fingers, which brings him nearer his work by the length of a needle-holder and gives a more delicate control of the movements of the needle point and a more accurate estimation of the tension of the sutures. Hand sewing is on the whole neater and faster.

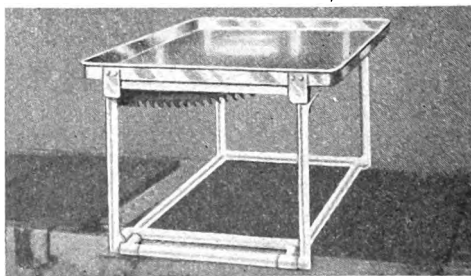


Fig. 20—Instrument tray and stand.

Having decided his method, the surgeon must select the shape, diameter, and length of the needles he will use. For hand sewing a straight needle should be the best. It is the shape that women use. It is propelled by a thrust along its length; and, while it is being propelled,

ASSISTANT

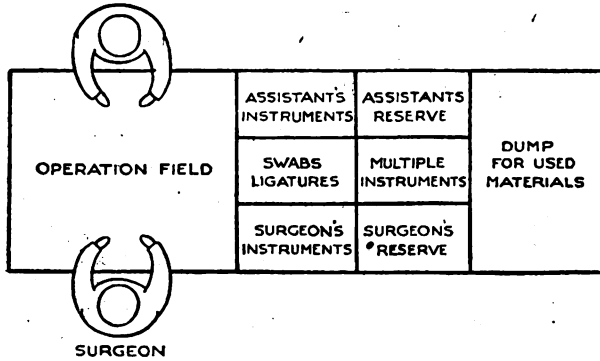


Fig. 18—Lay-out of operating-table.

(fig. 10c). When damage to included tissue is intended or unimportant, holding and crushing become synonymous. Holding forceps, such as hæmostats, Mayo-Ochsners, or gall-bladder forceps, depend for their security on the forcible apposition of their jaws. When hinged blades are applied forcibly they are kept apart by the tissue compressed between them in a gap which is wedge-shaped, holding the gripped tissue firmly at the hinge end and less firmly towards the points (fig. 11a and b). Even when the surfaces are roughened or corrugated they are unable to hold securely a tube like the duodenum, the appendix, or the cystic duct, if it is cut off flush with the blades. Only when a flange of uncrushed tissue is left projecting beyond is the hold safe. I have lately redesigned my holding instruments on what I call the trap-jaw principle. The blades are hollow, with a narrow rounded rim. The rim holds a strip of tissue in compression, while the hollow accommodates an uncompressed part that prevents slipping in the same way as does a projecting flange of tissue in the usual design (fig. 11c). The trap-jaw principle has

the direction of its travel and the site of its point are exactly known. But women have their sewing on their laps, and they work on fine flexible fabrics. A straight needle cannot be used in the depths of a wound, and it can be made to take a small bite only if the tissue through which it is being thrust is folded. Curved needles may be of any length, diameter, or curve. The more open the curve, the more do they partake of the advantages and drawbacks of a straight needle—i.e., the more easily are they propelled, the less are they suited to taking up a small bite of tissue and to working in a hole.

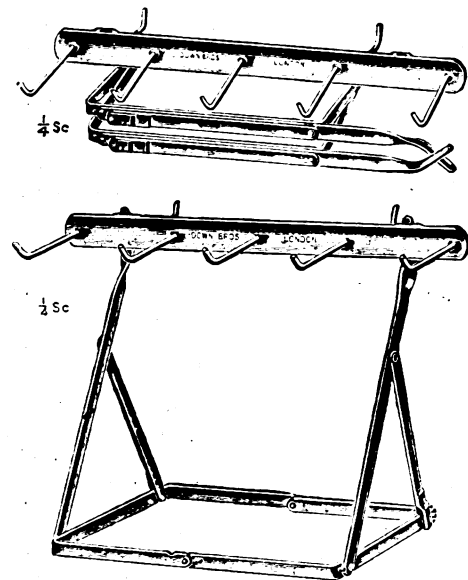


Fig. 21—Instrument rack.

The shape of a needle concerns the surgeon. The diameter affects the tissues through which it passes and the suture material that passes through it. A fat needle is the tool of a fat-head; it makes big holes and is no stronger than a thin one made of good steel. Needle

makers seem to work on a scale of gradations, their needles of any particular pattern increasing in thickness as they do in length, so that the larger sizes are quite needlessly coarse. The correct diameter of a needle is that which will carry an eye that is an easy fit for the thickest suture material to be used with it. An eye that is only just large enough makes the suture stand out on each side and tear the tissues; one that is too large allows it to drop out.

A needle must be long enough to take a reasonable bite of tissue, while at the same time enough of the eye end remains behind to be held, and enough of the point projects beyond to be grasped. If a reasonable bite of tissue is assumed to be 1/4 in., a needle for use with a holder requires at least another 1/4 in. proximally and distally to be grasped with the needle-holder, whereas one worked with the fingers requires 1 1/4 in. proximally to allow the three-finger grip (fig. 13) which is necessary

for accurate control, and 1 in. distally to be seized with the fingers. A needle for use with a needle-holder has therefore a minimal length of 3/4 in., and one used for hand sewing a length of 2 1/2 in.

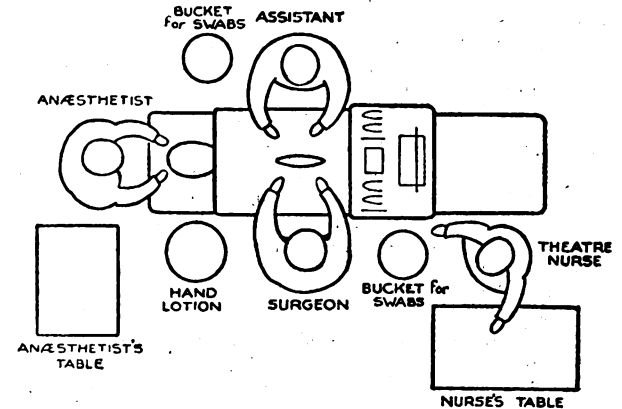


Fig. 23—Arrangement of theatre.

I decided many years ago that for hand sewing a 3/8 circle was best, a compromise between the straight and the curved: straight enough for control, curved enough for use in a deep wound. I required three needles all having the same length and curve: no. 1 triangular pointed to take stout silkworm gut; no. 2 round-bodied to take no. 1 catgut for peritoneum, aponeuroses, and soft tissues; and no. 3 to take 00 catgut for intestinal suture. All standard needles (fig. 14) of this length and curve were absurdly stout, and the patterns I required had to be specially made. For use with a needle-holder I chose three half-circle needles: no. 4 to take no. 1 catgut; no. 5 to take 00 catgut; and no. 6 a cutting needle for use with gossamer silkworm gut. The small needles have a flattened shank beyond the eye, so that they do not turn in the needle-holder. These six needles have now been standardised for ten years and are sold by the Medical Supply Association Ltd. as Ogilvie needles 1 to 6.

Having elected to work with needles of two shapes only, I found that the two groups of three, each roughly of the same length and curve, tended to confuse sisters unaccustomed to working with me. To solve this difficulty I ordered a small plated frame with numbered compartments that can be dropped into any needle-box (fig. 15). Each needle lies in its own compartment, and now, when I ask for no. 3 needle in Southwark or Somaliland, I get the exact curve and diameter I have been using since 1930.

Fig. 22—Lay-out for gall-bladder operation. A detailed diagram of a surgical instrument tray for a gall-bladder operation. It lists various instruments: Plain Forceps, Toothed Forceps, Stitch Scissors, Retractors (4 Towel Clips, 6 Doyen Towel Forceps, 2 Towel Clips), Lane Tissue Forceps (3), Spencer Wells (1 doz.), Mayo Ochsners (6), Moynihan Gall Bladder Forceps (4), Michel Clips, Bile Duct Probe, Plain Forceps, Toothed Forceps, Mayo Scissors, Knife, Swabs, Catgut Reel, Suture for Rectus Sheath (3 Tension Sutures), Suture for Peritoneum, Suture for Gall Bladder Bed, and Purse String for Appendix.

Fig. 22—Lay-out for gall-bladder operation.

Retractors.—A lesser difficulty, but one that must be faced, is the selection of retractors. An operation that is difficult without adequate retraction becomes simple if the right retractors are available. The right retractor is one exactly suited in width and depth to the tissues to be retracted. To provide all the retractors that may be wanted for every stage of every operation is almost beyond the resources of the average hospital, and to have the right one available just when it is wanted will tax the ingenuity of even the best theatre sister. The answer lies in a graded set that can be nested together. Nine years ago I designed a set of retractors with detachable blades and handles (fig. 16). This set is nested in a tray and can be sterilised and kept on a corner of the instrument table, ready to make up any retractor that is demanded. This year I have produced a simpler set of retractors of the curved shape usually known as Deavers (fig. 17). This is easier to make and therefore cheaper than the detachable set, and it provides twelve retractors: the largest suitable for resections of the rectum; the intermediate for gall-bladder or stomach surgery; and the smallest for operations in the neck or on the limbs.

LAY-OUT

The craftsman has the job on hand on his bench. Two or three tools with which he is working at the time are in his hand or beside him; the remainder are in shelves, trays, or racks close at hand, each with its own labelled place to which it is returned after use.

The surgeon's work-bench is his operating-table, and his material the body of the customer who has brought him the job to do. For tidy work, the table with the patient on it should be divided into three zones: the operation field, the reserve of instruments, and the dump (fig. 18). The first should contain only those instruments in use at the time; the second corresponds to the carpenter's tool rack and carries all the instruments and materials that may be wanted; the third is for soiled or discarded implements. The instrument zone is further subdivided into six areas: one side belongs to the surgeon, one to the assistant, and the middle is common ground, while each of these territories has a front half for things in constant use, and a back half for reserve instruments.

The technical problems involved are the provision of a stable platform for the instrument zone, and the arrangement on that platform of all the different things that may be required. They have been solved in my workshop by the stand, the tray, and the instrument rack. The stand (fig. 19) is a simple tubular frame that folds flat for transport and lies under the rubber mattress of the operating-table, with the sides hanging down when not in use. It can be put at any part of the table suited to the operation, and when erected forms a rigid support for the tray (fig. 20). The tray is an aluminium rectangle with sides 1 in. high, carrying underneath four angle-pieces to fit the sides of the stand. The instrument rack (fig. 21) consists of a horizontal bar carrying five pegs facing forwards and two short ones facing backwards. This bar is supported on trestles springing from a rectangular frame which serves as a base. The whole folds up for sterilising but is rigid when put together. The instrument rack serves as a magazine for multiple instruments, towel-clips, tissue-forceps, hæmostats, and so on, whose proper place is in the back half of the intermediate zone. The back pegs are intended to take a strip of gauze in which threaded needles can be placed ready for the surgeon. The exact arrangement of materials on the tray and of instruments on the rack is a matter for individual preference, and the diagram (fig. 22) of my own arrangement for a gall-bladder operation is merely intended to show the equipment in use.

In practice the system allows the team to have in the operation area only the tools actually being used and one clean swab piece. When an instrument is finished

with, it is laid in its place on the tray if a "first-line" instrument (knife, scissors, dissecting forceps, ligature reel), and given to the nurse if it is a multiple instrument or dirty. The nurse's duties are merely to see that the stock of swabs and ligatures in the intermediate zone is replenished, to wash instruments given to her and return them to their appropriate place or peg, and to have threaded needles ready (fig. 23). The surgeon used to the system gets precisely the same service wherever and with whomsoever he works. He comes to know the place of everything by instinct and, without taking his eyes off the wound, can reach out and get the exact instrument he wants.

ENVOI

These are the materials and the tools of our craft. We shall undertake more ambitious tasks as new discoveries bring better tools and methods to our workshop, and we shall do them better as craftsmen from all countries pool their designs and their experience. But our aims must remain the same: to treat each customer as if he were the most important man in the world, and to do the job he entrusts to us as well as we can; to divide tissues cleanly and gently, so far as possible along anatomical planes; to forestall hæmorrhage by seizing every vessel as it is encountered and by ligaturing it with the finest material; and to close the wound by anatomical reconstruction and to obliterate all dead space without tension or strangulation of living tissue by tight sutures. Our patients should return to bed showing no more than the normal physiological reaction to trauma, a reaction from which they will recover in a few hours. Our wounds should heal without incident. Our scars should be a pink hair-line in ten days and should be invisible in three months. Gentleness should be instinctive in one who is fitted for the craft of surgery, for the gentle surgeon is a gentle man; he treats tissues kindly because he feels instinctively for their suffering.

SURVIVAL OF VARIOLA VIRUS IN DRIED EXUDATE AND CRUSTS FROM SMALLPOX PATIENTS

A. W. DOWNIE

M.D., D.Sc. Aberd.

K. R. DUMBELL

M.B. Lpool

PROFESSOR OF BACTERIOLOGY

LECTURER IN BACTERIOLOGY

UNIVERSITY OF LIVERPOOL

THE dried crusts from the skin lesions of smallpox patients are usually regarded as an important source of infective material in the dissemination of smallpox (Ker 1909, Rosenau 1922, Stallybrass 1931). Blaxall (1930) states that the separating crusts remain potentially infective for years. It has been shown experimentally that the closely related animal pox viruses are relatively resistant to drying, but the evidence for the survival of variola virus in crusts from human lesions rests largely on epidemiological observations. Until recently, experimental work with variola virus taken directly from human sources was limited in scope, because monkeys were the only highly susceptible animals available.

Since it has been shown that variola virus can readily infect the chorio-allantois of developing hens' eggs (Lazarus et al. 1937), and that it produces in this tissue highly characteristic lesions (Downie and Dumbell 1947), the technique of egg inoculation appeared to afford a ready means for determining directly the infectivity of variola virus in material from human cases. In the observations recorded here egg inoculation has been used to determine the period of survival of variola virus in crusts and exudates kept under ordinary atmospheric conditions at room temperature (18°–20° C).

TABLE I—LESIONS PRODUCED ON EGG MEMBRANES FROM VARIOLA-VESSICLE FLUID DRIED ON GLASS SLIDES AND KEPT AT ROOM TEMPERATURE (CASE 1)

| Days at room temperature | Slides exposed to daylight | Slides kept in dark |
|--------------------------|----------------------------|---------------------|
| 0 | | C, C, C |
| 4 | 70, 50 | C |
| 8 | C, C, C | 19, 50 |
| 16 | 200, 33 | SC, SC |
| 30 | 0, 0 | 2, 0 |
| 35 | 6, 33, 46 | 9, 5, D |
| 50 | 0, 0 | 0, D |
| 62 | 0, 0, 0 | 0, 0, 0 |
| 84 | 0, 0 | 1, 2 |

C, confluent lesions; SC, semiconfluent lesions. Figures indicate number of specific lesions on individual membranes. D, embryo dead at time of examination and no lesions visible.

MATERIAL AND METHODS

These observations on survival of virus in crusts were begun in the spring of 1946, when several outbreaks of smallpox occurred in England, the infection being introduced from abroad, mostly by Service men who developed the disease, often in atypical form, on the way home.

Most of our material was derived from the cases which occurred in the 1946 outbreak on Merseyside (see Peirce 1947). We also had available in the laboratory samples of crusts from one of the cases in the Middlesex outbreak of 1944 (Bradley et al. 1946) and from two cases which occurred at different times in 1945.

Diagnostic complement-fixation tests had been made with extracts from the crusts at the time they were received, and the rest of these samples were kept in a desiccator in the refrigerator at a temperature of 2°–4° C until they were tested for the presence of virus in 1946.

In the 1946 outbreaks specimens of crusts were received from patients at various stages after the onset of illness (see table iv). The crusts were usually kept in the refrigerator without desiccation for some days and then were left at room temperature in the laboratory and tested at intervals thereafter.

Where the specimens were sufficiently large they were divided into two lots: one lot was placed in a test-tube or wide-mouthed bottle loosely stoppered with cotton-wool and kept in a cupboard; the other was placed in a similar container and exposed to diffuse daylight on the sill of a window facing north-west.

At intervals, from three to ten crusts were removed, thoroughly broken up in a sterile test-tube with a glass rod, and 1.0 ml. of sterile buffered distilled water was added. This suspension of crust material was left to extract, with stirring at intervals, for two hours at room temperature and then in the refrigerator overnight.

Next day the suspension was centrifuged for one minute at low speed in an angle centrifuge, and the supernatant fluid was mixed with an equal volume of penicillin solution, 300 units per ml. to suppress bacterial contaminants before inoculation on the chorio-allantois of two or three fertile hens' eggs.

In diagnostic tests reported elsewhere (Downie and Dumbell 1947) we had found that living virus could be recovered by egg inoculation from smallpox-vesicle fluid which had been smeared on glass slides and sent to the laboratory for microscopical examination. We made further tests on one sample of fluid dried in this way. This specimen had been taken with a capillary pipette from the skin lesions in a patient with hæmorrhagic smallpox on the seventh day of disease, one day before death.

The specimen was small, measuring about 0.05 c.cm. and was diluted to 0.5 c.cm. in broth on receipt at the laboratory. The diluted fluid was kept in the refrigerator for 17 days in a small screw-capped bottle. Human serum from a healthy young adult who had never been vaccinated was then added to make 20% by volume. The fluid was dropped from a pipette on a series of sterile glass slides and, after the drops had dried in air, the slides were placed in sterile petri dishes, some of which were placed in a cupboard and the others on the window sill.

At intervals afterwards the material from the drops was taken up in distilled water and after admixture with an equal volume of penicillin solution, 300 units per ml., the fluid was inoculated on the chorio-allantois of developing hens' eggs, as with the crust extracts.

The technique of inoculation on the chorio-allantois was that commonly used (Beveridge and Burnet 1946). Before inoculation the eggs were incubated at 37° C for 12 days. The inoculum was in each case about 0.1 ml. in volume, and the inoculated eggs were examined after two or three days' further incubation at 36° C.

When infection with variola virus occurred, the appearances on the membranes were typical and have been described elsewhere (Downie and Dumbell 1947): when the amount of virus in the inoculum was large, there was usually a spreading area of thickening and opacity which often covered most of the exposed chorio-allantois (confluent lesions); in other membranes a small central area of inflammatory thickening was surrounded by numerous discrete lesions (semiconfluent lesions); and in less heavily infected membranes the specific lesions were discrete and variable in number.

We have considered the number of such discrete lesions as proportional to the amount of living virus in the inoculum, and have recorded the number of lesions in such tests below. Where the lesions were few, or any doubt about their nature was entertained, the membranes were excised and ground up with glass, and after suspension in broth the supernatant fluid was inoculated on further eggs.

In only one instance, where two isolated lesions were present, did we fail to confirm the presence of virus in membranes which appeared to show typical variola lesions. Nor did we ever recover virus by further inoculation from membranes which did not show typical lesions after inoculation with crust extracts or resuspended dried vesicle fluid.

Where previous tests on a particular lot of crusts showed that very little living virus appeared to remain, several samples were taken and tested in parallel. This seemed more likely to lead to the detection of small amounts of residual virus than would the testing of a single extract from a larger sample of crusts.

RESULTS

Survival of Virus from Vesicle Fluid

The results of the tests on the vesicle fluid taken from one patient and dried on glass slides are shown in table I. The number of eggs inoculated with the resuspended dried vesicle fluid varied at different examinations according to the number of eggs available; and,

TABLE II—RECOVERY OF VARIOLA VIRUS FROM CRUSTS COLLECTED ON TENTH DAY OF ILLNESS AND KEPT AT ROOM TEMPERATURE IN DARK (CASE 2)

| Days after which crusts were tested | Lesions on egg membranes | Lesions on passage |
|-------------------------------------|--------------------------|--------------------|
| 28 | SC, SC | Not passed |
| 58 | 200, 20 | " " |
| 90 | 16, 5, 6 | " " |
| 111 | 0, 0, 0 | " " |
| 122 | 0, 0, 1 | SC, SC, SC |
| 162 | 8, D | C, C, C |
| 202 a | 0, 2, 0 | 21, 14, D |
| b | 0, 0, 0 | 0, 0 |
| c | 0, 0, 3 | 26, 7 |
| d | 0, 0 | 0, 0 |

a, b, c, d, different samples taken after 202 days.

though there was some irregularity in the results, table I indicates that the amount of virus surviving in the dried material diminished progressively up to 30 days, when very little remained. At subsequent examinations two drops were used, except in the last test, when the remaining four drops were used in each case. Though only one and two lesions developed on two membranes inoculated with the material kept in the dark for 84 days, passage to further eggs gave typical confluent infections, demonstrating the specific character of these lesions.

TABLE III—INFECTION OF EGG MEMBRANES WITH VARIOLA VIRUS FROM CRUSTS COLLECTED ON 24TH DAY OF ILLNESS AND KEPT AT ROOM TEMPERATURE (CASE 6). CRUSTS HAD BEEN KEPT IN REFRIGERATOR 145 DAYS BEFORE EXPERIMENT

| Days exposure at room temperature | Exposed to daylight | Kept in dark |
|-----------------------------------|---------------------|--------------|
| 0 | | SC, 70 |
| 41 | SC, D | SC, SC |
| 77 | 25, 12, 9 | 80, 120, 1* |
| 112 | 6, 0 | 7, 17, 0 |
| 140 | 2, 0, 0 | 2, 24, D |
| 196 | a 5, D | 0, 0 |
| | b 0, 1 | 1, 0 |
| | c 19 | 7, 2 |

* Membrane torn at time of inoculation.

Survival of Virus in Crusts

Specimens of crusts from five cases of smallpox were kept at room temperature for periodic examination. Table II shows the results with a specimen which was kept at room temperature in the dark for more than six months. These findings indicate a gradual diminution in the amount of living virus during the first 100 days of observation, and on subsequent examinations the amount of virus demonstrated was very small. At this stage the results, as might be expected, were rather irregular. The negative finding on the sample removed after 111 days may have been due to chance selection of negative crusts, to insufficient trituration of the crusts, or to some other minor variation in technique. No further tests were made on this specimen after 202 days.

The crusts from one case taken on the 24th day of illness had been kept in a screw-capped bottle in the refrigerator for 145 days before observations were begun. The specimen was then examined in the usual way for virus and divided into two portions, which were placed at room temperature, one exposed to light, and the other in the dark. The results are shown in table III. The last test made on these crusts after 196 days again shows, as in table II, the variation which may occur with different samples taken at the same time from one specimen. There appears to be little difference in the time of survival between crusts kept in the dark and those exposed to diffuse daylight in a glass container.

The day on which virus was last recovered from the other three specimens of crusts are shown in table IV, which summarises all the results. The specimens from case 5 were tested after they had been kept 138 days and again after 167 days (three samples from each), but virus was not recovered. These crusts were lighter and softer in texture than the others, and this may explain the shorter period of survival of the virus as determined by our technique. Extracts from the crusts from case 3 did not produce lesions on three eggs after 141 days; but after 152 days the remaining crusts were divided into six lots; and, of the extracts prepared from these, three produced specific lesions on eggs, while three did not. The crusts of case 4, which showed the longest period of survival, had been kept in a dark cupboard throughout. After 328 days four samples each gave a few discrete lesions; after 396 days two samples were positive, and two negative; after 417 days one large sample of 24 crusts, which had been very finely ground before extraction, produced after 3 days 57, 26, and 51 discrete lesions on three membranes. No further tests have been made on this specimen.

Survival of Virus at Low Temperature

Although we made no experiments designed to test the period of survival of virus in crusts and vesicle fluid

at low temperatures, it seems a priori highly probable that the period of survival at lower temperature would be longer than at room temperature. Such observations as we have made in the course of our work support this belief. Three specimens of crusts which had been stored in vacuo over calcium chloride were tested for virus after 202 days, 1 year and 43 days, and 2 years and 52 days. The third specimen, from a case in the Middlesex outbreak in 1944, gave confluent infections on egg membranes, and the others showed numerous discrete lesions. Part of the sample of vesicle fluid from case 1 (table I), which had been diluted in broth and kept in the refrigerator in a screw-capped bottle, gave confluent infections on egg membranes after nine months. A saline extract had been made from the crusts of case 4 (table IV) for serological tests soon after the crusts were received in the laboratory. Part of the saline extract which had been kept in a rubber-stoppered tube in the refrigerator for 1 year and 67 days produced 10, 31, and 87 specific lesions on three egg membranes. This result did not surprise us, as we had in December, 1945, recovered by culture on the chorio-allantois two strains of cowpox virus which had been stored in the form of concentrated elementary-body suspensions in dilute buffer solution at a temperature of 4°–10° C since April, 1938, and February, 1939, when they had been prepared from dermal infections in the rabbit. Buddingh (1938) has noted that vesicle fluid from a case of smallpox was infective for the chorio-allantois after 5 weeks at 0° C, and North et al. (1944) record the recovery of virus by egg culture from smallpox crusts which had been kept at –8° C for one year.

DISCUSSION

In general our results show that in crusts and dried vesicle fluid kept at room temperature the amount of virus recoverable by infection of the chorio-allantois of developing hens' eggs diminishes at first fairly rapidly, but that virus can be detected many months after this initial period. The results in tables I, II, and III indicate some irregularity in our findings during the later periods,

TABLE IV—SURVIVAL OF VARIOLA VIRUS IN DRIED VESICLE FLUID AND CRUSTS AT ROOM TEMPERATURE

| Case no. | Vesicle fluid or crusts | Day of illness on which specimen collected | Specimen exposed to | Time of survival of virus (days) |
|----------|-------------------------|--|------------------------|----------------------------------|
| 1 | Vesicle fluid | 7th | Daylight Dark | 35 84 |
| 2 | Crusts | 10th | Dark | 202* |
| 3 | " | 13th | Dark | 152* |
| 4 | " | 14th | Dark | 417* |
| 5 | " | 15th | { Dark + Daylight } | 34 + 63 |
| | " | | Dark | 97 |
| 6 | " | 24th | Daylight Dark | 196* 196* |

* Not tested later.

when the virus was less readily detected. This irregularity was evident especially when several samples were tested from the same specimen at one time, and may have been due to the irregular distribution of residual virus among crusts and to variation in the fineness of dispersion and degree of extraction of individual samples. It seems likely that repeated further examinations of our specimens using larger numbers of eggs would have shown the survival of variola virus for longer periods than those shown in table IV. The virus did not apparently survive so long in the diluted vesicle fluid which had been dried as thin films on glass slides as in crusts, and the nature and character of the crusts may be important in determining the period of survival of virus. It has been

noted above that the crusts of case 5 were large, lighter, and softer than the others; the specimens from cases 4 and 6 both consisted of rather smaller, harder, and denser "seeds," which may offer better conditions for the preservation of living virus.

There appears to be little relation between the virus content of crusts and the stage of the disease at which they were collected; at least our findings showed that the crusts of case 6, collected on the 24th day of illness, apparently contained virus in amount comparable to that in crusts removed from other patients on the 10th-15th day of illness. Virus therefore survives in the skin lesions of these patients after the immune state has become established.

Exposure to daylight seemed to have little influence in shortening the period of survival of virus in crusts (tables III and IV); but in these tests the virus was protected by tissue protein and shielded from ultraviolet radiation by the glass containers.

Though we have no information about the relationship between the infective dose of virus for the chorio-allantois and that for susceptible human beings, our findings confirm what has long been believed, that the material from the skin lesions in smallpox patients is infective. That such material has been responsible for the spread of smallpox there can be no doubt, and Stallybrass (1931) has recorded several instances of outbreaks among laundry workers where the infective material was conveyed on bedclothes. We have, by the egg technique, isolated virus from the sweepings from the ward floor near a bed in which a child was convalescing from smallpox. Such infective "dust" is a potential source of infection. We cannot regard the skin lesions as the only source of infective virus, for patients may spread infection before the skin lesions have developed; at this stage, and probably also later, the upper respiratory tract must be regarded as an infected region from which virus is disseminated.

SUMMARY

The chorio-allantoic membranes of developing hens' eggs, which are susceptible to infection with variola virus, have been used to detect the presence of virus in vesicle fluid and crusts from smallpox patients.

By this means virus was found to survive in diluted vesicle fluid dried on glass slides for 35 days when exposed to daylight, and for 84 days when kept in the dark at room temperature.

Virus was recovered from different samples of crusts kept at room temperature for several months, and from one specimen kept thus for over a year.

In crusts exposed to daylight virus survived as well as in crusts kept in the dark.

The bearing of these observations on the spread of smallpox is briefly discussed.

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SONNE DYSENTERY AND NON-SPECIFIC GASTRO-ENTERITIS IN A HOSPITAL

LAURENCE MARTIN
M.D. Camb., M.R.C.P.

PHYSICIAN TO ADDEN-
BROOKE'S HOSPITAL,
CAMBRIDGE

M. M. WILSON
M.B. Camb.

LATE BACTERIOLOGIST, EMER-
GENCY PUBLIC HEALTH
LABORATORY SERVICE

An epidemic of Sonne dysentery broke out among the nurses and domestic staff of a large general hospital and its war-time annexe in the second week of January, 1945. The main epidemic had abated by mid-March, but sporadic cases occurred during April and August. Intermingled with the Sonne-positive cases were others presenting a similar clinical picture from which neither *Bact. sonnei* nor other pathogenic organisms could be isolated despite repeated bacteriological examinations. The non-specific cases continued throughout the period January to mid-November and, although most numerous in January, when the Sonne epidemic was at its peak, occurred at an average rate of 2 a fortnight. In the first fortnight of November, however, 6 cases occurred when there were no cases of Sonne dysentery.

The purpose of this paper is to compare the clinical findings and epidemiology of the cases of Sonne dysentery with those of the non-specific gastro-enteritis and to consider the possible aetiology of the latter.

Material.—In the community of about 400 nurses and hospital domestics 49 attacks of Sonne dysentery were observed in 48 persons, and 45 attacks of non-specific gastro-enteritis in 38 persons. Eleven persons had both diseases or two attacks of one of them. Thus 4 had Sonne dysentery preceding the non-specific gastro-enteritis by intervals of 1-9 months, and 1 had an attack of non-specific gastro-enteritis before an attack of Sonne dysentery; 5 persons had two attacks of non-specific gastro-enteritis, and 1 had two attacks of Sonne dysentery.

LABORATORY FINDINGS

Faeces or rectal swabs from all cases were plated within a few hours on Leifson's desoxycholate citrate agar; some were also cultured on Wilson and Blair plates and in tetrathionate broth. Leifson plates were examined after 16-24 hours' incubation, and suspicious colonies were tested by slide-agglutination and picked off to sugar media. A presumptive report of *Bact. sonnei* could thus be given in most positive cases within 24 hours. Negative Leifson plates were then incubated for a further 24 hours and examined again for missed Sonne colonies. All Sonne organisms were confirmed by biochemical reactions and tube agglutinations.

Bact. sonnei was isolated from the first faecal specimen or rectal swab in the great majority of positive cases. Frequent specimens (3 to 12 or more) were examined from the non-specific cases while symptoms persisted, but no organisms of the dysentery, food-poisoning, or enteric groups were found.

Agglutination Reactions.—Sera were taken from 5 Sonne-positive cases and 5 non-specific cases at intervals varying from a few days to several weeks after the onset of symptoms. None showed any agglutination of *Bact. sonnei* at a dilution of 1/20.

CLINICAL FINDINGS

Onset.—The onsets of both Sonne dysentery and the non-specific gastro-enteritis were abrupt; sudden diarrhoea and/or vomiting, often in the early hours of the morning, being the rule. A few cases of both diseases had a premonitory phase of malaise with headache.

giddiness, colic, nausea, or fever before the onset of diarrhoea or vomiting:

| Mode of onset | Sonne-positive attacks | Non-specific attacks |
|---------------------------|------------------------|----------------------|
| Premonitory malaise .. | 12 | 6 |
| Diarrhoea .. | 29 | 23 |
| Vomiting .. | 1 | 8 |
| Diarrhoea and vomiting .. | 4 | 8 |
| Asymptomatic carriers .. | 3 | .. |
| Total .. | 49 | 45 |

The occurrence of initial pyrexia could not be correlated with either disease or with any particular mode of onset. Thus, in 18 of the 46 Sonne attacks (excluding the 3 asymptomatic carriers) and in 23 of the 45 non-specific attacks the patients were afebrile despite different modes of onset. No preceding or coincident upper respiratory infections were recorded in either disease. The degree of malaise and prostration was similar in both diseases but more severe in those patients who had high fever. It was impossible to predict from clinical observations whether a given patient would be Sonne-positive or not.

Stools.—All the Sonne-positive cases had frank diarrhoea, but some of the non-specific cases passed only one fluid motion daily. In 6 non-specific cases the patients did not have true diarrhoea at all after admission to hospital, though they had abdominal discomfort and rather loose motions.

The diarrhoea stools were fluid in both types of disease, and blood was never observed; mucus was often found in the Sonne-positive stools but only rarely in those from the non-specific cases. The number of stools averaged 7-8 during the first 48 hours of both diseases. The duration of diarrhoea could not be recorded in the Sonne-positive cases, because they were transferred to an infectious-diseases hospital as soon as the bacteriological diagnosis had been made. In the non-specific cases diarrhoea was usually of short duration and had almost always ceased by the fourth day. In 3 non-specific cases, however, diarrhoea continued for about 15 days, accompanied by a low intermittent fever, which never exceeded 99.4° F. In these cases the diarrhoea was uninfluenced by sulphaguanidine and sulphasuccidine, in contradistinction to the relief usually afforded by these drugs in Sonne dysentery.

Main Symptoms.—The main symptoms in the courses of 43 attacks of Sonne dysentery and of 36 attacks of non-specific gastro-enteritis are analysed as follows:

| Symptom | Sonne-positive (43 attacks) | Non-specific gastro-enteritis (36 attacks) |
|--|-----------------------------|--|
| Malaise .. | 34 | 32 |
| Nausea and/or vomiting .. | 31 | 31 |
| Headache .. | 17 | 13 |
| Vertigo or fainting .. | 5 | 7 |
| Tachycardia (90+) .. | 24 | 24 |
| Pyrexia .. | 24 | 22 |
| Colic .. | 30 | 29 |
| Diarrhoea .. | 43 | 30 |
| Average no. of stools in first 48 hours .. | 7-8 | 7-8 |

These numbers are smaller than the total number of attacks, because detailed information was not obtained in every instance.

Fever.—The only clinical feature which, in retrospect, offered any distinction between the Sonne-positive and non-specific cases was the character of the pyrexia. The incidence of pyrexia was about 50% in cases of both diseases, but further analysis of the temperature charts showed a difference in character:

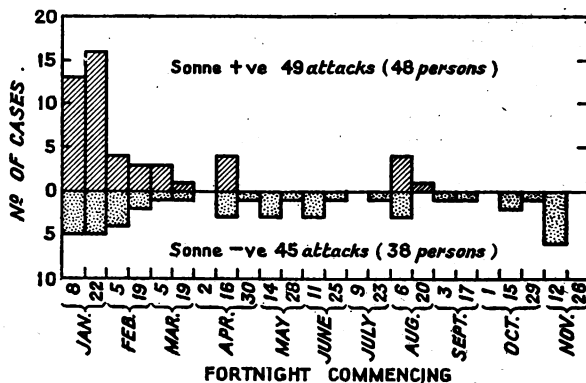
| | Afebrile | Low intermittent | High with quick fall | Total |
|-------------------|----------|------------------|----------------------|-------|
| Sonne-positive .. | 11 | 5 | 16 | 32 |
| Non-specific .. | 17 | 12 | 7 | 36 |

Charts of sufficient length were available in 32 attacks of Sonne dysentery and in 36 attacks of non-specific gastro-enteritis. Some patients were afebrile, others had a low intermittent fever—never exceeding 99.4° F, but

which might last for 7-14 days—and a third group had an initial fever of 100-103° F which fell to normal during the first 48 hours and did not recur. We are satisfied that the occasional administration of sulphaguanidine did not affect the pyrexia during the first 48 hours.

Thus there was an initial high fever in 50% of the Sonne-positive cases but in only 20% of the non-specific cases. Half of the non-specific and a third of the Sonne-positive cases were afebrile, and the low intermittent fever was twice as common in the non-specific cases. Unfortunately this difference in character of the pyrexia is not sufficiently constant to be of use in differential diagnosis.

Course.—We cannot compare the duration of Sonne dysentery in our cases with that of the non-specific gastro-enteritis, because bacteriological cure was demanded for the former, whereas clinical cure was accepted for the latter. For the non-specific cases the



Fortnightly incidence of Sonne dysentery and non-specific gastro-enteritis.

average stay in hospital per attack was 7.4 days. In the 3 cases of continued non-specific diarrhoea mentioned above, stay in hospital was prolonged to 27, 27, and 20 days.

To sum up the clinical aspect, the two diseases appeared, for all practical purposes, to be identical, and no obvious or constant means for their differentiation has emerged from this study.

EPIDEMIOLOGY

The fortnightly incidence of Sonne dysentery and non-specific gastro-enteritis is shown in the accompanying chart. The cases of Sonne dysentery occurred in three outbreaks. The first outbreak was due mainly to the presence of 6 infected persons in the kitchens of the hospital annexe: 3 had dysentery and 3 were asymptomatic carriers. After identification and removal of these persons the epidemic rapidly waned. Possibly a few nurses were infected in the wards by patients with Sonne dysentery. The two further minor outbreaks in April and August could not be traced to any source. Cases of Sonne dysentery were occurring in the district throughout the period of study, and nurses may have been infected outside the hospital.

The explosive character of the Sonne outbreaks was in contrast to the endemicity of non-specific gastro-enteritis, cases of which occurred in all but four of the fortnightly periods from January to mid-November. It is possible that more cases were detected in January and February than later owing to measures taken in these months to ensure reporting of any gastro-intestinal upsets. The occurrence of non-specific cases could not be correlated with any factors such as dormitory arrangements, wards in which the staff had worked, or infection by food or milk.

The nurses fed communally in dining-halls in the main hospital and in the annexe, and the domestics had

similar separate feeding arrangements. In the hospital both nurses and domestics had separate bedrooms, but in the annexe they were housed in small dormitories. The Sonne dysentery cases were largely confined to the staff of the hospital annexe because of the infected kitchen personnel, but non-specific cases occurred equally in the main hospital and annexe.

DISCUSSION

Two forms of gastro-enteritis with indistinguishable clinical pictures were prevalent at the beginning of this study. One was an explosive outbreak of Sonne dysentery, emanating from infected kitchen staff, which quickly subsided, and the other was a gastro-enteritis of unknown cause which was endemic throughout the period under review and had not entirely ceased when the investigation closed.

Our non-specific cases did not exactly resemble hyperemesis hiemis—the winter vomiting disease—epidemics of which were described in America by Zahorsky (1929, 1940) as affecting children but rarely adults. Diarrhoea often occurred, but the stools were thin, light-coloured, and offensive, and not considered to be due to a true enteritis.

Nor did our cases correspond to the epidemic nausea and vomiting described in this country by Miller and Raven (1936), Gray (1939), and Bradley (1943), in which diarrhoea was always a minor symptom, pyrexia was infrequent, and the disease assumed an epidemic form. In our cases, although nausea and vomiting were frequent, diarrhoea was the most prominent symptom, and the cases occurred as a smouldering endemic. Epidemiologically our non-specific cases most resembled those reported by Brown et al. (1945), in which diarrhoea was the main symptom, and those recorded by Reimann et al. (1945a). The latter described "a mild widespread epidemic disease characterised by anorexia, malaise, diarrhoea, nausea, and vomiting" and noted its spread over several months without peaking. In later work Reimann et al. (1945b) brought forward evidence that a gastro-enteritis, attributed to a virus, could be transferred to human volunteers by nasal inhalations of (but not by swallowing) stool filtrates and filtered garglings from patients. This evidence certainly supported an airborne infection and favoured a filter-passing virus as the infective agent. The association of non-specific enteritis with Sonne dysentery was noted by Barnard (1945), who observed an outbreak of Sonne-negative diarrhoea, associated with vomiting, which lasted 3 or 4 days and followed a wave of Sonne dysentery.

We offer the following considerations about the nature of our cases of non-specific gastro-enteritis:

(1) The least unlikely possibility is that they were due to a virus, because the bacteriological investigations practically excluded their being due to infection with *Bact. sonnei* or other organism known to cause enteritis.

(2) The clinical features differed from those recorded in hyperemesis hiemis and in epidemic nausea and vomiting, because diarrhoea was the most prominent symptom.

(3) Their endemicity excluded mass infection of food and metallic poisoning, and suggested a spread by contact. Our observations provided no evidence to show whether transmission was effected by droplets or from faeces. It seems probable that carriers were present in the community but, because no bacterial agent could be incriminated, they could not be identified.

SUMMARY

The coincident occurrence of epidemic Sonne dysentery and endemic gastro-enteritis of unknown origin among nurses and domestics in a large hospital is described.

The salient features of the non-specific gastro-enteritis were its sparse but widespread distribution in the community, its smouldering character, and its close clinical similarity to Sonne dysentery.

It appeared to differ from "epidemic nausea and vomiting" and from "the winter vomiting disease" in having diarrhoea as its salient feature.

Its aetiology is discussed.

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DIAGNOSIS OF EPILEPSY IN SERVICE CASES

T. B. S. DICK

M.B. Manc., M.R.C.P.

MAJOR R.A.M.C.

From an E.M.S. Neurological Unit

ONE of the most difficult problems of war medicine is to decide the nature of alleged epileptic attacks in serving soldiers. Accurate and rapid diagnosis is desirable for three reasons. First, since the Army authorities have laid down that virtually all epileptics should be discharged from the Service, the time and money spent in training a man will be entirely wasted if he later proves to have epilepsy. Secondly, it is clearly unfair to discharge a man to civil life with the label of epilepsy, and the stigma that this entails, without definite proof that the diagnosis is correct. Thirdly, the fact that there may be a conscious or subconscious desire to evade service must always be borne in mind.

Since 1941 nearly 500 cases of major epilepsy or suspected major epilepsy have been admitted to the Medical Neurological Unit at Winwick. The cases under consideration in this paper were those in which the diagnosis depended on an unsubstantiated history, there being no abnormal physical signs, no reliable accounts of attacks, and no evidence of trauma, tumour, syphilis, or cysticercosis.

In the first 164 cases of this group each case was provisionally diagnosed on the history alone as definite, probable, or improbable epilepsy.

ELECTRO-ENCEPHALOGRAM

The next procedure was to obtain an electro-encephalogram (E.E.G.). This was taken and interpreted by Mrs. E. M. Stewart-Gibb and Mr. Michael Saunders in the department of electro-encephalography at Manchester Royal Infirmary. The criteria of abnormality used in assessing these tracings were those laid down by the British E.E.G. Society. Except in a very few of the early cases all the patients were fasting, and all without exception were hyperventilated; none was on any form of therapy.

The E.E.G. tracings were assessed and placed in one of four groups: (1) "negative," being within normal limits; (2) "non-specific," showing a non-specific abnormality of rhythm of a type seen in a tenth of the normal population and in a higher proportion of neurotics and psychopaths, as well as in other neurological conditions; and (3) "very suggestive," presenting paroxysmal rhythms suggestive of epilepsy.

No tracings could be included in the fourth group—i.e., none showed the classical spike and wave or variant which is regarded as pathognomonic of epilepsy.

WATER PITRESSIN TEST

A water pitressin test was next performed on each case. McQuarrie and Peeler (1931), Jacobsen (1934), and others have shown that typical major epileptic seizures can be

produced in many epileptic subjects by inducing a positive water balance in the body for a comparatively short period. The most rapid and effective way of attaining this positive water balance is by utilising the antidiuretic action of pitressin. In performing the test the method we adopted was substantially the same as that used by Clegg and Thorpe (1935), 1/2 pint of water being given every two hours, and an injection of pitressin 0.25 c.cm. (5 units) followed by 0.5 c.cm. (10 units) every four hours, for forty hours. With the production of a major epileptic fit by this means the patient was regarded as having epilepsy. This test is not wholly devoid of unpleasant effects, and a small proportion of men refused to complete it, or even to undergo it at all.

McQuarrie and Peeler (1931), Clegg and Thorpe (1935), and others have done a control series of water pitressin tests on normal people. In no case was a fit produced in a non-epileptic. Garland et al. (1943) state that they have been unable to find in the literature any record of a positive water pitressin test in a person not subject to epilepsy.

RESULTS

The total number of cases assessed was 164. In 142 the water pitressin test was completed. In 22 cases this test was not completed, for reasons other than the occurrence of an epileptic fit.

From a clinical examination 58 patients were considered to be definitely epileptic, 48 probably epileptic, and 58 improbably epileptic.

The water pitressin test gave 37 positive results and 83 negative, the remainder not being completed, often because of vomiting or severe headache.

"Very suggestive" E.E.G. numbered 8.

Though 250 cases were investigated in this way, the results of only the first 164 have been used in this paper, as it has not yet been possible to follow up the rest.

The age of the patients in this group is fairly evenly spread between 18 and 45. There appeared to be no correlation between the E.E.G. findings or the water pitressin findings and the age of the patient.

It should be emphasised once again that, in grouping the cases as "definitely epileptic," "probably epileptic," and "improbably epileptic," the diagnosis was made merely on the history and the general impression of the

TABLE I—DETAILED RESULTS IN 164 CASES

| Clinical diagnosis | Water pitressin test | E.E.G. | No. of cases |
|---------------------|----------------------|-----------------|--------------|
| Definitely epilepsy | Positive | Negative | 18 |
| | | Non-specific | 7 |
| | | Very suggestive | 2 |
| | Negative | Negative | 18 |
| | | Non-specific | 11 |
| | | Very suggestive | 2 |
| Probably epilepsy | Positive | Negative | 6 |
| | | Non-specific | 1 |
| | | Very suggestive | 1 |
| | Negative | Negative | 31 |
| | | Non-specific | 7 |
| | | Very suggestive | 2 |
| Improbably epilepsy | Positive | Negative | 0 |
| | | Non-specific | 1 |
| | | Very suggestive | 1 |
| | Negative | Negative | 46 |
| | | Non-specific | 10 |
| | | Very suggestive | 0 |

case from a clinical point of view. The rest of the investigation had not been carried out, and the diagnosis was merely provisional.

The detailed results are given in table I. There were 18 cases of clinical "definitely epilepsy" which had a positive water pitressin test and yet a normal E.E.G. On the other hand, there were in this group 2 "very suggestive" E.E.G. associated with a negative water pitressin test. Of the 2 "improbably epilepsy"

cases with a positive water pitressin test, 1 had a "very suggestive" E.E.G. There is no reason to believe that a positive water pitressin test was obtained in a non-

TABLE II—FOLLOW-UP RESULTS ON 164 CASES

| Clinical diagnosis | No. of cases | Epilepsy confirmed | Total in which either E.E.G. or water pitressin or both were positive | Total still serving |
|---------------------|--------------|--------------------|---|---------------------|
| Definitely epilepsy | 58 | 51 (50*) | 29 { W.P. ... 27 E.E.G. ... 4 | 7 |
| Probably epilepsy | 48 | 16 (12*) | 10 { W.P. ... 8 E.E.G. ... 3 | 21 |
| Improbably epilepsy | 58 | 5 (3*) | 2 { W.P. ... 2 E.E.G. ... 1 | 41 |

* Confirmed in hospital.

epileptic in either of these cases; the provisional diagnosis in both of them had been hysteria.

The comparative results were as follows:

Clinical diagnosis "definitely epilepsy" (58 cases)

Water pitressin test positive in ... 47%
E.E.G. very suggestive in ... 7%
E.E.G. non-specific in ... 31%

(6 water pitressin tests unfinished, patients refusing to continue.)

Clinical diagnosis "probably epilepsy" (48 cases)

Water pitressin test positive in ... 17%
E.E.G. very suggestive in ... 6%
E.E.G. non-specific in ... 17%

(5 water pitressin tests not completed, patients refusing to continue.)

Clinical diagnosis "improbably epilepsy" (58 cases)

Water pitressin test positive in ... 3%
E.E.G. very suggestive in ... 2%
E.E.G. non-specific in ... 19%

(11 water pitressin tests not completed, patients refusing to continue.)

The first 164 cases were followed up at least six months after the patient had left hospital. Confirmation of a diagnosis of epilepsy means that a fit was observed by a reliable witness, or the patient was subsequently discharged from the Army as an epileptic by some other neurological unit. The results are given in table II.

DISCUSSION

On the basis of these results, the water pitressin test appears to be of more value than the E.E.G., and the clinical evaluation of the patient more important than either of these tests in reaching a rapid and accurate diagnosis. It must be remembered, however, that an E.E.G. was obtained only once in each case. No doubt, if several tracings had been taken in each case, more would have shown patterns suggesting epilepsy, but unfortunately this was impracticable. It should be remembered that those who interpreted the E.E.G. knew little of the clinical assessment beyond having a summary of the case-history. It has been suggested that more could have been made of the interpretation of these tracings had a person skilled in both the clinical aspects and in electro-encephalography been in charge of the cases, though it is only fair to state that the electro-encephalographers concerned kept rigidly to the criteria laid down by the British E.E.G. Society. Whether or not such criticisms are valid, there is no doubt that the E.E.G. is often used merely as an isolated test, and that the limitations of this procedure are not perhaps wholly appreciated.

If the E.E.G. was of a non-specific type, it was considered by the clinicians to be of little or no value in assessing the diagnosis. Interseizure abnormalities are often non-specific and of a type seen in at least 10% of the normal population (Gibbs et al. 1943). An even higher proportion of neurotics (Williams 1941) and psychopaths (Hill and Watterston 1942) show similar abnormalities. Williams (1944) has sought to show that

episodic outbursts in these non-specific patterns are of considerable significance and strongly indicate epilepsy. Episodic outbursts were not accepted in this series as confirmatory evidence, but episodic outbursts of abnormal activity not amounting to larval attacks were accepted.

Gibbs et al. (1943) state that, in their experience, 42% of tracings were of little or no value in confirming a diagnosis of epilepsy.

Often the only confirmatory evidence of epilepsy was a non-specific pattern in the E.E.G. Bearing in mind what has already been said about the occurrence of these tracings in the normal population, in neurotics, and in psychopaths I feel that to know that a man has a non-specific dysrhythmia of this type is of little value in weighting the scales in favour of a diagnosis of epilepsy. But it must be admitted that, if the views put forward by Williams (1944) are accepted as correct, so-called non-specific abnormalities may now be of considerably more diagnostic value.

According to Finley and Dynes (1942), Jasper (1941), Hill (1944), and others tracings strongly suggesting epilepsy were found not uncommonly in conditions regarded as non-epileptic. It seems reasonable to regard such a tracing as strong confirmatory evidence of this diagnosis if the history also supports it; but, when there is considerable clinical doubt about the exact diagnosis, even the finding of such a tracing should make one hesitate before discharging a man with the stigma of epilepsy.

I have found that a considerable number of medical officers seem to assume that all that is necessary to confirm or exclude a diagnosis of epilepsy is one E.E.G. This unfortunate tendency to substitute an E.E.G. report for a careful history and an examination is entirely unwarranted.

My view is that the E.E.G. used as a diagnostic aid as I have used it, and as I believe it is quite widely used by others, has only a limited value in the diagnosis of major epilepsy, and is less useful in this respect than is the water pitressin test. I believe that a careful clinical assessment is a more reliable means of reaching a correct diagnosis than is either the water pitressin test or the E.E.G., used either alone or together.

SUMMARY

In 164 cases of suspected epilepsy a routine investigation has been carried out, a provisional diagnosis being made in each case on the history alone. Electroencephalography and a water pitressin test were later performed on each case. A follow-up has been made, at least six months after the patient had left hospital, to reach a final and exact diagnosis if possible.

As a result of this investigation it appears that clinical evaluation of the case is the most reliable single factor in reaching an accurate diagnosis of major epilepsy; the water pitressin and the E.E.G. are both important as ancillary aids to this end, the water pitressin being the more useful of the two.

I have to thank Dr. Fergus R. Ferguson for arranging the encephalographic investigation of these patients; Drs. Fergus R. Ferguson, Gordon Holmes, and Joly Dixon for their help and advice in the preparation of this paper; and Dr. Michael Saunders and Mrs. E. M. Stewart-Gibb for their cooperation in interpreting the E.E.G.

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THERAPEUTIC USES OF KHELLIN

METHOD OF STANDARDISATION

G. V. ANREP

M.A. Camb., M.D. Petrograd,
D.Sc. Lond., F.R.S.

M. R. KENAWY

M.D. Cairo, M.R.C.P.

G. S. BARSOUM

M.D. Cairo

G. MISRAHY

MEDICAL STUDENT,
HARVARD UNIVERSITY, U.S.A.

From the Faculty of Medicine, Fuad I University, Cairo

EXTRACTS of seeds of *Ammi visnaga* Lam. (Arabic khella), an umbelliferous plant growing wild in the Eastern Mediterranean regions, have been used by the local population since ancient times as an antispasmodic in renal colic and ureteral spasm.

Chemical analyses made in Cairo and Vienna have shown the active principle to be a di-methoxy-methyl-furano-chromone and thus to belong to the same group as coumarines and possibly flavones. Some workers call it visamin, but we prefer to use the original name khellin.

Khellin causes a conspicuous and long relaxation of all the visceral smooth muscle—the intestines, uterus, bile-ducts, bronchi, and especially ureters. In 1934 preparations of *Ammi visnaga*, in the form of the 1 in 10 tincture and the 1 in 40 decoction, were introduced into the Egyptian Pharmacopœia and recommended as an antispasmodic in renal colic.

ANGINA

In 1945 a fresh interest in khellin arose as the result of the discovery that it acts as an extremely potent coronary vasodilator which, in doses used, has no effect on the general blood-pressure and does not increase the oxygen requirements of the heart (Anrep and Misrahy 1945). This action of khellin lasts many hours. Khellin has now been tried in over 150 cases of angina. With single or repeated doses of 100 mg. for intramuscular injections, or 50–100 mg. by mouth, three times daily, the results were extremely encouraging. Some of our early observations have already been published (Kenawy and Barsoum 1945).

BRONCHIAL ASTHMA

In view of the fact that khellin has been shown experimentally to dilate the respiratory passages (Samaan 1932), it has also been tried in severe bronchial asthma. A complete and prolonged relief was obtained in 41 out of 45 cases after a single intramuscular injection of 200–300 mg. In 3 cases the relief was obtained after repeating the injection after an hour. In 1 case relief was not obtained; this case was complicated by bilateral pulmonary tuberculosis, double phrenic evulsion, and thoracoplasty. Complete relief is given 5–15 min. after the injection and usually lasts about 24 hours. Repeated daily administrations of khellin by injection or by mouth conspicuously reduce the number and severity of the attacks. In obstinate cases of severe status asthmaticus a second and sometimes a third dose has to be given at intervals of one or two hours to produce relief.

The action of khellin in bronchial asthma is not so prompt as that of adrenaline or of ephedrine, but it is more lasting, and, since it has no effect on the general blood-pressure, it can be safely administered even in hypertensive patients. Spirometric records made in asthmatic patients show that under the influence of khellin their vital capacity increases by 600–1000 c.c., and that the speed of expiration becomes appreciably faster. Khellin relieved attacks in some cases resistant to adrenaline or to aminophylline. It is also safer than aminophylline to administer. Deaths due to aminophylline have been recorded.,

In the doses recommended above khellin is not toxic. The only fairly constant effect of its administration was a general sensation of warmth without actual flushing. One patient complained of vertigo and slight nausea which, however, soon disappeared. Control injections free from khellin were occasionally given to our patients to exclude any psychological effect. No relief was ever obtained with these injections. We wish to emphasise that the dose of khellin suitable for the asthmatic is much greater than that used for angina.

STANDARDISATION

Since the publication of our observations a considerable number of preparations of *Ammi visnaga* are being offered to the public without proper control or standardisation. We wish to issue a warning that crude extracts of *Ammi visnaga* may cause undesirable effects, especially when used for intramuscular injections in concentrated solutions. In animals such extracts may cause long-continued oliguria. Taken by mouth crude extracts and decoctions often cause severe gastric irritation and nausea, and sometimes diarrhoea. Therefore all preparations of *Ammi visnaga* to be used by mouth or by injection should be freed from injurious impurities, and the final concentration of the active principle (khellin) should be standardised. Extracts for oral or intramuscular administration should contain not less than 50 mg. per c.cm.

Fahmy and El Keiy (1931) discovered that khellin in contact with solid NaOH gave a characteristic pink colour. No other known extract in therapeutic use gives this reaction. Standardisation by the use of this reaction requires a progressive dilution of the extract until no more coloration is obtained with NaOH. Besides being rather laborious, this method entirely depends on the subjective factor of determining something which just fails to appear. In our experience the method gave, in duplicate determinations by two different observers, errors as high as 100%. We were therefore obliged to discard the method in its original form and to adopt the following modification, which proved to be satisfactory for rapid standardisation of pharmaceutical preparations containing the active principle.

Method.—A standard stock solution is prepared by dissolving 25 mg. of chemically pure khellin (melting point 154° C) in 100 c.cm. of distilled water. This solution keeps without deterioration for several months. For the standardisation, five flat-bottomed sampling-tubes, labelled from 1 to 5 and containing 5 c.cm. each of a saturated solution of KOH, are prepared: 0.05, 0.10, 0.15, 0.20, and 0.25 c.cm. of the stock solution of khellin are then added to the tubes in ascending order from no. 1 to no. 5. After a few minutes the characteristic pink colour of different intensities develops in the tubes. The coloration reaches a maximum in about 10 min. and remains unchanged for several hours, after which it gradually fades. The amount of khellin in each tube was thus 12.5, 25.0, 37.5, 50.0, and 62.5 µg.

1 c.cm. of the extract to be standardised is diluted with 200 c.cm. of water, and 0.20 c.cm. of this dilution is added to a sixth tube also containing 5 c.cm. of saturated solution of KOH. The developed colour is then matched in a colorimeter or by naked eye against the set of the standard dilutions. The difference in the depth of colour of the standards is so obvious that it is easy to find an exact match or to place the colour of the unknown between two neighbouring standard dilutions. In this way a standardisation of an extract with an accuracy of about 6 mg. per c.cm. can be rapidly made. When the unknown matches tube no. 4 containing 50 µg. of khellin the extract is of the required strength of 50 mg. per c.cm. No greater accuracy is required for pharmaceutical preparations of *Ammi visnaga*. However, if greater precision is desired, new dilutions of the standard

must be prepared, each of the tubes to contain 0.10, 0.11, 0.12 c.cm., &c., of the stock solution. The degree of dilution of the unknown must in this case also be increased.

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Medical Societies

ROYAL SOCIETY OF MEDICINE

Penicillin in Neurology

THE first session of a joint meeting of the section of neurology with the Société de Neurologie de Paris was held on April 15, with Dr. DOUGLAS McALPINE, the president, in the chair.

SUPPURATIVE CONDITIONS OF THE BRAIN AND MENINGES

Sir HUGH CAIRNS said that with the early preparations of penicillin (50–100 units per mg.) it had been necessary to work out minimal effective doses; and these have to some extent survived, even though the present-day penicillin II, containing 1650 units per mg., is an almost pure crystalline preparation. Early successes were obtained with accessible infections such as pyæmia and septicæmia; later it was found that larger foci of infection, such as bacterial endocarditis and pyogenic meningitis with macroscopic areas of fibrino-purulent material, are less easily treated; foci flare up when the penicillin concentration falls below the bacteriostatic level. With gunshot wounds it is not enough to instil penicillin in the hope that infection will be quenched; all macroscopic areas of necrotic and infective material must be removed.

Penicillin in the cerebrospinal fluid (C.S.F.) must be assayed when a method of chemotherapy is being elaborated, or in the absence of expected improvement. It may be given by the lumbar or cisternal route, or into the lateral ventricle; unless there is blockage it will spread freely. Normally, 12,000 units will maintain a bacteriostatic level for 24 hours; but occasionally, for example early in the treatment of pyogenic meningitis, this dose may be given every 12 hours. The upper limit of tolerance for the crystalline penicillin has not yet been worked out; but heavy doses of 50,000–100,000 units may cause severe meningeal reactions. Such large doses can do no good and may do harm; and there is never occasion to exceed 20,000 units in one day. Intrathecal penicillin, if continued, for some weeks, causes depression of the ankle-jerks, suggesting damage to the cauda equina; but this change is reversible.

Normally, penicillin is given by the lumbar route; if there is a block (of which the most important sign is difficulty in obtaining C.S.F. by lumbar puncture), then the cisternal approach may be adopted; but with head retraction this may not be easy, and blocks sometimes occur above the cisterna magna, so that there should be no hesitation about injecting into the lateral ventricle.

For pachymeningitis and subdural abscess penicillin is given into the subdural space, from which it passes about as rapidly as from muscle; usually 8000–10,000 units are injected every four hours.

Penicillin given systemically does not pass in appreciable amounts into the C.S.F. Nevertheless, systemic penicillin has its value in pyogenic meningitis, for these reasons: (1) it helps to combat the primary focus and the septicæmia from the primary focus or a relapsing meningitis; (2) it helps to overcome infection of the cerebral blood-vessels; and (3) it is probable, though not certain, that penicillin can pass from the blood-stream into the perivascular spaces of the brain, and it may thus be valuable in acute pyogenic meningitis (which is more correctly a meningo-encephalitis), also in limiting the spread of brain abscess. Penicillin appears to pass freely from the blood-stream into the subdural space, though here further evidence is needed.

Crystalline penicillin II seems to be non-toxic when given systemically; one patient has received 300 million units without reaction. The sulphonamides should be given along with penicillin; they are especially valuable when intrathecal penicillin is stopped.

Until the diagnosis of meningitis is established bacteriologically treatment should be confined to systemic penicillin and sulphonamides. Intrathecal injections of penicillin should only exceptionally be given in general practice, owing to the risks of aggravating the pressure effects of an inconspicuous brain abscess and of introducing an insusceptible organism.

With cerebral abscess penicillin has made complete extirpation the rule, except where it is due to a missile wound and in the rare deep-seated abscesses, which are better treated conservatively.

After all major neurosurgical operations a powder of penicillin and sulphamethazine has been used as a routine, with significant reduction in the incidence of postoperative infections.

In infections due to susceptible organisms results with penicillin are good so long as the concentration remains sufficient; precise planning of treatment is even more essential than with less powerful remedies.

MENINGITIS

Dr. HONOR SMITH described the treatment of a series of cases of pyogenic meningitis, mostly pneumococcal. Penicillin, made up in a solution of 2000 units per ml., was given intrathecally once or twice daily for at least five days, in doses of 8000–16,000 units. Though the other routes must be used where necessary, as with spinal block, the lumbar route is normally safe, convenient, and effective.

Sulphonamides are also given in full doses; sulphadiazine is the preparation of choice. Sulphonamides, by preventing or delaying the deposition of fibrino-pus, help to keep the pathways clear for the circulation of penicillin in the C.S.F. They should be given as soon as the diagnosis is made, to tide the patient over the interval before penicillin is begun; they also serve to cover the period in which intrathecal penicillin is withheld.

Penicillin is given not only intrathecally but also systemically, to control any septicemia as well as to attack the primary focus; and it is now considered that operation on the ear, where this is the focus, should not be undertaken during the acute stage.

The most common complications are spinal block and relapse. The treatment for relapse is the same as that for the original attack, and the prognosis is good provided that the relapse is promptly recognised and energetically treated.

Of 50 unselected cases of pneumococcal meningitis, 11 died, 2 of causes other than meningitis; of the remaining 9, 4 were virtually moribund on admission. Thus delay in instituting treatment, due usually to delay in diagnosis, was the commonest cause of failure.

Treatment follows the same lines in streptococcal and staphylococcal meningitis. Intracranial abscess is a relatively common complication of streptococcal meningitis; and in the presence of an abscess it is essential to give penicillin by the ventricular route. With meningococcal meningitis penicillin is rarely required, except where the response to sulphonamides is disappointing, or where the patient shows signs of intolerance, is vomiting persistently, or is severely dehydrated.

NEUROSYPHILIS

Dr. C. C. WORSTER-DROUGHT recalled that for early syphilis a "standard" course of penicillin was originally evolved; this consisted in altogether 2,400,000 units, given in doses of 40,000 units every four hours over 7½ days, and the relapse-rate averaged about 15%. Experience of penicillin in neurosyphilis is based mainly on this "standard" course. The present tendency is, however, towards larger total amounts—4–5 million units, given three-hourly in doses of 40,000 units. Penicillin should be given intramuscularly; there is little to commend intravenous administration; continuous administration calls for cumbersome apparatus, and even repeated single intravenous injections carry the risk of thrombophlebitis.

More recently a single daily dose of 300,000–500,000 units for 14 days has been reported as giving just as good results; and Dr. Worster-Drought has found 500,000 units daily for 14 days fairly effective against meningovascular syphilis. Further time must elapse, however, before the results can be finally assessed. In view of the relapses with penicillin alone, he has never abandoned arsenic and bismuth; there may possibly be a synergistic action between the two types of treatment.

In neurosyphilis, is it necessary for penicillin to pass the blood-brain barrier? Probably not, since the state of the C.S.F. improves in meningovascular infection treated with parenteral penicillin only; and the same is true of parenchymatous syphilis. Whether or not it passes the barrier, parenteral penicillin exerts a definite influence on the meninges and the central nervous system. Dr. Worster-Drought used to give penicillin intrathecally, but he now uses the intramuscular route, except in tabes with severe and frequent lightning pains. It is inadvisable to use the cisternal route. Though only slight and transient symptoms have been observed by him after the initial doses of penicillin, he now gives 4–6 injections of bismuth before starting penicillin, in view of the known risk of Herxheimer reactions.

With meningovascular syphilis penicillin produces a striking improvement both clinically and in the C.S.F., in which the Wassermann reaction may become negative in 2–4 months. It is doubtful whether neurosyphilis continues to improve beyond four months after the end of penicillin treatment. Further improvement with repeated courses is not conspicuous.

The blood Wassermann reaction, especially in the parenchymatous forms of neurosyphilis, is little affected by treatment with penicillin. Usually the blood reaction remains positive after the C.S.F. reaction has become negative; this is a strong argument for following up penicillin with the usual arsenic and bismuth treatment.

In many cases of general paresis treated with penicillin alone the cells and protein of the C.S.F. become normal in four weeks and the Wassermann reaction negative in two months; but after a further six months the Wassermann reaction may again be positive, and consequently malaria therapy is still advisable: "I know of no case of general paresis which has maintained clinical improvement, with negative serological reactions, on penicillin treatment alone."

Again in tabes dorsalis, administration of penicillin leads to improvement in the C.S.F.; and if this is followed by protracted treatment with arsenic and bismuth the disease in most cases, and especially the early ones, can be arrested. Dr. Worster-Drought gives penicillin initially up to a total dosage of 4–5 million units, and then the usual courses of arsenic and bismuth up to three years. With severe lightning pains, slightly better results are obtained by intrathecal injection: 10,000 units are given in 10 ml. of saline daily for 10 days.

Penicillin has been said to be effective in the treatment of primary optic atrophy; but as this condition may progress slowly for five years before blindness ensues it is difficult so far to assess results; initial penicillin is advisable but full malaria treatment is essential.

Early asymptomatic neurosyphilis occurs as a meningovascular reaction in the secondary stage, when it is readily treatable; but the late form, occurring long after infection, often resists treatment and may terminate in general paresis. Penicillin is fully effective against the first type, and it is of value in treating the second, where the best method is first to give bismuth, which is followed by 4–5 million units of penicillin, and then by full malaria therapy.

Erb's paraplegia has unfortunately proved as resistant to penicillin as to other forms of treatment.

GENERAL PARALYSIS

Dr. W. D. NICOL reported, jointly with Dr. M. WHELEN, experience of penicillin in 57 cases of neurosyphilis, of whom 42 were general paralytics. Of these, 14 were treated with penicillin only, while the remainder received also malaria therapy. The patients given penicillin only were carefully selected; their physical condition was poor, and the risk of malaria treatment high. The course of penicillin was 300,000 units daily for 14 days—a total of 4.2 mega units.

The interval since this series was treated has been too short for serological assessment. No Herxheimer reaction was observed in any case; results were best in patients who were mentally confused or physically in poor condition; and improvement during the actual course of treatment was remarkable, rendering some patients fit for subsequent malaria therapy. Penicillin failed, however, to save the lives of 1 patient with fulminating general paralysis and of 2 very advanced cases; so, in this respect, it is apparently no more successful than older forms of treatment. Penicillin will prove a useful adjunct to malaria, but the optimum dosage has yet to be determined.

Reviews of Books

Diseases of the Adrenals

LOUIS J. SOFFER, M.D., adjunct attending physician, Mount Sinai Hospital, New York. London: H. Kimpton. Pp. 304. 28s.

FOR some years the interest of physicians has been shifting from the attack to the defence—to the mechanism by which the constancy of the internal environment is maintained. Until recently knowledge of the adrenal glands was confined to that of Addison's disease, and little had been added to Addison's century-old description. Even now adrenal diseases may seem unimportant because they are so rare. Yet in the last 25 years a great deal has been learnt about the functions of the adrenals which closely concerns the practising physician and surgeon. Their place in the control of mineral metabolism and of water-balance would alone warrant this interest, but modern work has disclosed much about their relationship to shock, resistance to infection, and the response of the body to every form of insult.

This is the second book on the topic lately published, and it covers well the whole ground of adrenal physiology and pathology. Much smaller than Goldzieher's standard work, it bears comparison in accuracy and completeness, and by reason of its small size should perhaps prove even more useful to the general practitioner who tries to be up to date.

L'Électro-choc, et la psychophysiologie

JEAN DELAY, professeur agrégé à la Faculté de Médecine, Paris. Paris: Masson. Pp. 170. Frs. 230.

Professor Delay holds that since electrical convulsions benefit melancholia—and other mental syndromes—irrespective of the cause of the illness, they presumably act on the mechanism of the disorders and thus provide opportunity for further study of their pathology. The diencephalon, he believes, plays an important part in regulating instincts, mood, and consciousness: it is through action on the diencephalon that electrical convulsions bring about recovery from mental illness. The first part of the monograph deals with the relation of epilepsy to the diencephalon; Delay insists that the generalised classical convulsion (as opposed to the Jacksonian) is of diencephalic origin, and that the phenomena which have been observed to accompany the electrically induced fit are mainly such as excitation of the diencephalon could produce. The next section, on disorders of mood, similarly examines the controlling influence of the diencephalon, emphasising that it stands at the cross-roads of the extrapyramidal motor system and the endocrine system and is, by its connexions, peculiarly fitted to regulate the relation between emotion and intellect. In the final section, disorders of consciousness, which the author has previously investigated in his studies of memory, are likewise referred to the diencephalon: the obnubilation and the dreamlike condition found in twilight states are in Delay's experience remarkably responsive to electrical convulsive therapy. He reviews the evidence relating the diencephalon to sleep and waking, and concludes once more that in this group of confused cases it is through diencephalic excitation that the patient is aroused and restored to healthy vigilance. The extensive observations which the author and his collaborators have carried out on patients under convulsive treatment, and his skilful marshalling of the relevant data concerning the hypothalamus and its connexions and

functions entitle his monograph to be regarded as a valuable contribution, but it becomes evident through repetition that he has stretched his thesis unduly; when the diencephalon is made accountable for too much, it explains very little.

Skin Diseases in Children

(2nd ed.) GEORGE M. MACKEE, M.D., professor of clinical dermatology and syphilology, New York Post-Graduate Medical School, Columbia University, New York; ANTHONY C. CIPOLLARO, M.D., associate in dermatology and syphilology at the school. London: Hamish Hamilton Medical Books. Pp. 448. 37s. 6d.

WHETHER or not a textbook on skin diseases confined to children is carrying specialisation too far is debatable: certainly many diseases cannot be presented in proper perspective. For example, it becomes irrelevant to say that the commonest cause of rosacea is "the ingestion of stimulants, especially tea and alcohol." Dr. MacKee remarks that children with acne feel inferior, humiliated, and sensitive; this is often true, but the usual reason is that the parents feel that a spotty-faced child is a reflection on themselves—and do not conceal the feeling. The reader, coming to the statement that "faulty sex habits," whatever that may mean, "should be corrected" as part of the treatment of acne, will probably look back to make quite sure that the book really was published in 1946: actually no date of publication is given. This practice must be roundly condemned; no medical work of any sort should be published without a date. However, there is much valuable information in the book, and the sections on ringworm, congenital anomalies, and syphilis are particularly good.

Further Studies in Encephalography

E. GRAEME ROBERTSON, M.D., F.R.C.P., neurologist, Royal Melbourne Hospital and Children's Hospital, Melbourne. London: Macmillan. Pp. 103. 42s.

THIS short monograph is based on Dr. Graeme Robertson's investigations into the physics and radiology of encephalography. He observed that replacement of cerebrospinal fluid in the ventricles by gas introduced into the lumbar subarachnoid space was not achieved by flotation of the gas in the fluid alone. One of the factors responsible is elastic recoil of the brain, as a result of which gas can enter ventricular cavities which are at a lower level than the introduced gas. He therefore studied the passage of gas from the lumbar sac to the ventricles in living and dead subjects and in reconstructed models, and then applied his findings to altering the technique of radiology. Thus far his monograph is mainly of interest to the experts, but the illustration of his results will fascinate everyone. His radiographs of the pons and medulla, of the cerebellum, and of the third ventricle and its structures, including the infundibulum, are convincing and clearly valuable. Line diagrams with which he explains many of his plates might well have been extended to all.

The Irish Medical Directory and Hospital Year Book for 1946-47 (Dublin: Parkside Press, pp. 358, 15s. 6d.) fulfils the promise of its title and gives information about the doctors, hospitals, and public-health officers of all Ireland. It also contains an article on penicillin by Mr. Ian Fraser, surgeon to the Royal Victoria Hospital, Belfast, and a review of recent literature on the sulphonamides in surgery by Mr. William Doolin, editor of the *Irish Journal of Medical Science*.

Desirable Factors in Surgical Sutures, by Mr. E. J. Holder, B.PHARM. (obtainable from the author, 42, Lauder Road, Edinburgh, 9, pp. 56), deals chiefly with the effect of methods of preparation and of sterilisation on the durability and strength of catgut in the tissues. It seems careful work. The effects of chromic acid and iodine are clearly demonstrated. Like other investigators the author thinks that little is gained by using any but the thinnest strands of catgut. His conclusion that non-absorbable sutures cause considerable reaction in the tissues will be doubted by observers who have gone more carefully into the matter: the histological aspect must be taken into consideration as well as the naked-eye appearances on which alone he has relied. An interesting chapter on the chemical constitution of various types of catgut is included.

THE LANCET

LONDON: SATURDAY, APRIL 26, 1947

Food for Convalescence

EVERYONE is well aware that an acute illness, of whatever cause, will lead to loss of weight and strength; but the accompanying metabolic changes were not examined until recent years. It is now recognised that any acutely adverse circumstance, such as trauma, operation, hæmorrhage, or infection, is associated with an immediate outpouring of nitrogen in the urine, with the result that the patient passes into a phase of negative nitrogen balance. Though this tells us little more than we already knew, it shows that, partly at least, the weight-loss seen in acute illness is due to accelerated destruction of protein. From this little extra information new ideas have emerged which may improve the therapy of convalescence and lessen the risks of surgery.

As to the immediate origin of the excess of nitrogen which appears in urine after injury two views are held: (1) that it arises from an increase in katabolism of tissue protein or labile storage protein, and (2) that the tissues fail to utilise ingested protein and amino-acids. While both these sources may contribute to the total nitrogen loss, it is probable that destruction of endogenous protein is the more important. MADDEN and CLAY¹ have shown that a negative nitrogen balance develops in normally fed dogs in which a sterile abscess has been induced by the injection of turpentine, whereas in dogs whose labile protein stores have been depleted by a low protein intake such an abscess causes little or no increase in nitrogen loss. In both groups of animals the loss of protein can be made good by liberal protein feeding. CROFT and PETERS² suggest that the protein katabolic phase following trauma is a defensive response to injury, whereby protein is broken down in order to make available to the organism amino-acids essential for defence against the noxious agent at the height of its attack. In support of this hypothesis, they found that the addition of methionine to the diet of patients suffering from burns abolishes the negative nitrogen balance. LEVENSON et al.³ have observed an early increase in the level of amino-acids in the plasma of burned patients, and attribute it to an increase in the rate of amino-acid production in the tissues. MAN et al.,⁴ on the other hand, could see no correlation between the level of plasma amino-acids and the degree of nitrogen loss in patients after operation.

Whatever the fundamental cause and biological significance of the post-traumatic loss of protein, it is likely, if severe and long continued, to have certain harmful effects on the patient: apart from delaying recovery, it has been thought to diminish resistance to

infection and to delay the healing of wounds. MAYCOCK et al.,⁵ endeavouring to estimate the state of the circulation and cardiac output from the ballistocardiogram in patients before and after severe surgical operation, found that in patients who were kept in positive nitrogen balance by extra feeding the operation led to less disturbance of the circulation than in those who were losing protein: both objectively and subjectively, patients in whom protein destruction was compensated by extra feeding withstood surgery better than those in whom no special attempt was made to maintain nitrogen equilibrium. Similar findings are reported by KOOP et al.,⁶ who draw attention, however, to the practical difficulty of getting the postoperative patient to take a high-protein diet. These workers tried to build up a high protein reserve by giving an excess of protein—if necessary as protein hydrolysate—for five days before operation, and they formed the impression that patients prepared for operation in this way did better than others.

While the last word has not yet been said on protein metabolism in acute disease, and while we remain ignorant of the mechanisms involved in protein destruction, we cannot be certain that post-traumatic protein katabolism is in fact harmful enough to warrant inflicting unpalatable high-powered protein mixtures and digests on the sick. The work so far done has served, however, to focus attention on the dietetic aspect of hospital treatment, which has too often been overshadowed by the more dramatically urgent therapeutic measures which a given illness may necessitate. The organisation of hospital dietetics calls for a degree of integration and coördination of skills which is hard to achieve unless a positive effort is directed to a specific end. The work done in the Canadian army hospitals, which is reported elsewhere in this issue, illustrates the possible inadequacy of hospital diets, both for the severely ill and for the convalescent, and indicates the effort of organisation which is in fact necessary to ensure a daily intake of 2700–3500 calories with a protein ration of 100–170 grammes. In the hospitals of this country, no matter how complete the organisation for the dietetic care of patients may become, we have the additional difficulty of providing the dietetic machine with suitable material on which to work: as things now stand, it would be all but impossible to find a daily ration of 170 grammes of palatable protein for each patient who could be judged in need of it. Moreover, it can be difficult to induce convalescent patients to consume such diets, without recourse to force-feeding techniques. Again, it is one thing to see that protein is swallowed, but quite another to ensure that it is fully utilised; and for the invalid there is point in the Shakespearian toast "Now, Good Digestion wait on Appetite, and Health on both." None the less, the Canadian experience emphasises once more the deficiencies both in what we achieve and in what we attempt. Neither food shortages nor anything else excuse our hospitals from providing, to the best of their ability, the kind of food most likely to induce appetite and restore the patient's strength.

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Persistence of Smallpox Virus

IN former days, studies of the mode of spread of smallpox taught us much about the transmission of infectious disease in general. Such studies, made in the field, were chiefly observations on the natural course of events. At first, when smallpox was widespread, it was often difficult to discover how any particular person had acquired his infection; but when the incidence was reduced to a few sporadic cases, or to imported infections, the manner of spread became more frequently and more clearly evident. In this way we learnt that contagion, direct or indirect, was the ordinary means of transmission; and in outbreaks of variola minor in 1921 and 1925 J. J. BUTTERWORTH in Lancashire was able to find the source of infection of almost every patient. In major smallpox the striking distance seemed to be somewhat greater, and in some of the hæmorrhagic outbreaks there has been evidence of droplet infection. It became clear, too, that for a time the patient's body remains infective after death; in Hamilton, Ontario, for example, a number of people contracted the disease after attending the funeral of the mayor, who died from an unrecognised hæmorrhagic attack.

It was also fairly certain that smallpox infection could persist in the patient's bedding and clothing. This was shown by cases in disinfecting staffs handling fomites, and by outbreaks in laundries (as at Wallasey early this century) where it was found that ability to infect might even survive the process of washing. An even longer persistence of infection was assumed when smallpox broke out at Oldham, in mills where Egyptian cotton was spun, at a time when the disease was prevalent in Alexandria. The analogy of vaccinia virus, which resists dehydration by glycerin, led to a firm belief that the variola virus strongly resists drying. Actually, as long ago as the early 18th century, physicians in this country were familiar with a method of immunisation by dried crusts kept for the purpose by the Chinese—

"who take the skins of some of the dried pustules which have fallen from the body, and put them into a porcelain bottle, stopping the mouth of it very closely with wax. When they have a mind to infect any one, they make up three or four of these skins (inserting between them one grain of musk) into a tent with cotton, which they put up the nostrils."¹

Any doubts that may have remained about the viability of the virus will be finally dispelled by the laboratory experiments of Professor DOWNIE and Dr. DUMBELL which we publish this week. They find that virus from vesicle fluid will grow on the chorio-allantois of the chick after being kept in the dark for as long as 84 days; and even this is by no means the limit; for crusts from healing lesions, kept in the dark at room temperature, yielded virus after 417 days, and crusts kept in vacuo over calcium chloride were still infective after more than two years.

Evidently, therefore, unless they are properly disinfected, articles used by a smallpox patient may long remain capable of transmitting the disease. Indeed, in the light of DOWNIE and DUMBELL's findings, there is probably no further need to invoke aerial convection to explain the vagaries of smallpox spread. We now have an adequate explanation of

recent cases in which smallpox has occurred in houses to which presents of leather goods, or the like, had been brought back from the East—the disease even being confined to the recipient of the present. Prudence, however, dictates that before accepting such an explanation in any particular case all possible care should be taken to discover a human source of the infection who has been somehow overlooked.

Absorbable Hæmostatics

THE history of surgery is reflected in the development of the methods of hæmostasis. "The confidence gradually acquired from masterfulness in controlling hæmorrhage gives to the surgeon the calm which is so essential for clear thinking and orderly procedure at the operating-table."¹ It has been a long road from the pre-Hippocratic tenaculum to the modern artery forceps; and no less arduous a one from HEWSON'S and JONES'S classical experiments on the "coagulable lymph" of blood, dating from 1771, to our present understanding of the intricate biochemistry of hæmostasis.

Attempts to encourage clotting at the site of blood-vessel rupture have an extensive history. AMBROISE PARÉ dressed bleeding wounds with a mixture containing white of egg ("étoupe trempée dans une sorte de pâte faite de blanc d'œuf."²). PERTHES³ applied defibrinated blood of the rabbit to the wound and injected it under the bleeding surface; BROCA⁴ recommended local applications of human serum; others⁵ favoured proteins, such as gelatin. These empirical techniques led up to the clearer conception of hæmostasis by locally applied absorbable agents which is developing today. Absorbable hæmostatics are intended for application to sites of hæmorrhage which cannot be readily controlled by a hæmostat and when the removal of mechanical pressure or a temporary plug may lead to recurrence of bleeding; when the hæmorrhage is arrested they are absorbed by the tissues. HARVEY CUSHING and VICTOR HORSLEY were the first to propose striated muscle for this purpose, and such "muscle-stamps" well illustrate the principles of an absorbable hæmostatic—they transmit pressure, contain clot-promoting substances, and are absorbed. They have been widely used in neurosurgery, but the risk of infection and the impossibility of sterilisation have limited their value. It was CUSHING also who pointed the way to the use of fibrin as an absorbable hæmostatic—"... the fibrin from whipped blood might be so prepared that it could be immediately plastered on bleeding surfaces, just as cotton is now used, and thus obviate the necessity for any subsequent replacement."⁶ There is little to add to this definition. An ideal absorbable hæmostatic must be as simple to use as cotton-wool or gauze; it must be absorbed at the right speed, so that neither replacement nor removal is necessary; it must be safe—i.e., sterilisable by recognised practical methods.

The late war stimulated many advances in this field. In close succession fibrin foam, oxidised cellulose,

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3. Perthes, G. C. *Münch. med. Wschr.* 1905. Quoted by Lexer (ref. 5).
4. Broca, J. *med. Chir.* 1907. Quoted by Lexer.
5. Lexer, E. *Chirurgie*, Stuttgart, 1922.
6. Cushing, H. *Ann. Surg.* 1911, 54, 1.

1. Munk, W. *The Gold-headed Cane*, London, 1884.

and gelatin sponge have been developed in America ; calcium alginate in England. The American materials, used in conjunction with thrombin (and also without) have already proved their value. Experimentally they show much the same absorbability in tissue. Fibrin foam, the earliest material to reach the clinical stage, is absorbed from the liver, peritoneal cavity, abdominal wall, kidney, and lung in about five weeks⁷; in animals only a minimal amount of fibrous tissue is found at the site of implantation after this time. Soon after the foam has been applied polymorphs invade the implant area, and a tissue reaction characterised by many mononuclears and a few lymphocytes is elicited. About three weeks after implantation there is a well-marked giant-cell reaction. But the tissue reaction produced is far less than to a "muscle-stamp" of the same size. The safety and efficacy of fibrin foam were established by extensive trials in neurosurgery, and experience gained in 240 general surgical operations, including some on hæmophiliacs, corroborated the earlier results at Harvard. Perhaps the sole drawback to fibrin foam is the slightly complicated method of use, involving the "mixing in" of freshly prepared thrombin ; sterilisation also requires a special procedure.

Oxidised cellulose (oxycellulose), developed by FRANTZ and her co-workers at Columbia University, New York, is prepared as a gauze and is easier to use than fibrin foam. The tissue reactions to the two are much the same. There is said to be an actual chemical combination between oxidised cellulose and hæmoglobin, and it seems best to apply it without thrombin. In staunching bleeding a sticky gelatinous mass forms, not a clot ; this can be lifted away twenty-four hours later leaving a thin film of fluid between the material and the raw surface, without restarting the bleeding. Whereas fibrin foam can be applied in the presence of penicillin, oxidised cellulose inactivates the drug and is thus contra-indicated where penicillin is essential ; it apparently delays bone repair and its sterilisation has to be effected by chemical methods. Clinical reports on well over 100 cases⁸ have proved it to be efficacious in a variety of operative procedures. The third substance developed in the United States—gelatin sponge ('Gelfoam') is whipped or foamed gelatin. This is sterilisable by dry heat (autoclaving destroys its physical properties) and can be satisfactorily used with or without thrombin. It does not inactivate penicillin. JENKINS and CLARKE⁹ noted that there was sometimes a sharp inflammatory reaction to the sponge, which brought about its early liquefaction ; where the early tissue response was slight the sponge became encapsulated by fibrous tissue and was subsequently removed by the phagocytosis of macrophages. After a clinical study in which gelatin sponge was used in 272 neurosurgical operations and fibrin foam in 115 similar cases, PILCHER and MEACHAM¹⁰ preferred gelatin sponge, which was easier to apply ; it can be cut with scissors and retains its tensile strength on wetting.

Hard on the heels of these American developments BLAINE et al.,¹¹ in England, have reported on yet

another absorbable hæmostatic—calcium alginate—which is derived from Scottish seaweed and is increasingly utilised in British industry, to which must go the credit for its development. When sodium alginate solution reacts with a calcium salt coagulation immediately takes place, making it possible to prepare hæmostatic foams, filaments, cloth, gauze, wool, or a film resembling 'Cellophane' which can be prepared in situ. Calcium alginate can be autoclaved without serious loss of physical properties, and it can carry penicillin without inactivating it. Its versatility makes it easily adaptable for special purposes. Of the recently developed materials calcium alginate alone awaits clinical trial.

The absorption-rate of all these hæmostatics depends on their bulk and on the reaction of the tissue or organ in which they are placed. An experimental study of the effect of different pH levels in various sites of implantation might shed further light on absorption-rates ; it would be of interest to establish graded absorption-rates best suited to diverse purposes. Apart from fibrin and thrombin, which play a direct part in blood-coagulation, they probably owe their hæmostatic effect to the great surface they offer to extravasated blood. Calcium alginate may also aid hæmostasis by enhancing prothrombin formation by releasing calcium.

Annotations

AN AMERICAN HOSPITAL SURVEY

THE Michigan Hospital Survey,¹ undertaken as a pilot study of a single State, covers the whole range of hospital provision for urban and rural communities. While much of it goes over the same sort of ground as the recent hospital surveys in this country, the report does not always take the same line. For example, it recommends that the general hospital should not exceed 750 beds in size : "when an institution becomes too large, the administrative procedures of the service may become too impersonal and cumbersome, and this will be reflected in the quality of care given to the patient." As we said last week, we hope the regional boards will give due weight to this consideration when they come to set up their hospital management committees.

How many beds are needed in a given community ? The Michigan surveyors reject the arbitrary method of assuming so many beds per thousand of the population, and have attempted what seems to be an entirely fresh approach to the problem. "It is now thought," they say, "that the number of general hospital beds for any community is directly proportioned to the crude birth and death rates." Hospital and vital statistics show that the public use about 250 days of general hospital care for each death and correlated sickness in a general hospital, and the number of beds needed can be deduced from an estimate of the number of deaths that will take place in hospital. The proportion of people dying in hospital is nearly 38% in Michigan, and as high as 50% in some other States. "We should strive," the survey suggests, "for an average level of hospitalisation whereby at least 50% of all deaths and correlated sickness occur in general hospitals, whilst some 8%–10% would occur in other types of hospitals and institutions." The surveyors evidently believe that, used with discretion, their "bed-death ratio" represents a real advance on

7. Bailey, O. T., et al. *Surgery*, 1945, 18, 347.
8. Frantz, V. K. *Surg. Clin. N. Amer.* 1945, 25, 2.
9. Jenkins, H. P., Clarke, J. S. *Arch. Surg., Chicago*, 1945, 51, 4.
10. Pilcher, C., Meacham, W. F. *Surg. Gynec. Obstet.* 1945, 81, 4.
11. Blaine, G., Dollar, J. M., Sorsby, A. *Trans. ophthalm. Soc. U.K.* 1945, 64, 187 ; Blaine, G. *Lancet*, 1946, ii, 525 ; *Ann. Surg.* 1947, 125, 1 ; *Med. Pr.* (in the press).

1. The survey was undertaken by the staff of the American Hospital Association's Commission on Hospital Care, with Dr. A. C. Bachmeyer as director of study. It was financed by the W. K. Kellogg Foundation, of Battle Creek, Michigan, which publishes the report.

existing methods of estimating needs, and it would be useful to the Ministry of Health if statisticians over here would work out its possible application in this country. Bed-occupancy rates are also discussed, in relation to hospitals of different sizes and different degrees of segregation: "the smaller communities need more beds per thousand people because they must depend on smaller hospitals." Nothing, however, is said about costs, beyond a casual observation that "if hospitals could be constructed at \$8000 per bed, approximately \$90 million would be required to provide all the first class general hospital facilities that the State now needs." When, one may ask, is the curve of hospital provision going to level out, if not begin to fall?

This Michigan report emphasises, as our own hospital surveys can scarcely be said to have done, the educational aspect of nursing, and its recommendations for training schools resemble those lately made in these columns.² Hospitals which conduct schools of nursing should, it says, maintain separate budgets for the hospital nursing service and the nursing school, and "the value of services rendered by student nurses should be reflected in the accounts as a charge against the hospital, and a credit to the school." The school must have adequate financial support, which can be drawn from "endowment income, tuition and fees, taxation, and payment to the school by the associated hospitals for the nursing service rendered to the patients." An integrated system of hospitals would make it possible for the nurses' training schools to develop their curricula to the point where they could provide students with a varied experience of nursing in the hospitals, in the medical service centres, and in the field of public health.

ANTIBIOTICS IN BILIARY DISEASE

CHEMOTHERAPEUTIC drugs which were active against the coli-typhoid organisms and were excreted and concentrated in the bile would have considerable value as a substitute for or adjunct to surgery in cholangitis, cholecystitis, and empyema of the gall-bladder, and they might cure those chronic typhoid carriers in whom the gall-bladder has proved to be the reservoir of the organism. The sulphonamides, penicillin, and streptomycin are excreted in the bile of healthy men and animals, but it does not necessarily follow that these substances will be similarly excreted if the liver or the biliary tract is diseased or functioning poorly. Thus, Zaslów et al.³ have shown that where there is clinical or laboratory evidence of liver disease and dysfunction, excretion of penicillin and streptomycin in the bile may be absent or reduced, whereas if the biliary tract is returning to normal function after surgical drainage these drugs are excreted in the bile. These American workers agree with Mr. E. G. Tuckwell, who reported his findings at the Royal Society of Medicine on March 5, in finding that, with normal liver function, the level of penicillin is usually higher in the bile than that in the blood within the first 2 hours after parenteral injection, whereas streptomycin is usually less concentrated in bile than in blood and reaches its peak rather later, than does penicillin. Indeed, Zaslów et al. suggest that a biliary level below 0.5 unit of penicillin per c.cm. after an intramuscular dose of 15,000 units, or below 1.5 units of streptomycin after the injection of 100,000 units, is an indication of impaired liver function.

These drugs may reach the gall-bladder bile either by aspiration through the cystic duct or by passage through the blood-vessels in the wall of the gall-bladder. Normally, as Tuckwell showed, penicillin is present in the gall-bladder bile and may reach higher levels there than in the hepatic ducts, probably through concentration of the

bile by fluid absorption. However, when the cystic duct is obstructed, penicillin is not found in gall-bladder bile, showing that the drug enters the gall-bladder through the biliary ducts and not through the bloodstream. Thus, in a group of 25 patients who were to undergo cholecystectomy, Zaslów et al.⁴ found no penicillin in the gall-bladder of 8 cases; in 7 of these the cystic duct was obstructed by stones while in the eighth no penicillin was being excreted in the hepatic ducts. Unfortunately cholecystography, using the iodophthalein dyes, may not indicate correctly whether the cystic duct is patent. In the group in which penicillin was present in the gall-bladder and 4-14 hours elapsed between administration of the drug and cholecystectomy, the findings showed that the drug was neither much concentrated nor rapidly absorbed or excreted. The same applied to streptomycin.

The prospect of cure by chemotherapy in acute or chronic infections of the biliary tract is therefore not very bright, since neither penicillin nor streptomycin, nor presumably sulphonamides, will be excreted in the bile in significant amount if there is intrahepatic or extrahepatic biliary disease. Moreover, concentration in the gall-bladder will depend on patency of the cystic duct, which cannot be relied on in the type of patients among whom chronic typhoid carriers are usually found.

BLOOD-PRESSURE AND AGE

A YEAR or two ago we suggested that "few would now rely on the old dictum that the normal systolic blood-pressure, expressed in mm. Hg equals 100 plus the patient's age expressed in years."⁵ Now we have American workers expressing the opinion that "the old maxim '100 plus the age' may actually be a fair index of normal systolic blood pressure."⁶ This conclusion is based on a series of 5331 white men between the ages of 40 and 95, some of whom have previously been reported on.⁷

Analysis of the average systolic and diastolic pressures showed that though both rise with increasing age, the rise in the former is much greater. Thus the average systolic pressure increased from 133.3 mm. Hg in the 40-44 age-group to 164 in the 85-95 group, while the corresponding figures for the diastolic pressure were 84.8 and 90. This change with age is shown even more clearly by a comparison of the proportion in each age-group with "normal" blood-pressure (145/95 or less), systolic hypertension (150 or more/95 or less), and diastolic hypertension (diastolic pressure of 96 or more). The percentage with "normal" blood-pressure fell progressively with age from 87.2 at 40-44 to 27.8 at 85-95, while there was an equally striking increase in the incidence of systolic hypertension—from 4.2% to 45.2%. The rise in incidence of diastolic hypertension was less marked—from 8.5% at 40-44 to 27% at 85-95. The trends of "normal" systolic and diastolic pressures showed a progressive rise: the systolic rose from 129.6 at 40-49 to 134.1 at 80-95, the corresponding diastolic figures being 80.9 and 74.5. With advancing years there was no significant change in the incidence of pressures of 120/80 or less, but there was a big rise in the frequency of systolic pressures between 140 and 149 (from 18.6% at 40-49 to 40.9% at 80-95). Diastolic pressures below 70 rose from 3.6% at 40-49 to 21.2% at 80-95. The fact that diastolic pressure tended to fall rather than rise as age increased is adduced in answer to any suggestion that the series is vitiated by the inclusion of people with latent or potential hypertension.

If, as these observations indicate, the systolic pressure rises with age, what is the mechanism? Two factors

4. *Ibid.*, p. 140.

5. *Lancet*, 1943, ii, 549.

6. Russek, H. I., Rath, M. M., Zohman, B. L., Miller I. *Amer.*

Heart J. 1946, 32, 468.

7. *Ibid.*, 1943, 26, 11; see *Lancet*, 1943, ii, 549.

8. Miller, I. *N. Y. St. J. Med.* 1941, 41, 1631.

2. *Lancet*, Feb. 8, p. 227.

3. Zaslów, J., Counsellor, V. S., Hellman, F. R. *Surg. Gynec. Obstet.* 1947, 84, 16.

are probably involved—a neurogenic and a vascular. Russek and his associates^{9 10} have already shown that the reactivity of the blood-pressure, as judged by the cold pressor test, increases with age; and Dock¹¹ believes that this increase is related to trophic loss of neurones with ageing. The vascular factor, however, is probably more important, consisting of a progressive diminution of elasticity of the aorta and its larger branches. This change results in a higher systolic and lower diastolic pressure, whereas the neurogenic factor raises both systolic and diastolic. In other words, the neurogenic and vascular factors have a summing effect on the systolic pressure, but opposing effects on the diastolic pressure.

Two practical implications emerge from this study: (1) the upper limit of normality for the systolic pressure in the elderly must be accepted as considerably above 140 mm. Hg; and (2) in identifying essential hypertension emphasis must be laid on the diastolic rather than the systolic pressure. This latter view has been gaining ground in recent years; Hines,¹² for instance, suggested that only the diastolic pressure is of value in predicting the subsequent development of hypertension. It has also been generally accepted for many years that the prognosis in the elderly is much better with systolic hypertension than with diastolic hypertension. What is only now being elucidated is the "normal" blood-pressure for that increasingly large section of the community over the age of 50 years.

THE WHEELS TURN

THIRTEEN days at Geneva, from March 31 to April 12, were barely sufficient to dispatch the business of the third session of the Interim Commission of the World Health Organisation. The terminal scramble was partly due to the commission's failure to recognise that they had undertaken more than the secretariat could manage and partly to an inveterate tendency among some members to reopen questions already decided. Much good work, however, was done, and some important decisions taken in a most cordial atmosphere, to which the member from the U.S.S.R., Dr. C. A. Kolesnikov, was a notable contributor. As the chairman, Dr. A. Stampar, remarked in his closing speech, no serious differences of opinion were revealed and no voting was necessary. Of the 18 members 16 attended, Dr. I. Medved of the Ukraine and Dr. J. Togba of Liberia being unavoidably absent—the former because of his recent elevation to the post of minister of health. Sir Wilson Jameson was present during the first week of the session. Observers attended from the United Nations, F.A.O., the International Children's Fund, the International Refugee Organisation, the International Civil Aviation Organisation, the Paris Office, the Pan-American Sanitary Bureau, UNESCO, and UNRRA.

The most important task before the commission was to balance the budget, since the decisions taken at the second session last November¹³ called for an excess of expenditure over income of some 300,000 dollars. By careful pruning this was achieved, even with the inclusion of some new items, except for a necessary reserve of 200,000 dollars, for which a further loan from the United Nations may be required. Among the new items an omission was repaired by providing for an expert committee on tuberculosis, and experts on child welfare and nutrition, venereal diseases, infant mortality, and influenza are to be appointed. The commission approved the allocations of funds for field services, derived from UNRRA, according to the requests from countries for missions, fellowships, visiting lecturers, and medical literature, and also approved the agreements concluded

with the governments of Greece and Ethiopia for field missions.

The commission did not see entirely eye to eye with the observer from UNESCO, Mr. J. Needham, F.R.S., on the apparent encroachments of that body into the territory of health, but it was decided to set up a joint committee on the organisational level to define the boundaries. A joint committee on nutrition with F.A.O. will also be set up, to which the International Children's Fund may be conjoined. The negotiating subcommittee on relations with the Pan-American Sanitary Bureau reported considerable progress, which, as it failed to satisfy some members and went too far for others, was probably the best practicable mean.

Technical matters were chiefly dealt with by the committee on epidemiology and quarantine and by the new committee on priorities. Studies are to be undertaken by the secretariat on postvaccinal encephalitis, the "immune reaction" in vaccination, and immunisation against influenza. A meeting of a technical committee of the Interim Commission is now taking place in Cairo to consider revision of the clauses of the 1926 and 1938 conventions dealing with the Mecca pilgrimage, and on April 21 the expert committee on malaria met in Geneva. The expert committee on lists of causes of death and morbidity met in Ottawa last month.

If we look back over the twelve months since the technical preparatory committee met in Paris in March, 1946, the progress made is seen to be gratifying and unprecedented. A constitution for a World Health Organisation has been signed by 63 nations. An interim commission to carry on the urgent and statutory duties pertaining to world health has been working effectively for the past six months. The Paris Office, the Health Organisation of the League of Nations, and the Health Division of UNRRA have been in practice absorbed, and their work carried on without serious interruption. Considerable progress has been made with the integration with the Pan-American Sanitary Bureau. Ten States-members of the United Nations and 3 non-members have ratified the constitution, and the progress reported of other ratifications is such that the necessary 26 will almost certainly be obtained before the end of the year.

A PIONEER OF SOCIAL DYNAMICS

ONE of the clearest and simplest formulations of Kurt Lewin, whose obituary we publish this week, was his distinction between the scientific concepts of Aristotle and Galileo. In dynamics Aristotle emphasised the nature of the object: he held that a stone fell to the ground because it was "earth" and had therefore to go towards the earth. Galileo, on the other hand, made physicists pay more attention to the object's relation to its environment. According to Aristotelian thought the environment played a part by "disturbing" the processes which follow from the nature of the object concerned; but in Galileian thought it is the concrete whole, which comprises the object *and* the situation, that determines the dynamics of the event defined: that is to say, an object is always in and part of its environment—an obvious notion but one with far-reaching implications if taken literally and always applied.

Its application to medicine is plain. We cannot isolate a person from his environment. When we examine an individual we are also examining a part of a genetic and a social field at the same time, if our ways of thought are thorough. When a patient comes to us our training leads us to see an object with an extension in time: it begins as a speck smaller than a pin's head, and ends some day as a life-size corpse. That speck grows by reason of forces in the cell and in the tissues in which it is embedded; that embryo, that child, develops through adolescence to adulthood and withers in old age: we see on examination at any one time a small slice in that

9. Russek, H. I. *Amer. Heart J.* 1943, 26, 398.

10. — Zohman, B. L. *Ibid.* 1945, 29, 113.

11. Dock, W. N. *Y. St. J. Med.* 1945, 45, 983.

12. Hines, E. A. jun. *J. Amer. med. Ass.* 1940, 115, 271.

13. *Lancet*, 1946, ii, 799.

long history, but we also see one event which displays the interaction of forces within the organism and of those outside it—and knowledge of both are necessary for the understanding of that event before us, the patient in the consulting-room.

Our work requires that we "take a history," but in making our investigation, in so far as we use the methods of science, our mode of thought is a-historical: in other words, we consider exhaustively what is happening here and now, what is observable here and now, how we might by laboratory or other techniques extend our knowledge of the events occurring here and now. We do not, in so far as we are scientists, think of the patient as belonging to a "type," as Aristotle would have done, but as a product of forces operating in an interconnected set of fields, which (to use Lewin's term) is to employ a Galileian mode of thought. This does not deny us the right to use intuition, or "hunches," or any other process of thought, including a "feeling for" those historical developments which lead to present events; but the Galileian mode of approach does impel us to check our hunches a-historically—i.e., by the fullest observation of events occurring here and now.

The point of entry into a problem does not necessarily determine its point of emergence. As doctors we know this in our dealing with patients; they come to us for relief from pain (physical and mental), and that is our point of entry into their private world. Our treatment of them, however, is essentially an effort to improve their internal stability and external adaptability—which includes relief from the pain. Lewin applied the same principles to social problems. Here the point of entry was some symptom of social unrest, and from that starting-point he made a study of social dynamics with the aim of bringing about a stability in the social organisation he was advising. In yielding thus to the demands of "applied science" he did not feel that he was any the less a "pure scientist," for science is a method of thought and of testing ideas, and not an activity that can take place only in a region of social isolation. For Lewin, moreover, there could be no research without therapy, nor therapy without research, and his searching mind has given great help to those who try to assess the forces acting within the individual and within social groups.

DIETARY DEFICIENCIES IN HONG-KONG

THE period of the Japanese occupation was the blackest in the history of Hong-Kong; the exodus to the mainland and starvation with its attendant diseases reduced the population from its pre-war 1,500,000 to 500,000; many buildings were destroyed in the fighting in 1941 and later through bombing.

Dr. Selwyn-Clarke,¹ who remained on the island during the occupation as director of medical services, describes how most of the Europeans, Americans, and Indians were housed in Stanley internment camp. The 2500 inmates included 40 doctors, 6 dentists, and 100 nurses, so there was no shortage of trained medical staff. A hospital of 74 beds was set up at Tweedy Bay, but the extreme shortage of drugs and surgical material made the turnover very rapid. From the beginning the diet was poor, often consisting of half a pound of polished rice daily (sometimes deteriorating), with occasional beans, peanut-oil, and chrysanthemum leaves in place of green vegetables. Deficiency diseases soon appeared, the commonest being nutritional oedema (338 cases in 1942); this was closely followed by beriberi (the second commonest cause of death in Hong-Kong before the occupation), pellagra, and "central nerve blindness." The optic atrophy was an example of the "nutritional neuropathies" mentioned by Clarke and Sneddon² and

others,³ which also affected the tracts of the spinal cord, the peripheral and auditory nerves, and those supplying the vocal cords. This syndrome progressed from swelling round the ankles to weakness and paresthesia of the limbs with difficulty in walking, seeing, and hearing. Lastly, the condition called "electric feet" was commonly seen, the sufferers finding that keeping their feet cool was the only effective treatment. The deficiency syndrome was found in prisoners coming from all parts of the East, but not in Europeans (however badly they were fed), though it was noted in Italian prisoners by Spillane and Scott⁴ from the Near East, the common factor appearing to be a monotonous diet deficient in the vitamin-B complex. It responded poorly to vitamin therapy, suggesting that it is something more than a deficiency disease per se but is associated with an upset in carbohydrate metabolism and the formation of pyruvic acid. Harrison⁵ has described a similar condition among Hong-Kong prisoners which he calls "painful feet"; this responded fairly well to vasodilators, suggesting that the immediate cause is vascular spasm.

Fehily,⁶ who has compared the nutrition of Hong-Kong before and after the occupation, notes that signs of dietary deficiencies were unexpectedly mild when the island was reoccupied—in particular the widespread beriberi and pellagra foreseen did not materialise, though there were signs of general malnutrition. The relative freedom from gross deficiencies must have resulted mainly from the disappearance of highly milled rice and the necessity of eating whatever food was obtainable; in this one respect the Japanese occupation had a beneficial effect by breaking down many of the age-old food prejudices, some of which unfortunately tended to return when it again became possible to "corner" cereals or oranges and sell them at an exorbitant price. Nevertheless, thanks to the efforts of the relief workers, by a year after the liberation the infant mortality had fallen to 100 per 1000 live births, compared with the 327 per 1000 of 1940.

THE ESKIMO'S TEETH

THE Eskimo was once held to be happily immune from the caries which ravages the teeth of other peoples; but he is immune no longer. In Greenland, it seems, we can study caries as a "new" disease, attacking a population with previously healthy teeth; and advantage has been taken of this opportunity by Dr. P. O. Pedersen, associate professor of dentistry at Copenhagen. Last week, speaking to the odontology section of the Royal Society of Medicine, he said that though caries is seen chiefly among the young, the older men and women, "whose teeth developed under Stone Age conditions," are not infrequently affected when they are brought into contact with civilised ways. The incidence is highest among those Eskimos employed by Europeans in the trading stations; thus at Julianehaab about 90% have one or more carious teeth. In East Greenland villages, where civilisation has made less headway, only about 5% are affected. The rise in incidence from nil, or almost nil, (during the past fifty years in the west and still more recently in the east), has been associated with parallel changes in food habits. Formerly living on meat and fish, the Eskimo who adopts the white man's habits becomes a heavy consumer of carbohydrate; and "from whatever angle these principal results of the gigantic nutritional experiment forced upon the population of Greenland are surveyed it is beyond discussion that the natives who give up, more or less, the dietary habits of their ancestors and adopt white men's industrialised food are the ones who become afflicted with caries."

1. Selwyn-Clarke, P. S. Report on Medical and Health Conditions in Hong-Kong for the Period Jan. 1, 1942, to August 31, 1945. H.M. Stationery Office, 1946.

2. Clarke, C. A., Sneddon, I. B. *Lancet*, 1946, 1, 734.

3. Scott-MacGregor, R. G. *Ibid.*, p. 852. Walters, J. H., et al. *Ibid.*, Feb. 8, p. 205.

4. Spillane, J. D., Scott, G. I. *Ibid.*, 1945, ii, 261.

5. Harrison, G. F. *Ibid.*, 1946, i, 961.

6. Fehily, L. *Brit. med. J.* Feb. 8, p. 220.

Some may be quick to draw their own conclusions ; but Dr. Pedersen enjoins caution : " In my opinion we are not entitled to draw far-reaching conclusions from these studies as to whether the tooth structure or the carbohydrate factor plays the greater part. . . . I do not think either that field studies of this kind will definitely solve the caries problem. In all probability the final effort will have to depend on the pure experiment."

A VERSATILE REMEDY

AMPHETAMINE or β -phenyl-iso-propylamine, better known as 'Benzedrine,' has been put to many uses since it was introduced in 1935. It was first applied to the treatment of narcolepsy,¹ for which it has proved unflinchingly successful.² Though popular in Britain, the drug has received still more attention abroad, particularly in the United States; and reports testify to its value in such diverse conditions as depression, fatigue, postural hypotension, alcoholism, postencephalitic parkinsonism, epilepsy, obesity, sea-sickness, and behaviour disorders of children. It was soon apparent that this sympathomimetic amine was a central nervous stimulant, producing delay in the desire for sleep and subjective improvement in mood; and since one of its side-effects is to decrease appetite it has naturally found favour in the treatment of obesity. It has also been commended as a remedy for the postalcoholic "hangover." In some disorders, however, its value is still imperfectly defined, as was shown by the correspondence following an account in these columns of its use in pulmonary tuberculosis.³

Amphetamine's place in the treatment of adult psychopaths was discussed last week before the Society for the Study of Addiction by Dr. Denis Hill and Dr. H. J. Shorvon. Bradley and Bowen,⁴ and Cutts and Jasper⁵ have shown that amphetamine improves emotional control in children with hyperkinesis, temper tantrums, and enuresis. Many of these have an abnormal electroencephalogram, characterised by excess theta rhythm; and Hill, postulating the same constitutional background, has treated with amphetamine adult aggressive psychopaths with a "theta-persistent" E.E.G. Among 8 patients studied for four years he has observed improvement in the predominantly aggressive, bad-tempered, intolerant, easily frustrated, irresponsible psychopaths who are yet capable of warm interpersonal relationships. The effect is particularly impressive in a smaller but well-defined subgroup of aggressive psychopaths with the stigmata of very deep sleep, late cessation of nocturnal enuresis, excessive or morbidly excitable sexual appetite, and immature E.E.G. Shorvon, unlike Hill, has also found the drug of value in some inadequate psychopaths. Both emphasise the amazing tolerance of the predominantly aggressive psychopath to large doses; even such amounts as 45-60 mg. daily do not disturb sleep; during treatment libido is reduced and tempers are better controlled. Hill makes the interesting suggestion that there may be a link between Myerson's⁶ anhedonic neurosis, with its "diminution, even to the point of disappearance, of the satisfactions normally obtained from life's activities and loss or distortion of the appetites and desires," and the beneficial effect of amphetamine in reducing libido, appetite, and aggression—that is, "the appetitive drives." Mann and Quastel⁷ have shown by in-vitro experiments that amphetamine stimulates by neutralising the inhibitory action of amines during cerebral respiration; the E.E.G. of the aggressive

psychopath shows cerebral immaturity, and amphetamine may produce a more mature expression of the primary appetitive drives by its effect on cortical oxidation.

In the late war enormous quantities of amphetamine were supplied to the Allied Forces, mainly for use in emergencies when it might be necessary to diminish fatigue and to postpone sleep. At last week's meeting Prof. R. C. Browne reported that, while it combated some of the deterioration in the anoxæmic airman's performance and had a statistically significant action on sleeplessness, it caused no consistent improvement in the fatigued pilot's performance; with it, skilled function was, if anything, rather less good. Dr. H. Crichton-Miller and Dr. G. R. Rudolf agreed that amphetamine's effectiveness against fatigue is enhanced by glucose; but Crichton-Miller's view that its main action "is associated with the mobilisation of blood-sugar" is not endorsed by other workers,⁸ most of whom have found little or no rise in blood-sugar. Rudolf recommends that the glucose should be taken six or seven hours after amphetamine, to counteract the postponed fatigue.

With judicious use, signs of idiosyncrasy or other reactions are rarely seen. Acute hallucinosis⁹ and a paranoid or toxic psychosis have very rarely been recorded after continued large doses; but most patients, such as narcoleptics and psychopaths, who take it continuously for years, display neither toxic signs nor increased tolerance. They can, moreover, discontinue the drug abruptly without craving or other withdrawal symptoms.

METHYL ALCOHOL POISONING

THE war in Norway provided ample opportunities for the clinical study of poisoning by methanol, and a monograph by Røe¹⁰ is based on 82 cases treated in various hospitals in or near Oslo. Though methanol does not as a rule provoke acidosis in experimental animals, Røe's observations lead him to believe that in man the outcome in cases of poisoning hinges entirely on the degree of acidosis, and in treatment he puts much emphasis on bicarbonate. Another of his conclusions is that ethyl alcohol counters the effects of methanol: his case-records show that the patients who suffered least were those who had mixed their drinks. In this connexion he writes: "It has been ascertained that when methanol alone is consumed, the latent period for the appearance of signs of poisoning is from 12 to 24 hours, usually 18 hours. Prolongation of the latent period beyond 24 hours is always due to the consumption of ethyl alcohol." Also he has a tilt at the teaching that individual predisposition is a factor of great importance.

G.M.C. ELECTION

OWING to the death of Sir Kaye Le Fleming there is a vacancy on the General Medical Council for a direct representative of the medical profession in England. The following have offered themselves as candidates:

Dr. JAMES BROWN, of Birmingham, member of the council of the British Medical Association.

Dr. J. E. OUTHWAITE, of Leeds, barrister-at-law, who stood at the election last June as a nominee of the Medical Practitioners Union.

Dr. ISAAC ROSE, of Leeds, medical officer at St. Helen Municipal Hospital.

Dr. P. S. Selwyn-Clarke, director of medical services, Hong-Kong, since 1938, has been appointed governor and commander-in-chief of the Seychelles. He has been a member of the executive and legislative councils of Hong-Kong.

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Special Articles

NEW CONCEPTS OF HOSPITAL FEEDING

HOSPITAL NUTRITION PROGRAMME OF THE CANADIAN
ARMY OVERSEAS

J. A. F. STEVENSON

M.D. McGill

MAJOR R.C.A.M.C.

E. H. BENSLEY

M.B.E., M.D. Toronto

MAJOR R.C.A.M.C.

ADVISERS IN NUTRITION TO THE CANADIAN ARMY OVERSEAS,
1942-46 *

DURING the late war the Canadian Army Overseas undertook an extensive programme based on the results of recent investigations of metabolism in injury and disease and designed to provide adequate nutrition for patients in its hospitals in the United Kingdom and Europe. This programme, outlined here, can be applied to civilian as well as military medicine.

The need for such a nutritional programme in hospitals was made obvious by the frequency with which weight-loss, representing tissue destruction, had been observed after injury and in disease (Taylor et al. 1943a, Elman 1944, Lund and Levenson 1945). Surveys of weight changes in military patients in hospital revealed that losses of 10-60 lb. were common (Lyons 1943, Stevenson et al. 1945a and b, 1946). Loss of weight in hospital patients is so common that it is usually considered an inevitable and unimportant accompaniment of injury and disease. However, recent investigations of metabolism following injury and in disease have shown that this loss of weight is due to malnutrition, which may seriously interfere with recovery; it is therefore neither inevitable nor unimportant.

BASIS OF NUTRITION PROGRAMME

Protein metabolism is disturbed after fractures, burns, infections, surgical operations, wounds, and various infections with or without fever (Cuthbertson 1942, Taylor et al. 1943b, Browne et al. 1944a and b, Peters 1944, Stevenson et al. 1945a, Grossman et al. 1945). There is increased catabolism of body protein, with excretion of large quantities of nitrogen in the urine, followed, after a variable period, by a tendency to increased anabolism of protein and replenishment of lost tissue. The first period of breakdown of protein tissue has been called by Browne et al. (1944b), Stevenson et al. (1945a) the protein catabolic period, and the second period of rebuilding of body protein tissue the protein anabolic period.

The loss of protein in the catabolic period cannot be explained by local-tissue destruction at the site of the pathological process, or even by loss of protein in its vicinity—e.g., muscular atrophy in a fractured limb (Cuthbertson 1942, Howard et al. 1944, Howard 1945). The catabolism of protein is increased throughout the body.

The increased catabolism of protein usually begins immediately after the onset of the damage, reaches its maximum during the first week, and, though gradually declining, persists for several weeks in serious injuries, when the patient gradually passes into the protein anabolic period. With moderate or severe injuries the duration and intensity of the protein catabolism are sufficient to cause appreciable weight-loss. Thus, in six cases of fracture the average total loss of protein amounted to 1400 g., equivalent to a loss of about 15 lb. of protein tissue (Howard et al. 1944).

The significance of the increased protein catabolism following damage is unknown. It is generally assumed that it is part of the response of the organism to damage

and fulfils some useful purpose. It seems probable that the increased breakdown of protein makes available to the organism amino-acids and glucose, which may be useful in tissue repair or in furnishing energy for the body at a time when intake of food is apt to be low. There seems to be no reason to doubt that the significance of the subsequent anabolic period is replacement of body protein lost in the catabolic period.

Regardless of the significance of the increased catabolism of protein following damage, there is evidence that it may have deleterious effects, particularly if replenishment of tissue protein in the subsequent anabolic period is prevented or delayed by a low food intake, leading to loss of weight, involving protein tissues, such as liver and muscle, and to weakness. In some instances the loss of protein is further increased through transudates and exudates, as in burns, chest or bowel lesions, and any draining wounds (Taylor et al. 1943a, Hirshfeld et al. 1944, Co Tui et al. 1945, Lund and Levenson 1945). It is obvious that the greater the loss of weight and weakness the longer will be the convalescence, if death from inanition does not intervene (Elman 1944). There is also evidence that depletion of protein may interfere with wound healing and resistance to infection, and predispose to disturbances of gastrointestinal function, liver damage, and shock (Mulholland et al. 1943b, Whipple and Madden 1944, Cannon 1945, Lund and Levenson 1945).

The obvious method of preventing or correcting depletion of protein in cases following damage and during convalescence is to increase the protein intake. At the same time the calorie intake must be increased; otherwise protein will be used to furnish energy, for energy requirements are known to be increased after damage. Daily intakes of 3500-4000 calories and 130 g. or more of protein are often required to prevent or correct rapidly the protein depletion (Mulholland et al. 1943a, Taylor 1944, Browne et al. 1944b, Stevenson et al. 1945a, Lund and Levenson 1945), even though the patient is confined to bed; and a daily intake of 2700 calories and 100 g. of protein should be regarded as the *minimum* required by convalescent patients.

These levels can be reached only by attention to all details necessary to ensure attractive and palatable meals of high nutritive value and by the use of supplementary feeds. Intravenous protein hydrolysates or tube feeding may be required in some cases. Though anorexia may make administration of a high diet difficult at first, feeding at a high level for a few days often leads to improvement in appetite (Elman and Akin 1945, Stevenson et al. 1945a).

If patients are fed at this level the net loss of protein from the body in the catabolic period may sometimes be reduced, and certainly restoration of body protein proceeds more rapidly in the anabolic period. Weight-losses, involving vital protein tissues, and associated weakness are thus prevented or reduced, and convalescence is shortened; there may also be a favourable effect on other consequences of protein depletion, such as delayed wound healing and lowered resistance to infection.

THE NUTRITION PROGRAMME

The nutrition programme, undertaken in hospitals of the Canadian Army Overseas, may be divided into four parts: (1) general educational measures; (2) surveys of food intakes of patients; (3) rules for three-meal diets, to obtain daily intakes of 100 g. of protein and 2700 calories; and (4) use of supplementary feeds to raise the total daily intake to any level necessary up to 130-170 g. of protein and 3200-3800 calories.

General Educational Measures.—Detailed information about the scientific basis of the programme, as outlined above, was disseminated among all medical officers,

* This appointment was held by E. H. B. in 1942-45 and by J. A. F. S. in 1945-46.

dietitians, and other hospital personnel by lectures, conferences, circular letters, and pamphlets. In this way a thorough understanding of the need for the programme was provided, and its importance, as part of the medical care of the patient, was emphasised.

Surveys of Food Intakes of Patients.—To determine quantitatively the level of food intake of patients and the extent to which this must be increased to be adequate, surveys were made in three Canadian Army hospitals in the United Kingdom (X, Y, and Z), chosen at random. Convalescent surgical patients, free from gastro-intestinal disturbances and receiving ordinary diets, were chosen at random in each hospital. The foods offered to each of these patients at meals, and those portions returned uneaten, were weighed over a three-day period. The plates served were chosen at random so that the servings would represent those usually given by the nursing sister. The patients kept accurate lists of the food they ate between meals, such as supplementary feeds, canteen purchases, and items of parcels sent from Canada.

From these observations the protein, fat, carbohydrate, and calorie value of the food eaten each day by each patient was calculated, with the tables of McCance and Widdowson (1942).

The average daily intakes of protein and calories of each patient, of each hospital group, and of the group as a whole are shown in table I. The results are broken down to show (A) the amount eaten from the three meals, (B) the amount eaten from supplementary (between-meal) feeds supplied by the hospital, (C) the total amount eaten from hospital sources (A + B), (D) the amount eaten from personal sources (not supplied by the hospital), and (E) the total amount eaten during the day (C + D).

The average results of the individual hospital groups, and of the group as a whole, indicated that feeding of

patients in Canadian general hospitals in the United Kingdom was adequate, if judged on the basis of the nutritional requirements generally accepted until that time. It may also be said that the results compared very favourably with those of surveys carried out in civilian and military hospitals in Great Britain and North America (King Edward's Hospital Fund for London 1943, Stevenson et al. 1945b). However, satisfactory as the results were in this regard, they fell far short of what is now considered optimal for these patients

TABLE II—DAILY INTAKES OF TWO CONVALESCENT SURGICAL PATIENTS ON SPECIAL HIGH DIETS

| Case | A | | B | | C | | D | | E | |
|------|------------|-------|-------------|-------|-------------|-------|-----------|-------|-------------|-------|
| | Meals | | Supplements | | Hosp. total | | Extras | | Grand total | |
| | Pr. | Cals. | Pr. | Cals. | Pr. | Cals. | Pr. | Cals. | Pr. | Cals. |
| 1 | (g.) 65 | 2097 | (g.) 17 | 338 | (g.) 82 | 2435 | (g.) 4 | 255 | (g.) 86 | 2690 |
| 2 | 56 | 1882 | 7 | 162 | 63 | 2044 | 4 | 213 | 67 | 2257 |

and were even below the minimal requirement of 2700 calories and 100 g. of protein per day.

The figures for individual intakes emphasised the lack of nutritional care of the individual patient. Only one of the patients (case 4, hospital X) had an intake approaching that now recognised as optimal. In many instances the intakes were below even the older standards of food requirements.

The average daily intake derived from the three meals for the group as a whole amounted to 69 g. of protein and 1976 calories only. Experience with high diets has shown that the desired intakes cannot readily be attained, even with special supplementary feeds, unless the three meals alone supply at least 100 g. of protein and 2700 calories daily.

The average daily intake derived from supplementary (between-meal) feeds for the group as a whole amounted to 14 g. of protein and 348 calories only. This is much lower than can be obtained by the properly regulated use of special supplementary feeds.

These data concern patients on ordinary diets only, but no better results were being achieved with patients for whom special "high" diets had been ordered. Thus, the food intake of two such patients, shown in table II, was much less than the prescribed diet, and in case 2 was less than the average intake of patients on ordinary diet. In fact, in this case the prescription of a high-protein low-fat diet led to the consumption by the patient of 67 g. of protein and 90 g. of fat a day!

The most serious and most common fault revealed by these investigations was the low food intake of most hospital patients, even when well along in convalescence. At this time, when a good appetite was the rule and the protein anabolic tendency predominated, the food intake was often so low, owing to poor quality, quantity, variety, preparation, and serving of food, and lack of education of the patient with regard to his nutritional requirements, that there could be no expectation that the protein deficit of the catabolic period would be rapidly replenished.

It was concluded from these surveys that steps must be taken to increase the protein and calorie intakes from the three meals, and to provide special high-protein high-calorie supplementary feeds, with detailed instructions concerning their use, if intakes of about 130-170 g. of protein and 3200-3800 calories were to be achieved where such levels were necessary to prevent or correct weight-loss.

The report of these surveys was distributed to all Canadian Army hospitals overseas. At the same time

TABLE I—DAILY INTAKES OF CONVALESCENT SURGICAL PATIENTS RECEIVING ORDINARY DIETS

| Case | A | | B | | C | | D | | E | |
|--------------------------------------|-----------|-------------|-------------|------------|-------------|-------------|----------|------------|-------------|-------------|
| | Meals | | Supplements | | Hosp. total | | Extras | | Grand total | |
| | Pr. | Cals. | Pr. | Cals. | Pr. | Cals. | Pr. | Cals. | Pr. | Cals. |
| <i>Hosp. X :</i> | (g.) | | (g.) | | (g.) | | (g.) | | (g.) | |
| 1 | 77 | 2059 | 19 | 428 | 96 | 2187 | 5 | 310 | 101 | 2797 |
| 2 | 84 | 2102 | 17 | 446 | 101 | 2548 | 8 | 611 | 109 | 3159 |
| 3 | 67 | 1860 | 20 | 560 | 87 | 2120 | 9 | 772 | 96 | 3193 |
| 4 | 81 | 2191 | 35 | 838 | 116 | 3029 | 12 | 564 | 128 | 3593 |
| 5 | 25 | 832 | 28 | 570 | 53 | 1402 | — | — | 53 | 1402 |
| 6 | 74 | 2028 | 17 | 537 | 91 | 2565 | 3 | 175 | 94 | 2740 |
| 7 | 63 | 1599 | 18 | 472 | 81 | 2071 | 6 | 430 | 87 | 2501 |
| 8 | 64 | 1653 | 18 | 471 | 82 | 2123 | 6 | 382 | 88 | 2505 |
| Average .. | 67 | 1791 | 21 | 540 | 88 | 2331 | 6 | 406 | 94 | 2736 |
| <i>Hosp. Y :</i> | | | | | | | | | | |
| 1 | 73 | 1993 | 5 | 115 | 78 | 2108 | — | — | 78 | 2108 |
| 2 | 75 | 1956 | 12 | 268 | 87 | 2324 | 1 | 32 | 88 | 2256 |
| 3 | 60 | 2080 | 13 | 267 | 73 | 2347 | 1 | 32 | 74 | 2379 |
| 4 | 89 | 2545 | 14 | 306 | 103 | 2851 | 4 | 257 | 107 | 3108 |
| 5 | 84 | 2527 | 13 | 267 | 97 | 2794 | 1 | 52 | 98 | 2846 |
| 6 | 56 | 1711 | 17 | 370 | 73 | 2081 | 3 | 377 | 76 | 2456 |
| 7 | 60 | 1772 | 16 | 462 | 76 | 2234 | 22 | 740 | 98 | 2974 |
| Average .. | 71 | 2083 | 13 | 294 | 84 | 2377 | 5 | 213 | 88 | 2590 |
| <i>Hosp. Z :</i> | | | | | | | | | | |
| 1 | 28 | 1002 | 17 | 378 | 45 | 1380 | 1 | 32 | 46 | 1412 |
| 2 | 82 | 2312 | 13 | 250 | 95 | 2562 | 15 | 1197 | 110 | 3759 |
| 3 | 89 | 2603 | — | 15 | 89 | 2618 | — | — | 89 | 2618 |
| 4 | 64 | 1773 | 1 | 30 | 65 | 1803 | 5 | 288 | 70 | 2091 |
| 5 | 75 | 2338 | 12 | 256 | 87 | 2594 | 17 | 661 | 104 | 3255 |
| 6 | 72 | 1990 | 13 | 559 | 84 | 2549 | 3 | 150 | 87 | 2699 |
| 7 | 49 | 1503 | — | 15 | 49 | 1518 | 3 | 175 | 52 | 1693 |
| 8 | 80 | 2274 | 13 | 570 | 93 | 2844 | 2 | 66 | 95 | 2910 |
| 9 | 87 | 2483 | 9 | 250 | 96 | 2733 | 2 | 295 | 98 | 3028 |
| 10 | 67 | 2211 | — | — | 67 | 2211 | — | — | 67 | 2211 |
| Average .. | 69 | 2049 | 8 | 232 | 77 | 2281 | 5 | 286 | 82 | 2568 |
| Average of three hospitals .. | 69 | 1976 | 14 | 348 | 83 | 2324 | 5 | 304 | 88 | 2628 |

Pr.—proteins; Cals.—calories. A, B, C, D, E, see text.

detailed instructions were issued about the means by which adequate food intakes of patients could be attained. These instructions were divided into two parts: those relating to the three meals, and those relating to supplementary feeds.

Rules for Three-meal Diets.—To obtain daily intakes of 100 g. of protein and 2700 calories from the three meals alone, the following instructions were issued:

(1) *Provision of diets:* the dietitian will provide ordinary diets planned so that the three meals will contain at least 100 g. of protein and 2700 calories a day.

Protein and calorie intake will be further increased, when necessary, by special supplementary feeds and not by changing the content of the three meals. High diets will therefore consist of these improved three meals of the ordinary diet plus special supplementary feeds served between meals.

Most of the items now served as supplementary feeds are to be included in the meals. Specifically, milk should be served as the beverage with meals rather than between meals. The between-meal periods will then be left free for special high-protein high-calorie supplementary feeds.

However, patients already at ideal weight, not seriously ill or injured, and therefore not requiring special supplementary feeds, may be given ordinary between-meal feeds, such as tea, cocoa, biscuits, and fruit juices.

(2) *Serving in wards:* dietitians will demonstrate to the nursing sisters the proper quantities per helping of each food to provide each patient with at least 100 g. of protein and 2700 calories in the three meals each day.

(3) *Supervision of feeding of patients:* no improvement in food intakes can be accomplished unless the doctor assumes his responsibility for the nutrition of his patients.

The doctor should personally explain to each patient the necessity of eating all the food offered him, and tell him that his failure to do so only prolongs his convalescence. Most patients think that, because they are in bed, their food requirements are small, whereas usually the opposite is true; this must be explained to the patient.

The doctor should visit his wards at mealtimes often, to observe the serving and consumption of the meals. Special attention should be paid to the amount of food left by the patient, and the causes of failure to eat all the food offered should be determined and eliminated.

Feeding problems should be discussed by the medical officer with the dietitian, nursing sister, and senior cook.

It is the special responsibility of the officers in charge of the medical and surgical divisions to ensure that their ward medical officers are fully aware of the importance of this nutritional supervision.

The level of food intake required in any case is judged on the basis of the severity of the injury or illness, and the maintenance or restoration of ideal weight. Changes in weight and tissue mass are best measured by regular weighing of the patient. In the many cases where this is impossible the nutrition can be fairly accurately judged by observation of the general appearance of the patient, the tenseness of the skin over the underlying tissues, the tightness of plaster-casts, or measurements of limb circumferences.

The success of this programme to improve the nutrition of patients depends entirely on the support it receives from the doctors; the desired increase in food intakes cannot be effected merely by sending more food from the kitchen to the wards, or by the haphazard ordering of supplementary feeds or special diets.

(4) *Responsibilities of nursing sisters:* attention must be paid to supervision of food intakes. Plate wastage must not be ignored or eliminated by reducing the amount served, but should be overcome by determining and correcting the cause—e.g., failure to report to the dietitian individual food dislikes of the seriously ill patient, failure to provide feeding aids and other assistance to patients unable to feed themselves easily, and delay in serving owing to poor discipline of ward help.

Use of supplementary feeds to raise the total daily intake to any level necessary up to 130–170 g. of protein and 3200–3800 calories.—In investigations of nutrition in convalescence carried out for the associate committee on Army medical research of the National Research Council of Canada, supplementary feeds composed of milk, milk powders, ice-cream, eggs, and flavourings

had been found most useful in attaining high food intakes (Stevenson et al. 1945a). In view of the scarcity of these foodstuffs in the United Kingdom and Europe the Canadian Army in Canada and the Canadian National Research Council developed a powdered high-protein milk-shake mix and syrup flavourings suitable for shipment and use overseas (Stevenson et al. 1946). This powdered mix, obtained from milk, had the following food value per oz.:

| | |
|----------------------|---------|
| Calories | 123 |
| Protein | 9.0 g. |
| Fat | 4.0 g. |
| Carbohydrate | 12.7 g. |

Five syrup flavourings (chocolate, vanilla, maple, strawberry, and pineapple) were provided. When reconstituted in the proportions of 4 oz. of powdered mix, 12 oz. of water, and 1 oz. of flavouring, the product had a volume of 16 oz. and furnished 36 g. of protein and 570 calories.† (The ordinary egg nog made with two eggs provides about 20 g. of protein and 200 calories only.) The powder was easily reconstituted with water, in bulk quantities if necessary, and, after refrigeration for at least an hour, yielded a very palatable drink. Flavourings were varied each day to avoid monotony. Further dilution with water usually overcame the objection of the occasional patient who found the regular recipe too rich.

The indication for the therapeutic use of the milk-shakes as supplementary feeds was a food requirement exceeding that supplied by the three meals. With the three meals providing a daily intake of at least 100 g. of protein and 2700 calories the total intake could readily be raised to about 170 g. of protein and 3800 calories by the use of 32 fluid oz. of reconstituted milk-shake. Clinical trial demonstrated that it was best to divide this into two feeds of 8 oz. each, given in the mid-morning and mid-afternoon, and one of 16 oz. given at bedtime.

These feeds were also very satisfactory as one of the major items in liquid diets. For this purpose they were often given in a more dilute form. They were also well suited to tube feeding.

CATERING PROGRAMME

It is useless to make demands for improved feeding of patients unless the catering organisation and equipment of the hospital are first made adequate to meet those demands. The nutritional programme described above was preceded and accompanied by a catering programme under the direction of the chief inspector of catering and the adviser in nutrition of the Canadian Army Overseas. The catering programme, which had been begun in early 1943, included the clarification of the duties and responsibilities of all hospital personnel concerned with the feeding of patients; the selection, training, and qualification of cooks; the provision, organisation, and discipline of kitchen help; the planning of menus; the standardisation and proper supervision of methods of storage, preparation, transport, and serving of food; the construction of kitchens; and the provision of kitchen, transport, and serving equipment. The main object of this catering programme was to ensure the provision of meals not only adequate in amount but also palatable and attractively served.‡

† A mixture of about the same composition can be prepared by mixing high-quality spray-dried skimmed-milk powder and fresh whole milk in suitable proportions, and adding flavouring to taste. Care must be taken in the selection of suitable skimmed-milk powder preparations and flavourings; products of inferior grade produce an unpalatable drink. Feeds could not be prepared on any large scale overseas during the war in this way, because supplies of these commodities were not available in the quantities required.

‡ Civilian hospital catering in U.K. was made the subject of a study in 1945 by the committee on hospital diet of the King Edward's Hospital Fund for London.

Each hospital carried on its staff a lieutenant-dietitian who was a university graduate and met the qualifications of the Canadian Dietetic Association. As the officer in charge of the patients' kitchen, she was responsible for drawing up menus, ordering foodstuffs from the steward, supervising their preparation, transport, and serving, and for the administration and further training of cooks. The dietitian must have full authority in all these fields if the catering is to be efficient. She must also have direct contact with patients, doctors, nurses, and the administrative head of the hospital. The importance of a well-trained and experienced dietitian, alive to the fact that patients must be "sold" their food in the same way as restaurant customers, and with complete authority over catering for patients, cannot be too strongly emphasised.

In most hospitals maintenance of a low cost of food and catering is regarded as a sign of efficiency. This attitude, which was prevalent in the Canadian Army as elsewhere, is not compatible with a high standard of medical care. Every effort was therefore made to substitute for it the concept that efficiency should be judged on the basis of the provision of adequate nutritional care for the patients.

The value of such a catering programme, under the supervision of an experienced caterer and a medical nutritionist, can be demonstrated by comparing the results of surveys of food intakes of patients reported here with the results of those made in military hospitals in Canada (Stevenson et al. 1945b). The overseas surveys reported here were done after the catering programme was well under way, whereas no special emphasis had been laid on hospital catering in Canada before the surveys conducted there. Though rations in Canada were much more liberal, both in quantity and variety, than those available in the United Kingdom, the food intakes in Canadian Army hospitals in Canada were actually lower than food intakes in Canadian Army hospitals in Britain. Thus, in Canada the average daily intake from hospital sources amounted to 64 g. of protein and 2064 calories (Stevenson et al. 1945b), whereas the corresponding figures for the United Kingdom were 83 g. of protein and 2324 calories (table 1).

SUMMARY

An outline is given of the nutritional programme undertaken in the hospitals of the Canadian Army Overseas during the late war.

The purpose of this programme was to raise the standard of nutritional care of patients to that considered optimal in the light of recent investigations of metabolism in injury and disease.

The scientific basis of the programme, the results of surveys of food intakes of patients, the measures used to attain the standards required, and the associated catering programme are described.

The investigations revealed that the food intake of most hospital patients was far too low, even when patients had recovered sufficiently to regain their appetite.

It seemed necessary to increase the protein and calorie intakes from the main meals, and to provide supplementary feeds of high-protein and high-calorie content, such as the milk-shakes described.

The value of similar programmes in most civilian hospitals is obvious, but they require supervision by an experienced caterer and a medical nutritionist, and involve a reorientation and reorganisation of the professional and technical staff of the hospital, in so far as the feeding of patients is concerned.

§ A second survey of food intakes in Canadian Army hospitals in Canada, done nine months later, following implementation of an intensive nutritional and catering programme, showed a well-marked improvement (Stevenson et al. 1946).

References at foot of next column

Medicine and the Law

A Name Misheard

THE newspapers have lately described a case in which confusion between the words "procaine" and "cocaine" led to a fatal accident and raised questions of liability for negligence. Mr. Justice Hilbery dealt with the facts in deciding the case of *Collins v. Hertfordshire County Council* and King last month. The circumstances, he said, were so extraordinary that he could not believe they were ever likely to occur again. Hospital management, it may be added, will be alert to see that they do not.

A patient entered the Wellhouse Hospital at Barnet for an operation on his jaw. Arranging to give an injection before operating, the surgeon telephoned an instruction to have ready 100 ml. of 1% procaine and 1/200,000 adrenaline. The message was taken by a student (not then qualified) acting as student house-surgeon; she misheard the instruction and asked the hospital pharmacist to prepare a solution containing 1% cocaine. The operating surgeon injected 80 ml. of this solution—some four times the lethal dose—and the patient died. The widow claimed damages both from the county council (as the owners of the hospital) and from the surgeon who gave the injection.

The defendant surgeon stated in evidence that he himself always called the drug "procaine." The term 'Novocain,' adopted by German manufacturers as its trade name, had been commonly employed; but at the beginning of the late war the medical profession had been asked not to use it. He had never known of cocaine being given by injection, and he had no idea that he had injected it. He could not understand an experienced pharmacist dispensing so large a quantity of a dangerous drug; the amount of adrenaline was unusual, and the pharmacist should have queried it. The regulations, said the surgeon, require that dangerous drugs be dispensed only on the written instructions of a qualified medical practitioner; the pharmacist had dispensed this solution to an unqualified person without referring the matter back to himself or insisting on the signature of a qualified practitioner.

The judge found that the surgeon who gave the instructions by telephone and who made the injection was negligent. The surgeon had expected the student house-surgeon who took the message to use her knowledge and reason and to apply her mind to what he was saying; but still the surgeon himself was responsible for not making sure that he was getting what he had ordered. The student house-surgeon, continued the judge, was

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negligent; she knew that the solution was required for an injection and she knew that the solution as prepared was lethal; she had not used reasonable skill or care. Further, the pharmacist was negligent. He had accepted an oral demand for an exceptional dosage of cocaine and adrenaline for injection and had not required the order to be initialled by a qualified person; he had not checked the demand with the surgeon; and he had disregarded all the prescribed safeguards, including the cautionary instruction in the *British Pharmacopœia* that when an unusually large dose of a drug appears to have been prescribed the pharmacist or dispenser should satisfy himself that the prescriber's intention has been correctly interpreted. Finally the judge found the hospital responsible. It was liable for the negligence of its two employees (the student house-surgeon and the pharmacist), and it had failed to establish a proper system and to insist upon obedience to the rules about dangerous drugs. "If the hospital had had a proper system, this solution could not have arrived at the operating-theatre, let alone the body of the unfortunate patient." The judge awarded £2500 damages and directed that payment be borne equally by the county council (as owners of the hospital) and the surgeon.

It will be remembered that the risk of confusion between procaine and the proprietary preparation 'Percaïne' was dealt with by the manufacturers of the latter changing its name to 'Nupercaine' (*Lancet* 1942, ii, 221, 340). As Mr. Justice Hilbery deemed the circumstances in the Collins case unlikely to recur, there seems no need to rechristen all our dangerous drugs with names chosen, like those of the London telephone exchanges, for their distinctive enunciation, so as to avoid all possible risk of misunderstanding. With ordinary and proper care these accidents will not happen, even when hospital staffs are overworked and undermanned.

Public Health

Tuberculosis in Lancashire

FOR the purpose of treating tuberculosis the administrative county of Lancaster is divided into 8 areas—5 large, 3 small. Each large area is in charge of a team made up of a consultant tuberculosis officer, one or more assistant tuberculosis officers, 4-7 health visitors, and 2 clerks. The area served by the team has a chief dispensary, two or more branch dispensaries, and a sanatorium-hospital of up to 70 beds for treatment and isolation of patients near their homes. The consultant acts as visiting medical superintendent of the hospital. One of the three small dispensary areas is in the charge of the medical superintendent of High Carley Sanatorium (154 beds), and another under the superintendent of the Elswick Sanatorium (70 beds). In the third dispensary area, adjoining Wrightington, the tuberculosis officer has been appointed visiting physician to the 74 beds in the pulmonary section of Wrightington Hospital. Thus all senior or consultant tuberculosis officers have institutional beds, like consultants in other branches of medicine; and Dr. F. C. S. Bradbury, the central consultant tuberculosis officer of the county, believes that this combination of hospital, dispensary, and domiciliary practice enables them to see the problem of tuberculosis treatment and prevention whole.

In his report¹ for 1945, which has just appeared, 709 deaths from pulmonary tuberculosis and 161 deaths from non-pulmonary tuberculosis are recorded—the lowest figures ever achieved in Lancashire, giving death-rates of 0.38 and 0.08 per 1000 population. New cases of pulmonary tuberculosis, however, amounted to 1511, a figure as great as the high record of the previous year. Non-pulmonary tuberculosis notifications reached a record low level (641 cases); and the case-rates for the two forms were 0.82 and 0.34 per 1000 population. Though the death-rates are the best yet recorded, they are probably higher than they would have been but for the war. The rise in deaths from tuberculosis in 1940-41 was probably due to the failure of many patients to survive increasing hardship. War must be blamed, too, for the fact that death-rates in subsequent years have

not fallen as fast as they should: patients with pulmonary tuberculosis could not give themselves the necessary care and protection; and non-pulmonary tuberculosis—including meningitis—increased not only because children and others were exposed to infection from sputum-positive adults in crowded ill-ventilated billets and shelters, but also because many patients stayed in their homes owing to lack of sanatorium beds.

The Lancashire mass-radiography unit had made eight surveys up to Jan. 16, 1946, the results of which are analysed in the report.

In all, 74,208 factory workers were examined in this way. Active pulmonary tuberculosis was found in 239 (3.2 per 1000 examined), and healed pulmonary tuberculosis in 1515 (20.4 per 1000). Of 500 cases classed as "inactive tuberculosis" (in which the lesion seemed to be healed or healing, but which needed further investigation), 301 were referred to a dispensary, 165 to their own doctor, and 34 refused treatment. These findings indicate, Dr. Bradbury considers, that, in addition to the incidence of pulmonary tuberculosis notified through the ordinary channels, there is an equal incidence, in those age and sex groups represented by factory workers, of which we have no knowledge apart from mass radiography. Two age-groups were specially concerned in these surveys: men over 45 and women under 25. Dr. Bradbury concludes that mass radiography or other intensive methods of investigation should be extended to groups of the population among whom unknown cases are even more likely to be found than among factory workers.

Good results with calciferol in the treatment of lupus vulgaris are recorded by Dr. E. H. W. Deane, and the report also contains an analysis of the after-history for five years of 2200 new cases of tuberculosis notified in 1940. The net number of these treated under the county tuberculosis scheme was 1810, 1178 of these being cases of pulmonary tuberculosis. Lest a low-record death-rate should mislead any into a belief that tuberculosis is controlled, it is worth recalling what this disease means for the patient, even in a county like Lancashire, which has developed a good scheme. Of 1027 pulmonary cases in the survey (removals from the area excluded) 58.3% died from tuberculosis within five years, and 33.6% were still under treatment at the end of that time.

Smallpox

No further cases have been reported up to April 22. The foci at Grimsby, Stepney, and Doncaster were controlled by surveillance and vaccination of close contacts, and are believed to be extinct. At Scunthorpe the total number of confirmed cases is 7; the last was removed on April 12 (onset April 7, rash April 12). At Bilston the position is unchanged. The last of the 8 patients died at home in the prodromal stage on April 11. The last removals to hospital were on April 10.

In New York, where, according to British United Press, there have so far been 10 cases with 2 deaths, vaccine for 5 million people has been provided; and some 67,000 have already been vaccinated. The outbreak began with the death of a Mexican business man on March 10; subsequent cases have been traced to a child who was transferred from the hospital where this man died. The *Daily Telegraph* reports that visitors from Europe who are unable to produce written evidence of having been vaccinated within the past three years are now required to undergo vaccination before landing in the United States.

Infectious Disease in England and Wales

WEEK ENDED APRIL 12

Notifications.—Smallpox, 13; scarlet fever, 928; whooping-cough, 1751; diphtheria, 213; paratyphoid, 1; typhoid, 6; measles (excluding rubella), 10,326; pneumonia (primary or influenzal), 709; cerebrospinal fever, 89; poliomyelitis, 11; polioencephalitis, 0; encephalitis lethargica, 0; dysentery, 77; puerperal pyrexia, 156; ophthalmia neonatorum, 61. No case of cholera, plague, or typhus was notified during the week.

Of the 13 cases of smallpox, 5 were notified at Scunthorpe and 8 at Bilston, Staffs.

Deaths.—In 126 great towns there were no deaths from enteric fever or scarlet fever, 1 (0) from diphtheria, 12 (1) from measles, 26 (4) from whooping-cough, 85 (14) from diarrhoea and enteritis under two years, and

1. Prevention and Treatment of Tuberculosis in the Administrative County of Lancaster. Report of the Tuberculosis Services of the Lancashire County Council for the year 1945.

33 (7) from influenza. The figures in parentheses are those for London itself.

The number of stillbirths notified during the week was 246 (corresponding to a rate of 23 per thousand total births), including 35 in London.

Parliament

ON THE FLOOR OF THE HOUSE

THE Chancellor's Budget was in some ways better than was expected, and the income-tax concessions are of value to many people. The solar-plexus blow of the increase in the duty on tobacco took Members' breath away, but one financial authority was heard to mutter—not loud enough to get into *Hansard*—that the income-tax concessions would just about pay his tobacco and cigarette account. We shall have to wait a year to find out how many people in fact will reduce their consumption. Smoking increased sharply during the war, and the psychology of the war years has not changed back to normal. The Chancellor hopes that smokers will cut down their consumption by a quarter. But psychological estimates are not made so accurately as financial ones, and if he is wrong we shall increase the proportion of our income we spend on tobacco and save no dollars. To save dollars is the Chancellor's professed aim, and many Members are asking, in the lobbies, if not in the House, whether it would not have been simpler to cut down tobacco imports by a half or a quarter, and (if practicable without undue waste of man-power) ration cigarettes and tobacco just as we ration sweets. The severe winter has made it even more important to save dollars; for many sheep and cattle have died, many clamps of potatoes have been destroyed, the sowing season was postponed, and our food-supplies not only for next winter but for 1949 are seriously depleted. If we spend too many dollars on tobacco—and incidentally on American films—we shall not have enough to buy food in dollar markets. There is need of the greatest care and economy to avoid actual food shortage in the near future.

Sir John Anderson, who was Chancellor under the Coalition Government, criticised Mr. Dalton severely and drew attention to the large sum of £425 million which is being spent on subsidies to keep price-levels stable—largely price-levels of food. But the proof of this pudding is definitely in the eating. A comparison of our costs of living, plus the subsidies, with costs of living in the many countries of the world where inflation rages like an acute pyrexia, is in our favour.

MEDICUS, M.P.

FROM THE PRESS GALLERY

Third Reading of Scottish Bill

On April 21 the House of Commons considered the amendments made to the National Health Service (Scotland) Bill in committee, and then passed directly to the third reading, which was completed before the House rose.

The finishing touches made in committee included a new clause permitting a local health authority to make provision for research relating to their functions. As examples of the kind of research the clause would cover, Mr. J. J. WESTWOOD cited studies into the effectiveness of forms of care given at child-welfare centres and inquiries into the effects of environment on health. A further new clause gave local health authorities power to contribute to expenditure on co-ordination of services. This clause was inserted to encourage the formation of non-statutory local committees in which representatives of the three divisions of the new service would take part.

An amendment to clause 5 laid down that the accommodation set aside in hospitals for private patients must not reduce the number of beds available free of charge immediately before the new service came into operation. An amendment was also inserted in clause 8 ruling that hospital endowments must be used with due regard to—

“the spirit of the intention of the founder or donor of the endowment to which the scheme relates and in particular to conditions intended to preserve the memory of any person or class of persons;

“the extent to which the original purpose of the endowment is sufficiently provided for by a public service or otherwise; and

“the interests of the hospital and specialist services.”

Mr. Westwood, moving the third reading, said the Bill achieved a major reform, and this inevitably had meant the displacement of both the voluntary and local-authority hospital systems, but he believed that both retained a proper place in the hospital organisation of the future. The Bill made it easy for the biggest number of hospitals to come within the teaching field and to share in the advantages which that work conferred, and without trespassing on their responsibilities it brought the teaching and licensing authorities into the administration of the hospital service. Building on the foundation that the duty of the local authorities was to watch over the incidence of disease, the Bill gave them power for important developments in the prevention of disease and the treatment of health in the community life. It also enabled the Minister to arrange for everyone to have the care and attention of the family doctor of their choice without need to count the cost. But it gave the Minister no power to direct individual doctors to work in particular localities at particular jobs. The Bill would not produce more doctors overnight, but Mr. Westwood believed that the new system of remuneration, and abolition of the sale and purchase of practices, would improve the attraction of general medical practice as a career, and that the measure to bring further education within the reach of all would produce at no distant date an adequate number of doctors.

Colonel WALTER ELLIOT moved an amendment criticising the Bill for its centralisation of control. Such a change, he declared, would only be justified if the medical system of Scotland had been a signal failure instead of admittedly one of the great scientific and practising successes of the world. The people of Scotland did not lack medical advice, but they had the greatest difficulty in carrying out that advice, and the Bill did not take a single sensible step towards remedying this. The principles on which it was based would threaten not only the practice of medicine but the research upon which this practice depended. Mr. HENDERSON STEWART recognised that the State had great functions to perform, but they did not include, he suggested, the intimate day-to-day control of detailed services of this kind. While Mr. J. RANKIN applauded the training given to medical students, he asserted that the young doctor emerged into the world to face complete anarchy. Neither his medical school nor the British Medical Association took the slightest interest in placing that young lad in any post. The Bill would absorb at once into active useful work every young doctor who left the universities.

Lady GRANT suggested that the Bill gave us a rigidity of administration unsuited to the living human art of caring for the sick, and Commander T. D. GALBRAITH feared that over-centralisation would bring in its train uniformity and standardisation. Dr. H. B. MORGAN thought the Bill better than the English one. Mr. G. BUCHANAN, in summing up, said at present we only had a partial service, but the Bill would offer everyone a modern service without restriction.

QUESTION TIME

Panel Dentistry

Mr. G. C. TOUCHE asked the Minister of National Insurance if he was aware of the inconvenience caused to panel patients by their inability to get dental treatment owing to the prolonged dispute about dentists' fees; and if he would make a statement on the subject.—Mr. T. STEELE replied: As the House was informed at the time, agreement on the payments to be made for National Health Insurance work was reached with the Joint Advisory Dental Council of the profession towards the end of last year. In accordance with that agreement the council advised, and continues to advise, members of the profession generally to resume the practice of accepting insured persons for treatment in accordance with the Dental Benefit regulations. The Minister is aware that a number of dentists who have given treatment under the regulations in the past have not yet followed this advice of their negotiating body and he is sorry that because of this insured persons in some areas are still having difficulty in obtaining dental benefit. But the general position is improving steadily and he thinks he must leave it to the council to continue their efforts to secure a satisfactory service for insured persons in all areas under the terms of the agreed settlement.

In England Now

A Running Commentary by Peripatetic Correspondents

TOBACCONISTS must be lonely men these days; not that some of them haven't asked for it. I'm disappointed in my chap; on the morning after the Chancellor's fateful speech I found my way to him barred by a closed door: "Back in Ten Minutes," said the notice. But twenty minutes later the door was still locked, and quite a lot of angry customers were trying to lure the wretched fellow out of his hiding-place, where he was presumably counting his excess profits when the prices went up next day. At lunch-time "Back in Ten Minutes" had given way to "Closed All Day for Stocktaking." The next morning it was invitingly "Push," but no-one did.

These are testing days; indeed for those with a mind for the finer things they are critical days. Some of us are moved to philosophy: "Just look," said the man in the station buffet, indicating the unclaimed piles of yellow, blue, and red packets, "just look; in the war we could pay for 'em but couldn't get 'em, and now we can get 'em but can't pay for 'em. It makes you think." It does indeed. But what most of us want to know is how we are to face our plight. Well, of course, you can give up smoking altogether; I did yesterday, but after three hours I modified my ideas along more rational lines. (It was only for a moment that I felt like the drunk who, being taxed with failure to stay on the water-cart, explained: "I just put one foot down to steady myself.") Now I ration myself to a pipe after every meal, plus any additional ones needed to keep my fingers steady enough to hold a pen or lift a knife and fork. Not everyone, I appreciate, is strong enough to stick to such a scheme as this. These weaker brethren could do no better than attend my course for tobacco addicts next week. Naturally patients must on arrival hand over to me all tobacco in their possession; but I attach great importance to keeping these subjects alive to the temptation they will be exposed to on return to the outside world; so they must be prepared to sit and watch me smoke. It's a great idea, really. Success guaranteed, or money back. But not the tobacco. That is expendable by me on the treatment sessions.

It is a peculiarly irritating phenomenon (irritating is the operative word) that whenever my oldest son's school term starts I get threadworms again. There is no snob association about it; it has happened regularly at his prep. school, private school, nursery school, and council school. (Yes: we *have* moved about a bit.) Nor does there appear to be any sectarian bias; all institutions act in the same way, whether C. of E., R.C., free-for-all, or frankly atheistic. Before he handed it on to me I used to take a detached and tolerant view of the boy's infection—"You can find them in every child if you look long enough"; "Lot of rot about causing general debility"—that sort of thing—but I well recall the shattering experience of discovering at midnight with a pocket mirror, a torch, and a good deal of general contortion that my own pruritus was due to the same invader. The moment when one first discovers oneself to be harbouring a living parasite is disintegrating and humiliating, to say the least. To make matters worse, when I fled to my spouse, who is a hard-hearted pathologist, for comfort and consolation, I was met with laughter and gentian-violet pills. (The trick of swallowing these whole is to keep your tongue glued to the back of your lower teeth.) However, a week later I noticed she wasn't quite so ready to snort when I remarked that there was much to be said for a private tutor, or even a nice governess.

The other day I heard of someone who was alleged to be able to recite 114 causes of albuminuria. Such a combination of analytical gymnastics and mnemonic virtuosity should appeal to those who recommend the intensive study of Latin in schools "as a mental discipline." But this trifle of knowledge was being looked on as a handy weapon for an approaching grapple with the Censors, so I wondered whether the M.R.C.P. examination was worthy of this implied slight. I was somewhat reassured by the latest papers, which do not seem to

favour an approach by preformed "lists of causes." But the membership is a "higher exam."; can we be sure that, in the final M.B. or Conjoint, the man with a music-hall memory will not be at an undue advantage in his finals, compared with the man who thinks of disease in terms of a comparatively small number of physiological mechanisms which can be disturbed in different ways? It is unfortunate that questions of the type "Give the causes and symptoms of . . ." are easier to correct than questions which demand some selection and synthesis on the part of the candidate. Yet our ultimate progress in medical wisdom is largely along the path of selection and synthesis; we learn what diseases are common, and how they are related, while at the same time we preserve our sanity by forgetting a good many of the polysyllabic syndromes which Dame Nature has once or twice been caught scattering from her malign cornucopia of ill health. In natural history, the taxonomic approach is regarded as subsidiary to an understanding of evolutionary trends. Is it not time that we in medicine tried to free ourselves from the crossword-puzzle fascinations of multiplying syndrome; and should not this attitude be reflected in the examination papers set?

While I was on holiday a patient with sciatica, whom I had been treating (with success) on the assumption that his pain was due to gluteal fibrositis, was examined by a colleague who referred him as a prolapsed disk to a neurosurgeon. The surgeon confirmed this diagnosis, but, considering the man's symptoms to be partly hysterical, refused to operate until the patient had seen a psychiatrist. On my return a nurse told me that the diagnosis had been changed to "inverted disk." Touché!

There's been a lot of talk lately about choosing people suitable for various careers, especially for medicine. Everyone agrees that intelligence tests alone are not enough. I believe the following additional quotients are necessary, and I await suggestions how to measure them. Taken together with the I.Q. they would give a very fair measurement of personality.

The *Bee-in-bonnet Quotient* (B.I.B.Q.) assesses the prejudice coefficient of a man. A doctor with a high B.I.B.Q. will hold one belief to the exclusion of all others, and will find some diagnosis in his particular speciality to fit every complaint. Nevertheless, his constancy of purpose and unflagging application may bring him success where others have failed. Research-workers should have low B.I.B.Q.'s, or they will discover only what they believe. Reformers should have high B.I.B.Q.'s, lest they get bored with repetition or dismayed by repeated failure. The bee-in-bonnet type of man is liable to be tedious and unpopular in community life, but he is useful because he gets things done.

The *Goat-getting Quotient* (G.G.Q.) is highly important, for it measures the degree to which the candidate gets other people's goats. It depends on thick skinnedness, lack of tact, the possession of irritating personal habits, and so on. Intelligent people surprisingly often have a high G.G.Q., and less able people may be preferable for a post because others can work with them. It isn't always easy to see how these remarkable goat-getting properties arise, but everyone knows the type that though free from major defects manages to rub others up the wrong way.

Then there is the *Goose-booing Quotient* (G.B.Q.), expressing ability to say boo to a goose. This is the inverse of the *Yes-man Coefficient*, which can be expressed as Y.M.C. A high G.B.Q. is an asset to the intelligent but a menace in the hands of a fool, for to have the courage of one's convictions is useless if the convictions are foolish, and leads to senseless aggression. A high G.B.Q. is essential for iconoclasts, deans of medical schools, and chairmen of committees. Those with low G.B.Q.'s are a delight to dictatorial medical superintendents or fierce ward sisters, who find them a pleasure to handle; they also make good housemen for chiefs who make mistakes but do not wish to be corrected.

So there are four headings under which you can jot down impressions of your fellow men: intelligence, bee-in-bonnet, goat-getting, and goose-booing. We already have matrix tests, &c., for intelligence; no doubt psychologists will evolve appropriate methods for measuring the others.

Letters to the Editor

TUBERCULOSIS AND THE NATIONAL HEALTH SERVICE ACT

SIR,—The names of the members of the regional boards may be published at any moment, and as soon as appointed they will have to get to work on the new organisation due to operate from next April. We also see that on July 8 the Minister of Health himself is to address the Commonwealth and Empire Health and Tuberculosis Conference (arranged by the National Association for the Prevention of Tuberculosis) on the National Health Service Act and its Effect on Tuberculosis Schemes.

Tuberculosis, because of its effect not only on the patient but on the community, presents special problems and difficulties, as is generally admitted; we note that the Minister of Health and the Minister of National Insurance have accepted the position that pulmonary cases will qualify for extra benefits, and the Ministry of Labour are planning special workshops for the tuberculous. No scheme for the prevention and treatment of tuberculosis can ever be efficient and effective unless the family is regarded as the unit. If separate medical staffs undertake separate parts of what should be a unified tuberculosis scheme, then we shall surely see return a state comparable with the days before the Astor report.

Leading officials of the Ministry of Health have stated that it is the full intention to continue the best features of efficient tuberculosis schemes. How, then, can we ensure within the framework of the new Act the greatest possible integration of the several components which ought to constitute a workable and successful regional organisation? I would like to make the following suggestions.

(1) The Minister of Health, after consultation with the Central Health Services Council, should have a Tuberculosis Advisory Committee to advise on policy and to provide technical guidance on tuberculosis, such course being permissible by section 2 (3) of the Act.

(2) For the control and direction of the day-to-day tuberculosis work of diagnosis and treatment each regional board should appoint a tuberculosis committee to be assisted by a regional tuberculosis officer and staff. The committee could take the form of (a) selected members of the regional hospital board with co-opted persons of experience in tuberculosis, or (b) an advisory technical body of mainly tuberculosis officers and medical officers of health, or (c) in large regions, both (a) and (b)—that is, a tuberculosis committee aided by a technical body.

(3) The tuberculosis medical staff for each region should consist of one or more graded medical teams with clerical assistance and tuberculosis health visitors who would assist in the dispensary work and bring a first-hand knowledge of the family circumstances and conditions and contacts—so, important in a scheme based on persuasion. Each team could be given responsibility for an area containing several hundred thousand population and preferably coextensive with one or two hospital management committee areas. The teams should perform both dispensary and sanatorium duties, work in the closest relation with the general practitioners, examine contacts, and be given the definite duty to assist the medical officers of health of county and county-borough councils in case work and in preventing the spread of infection. Each team should have a register of all the tuberculosis cases in their area and generally hold the tuberculosis service together so that they would always know what is happening to the patients, both pulmonary and non-pulmonary.

(4) Throughout the country there are many small tuberculosis institutions; it is the intention gradually to eliminate these as separate units and to provide equivalent accommodation as part of the large and improved general hospitals. This may take a long time. Meanwhile how should the day-to-day management of the existing sanatoria be effected? I suggest that they and the tuberculosis dispensaries be taken as a group in each region and administered by the regional tuberculosis committee, who could and should co-operate where advan-

tageous with hospital management committees in the region.

The proposed transfer of the whole hospital and specialist services on April 1, 1948, will involve (along with general medical, dental, pharmaceutical, and ophthalmic services) a considerable feat of organisation. In the event of delay, and if the date fixed cannot be amended, I suggest that the county councils and county boroughs be asked to continue by contract the tuberculosis service on behalf of the regional boards until the transfer can be made on a well-planned basis.

Church Stretton, Salop.

G. LISSANT COX.

SAND-FLY FEVER

SIR,—In their article of April 5, Dr. Fleming and his colleagues state that since sand-flies were difficult to find in the Naples area they were not able to confirm their clinical diagnosis. This was not the experience of our American colleagues, who carried out extensive searches and satisfied themselves on this point in both the Naples and Caserta areas.

The high incidence in the summer of 1945 was probably due to the increase in the number of troops billeted in towns and villages which had been damaged in the previous year. It was noted in the Middle East that this illness was more common in Service people living in towns and villages than in troops engaged in active warfare in the open.

From my personal experience, I am sure that the preicteric fever, when it occurs, heralds the onset of jaundice by four or five days at the most, and that during the latter part of this time the earliest gastrointestinal symptoms of nausea and anorexia manifest themselves. In the autumn of 1940 it was quite commonly found that men evacuated from the Western Desert 48 hours previously with a diagnosis of sand-fly fever, and with all the symptoms of this condition, arrived in hospital apyrexial but with an increasing jaundice.

It would be interesting to know whether any of Dr. Fleming's volunteers developed jaundice within 3-4 weeks of the inoculation of the serum of patients with sand-fly fever, because one feels that there may possibly be some similarity between the virus of sand-fly fever and that of infective hepatitis.

Children's Hospital, Birmingham. GEORGE KOMROWER.

SOCIAL PATHOLOGY

SIR,—After reading your admirable leader and Prof. Perrin H. Long's fine factual and philosophical address, many physicians will ponder again and further over the subject of social pathology.

Many will agree that social medicine should be a development in clinical medicine. This is a fundamental idea which should be in the minds of the teachers of medicine, whichever age-group of patients may be their particular concern. The tendency to geographical divorcement of the patients and wards from the realities of the outside world has not been conducive to a complete study of the individual and his environment. It is increasingly apparent, however, that clinical teachers are making headway towards a better synthesis of the factors related to a person's health or sickness. Moreover the added interest to physician, student, and nurse in knowing as fully as possible "what sort of a person is he?" rather than the brief material approach of "what has he got?" gives a warmer climate to one's work and enhances understanding of the all-round treatment required to make a patient better and happier. When a careful, tactful, yet comprehensive survey is made of their way of life, many patients gratefully recognise that something more than mere treatment of their particular disease is being attempted.

One might argue that clinical medicine has always aimed at understanding the "whole man"; and of course many practitioners daily practise the principle, even so far as, on occasion, to treat the person rather than the disease. It may well be that the hospital physician has been at a disadvantage in his assessment of a patient, in so far as he seldom possesses detailed knowledge of a patient's home, work, and leisure. In the present better-regulated outpatient departments, which afford more time for inquiry, a full and purposive social history should form an essential part of the clinical approach.

Liaison with the social service has been sadly neglected. In the past year or so it has become increasingly evident that a collateral social history, taken by a skilled person, will elucidate factors contributing to dyspeptic, rheumatic, thyrotoxic, and many other disorders. Thus the discovery of occult factors, which seem to raise or lower a person's susceptibilities or which appear to unmask a constitutional trend, can be made. Medical students certainly find this approach interesting and helpful, and it gives an added educational value to their study of the patient. The insidious progression of disorder to disease can often be nicely correlated with the pressing problems in the social history.

Our teaching should not be limited to the clinical and special methods of diagnosing the lesion; we must proceed to inculcate the notion that some of the commoner diseases, such as rheumatoid arthritis and ulcerative colitis, have not uncommonly a preamble in psychosomatic or neurosomatic stresses, which, if fully explored through the channels of clinical and social medicine, may be remedied in such a way and at such a time that progression of the disease is checked. The student should develop an attitude of mind whereby he says to himself, "I know the diagnosis is (say) duodenal ulcer, or asthma; but why has this occurred in this individual? What are the factors, outside ordinary medical or surgical practice, which must be inquired into in order to get the patient back on to a firm and steady track?" By such a clinical discipline the student will come to learn the significance of the possible conflicts of personality and environment in its widest sense: the gradual—or sometimes apparently acute—wearing down of somatic resistance under stress, or, one might say, the decline of one or more of the barometers of health to a degree sufficient to precipitate disease.

Social study of the patient therefore reaches a high plane of practical application, and one can readily see how futile is the treatment of patients without this larger background to work upon. It implies an intelligent interest in the family life, the factory, the particular good or bad industrial selection of the individual, the educational and possibly scholastic problems of the child, and a host of variables which may be gathered up to allow a final conclusion in the "total diagnosis." I hope that a better appreciation of all this will be shown by hospital authorities, so that each physician will be able to have his social worker at hand at all times. It may well be that if social pathology is intensively studied, we shall gain much information on the causes of the common maladies; in fact, it may be regarded as an important research project in hospital practice. The scheme at Newcastle-upon-Tyne, as outlined by Prof. R. C. Browne, is excellent.

Birmingham.

A. V. NEALE.

THE MEDICAL SCHOOL

SIR,—Like "Amos" (March 29), I was a war-time student at one of London's medical schools; but unlike him I have no complaint against the organisation of my teaching. Certainly I have not found teachers indifferent to our presence "and to our early difficulties in approaching the patient in his bed." At my school we had an elementary course in medicine and surgery for six months after taking the 2nd M.B., and during our early clinical training we had lectures on nursing techniques by a sister-tutor.

I would comment on Amos's five suggestions as follows. (1) The average student is not in a position to know what is really good for him. (2) I commonly see in our hospital a round taken by a registrar who is teaching 3 or 4 students individually; larger rounds are split up now that the numbers of men qualified to teach has increased. (3) Our lectures were very systematic, but I agree that teaching in some of the special departments left much to be desired. (4) I cannot see any benefit to be gained from student house appointments: the newly qualified house-officer is quite raw enough. (5) The final suggestion, that students should sit on medical rounds, adds weight to the contention of some of the older teachers that the medical student of today is rapidly becoming more decadent. We willingly stand for three hours to watch a rugger match, yet are supposed to require a chair for a ward round.

HOSEA.

HEALING OF PEPTIC ULCERS

SIR,—I would like to add a few points in support of Dr. Morton Gill's excellent article of March 8.

For a number of years I have been struck by the symptomatic improvement which so often follows immediately upon the initiation of full investigation. Time and again patients referred to me on account of resistance to routine treatment have at the second consultation which follows radiological and pathological investigation reported remarkable lessening of symptoms. It has often been possible to show that symptomatic improvement has gone hand in hand with a process of healing; and this observation has been made too frequently to be merely accidental. Nor does it seem likely that the barium meal by its mechanical effect deserves the credit for this happy state, though I have heard this suggestion put forward. It is more probable that the confidence which full investigation commonly engenders has been responsible.

We have treated with Young's duodenal tube a number of patients who had large lesser-curve ulcers previously resistant to full hospital treatment. This method has been so immediately successful, and it has apparently mattered so little whether the tube reached the duodenum or remained curled up in the stomach, that it looks as though the effect was more on the psyche than on the soma.

For ten years phenobarbitone has been used freely in the treatment of peptic ulcer, and I am firmly convinced that it is still the most useful drug in the ulcer syndrome. This again emphasises the importance of the patient's emotional state.

Finally, I have sometimes wondered whether the unquestioned success of certain surgical procedures owes something to the effect upon the victim's soul; for there remains amongst us a certain inherent faith in the drama of surgery. It will be interesting to learn whether the cases of perforation which are treated without operation show the same long symptom-free interval which can so confidently be expected to follow surgical closure.

Winchester.

KENNETH ROBERTSON.

EX-SERVICE ADMINISTRATORS

SIR,—After ten weary years in the Indian Medical Service may I support the plea of "Burma Star" (Feb. 15) that military administrators should be kept out of the National Health Service. It was a poor commentary on the I.M.S. that from 1942 the consultants in India Command were almost entirely drawn from the home teaching hospitals. Under the guidance and encouragement of these distinguished men the standard of military medicine was raised to a level which has never been achieved by the pure "administrators." The patient had come into his own.

Let us see to it that we start with a clean slate. Let the newborn infant be tended through its first years by men who wish to see it flourish and not by those who will smother it in innumerable forms, the bane of the clinician and the delight of the "administrator." Let us ensure that when the doctor is called to see a case, he is able to think of the patient and that he is not subconsciously worrying about a pair of Spencer Wells forceps which have disappeared from his surgery.

ENMESHD.

DEODORANTS

SIR,—Your note of April 5, reviewing Mr. Dewey H. Palmer's survey, quotes his opinion that volatile deodorants should not be used in places where food is stored.

Some years ago I was consulted by a company that owned large refrigerating rooms in the Middle East, on how to abolish the "refrigerating odour" that is so noticeable in such establishments. This odour clings to refrigerated meat, butter, and other foods. I advised them to spray out the rooms every day with a watery solution of chloramine (made by mixing ammonia vapour with water containing free chlorine), and this routine (using monochloramine ten parts per million in water sprayed with an ordinary 'Imshi' pump), together with as much cleanliness as was possible in the treatment of floors and shelves and in the handling of bulk foods, successfully dealt with the nuisance. Ten parts per

million of monochloramine in water is tasteless and odourless and does not harm tissues; it is however a very effective bactericidal agent and completely disrupts the organic molecule that is mainly responsible for the objectionable odour.

St. Margaret's Hospital,
Epping, Essex.

FRANK MARSH.

THE GENERAL PRACTITIONER'S PENSION

SIR,—I was much interested in your reply last week to Dr. Gordon Ward's letter. Your suggestion about bonus years to compensate for time-lag is an excellent one and has the great merit of being practical.

With regard to provision of "pension or insurance," mentioned in your last paragraph, I remember that some years ago, when I was writing *Your Doctor of the Future*, I found that this solution had considerable support in medical, legal, and actuarial circles. On the other hand, Major-General Mitchiner, of St. Thomas's Hospital, speaks with authority in saying: "long years on the Royal Medical Benevolent Fund have convinced me that some form of universal contributory scheme is essential."

Superannuation bristles with difficulties, but it does appear that if the first five and last five years of a general practitioner's working life are not reckoned, the average of the remainder (in most cases about 40 years) would give a fair computation.

Worthing, Sussex.

HAROLD LEESON.

DELAYS AT THE TELEPHONE

SIR,—A peripatetic correspondent of April 5 complains that the general practitioner is commonly kept waiting 30–40 minutes before a houseman at the hospital answers his emergency telephone call. It is unfortunately true that on occasions G.P.'s are kept waiting a very long time for a house-officer to be found. But this is, I feel, due more to the nature of a hospital than the sluggishness of the houseman. The following list of reasons why I have kept G.P.'s waiting may help to calm the fury of your correspondent:

- (1) I have already been on the telephone.
- (2) I have been in the theatre, either scrubbed up or anaesthetising.
- (3) I have been engaged in some manoeuvre such as a transfusion, lumbar puncture, or paracentesis.
- (4) I have been in my bath.

These causes of delay cannot readily be avoided. But there is a fifth cause, in some hospitals, that could be avoided. This is a faulty method of notifying the houseman that he is wanted. Where coloured lights which flash all over the hospital are used, one knows at once when one is wanted. But when the telephonist has to phone each ward and department, it is possible to spend nearly an hour "chasing" the house-officer round the building.

Instead of the house-officer doing six months as a G.P., as your correspondent advocates, I suggest that he should do a fortnight as a house-officer to remind himself that the resident does not sit at the end of a telephone all day long. He would also discover that there is a very serious shortage of nurses just now, and there are none standing "straining at the leash for our commands."

Romford, Essex.

MICHAEL D. WARREN.

CERVICOBACHIAL SYNDROMES

SIR,—Your annotation of April 12 points out that there is so far no agreement on causal anatomical and postural factors, and quotes Leriche's remark that a number of these syndromes are still unclassified. Anatomical arrangement and abnormalities of the parts have attracted more attention than physiological mechanisms, and the sympathetic supply to the brachial artery has been noted mainly because it is vulnerable, being exposed to pressure or irritation at the level of the first rib or cervical rib. However important these anatomical considerations may be, they do not explain every case in which differences are observed between the brachial and the axillary arteries, the former being contracted and pulseless below the level of pectoralis major insertion, the latter normal above this level.

It is not uncommon to find contraction of the brachial artery in cold-sensitive psychotic patients, who display severe peripheral cyanosis when exposed to mild chilling at room temperatures of 60–64° F; the artery is contracted to a firm pulseless cord which can be rolled under the finger but dilates fully after warming an indifferent limb (reflex vasodilation), whereas the axillary artery can be felt and seen to pulsate normally above this level. Observations on these patients, which will be reported more fully elsewhere, suggest a "physiological" level below pectoralis major insertion, with greater vasomotor alertness below this level, strikingly displayed in some exaggerated thermoregulatory reactions.

F. MACKENZIE SHATTOCK.

Three Counties Hospital, Arlesey, Beds.

PERITONEAL DIALYSIS

SIR,—Mr. Reid and his colleagues (Feb. 15, p. 269) prefer intermittent to continuous irrigation on the ground that the latter may permit sidetracking much of the peritoneal surface by the development of a straight channel between the inlet and outlet tubes. This has never been observed in our necropsy material in patients or in animals, for the apparent reason that irrigation, when uncomplicated by infection, does not provoke deposition of fibrin when heparin is used. In animals dye injected into the inlet tube shortly before death stained the entire peritoneal cavity, even when there was peritoneal inflammation. Peritoneal irrigation continued for many days, with or without peritonitis, shows no decline in the capacity of the peritoneum to clear urea. Nevertheless there may be an advantage in using intermittent irrigation. We also have used this method occasionally, but we have always maintained a current flow instead of a stagnant pool.¹ The latter has the notable advantage of greatly reducing the volume of irrigating fluid required, and we do not doubt its capacity to extract as much of the retention products as does continuous irrigation.

The finding, by Mr. Reid and his colleagues, of a concentration of urea in the fluid in excess of that in the blood requires some elucidation. In 1939 Gilligan and Altschule² showed that the thiocyanate levels in blood and a fluid deposit take from four to ten hours to reach equilibrium, depending on the volume of the fluid deposit. In the two-litre volume used by Mr. Reid the urea content of the fluid at its point of contact with the diffusion membrane will be higher in the earlier phase of the diffusion period than towards the end of this period. The average urea content of the fluid after two hours should be the mean of the concentrations in the blood at the beginning and at the end of the period. This mean will be higher (cf. Gilligan and Altschule) than the blood-urea level measured at the end of the period, and lower than that measured at the beginning of the period, assuming that all the fluid with a still higher urea content from a previous rinsing period has been completely extracted. It would be necessary to have all these data before accepting the implications from Mr. Reid's statement.

We agree with Mr. Reid's warning of greater danger from waterlogging than from a moderate haemoconcentration, because uræmic patients are especially susceptible to pulmonary oedema, which may be rapidly fatal. With the formula variations we have used we have not had reason to fear haemoconcentration except in one instance, when the fluid used consisted of 5% gelatin solution plus 2½% glucose.

Mr. Reid's suggestion that penicillin may be irritating to the peritoneum deserves consideration, but the concentration we have used is less than that in blood when average parenteral therapeutic doses are used. Mr. Reid's further suggestion that exudate may interfere with osmosis does not conform to our observation that in the presence of peritonitis the urea excretion

1. In certain instances when the sump did not reach or did not remain in the cul-de-sac, we were not successful in avoiding stagnation. Such a stagnant pool can be the source of unintended overhydration if it remains after ionic equilibrium is reached. The time required for this depends on the fluid volume, but it is surprisingly short. Therefore, it is essential to remove a stagnant pool of fluid before it loses hypertonicity.
2. Gilligan, D. R., Altschule, M. D. *J. clin. Invest.* 1939, 18, 501.

continues to be as high as when the peritoneum is not inflamed.

We have not observed pain from the procedure, or any injury to the viscera from pressure caused by the tubes.

Our view is that control of chemical balance will not be so difficult as control of peritonitis. We have recently modified our method of loading the carboys containing the irrigating fluid so as to reduce the possibility of contamination from this source. We have also modified the outlet tube so that it cannot slide back and forth in the incision, and that overflow of fluid cannot collect in the dressings round the incision. Back flow of such fluid containing skin organisms through or alongside the tube is thus avoided. The air entering the irrigating fluid carboy is now filtered through alkaline cresol and parachlorophenol solution. If these improvements in sterility technique solve the problem of peritonitis, the intestinal origin of peritoneal infection in these patients can be dismissed. If not, this source of contamination will need further exploration. Preliminary studies of this problem are in progress. Meanwhile all patients, except those suspected of sulphamide sensitivity, receive sulphthalidine by mouth to reduce intestinal bacterial counts.

We have recently modified the irrigation system by combining the inflow and outflow systems in a double-tube arrangement connected to a much shortened and weighted sump drain, the whole of which lies deep in the cul-de-sac and which is introduced so that neither overflow nor backflow can occur. A small volume of a hypertonic fluid is run in and totally removed every 15 minutes with a resulting satisfactory urea clearance. This prevents overhydration and we have reason to believe it will also prevent peritoneal contamination from the skin. The apparatus will be described in a forthcoming publication.

We wish to thank you for the interest you have shown in this problem and the care you are taking to point out its difficulties and complexity, so that the harm done by injudicious use of the method will not overbalance the possible good that may come of it.

Department of Surgery, Harvard
University, Boston, Mass.

JACOB FINE
HOWARD FRANK
ARNOLD SELIGMAN.

COMPRESSION OF MEDIAN NERVE IN CARPAL TUNNEL

SIR,—I apologise for returning to this subject (*Lancet*, March 8, 22, and 29, April 5), but I must reiterate that the median nerve is normally enlarged and pinkish in colour proximal to the anterior carpal ligament. This pseudoneuroma has been well known for over a hundred years.

Every nerve in the body increases in cross-sectional area before passing beneath a ligament. This increase in area is due to the addition to the nerve of a nutrient artery and vein. Beneath the ligament, on the other hand, the nerve usually receives no arteries or veins and is surrounded by a sheath of loose cellular tissue. Moreover the swollen pinkish nerve, which is circular or slightly elliptical in cross-section proximal to the ligament, becomes definitely flattened beneath the ligament.

The internal popliteal (posterior tibial) nerve is pinkish and swollen proximal to the ankle-joint. Beneath the various ligaments at the ankle the nerve (or its internal and external plantar branches) becomes flattened. This normal "pseudoneuroma" on the posterior tibial nerve is almost as well marked as that normally situated on the median nerve. The external cutaneous nerve of the thigh, as it passes beneath Poupert's inguinal ligament, lies in a sleeve-like sheath of loose cellular tissue.

It has been shown that there is a smaller amount of connective tissue in the female nerve than in the male, and as far back as 1853 Romberg called attention to the fact that neuromata are much less frequent in the female than in the male. Gowers stated that lesions of the median nerve, if rare, are apt to be severe and their course correspondingly prolonged. Kinnier Wilson stated that "weakness and atrophy of the median muscles, partial or complete, sometimes follows prolonged use of trade tools, or constant repetition of professional movements—an 'occupation' neuritis seen occasionally for

example in gardeners, ironers, scrubbers, carpenters, smiths, dentists, and others, whose business entails their grasping instruments for long periods, or pressing them into the ball of the thumb."

When I suggested that the hand should be lightly bound over a solid core in the position of rest I assumed that the use of cotton-wool was known, for the hand cannot be lightly bound without placing a solid core in the palm. There is no risk of compression of the median nerve or of its digital or muscular branches with such a dressing intelligently applied.

Anatomy School, University of Cambridge. H. A. HARRIS.

BONES IN THE BANK

SIR,—I had the pleasure of meeting Dr. Bush in New York last November, and I feel sure he would wish to correct an impression given by your annotation of April 12. His interesting work on the storage of bone did not originate in Pennsylvania but in that famous institute of orthopaedics, the New York Orthopaedic Hospital, where until recently Dr. Bush was on the staff. I saw his bone bank at that hospital, and was convinced that worth-while results were being achieved, in spite of the biological disadvantages which one might expect from previous experience with homogenous skin and nerve grafts—let alone the heterogenous grafts which you mention.

Exeter.

NORMAN CAPENER.

THE CALL-UP

SIR,—In your annotation of April 12 you made a strong case for the economical use of newly qualified medical men. You did not, however, discuss the simplification of the problem if the student put in his year's service with the Colours before entering a medical school.

For a certain proportion, this timing would, I think, be advantageous to all concerned. The man who passes straight from school to hospital without a period of general education at a university is especially in my mind. The knowledge of the outside world acquired and the personal contacts involved in any of the Services should equip him better for his medical career than does the average school education.

Most teachers agree that the ex-Servicemen at present training in the medical schools are apt and industrious pupils. Though the comparison is not exact the circumstances are in some degree parallel.

Faversham, Kent.

MAX PAGE.

* * * We agree with Sir Max Page that the enthusiasm and judgment of the ex-Service medical student strengthen the claim for a break between school and university. Ideally, no doubt, there ought to be a break; but present conditions are far from ideal. We argued on March 22 (p. 375) that the supply of doctors is limited by the number of places in the medical schools, and that a later age of entry is extravagant because it reduces the professional life of those who gain admission. We also suggested that any further delay in qualification is both biologically and professionally undesirable: even now the doctor marries late, and the profession loses good recruits who attach importance to an early marriage and family. When, as is feasible, these drawbacks are removed, there will be nothing against, and much in favour of, an interval before medical training. It should lessen the strain now imposed by continuous book-work between the ages of 7 and 23.—ED. L.

CORRECTION OF MEDICAL REGISTER

SIR,—I am desired by the Returning Officer to say that voting papers for the purpose of the forthcoming election of one member of the General Medical Council to represent the registered medical practitioners resident in England were issued on April 22 to all practitioners having registered addresses in England; and that the authorities of the Council would be glad if any such practitioner who has not received a voting paper would communicate immediately with the office of the Council (44, Hallam Street, London, W.1), whether or not he proposes to vote in the election, in order to ascertain that his address is correctly entered in the Medical Register.

MICHAEL HESELTINE
Registrar.

London, W.1.

GROUPING OF HOSPITALS

SIR,—It would be difficult to exaggerate the importance of some of the issues raised in your editorial last week on the grouping of hospitals. It is time that attention was drawn not only to the critical nature of the nursing problem which will confront the regional boards in any case, but also to the additional hazards which will be introduced if the method of grouping ignores the psychological aspects of recruitment and staffing.

An arbitrary pooling and distribution of nursing staff in a region, in accordance with needs but out of accord with personal choice, would inevitably reduce the pool to drought level. The limited measure of direction of nurses into the scarcity fields during the war indicated how violent is the reaction against interference with a nurse's free choice of work, and how harmful such interference can be to the cause of nursing recruitment.

It would be disastrous to group hospitals in such a way that some groups had no focal hospital of strong recruitment appeal and had to depend on staff drafted in by the regional board. Already potential recruits are asking at the Nursing Recruitment Centre, "If I take up nursing, may I choose my own hospital, or shall I come under a scheme which will send me to any hospital?" On the answer to that question may depend the decision to take up nursing or to choose some other career. Instead of reducing the source of supply even further than at present, it would be well to stimulate recruitment by allowing some measure of competition, and then, by a process of natural adjustment, to staff the scarcity fields with a generous overflow from other fields.

Many of the teaching hospitals have doubled the capacity of their preliminary training schools for the time being in order that they may staff additional beds, and have thereby reduced their waiting-lists both of student nurses and eventually of patients. A number of other voluntary hospitals could follow their lead if they had sufficient accommodation for nursing staff.

This is in line with your suggestion of including deficit hospitals in a group containing a teaching hospital or other hospital which is able to increase its intake of nurses. A nurse who has chosen a particular general hospital will gladly work in the chronic wards attached to that hospital when she would resist transfer to an institution for the chronic sick—probably by leaving hospital service altogether.

In a profession already regarded as hemmed about with restrictions, we could not afford to sacrifice the element of free choice of hospital and thereby to widen still further the gap between demand and supply.

H. MORLEY FLETCHER

Chairman, Nursing Recruitment Committee.
Nursing Recruitment Centre, 21, Cavendish
Square, London, W.1.

ANALGESIA IN LABOUR

SIR,—It is now nearly fourteen years since R. J. Minnitt showed that women can be helped in their confinements by the administration of nitrous oxide. Further developments of Minnitt's technique, such as the Chassar Moir attachment, and the promising results with 'Trilene,' now make it possible to promise the expectant mother that her confinement will not be the nightmare of former days. Yet full use is not being made of these recent advances.

During the past few months I have received a number of letters telling the same sorry tale, and, from my own observation, I know that these correspondents have good reason to complain; many hospitals do not seem to recognise that the relief of pain during confinement is a primary duty. Analgesia is too often administered half-heartedly and for too short a time.

The two main reasons for this lamentable failure are (1) lack of medical interest, and (2) shortage of staff. I have found that while the actual administration of the analgesic can be entrusted to nurses, yet there must be "medical interest" in their work. It is essential that an experienced anaesthetist, genuinely interested in the relief of pain in labour, should watch the administration from time to time, and should frequently inspect apparatus; for only a trained anaesthetist can notice at once the small mechanical defects which so frequently lead to bad results.

Are we not asking too much of our overworked midwives? Would it not be much better to have a number of nursing auxiliaries trained as analgesists, with no other duties? We cannot rest content with present arrangements, which are neither to our credit nor to our advantage. In 1937 there was published a Maternal Mortality report, which shook public confidence in our profession. I have little doubt that if a 1947 Maternal Analgesia report were to be published we should suffer an even worse loss of prestige.

New Barnet.

JOHN ELAM.

Obituary

SYDNEY ARTHUR MONCKTON COPEMAN

M.D. CAMB., F.R.C.P., F.R.S.

Dr. S. Monckton Copeman was an officer of the Local Government Board and Ministry of Health for over thirty years; but though he became an able administrator he remained an investigator, and it was no accident that in 1898, while the Vaccination Bill was passing through Parliament, Copeman in his Milroy lectures to the Royal College of Physicians was describing the scientific experiments which led to the official adoption of glycerinated lymph.

He was educated at King Edward VI School at Norwich, where his father was a canon, and at Corpus Christi College, Cambridge. In 1885 he qualified from St. Thomas's Hospital, and he took his M.D. five years later. Meanwhile he had served as an assistant lecturer in physiology and morbid histology at St. Thomas's and taken the D.P.H. in 1889 preparatory to joining the Local Government Board in 1891. It was in this year, at the International Congress of Hygiene, that he first called attention to his method for the bacteriological purification and preservation of vaccine lymph. The admixture of glycerin with vaccine lymph was, as he himself pointed out, no new device, but he was the first to recognise its selective action in eliminating extraneous germs from the lymph without affecting the specific virus. Later, with F. R. Blaxall, he showed the advantage of glycerin over soft paraffin and lanolin as a vehicle for vaccine lymph.

Copeman remained at the Ministry till 1925, and served not only his own department but also the Home Office and Board of Trade as a Government delegate to European countries and to the United States. His own profession he served as a member of the council of the Royal College of Physicians, as president of the epidemiology section of the Royal Society of Medicine, and as a special commissioner of the British Medical Association. During the 1914-18 war he was in charge of the department of hygiene at the Royal Army Medical College, holding the rank of lieutenant-colonel. He was also for many years lecturer in public health at Westminster Hospital, an examiner for the Conjoint Board and for the universities of Bristol and Leeds, and chairman of the board of studies in hygiene of the University of London.

Though working long at a desk he did not lose his interest in the bench. His papers on the relationship between variola and vaccinia were read before the Royal Society in 1903, and in the same year he was elected to their fellowship. He had already been awarded the Cameron prize of the University of Edinburgh, and the Fothergill medal of the Medical Society of London, and he was later to receive the Buchanan gold medal of the Royal Society, the Jenner medal of the Royal Society of Medicine (1925), and the gold medal of the International Faculty of Sciences (1938). His interests were not limited to the subject which he had made his specialty, and with M. Greenwood he wrote a paper on diet and cancer. In 1928, at the International Cancer Congress held in London, he read a paper on irradiated



Press Portrait Bureau

fluorescein in the treatment of cancer, and he was a member of the Ministry of Health's committee on cancer.

On his retirement Copeman continued his public-health work from a different angle as a member of the hospital and medical services committee of the London County Council and as chairman of the public-health committee of Hampstead borough council. He also contributed articles to the *Encyclopædia Britannica* and the *Dictionary of National Biography*. A member of the livery of the Society of Apothecaries, he was a freeman of the City of London, and a knight of grace of the Order of St. John of Jerusalem. "To his juniors," writes a colleague, "he was especially kind and courteous: a generous host, a genial neighbour, he always had the knack of seeming pleased to see one. His wide experience was ever at the disposal of his friends, and anyone who consulted him would receive of it in full measure. I shall always remember gratefully one occasion of great urgency in connexion with an outbreak of anthrax, when Copeman's knowledge and his prompt and effective action saved a dangerous situation, and incidentally greatly relieved me."

Dr. Copeman died at Hove on April 11, at the age of 85. His wife, Ethel Margaret, daughter of Sir William Boord, predeceased him, and they leave two daughters and a son, Dr. W. S. C. Copeman.

KURT LEWIN

THE death of Kurt Lewin in Massachusetts in February at the age of 56 deprives the world of science of a vigorous and an integrating mind. He was not a medical man, but like a good clinician he could combine the results of investigations made in a number of fields of inquiry in such a way that each investigation was seen as part of a whole. His chief gift to medicine, however, was an indirect one through his contribution to the philosophy of science.

He began work in the famous Berlin Psychological Institute with a team which created the *Gestalt* school of psychology (Wertheimer, Koffka, Koehler, and others), but when the Nazis were coming into power he emigrated to America. There he absorbed a new aspect of "dynamic psychology" and did much to give the *Gestalt* and the Freudian ways of thought a mutual illumination. He was a professor and trained as a laboratory research-worker, but his laboratory in the latter part of his life was in "real-life situations"; he brought his powers of conceptualisation into everyday life and made the work-shop of industry and the classroom his laboratory and tested there his theories "in real life." Appropriately he found a home in the Massachusetts Institute of Technology, and was head of the department of group dynamics. An annotation on his contribution to psychology appears on another page.

Births, Marriages, and Deaths

BIRTHS

- AYRES.—On April 17, at Chippenham, the wife of Dr. Geoffrey Ayres
—a daughter.
BECKETT.—On April 20, in London, the wife of Dr. H. D. Beckett
—a son.
CAMPBELL.—On April 16, the wife of Mr. W. G. Campbell, F.R.C.S.
—a son.
CURRIE.—On April 13, in London, the wife of Dr. Donald Currie
—a daughter.
HERBERT.—On April 16, at Worksop, the wife of Dr. George Herbert
—a daughter.
MACLEOD.—On April 17, in London, the wife of Mr. Cameron
MacLeod, F.R.C.S.—a daughter.
RUSSELL.—On April 17, the wife of Mr. P. M. G. Russell, F.R.C.S.
—a daughter.
TAIT.—On April 11, at Edinburgh, the wife of Dr. G. B. Tait
—a son.

MARRIAGES

- CHARLES—HUME.—On April 18, at Newcastle-upon-Tyne, John
Alexander Charles, F.R.C.P., to M. F. Hume.
HOWAT—HARKER.—On April 18, at Goathland, Yorks, James
M. L. Howat, M.B., to Margaret E. Harker, M.R.C.P.

DEATHS

- BLACKMORE.—On April 13, George John Blackmore, M.D. Edin.,
D.P.H., aged 83.
GILL.—On April 17, Cyril Illingworth Carswell Gill, M.B. Camb.,
aged 53.
MANSON.—On April 13, James Kennedy Manson, M.B. Glasg.
ORTON.—On April 18, George Harrison Orton, M.D. Camb.
SMITH.—On April 16, John Morland Smith, M.R.C.S., D.A., aged 32.
TIBBETTS.—On April 15, Arthur Willoughby Tibbetts, M.R.C.S.,
aged 49.

Notes and News

NEWLY QUALIFIED ASSISTANTS

Position in Relation to Military Service

THE Central Medical War Committee thinks it desirable to draw attention to the fact that newly qualified practitioners liable to military service, although now free to accept assistantships in general practice, are not free to remain in such appointments after they have been qualified for six months.

The committee urges all newly qualified practitioners, in their own interests and the interests of the hospitals, to seek junior hospital appointments of the A category. A practitioner liable to military service is granted deferment to enable him to hold such a post for six months, *provided that he has obtained the post within three months of qualification*. He is then granted a further six months' deferment if selected for a B2 post, and if, on completing this post, he is appointed to a B1 post, his recruitment is again deferred, normally for twelve months at least, and he may eventually be recommended for recruitment as a graded specialist. If, however, he enters general practice on qualification, his recruitment is initiated about five months after the date of qualification with a view to call-up when he has been qualified for six months, and the committee will not then entertain an application for deferment for the purpose of gaining hospital experience before undertaking military service.

At the present time, male practitioners are liable to military service as general-duty medical officers if they were born on or after July 1, 1916.

SUTTON INDUSTRIAL NEUROSIOS UNIT

WHEN men and women in industry need psychiatric advice they will normally be referred first to an outpatient clinic. The Ministry of Health notes (Circular 64/47) that they may need outpatient treatment, and adjustment of difficulties at home or at work; or will profit by a period in a training centre before resettlement; or that they may be fit to undertake ordinary or sheltered work at once. Some, however, will need inpatient treatment in hospital, and some will be uncooperative and unemployable. Finally, there are some about whom a decision cannot be reached at the outpatient clinic, and who present a problem to both the clinic and the employment exchange. For these, a special inpatient centre of 100 beds was opened on April 1 at Sutton Emergency Hospital, where they can get psychiatric treatment, occupational assessment, work therapy, and occupational therapy, according to their needs. Work therapy will be carried out in a normal work environment—whether firm, shop, Government training centre, or technical institute. The period spent in hospital will be 6–8 weeks, which is not long enough, of course, for a complete training, but which is sufficient to allow the medical staff to study aptitudes and advise on vocational selection.

Applications for admission made either through the Commissioner of Medical Services (in the case of ex-Service or ex-Merchant Navy patients whose accepted war disablement is psychosis or psychoneurosis), or else through a neurosis centre, must be accompanied by a psychiatrist's report. Final selection of cases will be made by the hospital authorities at Sutton.

COLOUR-VISION TESTS ON VIEW

THE Colour Group of the Physical Society had assembled an instructive collection of apparatus for testing colour vision, as part of the Physical Society's exhibition held in London on April 9–12. Many of the tests mentioned in the Colour Group's report¹ were on view. These ranged from the simpler tests, like the Holmgren wools and the various confusion test charts, to delicate research apparatus, like the Wright colorimeter. The first room contained the simpler classical tests—the Ishihara and other confusion charts; the Holmgren wools and various other matching tests—and also some new apparatus based on the principle of the Nagel Anomaloscope. In this type of test the subject views a circular field divided into two. One half of the field is a standard yellow, while the colour of the other half is determined by the subject who can vary a mixture of red and green. The Shaxby test and one devised in Messrs. Ilford's research department are of this kind. Messrs. Kodak have produced a test in which pairs of light filters of different colours are selected to detect

1. Report on Defective Colour Vision in Industry. See *Lancet*, April 5, p. 455.

the different types of colour-blindness; these filters are illuminated by an ordinary X-ray viewing box and the subject is asked to point out the pairs which match. These new tests are very simple to apply but are designed to give a high degree of sensitivity. The apparatus is not yet generally obtainable.

Other exhibits included the Board of Trade lantern, which is designed to imitate conditions at sea, and some highly specialised research apparatus which makes it possible to determine the exact nature and degree of a defect of colour vision; in this type of apparatus the source of light is usually a pure spectrum.

At present the materials for many of the classical tests, such as the Ishihara, are very scarce, and they are not easy to produce because the colour of the inks used in printing them is all-important. Any really large-scale testing of sections of the population is therefore ruled out, but experiments on reasonably large samples might now be made to determine which tests could most easily be applied to large numbers without sacrifice of sensitivity.

TESTIMONIALS FOR EX-R.A.F. MEDICAL OFFICERS

To clear up misunderstanding among released medical officers regarding the furnishing of a testimonial, the Director-General of Medical Services, R.A.F., writes: "A document of this nature, if it is to be of any value, must be written by someone who has a personal knowledge of the individual who requests it, and on this condition senior officers are empowered to give such testimonials. The practice in this Directorate-General is to advise ex-Service doctors who write to us for testimonials to apply to senior officers of the Medical Branch under whom they have worked, for a statement of their character and professional skill. Letters addressed to senior medical officers, care of this Directorate-General, will be forwarded. A released medical officer may obtain a certificate of service based on the whole of his service by applying to the Under-Secretary of State, Air Ministry (A.R.9), Kingsway, London, W.C.2."

University of Sheffield

On July 1 the honorary degree of D.Sc. will be conferred on Sir Howard Florey, F.R.S.

University of Leeds

On Monday, May 5, at 3.30 p.m., Dr. M. N. Smith-Petersen, professor of orthopaedic surgery in Harvard University, is to deliver the Moynihan lecture at the University Union. He is to speak on the Evolution of the Surgery of the Hip-joint.

Royal Faculty of Physicians and Surgeons of Glasgow

The following have been admitted to the fellowship:

James Allan, Richard Thomas Stanley Gunn, John Raven Lauckner, Alasdair Cameron Macdonald, John Hamilton Ramage, David Neilson Ross, qua physician; James Arthur Victor Hamilton, David James Livingstone, Iain McLennan, Vallyavectil Muhamed, John Neilson, Alexander Paterson, William Reid, David Gemmill Smith, qua surgeon.

Scottish Conjoint Board

The following 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. S. Barnett, H. Y. Caldwell, R. H. Freedman, J. McD. Hanley, W. P. Hanley, Garnet McDermott, Josephine B. McClror, Hugh McIntyre, R. D. Wassman, E. F. Weiswasser, A. M. Westwater, N. G. P. de S. Wijesekera, Mariella M. Williams.

University College of the West Indies

Mr. B. W. Williams has been appointed medical adviser and dean of the medical school of this college, lately established at Jamaica, which is associated with the University of London.

Mr. Williams, who is 51, was born in Jamaica and educated at Oundle School, and Exeter College, Oxford. During the first world war he served as a trooper in the 2nd King Edward's Horse and later in the Royal Field Artillery reaching the rank of captain. On demobilisation he continued his medical studies at St. Thomas's Hospital; he qualified in 1921, graduated as M.B. two years later, and took his F.R.C.S. in 1924. After holding house-appointments at St. Thomas's he became first assistant in the surgical unit there and was later elected to the staff. He is also surgeon to the Mount Vernon Hospital, Northwood, and consultant surgeon to the L.C.C. hospital service. He has examined for the University of Oxford and the Royal College of Surgeons, and he has held the office of subdean at St. Thomas's. During the late war he served in the R.A.M.C. with the rank of Lieut.-colonel. He has published papers on abdominal infections, including his Hunterian lecture of 1927 on toxæmia due to anaerobic organisms in intestinal obstruction and peritonitis.

St. Thomas's Hospital

Prof. W. G. Barnard has been appointed dean of the medical school in succession to the late Prof. B. A. McSwiney.

Guild of Hospital Librarians

A meeting of the guild will be held at Chaucer House, Malet Place, London, W.C.1, at 2.15 p.m., on Wednesday, May 7, when Mr. Adrian Hill will speak on the subject of his book *Art and Illness*.

Central Council for the Care of Cripples

The annual general meeting of the council will be held on Thursday, May 1, at 2.30 p.m. at 1a, Henrietta Place, London, W.1, when Mr. George Tomlinson, Minister of Education, will speak.

Hospitals Day

Hospitals Day in London will be held this year on Tuesday, May 6. Those who wish to help should write to the appeal secretary of their local voluntary hospital or to Lord Luke, chairman, Hospitals Day, 36, Kingsway, London, W.C.2.

British Medical Association

Dr. J. H. Bruce and Dr. John Revans, M.B.E., have been appointed assistant secretaries to the association. Dr. Bruce took his M.B. Glasg. in 1937. Dr. Revans qualified in 1935 from the Middlesex Hospital and afterwards joined the Indian Medical Service.

The London Clinic

Dr. J. D. Robertson has been appointed director of a new department of clinical investigation at the London Clinic. The department, which will include units of haematology, biology, histology, and chemical pathology, will provide a comprehensive laboratory service for the clinic and also for outside practitioners.

Society for Relief of Widows and Orphans

At a meeting of the directors held on April 9, with Dr. R. A. Young, the president, in the chair, Dr. E. J. Blackett, who has been secretary for 42 years, tendered his resignation, which was accepted. The annual general meeting will be held on Wednesday, May 21, at 5 p.m., at 11, Chandos Street, London, W.1.

Association of Municipal Medical Officers

This association is being formed, with the knowledge of the Association of Municipal Specialists, to represent the views of medical officers of non-specialist status. Further particulars may be had from the hon. secretary, Dr. J. J. Hamilton, 56, Castlebar Road, Ealing, London, W.5.

Edinburgh Postgraduate Lectures

In connexion with their courses in medicine and surgery the Edinburgh Postgraduate Board is holding the following open lectures on subjects of biological interest: Mr. J. Russell Greig, Ph.D., Studies in Comparative Medicine (April 29); Prof. F. A. E. Crew, F.R.S., Biology of Polytoxy (May 13); Dr. Reginald Passmore, The Fat of the Land (May 27); Mr. C. P. Stewart, Ph.D., Biochemistry of Senescence (June 10); Dr. T. N. MacGregor, Sex Hormones (June 24). The lectures will all take place at 5 p.m. in the west medical lecture theatre of the Royal Infirmary.

Blindness in Africa

The joint mission of the Colonial Office and the National Institute for the Blind which has been inquiring into problems of blindness in British tropical Africa has now returned to this country, and is preparing a report. The mission found that in one small area of Uganda the incidence of blindness among the population was 4187 in 100,000, compared with a rate of 191 in the United Kingdom.

Joyce Green Hospital

On April 21 Mr. A. Reginald Stamp, chairman of the hospitals and medical services committee of the London County Council, opened the extensions completed at a cost of over £130,000 in 1939 when the hospital was converted from an infectious-diseases unit to a general hospital. The new buildings contain wards for neurosurgery and physiotherapy, and for children; clinics for dentistry, for ear, nose, and throat work, and for eyes; an operating-theatre; and a nurses' home. During the war the new wards were not open, because the large amount of glass in their construction made them unsafe.

Appeal for Blood-donors

A number of Post Office stamp cancelling machines are now using dies engraved "Blood donors are still urgently needed." By this it is hoped to assist in the appeal for additional volunteer blood-donors, 200,000 of whom are required immediately.

Closed Shop

Dr. A. T. W. Powell, M.O.H. for Walthamstow, informs us that the council of the borough, having regard to the views expressed by the Ministry of Health, have withdrawn, so far as the medical and nursing services are concerned, their resolution requiring that people in their employ should be members of a trade-union.

Barley Sugar on Prescription

By a Ministry of Food order, which came into force on April 6, glucose barley sugar may be obtained ration free on medical grounds on a doctor's prescription. Not more than 2 lb. may be ordered at a time, but the prescription may direct that this quantity can be repeated twice at intervals of not less than a month.

Gleneagles Fitness Centre

Gleneagles Hotel, taken over in 1939 by the Department of Health for Scotland and used as a hospital and, since 1943, as a fitness centre for the reablement of miners, is being returned to the L.M.S. Railway Company. The centre will reopen at Bridge-of-Earn Hospital, Perthshire, on April 28, where its facilities will be extended by association with the work of a general hospital. Although originally only miners were accepted, any person in industry may now be admitted to the centre if suffering from a disability which may yield to treatment. Patients can be admitted on application to the medical superintendent by their family doctor or the medical officer of a hospital.

U.S.A. Population Increases

The population of the United States is reported by the Census Bureau to have increased by about 10 million since 1940; last July it was 141,288,693, compared with 131,669,275 in April, 1940. Whereas males then outnumbered females by 454,000, females now exceed males by nearly 470,000, this change being attributed chiefly to military losses and the perennial excess of male over female deaths. The numbers have increased in every age-group except 10-19. Shifts in age and sex distribution have been associated with the great rise in the birth-rate dating from the early war years, with reductions in the civilian mortality-rate, and with the small but regular flow of civilian immigrants.

Health Education in Scotland

The Scottish Council for Health Education is holding this summer three schools on the theme of Healthy Living. There will be an elementary course in Edinburgh (July 26 to August 9) under the direction of Prof. James Ritchie; an intermediate course at St. Andrews (in the same fortnight) under the direction of Prof. A. F. Skinner; and an advanced course at Strathpeffer Spa (August 8 to 22) under the direction of Dr. W. G. Clark. Further information may be had from the secretary of the council, 3, Castle Street, Edinburgh, 2. The Central Council for Health Education, Tavistock House, London, W.C.1, is also holding courses at Keble College, Oxford (July 25 to August 8), and at Bede College, Durham (August 20 to Sept. 3).

Recruitment of Midwives

The Secretary of State for Scotland and the Minister of Health have set up a working party to inquire into the recruitment and training of midwives and any other matters which have a bearing on the present shortage of practising midwives. The chairman is Mrs. Mary Stocks, principal of Westfield College, London, and the members are Miss J. P. Ferlie, matron-in-charge, Simpson Memorial Maternity Pavilion, Edinburgh Royal Infirmary; Miss V. R. Shand, supervisor of midwives, County of Lancashire; Mr. R. M. Titmuss, of the Cabinet Offices; and Dr. Albertine Winner, of the Ministry of Health. Assisting the working party is a steering committee, also under the chairmanship of Mrs. Stocks, which will include Dr. W. S. Macdonald, of Leeds, and Mr. Arnold Walker, F.R.C.S., chairman of the Central Midwives Board. All correspondence should be addressed to the secretary of the Midwifery Inquiry, Ministry of Health, Whitehall, London, S.W.1.

Return to Practice

The Central Medical War Committee announces that the following have resumed civilian practice:

Mr. IAN JACKSON, F.R.C.S., M.R.C.O.G., 104, Harley Street, London, W.1 (Welbeck 1801).

Dr. W. ERIC GIBB, 47, Queen Anne Street, London, W.1 (Welbeck 1011).

Mr. Franklin Kidd, F.R.S., has been appointed director of food investigation in the Department of Scientific and Industrial Research.

New arrangements for the issue to ships' surgeons of dried plasma or serum are announced in a Ministry of Transport notice (no. M. 301); the normal issue for each ship will be six bottles.

Appointments

CAMPBELL, RUTH, M.R.C.S.: psychiatrist, child-guidance service, Kent.

CROSBY, J. H. ST. B., M.B. Lpool, D.P.H.: M.O.H., Chingford, and ast. county M.O.H., Essex.

LEWSEN, S. O., M.R.C.P.: physician, Institute for Scientific Treatment of Delinquency, London.

MILNE, ADAM, B.S.C., M.B. Aberd.: psychiatrist, Victoria Infirmary, Glasgow.

MURDOCH, J. A., L.R.C.P.E.: examining factory surgeon, New-castle-on-Tyne, Roxburgh.

SHULMAN, JOHN, M.B. Glasg., D. PHYS. MED.: physician i/c physical medicine, Warneford General Hospital, Leamington Spa.

Napsbury Hospital, Herts:**Chief Physicians:**

EDWARDS, A. M., M.B. Lond., D.P.M.

PATTERSON, J. H., M.D. Edin., DIPL. PSYCH.

Diary of the Week

APRIL 27 TO MAY 3

Monday, 28th

ROYAL COLLEGE OF SURGEONS, Lincoln's Inn Fields, W.C.2

5 P.M. Dr. Frankis Evans: Spinal Analgesia.

6.15 P.M. Prof. R. Willis: Pathology of Tumours of the Nose and Throat.

Tuesday, 29th

ROYAL COLLEGE OF SURGEONS

5 P.M. Dr. A. D. Marston: Anaesthesia in Obstetric Practice.

6.15 P.M. Mr. J. F. Simpson: Chemotherapy and Antibiosis in Otolaryngology.

EDINBURGH POSTGRADUATE BOARD FOR MEDICINE

5 P.M. (Royal Infirmary.) Mr. J. Russell Greig, PH.D.: Studies in Comparative Medicine.

Wednesday, 30th

ROYAL COLLEGE OF SURGEONS

6.15 P.M. Mr. C. Gill-Carey: Chronic Maxillary and Ethmoidal Sinusitis.

SOCIETY OF MEDICAL OFFICERS OF HEALTH

2.20 P.M. School Medical Service Group. (Civic Hall, Leeds.)

Mr. D. D. Stenhouse, Mr. J. Lumsden: Education of Blind and Partially Sighted Children.

Thursday, 1st

ROYAL SOCIETY OF MEDICINE, 1, Wimpole Street, W.1

8 P.M. Neurology. Dr. Erik Lindgren: Normal Temporal Horn and its Deformities by Tumours in the Middle Cerebral Fossa.

ROYAL PHOTOGRAPHIC SOCIETY, 16, Princes Gate, S.W.7

6.30 P.M. Medical Group. Mr. Edward Brain: Medical Photography.

Friday, 2nd

ROYAL COLLEGE OF SURGEONS

6.15 P.M. Mr. F. C. W. Capps: Malignant Disease of the Paranasal Sinuses.

ROYAL SOCIETY OF MEDICINE

10.30 A.M. Otolaryngology. Mr. E. C. Naylor Strong: The Design and Application of Electronic Hearing-aids.

2 P.M. Surgery. (Royal Sheffield Infirmary and Hospital.) Operations and demonstration of pathological specimens and X rays.

3 P.M. Epidemiology and State Medicine. (Harvard Hospital, Salisbury.) Dr. W. H. Bradley: History of Harvard Hospital and of the Common Cold Research Unit. Dr. C. H. Andrewes, F.R.S.: Plan of Research into the Etiology of the Common Cold. Dr. D. K. M. Chalmers: Routine of Experiments with Human Volunteers. Dr. F. Fulton: Interim Report on the Results of Transmission Experiments.

5.30 P.M. Anaesthetics. Dr. E. Trier Moersch: Controlled Respiration by means of Automatic Apparatus in use in Denmark and Sweden. Dr. J. Clutton-Brock: Skin Temperature as a Clinical Aid during Anaesthesia. Dr. R. P. Shackleton: Anaesthetics in Yugoslavia.

Saturday, 3rd

ROYAL SOCIETY OF MEDICINE

9.30 A.M. Surgery. (Royal Sheffield Hospital.) Short papers and clinical cases.

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| Dec 27 '61 | Winter | | |
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