MAY, 1948

THE ULSTER MEDICAL JOURNAL

PUBLISHED BY
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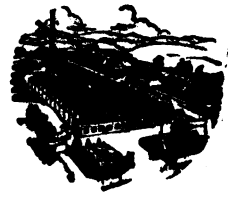

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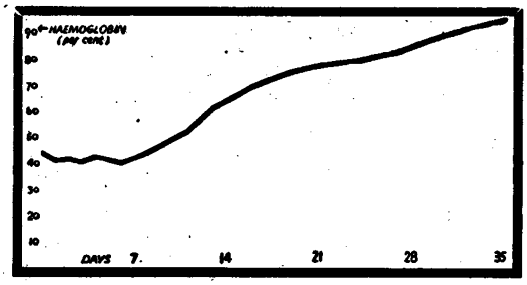

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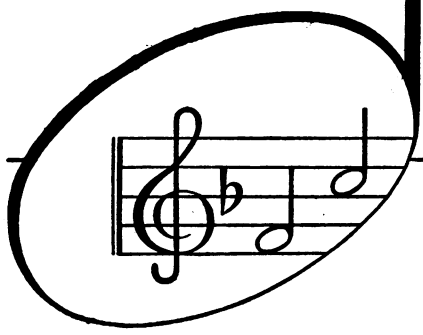

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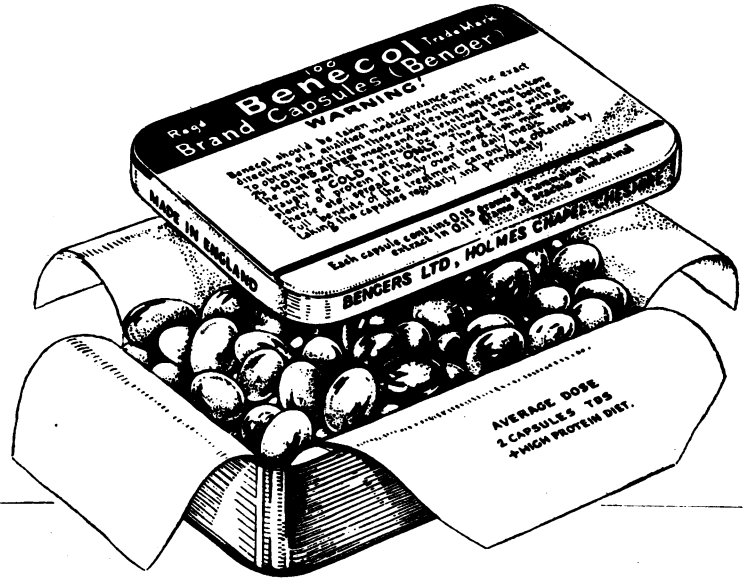

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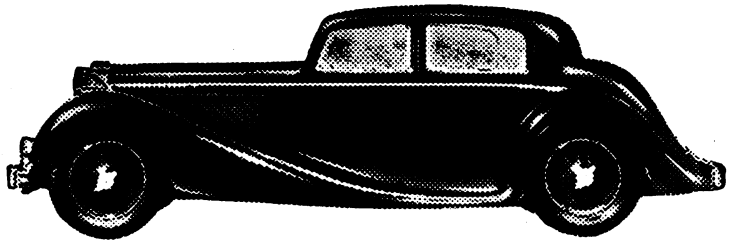

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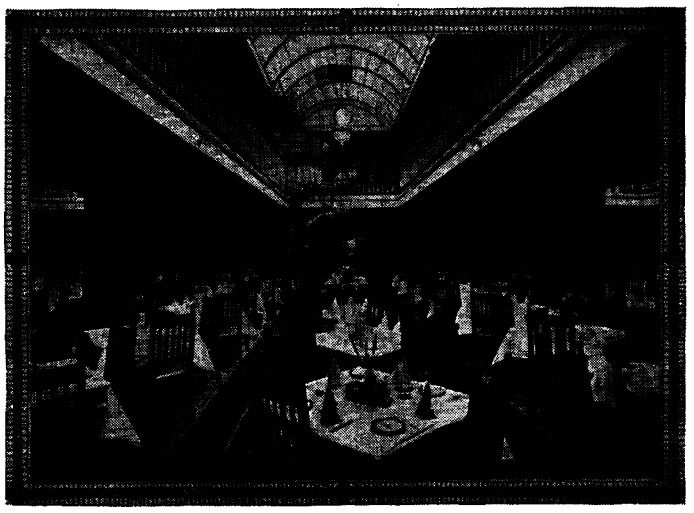

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DATES OF PUBLICATION

Under present difficult circumstances it is hoped to issue two numbers each year: on 1st May and on 1st November.

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1. Anatomy (etc.), 2, 1948.
3. Endocrinology, 2, 1948.
8. Neurology (etc.), 1, 1948.
9. Surgery, 2, 1948.
10. Obstetrics (etc.), 1, 1948.
13. Dermatology (etc.), 2, 1948.
14. Radiology, 2, 1948.
15. Tuberculosis, 1, 1948.

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ULSTER MEDICAL JOURNAL

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Vol. XVII 1st MAY, 1948 No. 1

The Contribution of Pathology to our Knowledge of the Internal Environment

By PROFESSOR J. HENRY BIGGART, M.D., D.SC.

A ROBERT CAMPBELL ORATION

I FEEL that no greater honour could have been conferred upon me by my colleagues than that I should have been asked to deliver this year's Robert Campbell Oration. Yet it was with more than usual diffidence that I accepted their invitation. In the past when we have drawn orators from outside our own school we have been able to honour a Colebrook or a Fleming, whilst inside the school scrutiny has been severe, and the names of Sinclair, Houston, Fullerton, Sinton, and Purce attest to its severity. For myself, I feel that my time of attainment was not yet come, and my wish would have been that I should have been more worthy to follow in the footsteps of those who have done service to this appointment.

"What you have inherited from your fathers, win for yourself so that it may be your own." So wrote Goethe, and no better motto could be written for the past history, and I hope the future history, of this medical school. For in the past hundred years each generation has produced an outstanding teacher and leader. The roll includes Andrews, Gordon, Redfern, Cuming, Symington, and more recently Lowry, and amongst its members the name of Robert Campbell shines as bright as any. Not only did he inherit a fine tradition of surgery, but more, he won for himself a reputation in his chosen field. It is such men who build the tradition of a school, and it is with a pardonable pride that we look back over the past hundred years, and to-night honour the fact that the list of builders of our school and of its traditions includes the name of Robert Campbell. To many the name has now become a legend. It will remain one of the half-dozen which will continue to stimulate our students and their teachers in the next hundred years of our endeavour.

For myself I have no personal knowledge of him. Yet perhaps if external environ-

ment shapes our destinies I may claim to have been nurtured by the same soil, to have drunk the same water, and to have breathed the same air, for in the first eight years of my life I lived in the old manse at Templepatrick where Robert Campbell spent his boyhood.

During his medical lifetime he saw the creation of the Chair of Pathology and its occupancy by my distinguished predecessors—Professors Lorain Smith and William St. Clair Symmers. To-night I should like to give a report on certain advances in our knowledge of pathology which have been gained in the last twenty years.

It is perhaps interesting in these days, when so much stress is placed upon the social obligations of medicine, in which the influence of external environment on health and disease is being extensively studied, and in which 'housing' takes precedence over 'hospitals,' to examine the factors which preserve the integrity of the body and maintain what Claude Bernard once called 'the internal environment.'

In the teaching of pathology it is a universal maxim that the processes taking place within the body cannot be understood by considering merely the disease of any one organ. It may be possible to isolate and preserve individual organs and stimulate their activity to continue in the test-tube, but such activity has only a superficial resemblance to the phenomena which we are able to observe and study in the individual. Indeed, the closer study we make the more it becomes apparent that all bodily activities are bound together and co-ordinated, and that there exists some centre where this co-ordination and integration are performed. In a different connection St. Paul has said "Yes, God has tempered the body together, with a special dignity for the inferior parts, so that there may be no disunion in the body, but that the various members should have a common concern for one another. Thus if one member suffers, all the members share its suffering; if one member is honoured, all the members share its honour."

We live in an environment which is constantly changing. The healthy individual can expose himself to a wide range of heat and cold, yet because of the delicate balance of heat-production and heat-loss the temperature of the body remains remarkably constant. Fluid intake may be large or small, yet within wide limits water output compensates for the variation in intake. The salt content of our food may be great or little, yet that of our blood remains constant. Life may be active or sedentary; the rate of the heart, the cardiac output, the respiratory rate—these will ensure a proper nutrition for our tissues. These and the manifold other functions of the body are graded to meet the needs of the moment, so that the internal environment shall remain constant. Table I, which is taken from Barcroft's "Architecture of Physiological Function," shows how important this fixity of the internal environment is to the proper functioning of the body.

To-day we believe that the centre for this control is in the hypothalamus.

The suggestion that the hypothalamus might possess important functions was made by the Viennese pathologist Rokitansky (1842), who first pointed out that lesions of the base of the brain might be associated with gastric hæmorrhage or with perforation of the stomach. He postulated that disease of this area led to an imbalance in the regulation of the internal organs. In 1890 Mauthner, also of

TABLE I

ENVIRONMENT	DEFICIENT	EXCESSIVE
Temperature - -	Inertia Unconsciousness	Delirium
Oxygen - - -	Nervousness Hunger	
Water - - -	(Weakness)	Headache Nausea Dizziness Asthenia Inco-ordination
Sodium - - -	Fever	Reflex Instability Weakness Paresis
Calcium - - -	Nervous Twitchings Convulsions	Apathy Drowsiness General Atonia

Vienna, considered that the somnolence of encephalitis was due to involvement of the base of the brain—in particular that part lying posterior to the sella turcica. Two years earlier (1888) Byron Bramwell in his book on intracranial tumours had written : "Tumours of the pituitary body are in many instances attended with an excessive development of the subcutaneous fat, and in some cases with the presence of sugar in the urine, or with simple polyuria (diabetes insipidus). Whether these symptoms are due to the fact that the pituitary body is itself diseased, or whether, as seems more likely, to the secondary results which tumours in this situation produce in the surrounding cerebral tissue, has not yet been decided."

In 1901 Alfred Fröhlich published a case of tumour of the pituitary associated with arrest of sexual development, adiposity of peculiar distribution, and a peculiar texture of the skin. Unlike Bramwell, Fröhlich did not appreciate the possible role of the nervous system in the evolution of the clinical picture, and it remained for Erdheim in 1904 to insist that the adiposity was the result, not of the pituitary, but of the nervous lesion. The clinical and experimental work of Cushing and his collaborators tended, however, to emphasise the role of the pituitary, and it was not until 1920 that through the work of Camus and Roussy and Bailey and Bremer (1921) attention was again drawn to the fact that injury to the hypothalamus might produce symptoms of adiposity, of polyuria, and even of sexual dystrophy, which

were currently thought to be of pituitary origin. In the past twenty years advance has been rapid, and now the function of the hypothalamus is beginning to become apparent.

The hypothalamus is a very ancient portion of the brain. It is the area lying between the anterior boundary of the optic chiasma and the region just posterior to the mamillary bodies, whilst laterally it comes into relationship with the subthalamus, the cerebral peduncles, and the internal capsule. It is seen to be a mass of grey matter, and further analysis reveals that this can be conveniently subdivided into three parts—(*a*) the pars supra-optica, which lies in relation to the optic chiasma, (*b*) the tuber cinereum, which is the point of attachment of the pituitary stalk, and (*c*) the pars mamillaris. Each of these areas contains groups of nerve cells which in some cases are aggregated into definite nuclei, whilst others are dispersed more or less diffusely. The arrangement is, however, symmetrical so that the left is the mirror image of the right. Fig. 3 illustrates the relationship of the more important nuclei. Nervous pathways have been traced to these nuclei from the forebrain, the thalamus, and the pallidum. From them, tracts run to the thalamus, to the posterior lobe of the pituitary, and to the lower centres of the autonomic nervous system. Short fibres run between the various nuclear masses.

Anatomically, therefore, the hypothalamus is a small symmetrical centrally placed mass of grey matter having connections with the cortex and the subcortical nuclei, with the posterior pituitary, and the autonomic nervous system.

Pathology.—Situated as it is close to the surface of the base of the brain, in immediate relation to the third ventricle and in close relationship to the pituitary and to the base of the skull, it is not surprising that this small area is frequently damaged—not only by intrinsic disease, but also and more frequently by disease processes extending from these neighbouring structures. Analysis of its lesions shows that it may be involved by inflammation, by tumour growth, by injury, but only rarely by vascular disease. Occasionally, too, we find it almost selectively damaged in deficiency of Vitamin B.

Inflammation.—Like the adjacent subcortical nuclei, it is frequently involved in virus infections of the brain. Thus we find Mauthner (1890) and later von Economo seeking to place here the lesion responsible for the sleep disturbances of encephalitis lethargica. It was, indeed, this disease process which stimulated much of the subsequent study of the hypothalamus, so that to-day we accept many of its symptoms as of hypothalamic origin. Thus in one patient studied there was a gain in weight of five stones in two years, a persistent profuse sweating, atrophy of the genitals, and loss of sexual desire. Other cases showed polyuria, obesity followed by wasting, sexual retardation in the young, and impotence in the adult. Stern (1922) and Wimmer (1924) also described precocious puberty.

All such cases showed extensive inflammatory changes in the hypothalamus in the acute, and ganglion cell loss with gliosis in the chronic stage. The lesions, however, are too diffuse to permit of their being used in the localisation of function.

Other inflammations extend to the hypothalamus from the meninges or ventricles. Thus in basal meningo-vascular syphilis the superficial position of the hypothalamic

nuclei and tracts renders them prone to damage. Diabetes insipidus, obesity or emaciation, sexual dystrophy, and sleep disorders may be found in association with other localising symptoms. Such cases are occasionally seen as the result of a syphilitic cystic arachnoiditis of the basal cisterns and closely simulate the presence of a tumour.

It might be expected that tuberculous meningitis would play a similar role, but though several such references are to be found in French literature, little attention has been paid to this possibility in this country. However, with the prolongation of life in this disease by treatment with streptomycin and with the vascular lesions which develop, it will be somewhat surprising if there is not soon an increasing literature upon hypothalamic sequelæ in this disease.

Tumours.—Whilst many tumours may, by obstruction of the cerebro-spinal fluid pathways, produce ventricular dilatation and hence thinning of the floor of the third ventricle, symptoms of hypothalamic damage are usually late in their appearance, and are rendered somewhat difficult of analysis by reason of the associated pressure effects upon the pituitary. Brain tissue, as Dott (1938) points out, is wonderfully tolerant of deformation by a tumour, provided the tumour grows slowly. Hence, even with severe degrees of hydrocephalus or with tumours pressing directly upon or invading the hypothalamus, we are often surprised by the extent of the lesion in the presence of minimal symptoms. In spite of this there are a number of symptoms which occur in association with tumours arising in the hypothalamus, the pituitary, or other adjacent structures with such a degree of frequency that we must consider them to have their origin within the hypothalamus itself. Usually when the tumour is examined at post-mortem or at operation it has so deformed the brain tissue that no conclusions can be reached as to the accurate localisation of this or that function. Still, it is interesting that groups of symptoms are prone to occur together. Adiposity is often associated with polyuria and sexual depression; somnolence with hyperthermia, hyperpnœa, and tachycardia. Yet occasionally only one function is disturbed, and so we find some patients suffering only from polyuria; others in whom somnolence, or adiposity, or sexual dystrophy constitute the sole manifestation of altered function. Here too, as in cases of encephalitis, the presence of a tumour or of surgical trauma may seem to determine the presence of psychological symptoms—episodes of laughter and tears, of placidity and manic excitement. The nature of the tumour may vary from the colloid cyst of the third ventricle to tumours arising from the pineal or the pituitary, but it is the site of the tumour and the amount of hypothalamic destruction which determines the symptoms rather than the type of the tumour. Often, indeed, it would seem that the smaller tumours with only partial destruction of hypothalamic centres are more productive of the specific symptoms than the larger lesions which are found at post-mortem to have destroyed completely the whole centre.

In head injuries lesions of the hypothalamus are occasionally found. Most frequently these consist of small hæmorrhages—especially in the pituitary stalk at its junction with the posterior pituitary. At this site, too, small areas of necrosis are to be found in many cases of increased intracranial pressure (Biggart).

Clinically, the involvement of the hypothalamus is most often recognised by reason of the development of polyuria, and hyperthermia, but some of the emotional and vasomotor disturbances may have their origin in such lesions.

Symptoms indicative of hypothalamic involvement are to be found in cases of Wernicke's encephalopathy—a lesion produced by deficiency of thiamin. Here multiple small petechiæ are found in the corpora mamillaria and around the aqueduct of Sylvius. Lethargy, periods of excitement, glycosuria, irregularities of respiration, etc., certainly suggest the involvement of this area (Campbell and Biggart, 1939).

Such a brief glance at the symptoms associated with pathological lesions in the hypothalamic region has raised the problem of the nature of the control exercised by this centre over sleep, the elimination of urine, temperature, fat metabolism, sex function, cardiac and respiratory rhythm, and possibly emotion. The fact that such symptoms are more prominent in association with small localised lesions raised the question of whether destruction of the balanced co-ordination of the hypothalamus is not more prone to produce symptoms than destruction of the whole centre. We must not forget the symmetry of the nuclei—which might suggest that unilateral lesions would not be associated with the same intensity of symptoms as bilateral destruction. Such pathological observations have served as a continuous stimulus to research, until to-day there is a remarkable consensus of opinion on the means of control of many of these functions.

Sleep.—The sleeping state can be overcome by sufficiently strong stimuli, but what determines why the state of wakefulness should give way, often relatively suddenly, to sleep we are still unable to explain. Some observers postulate that sleep is produced by the accumulation of metabolites during waking, and that these in turn act upon the brain. Chemical examination has failed to support such a theory. Others, influenced by Pavlov, believe that sleep is the result of a diffuse inhibition of the cerebral cortex and subcortical centres. Such a widespread inhibition was thought to be due to conditioned stimuli. This theory, once popular, has now been subjected to severe criticism. It neglects completely the observations of pathologists that lesions at the base of the brain do produce sleep. It fails to explain narcolepsy—a state of somnolence in which the patient may be asleep on his feet whilst walking or marching—and which therefore cannot be due to such a diffuse inhibition as is postulated by Pavlov. Experiment has failed to confirm theory. Even after complete decortication an animal may still continue to show alternation of waking and sleeping. As Denny-Brown (1932) points out, Pavlov's supposition 'rests on no evidence at all.'

From his analysis of cases of encephalitis lethargica, von Economo (1930) was led to postulate a sleep centre in the region of the third ventricle. Though his material did not permit of detailed localisation, he considered that such a centre existed in the hypothalamus posterior to the tuber cinereum and in the central grey matter of the anterior part of the mid-brain. It will be remembered that Mauthner (1890) also localised his centre posterior to the sella turcica. Von Economo considered that the sleep centre acted by inhibiting the cerebral cortex,

i.e., stimulation of such a centre should induce sleep. Analysis of our own and other pathological material, however, indicates that the lesions which induce sleep are not irritative, but rather destructive. Hence we should, as Ranson and Magoun (1939) point out, consider the centre as a waking centre rather than as a sleeping mechanism. When it is destroyed the stimulation to stay awake is impaired and sleep results. Figs. 8, 9, and 10 illustrate the site of three small lesions associated with sleep disturbances.

In Case 1 a tumour (ependymoma) was found to involve the anterior five millimetres of the aqueduct. It extended to a depth of 5 mm. into the lateral hypothalamus of both hemispheres above the corpora mamillaria. Case 2 showed sleep disturbance of the narcoleptic type. The onset of the condition had been sudden and two weeks before death. At post-mortem there was an acute necrosis of the tuberal nuclei extending along the floor of the third ventricle to the corpora mamillaria. The cause of the necrosis was not apparent but was probably vascular.

Case 3 (F. 45) was found to be associated with a metastatic carcinoma of the lung. The lesion was situated in the floor of the hypothalamus between the tuber cinereum and the corpora mamillaria. In transverse diameter it measured 1 cm. There was hæmorrhage and œdema of the surrounding tissue.

In a fourth case (F. 11) there was a cystic astrocytoma which, arising in the posterior hypothalamus, had completely replaced the corpora mamillaria, and extended laterally into the walls of the third ventricle for 1.5 cm. on either side. Though obviously of many months duration, it was only within the last month that sleep disturbance was obvious. There was only a slight hydrocephalus and it is possible that the somnolence is to be correlated with the occurrence of hæmorrhage into the cyst.

Others have had much larger series. Davison and Demuth (1946) record seventeen cases in which there was direct involvement of the hypothalamus in fourteen. In sixteen cases the posterior hypothalamus showed bilateral changes. In seven the lesion was entirely hypothalamic. These authors conclude that damage to the hypothalamus, especially the posterior part of the hypothalamus, causes somnolence. Similar cases have been reported by Fulton and Bailey (1929), Lhermitte and Tournay (1927), Cox (1937), Engel and Aring (1945), and others.

These conclusions, based on clinico-pathological evidence, have been put to experimental test by Ranson (1939), Ranson and Ingram (1932), Harrison (1940), and others. The work of Ranson and his school is of particular value, as his animals were observed for days or weeks following the operation. They found that lesions in the posterior part of the lateral hypothalamus were effective in producing sleep.

Calcium salts, which decrease the irritability of nervous tissues, have been injected into the brain by Demole (1927) and Cloetta and Fischer (1930). Such injections, presumably by decreasing the activity of the waking centre, have been found to induce sleep.

There has been accumulated sufficient evidence to postulate a waking centre in the posterior hypothalamus. Obviously such a centre is of great importance to the body, and though our evidence does not allow us to assume that this is the sole mechanism involved, it must be regarded as one of the centres compelling sleep.

Temperature.—Hyperthermia is not only occasionally present in hypothalamic disease, but is one of the symptoms which frequently develops after operation on this area. Sudden emptying of the ventricles, especially in children, has been followed by high temperatures which may be fatal (Cushing). It is seen occasionally as a complication of head injury and in association with pontine hæmorrhage. Rarely it is seen in encephalitis lethargica. Gelpke reported a case in which the temperature reached 111° and recurred at intervals on seven days during a fortnight. The man eventually recovered. Lhermitte and Ledroux have recorded cases in which there was a persistent high temperature, in one patient for two years. Dott (1938) has seen hyperthermia of sixteen days duration following operation on the hypothalamus. In general, however, though there appears to be little doubt as to the relationship between the occurrence of hypothalamic damage and the hyperthermia, most of the cases show such extensive damage that it is difficult to localise the control of temperature to any one nucleus. Alpers (1932), Gagel (1936), Davison (1940), and Zimmermann (1940) have described patients with fairly well localised lesions. In four out of five cases of hyperthermia studied by Davison, the tumour was found in the anterior and middle parts of the hypothalamus. In the fifth, the lesion was more posterior.

Hypothermia has also been found in cases of encephalitis and of tumour. In the human cases which were capable of analysis, the lesion has been found in the posterior part of the hypothalamus and involved the lateral hypothalamic nuclei at the level of the mamillary borders.

The findings in man, therefore, emphasise the importance of the hypothalamus in heat regulation, but do not permit us to localise the function in particular nuclei. There is some suggestion that injury to the anterior group of nuclei may be responsible for hyperthermia, whilst damage to the posterior group may be associated with hypothermia.

These suggestions have been supported by the experimental work of Ranson. He has shown that a receptive mechanism specifically sensitive to heat lies in the pre-optic and supra-optic regions. From this, centre pathways descend through the lateral hypothalamus. Experimental destruction of this centre or of the pathways leading posteriorly, injure the mechanism which normally prevents the body from over-heating. In other words, this centre controls and co-ordinates the various mechanisms of heat loss. If such animals are exposed to an environment with a temperature equal to or greater than the body temperature, their temperature rises. There is an absence of sweating. The respiratory rate which in normal animals rapidly increases, fails to show any change until hyperthermia is established. Stimulation of the centre results in sweating, increased respiratory rate, vasodilation, and cardiac slowing. It is important to note that though destruction of the centre results in deficient control of heat loss, the body still continues to manufacture heat.

Experimental lesions in the posterior lateral hypothalamic region result in loss of the ability to produce and conserve heat. Such animals fail to show shivering, which, though performed by somatic muscles, seems to be under hypothalamic

control. Under suitable environmental conditions such lesions will result in hypothermia.

When the lesion is so large as to destroy both the centre for heat loss and the centre for heat production, the animal tends to take the temperature of its environment, i.e., to become poikilothermic—at least for a time.

The co-ordinative and integrative functions of the hypothalamus are therefore beautifully demonstrated in the control of temperature, and it is obvious that in the exercise of this control many of the activities of the autonomic nervous system are involved. Respiratory rate, cardiac rate, shivering, vaso-dilation and vaso-constriction, the distribution of the blood in the skin and viscera—all these must be integrated and co-ordinated. Such functions must denote the presence of descending pathways and connections with the autonomic nervous system.

Water Metabolism.—Certain of the functions of the hypothalamus are so closely linked with the pituitary gland that it is necessary to review briefly the relationship between these structures. The epithelial elements of the pituitary develop from the oral ectoderm; the neural elements from the hypothalamus. Embryologically, the pars distalis or anterior is the only part of the pituitary which does not come in contact at any stage of development with neural elements from this source. This is of some importance, as we shall see that collateral functions often appear to be exercised by the anterior lobe and hypothalamus, and many investigators assume a supply of nerve fibres to this lobe from the hypothalamus. I have never been able to demonstrate such fibres, and the existence of a cleft between the anterior and posterior lobes until post-natal life tends to render the development of such a supply difficult. It is not surprising that the posterior lobe, which develops from neural tissue, has been shown to contain a rich plexus of unmyelinated nerves. It has been difficult to find the origin of these fibres. Some arise in the supra-optic nuclei, but whilst these constitute the majority of the fibres in the anterior part of the pituitary stalk, they are by no means the only fibres. It is possible that fibres come from the paraventricular nuclei, but there is as yet no definite evidence of these origins.

The posterior lobe is composed of rather peculiar glial cells—pituicytes. These cells are by no means confined to the posterior lobe but are also present in the stalk and in the median eminence of the hypothalamus. Indeed, from the standpoint of structure, one must include the median eminence, the stalk, and the posterior lobe as one functional unit. All three structures might well be included under the term pars nervosa. Much of our knowledge of this anatomical relationship between the hypothalamus and the pituitary has only been gained during the past decade, and until this relationship was clearly understood, the problems of the control of water in the body could not be solved.

In 1674 Thomas Willis differentiated between diabetes mellitus and diabetes insipidus. Lacombe in 1841 gave a good clinical description of the malady, emphasising the polyuria and the low specific gravity. In the development of our modern ideas concerning this syndrome there have been three main periods. The first dates from 1860 when Claude Bernard produced a polyuria in rabbits by

puncture of the floor of the fourth ventricle. Such a polyuria cleared up in a few days. Biggart and Alexander (unpublished observations) confirmed this in the cat, and this form of polyuria remains one of the unsolved problems of water metabolism. Kahler (1886), for example, claimed to have produced a permanent polyuria by the injection of silver nitrate into the medulla in the neighbourhood of the restiform body.

The second period in the interpretation of the lesion responsible for diabetes insipidus was ushered in by the discovery that extracts of the posterior pituitary were related to the control of the excretion of body water. Stimulus to the viewpoint that the pituitary played the major role in the ætiology of the syndrome was given by the work of Cushing (1910-14), who succeeded in establishing the syndrome experimentally by hypophysectomy. Farini in 1913 and van der Welden showed that diabetes insipidus could be controlled by injection of posterior pituitary extract. It therefore became accepted that the syndrome was the result of hypofunction of the posterior pituitary.

Such a viewpoint neglected the facts described by Aschner (1912) and Camus and Roussy (1913) who stated that removal of the pituitary did not in itself produce a polyuria, but that when the syndrome developed there was always concomitant damage to the hypothalamus. To this argument was added the observations of those pathologists and physicians who described diabetes insipidus appearing as the result of encephalitis lethargica or of other hpyothalamic injuries in the absence of any direct damage to the pituitary. In 1933, when my interest in this subject was first aroused, medical opinion was sharply divided into two camps—(*a*) those who believed in the ætiological importance of the pituitary and (*b*) those who believed in the importance of lesions in the nervous tissue.

At its inception, the problem had been rendered more difficult by the demonstration by Magnus and Shaefer (1901) that extracts of the posterior pituitary caused a diuresis in the anæsthetised animal. As a result, Frank (1910), who reported a case of diabetes insipidus due to a bullet piercing this region, was led to attribute the syndrome to an over-activity of the pars intermedia—at that time credited with the production of pituitrin. Cushing (1910) and his co-workers also believed that the lesion was irritative in character. They found that total removal of the pituitary resulted in oliguria. In the case reported by Simmonds in 1913 there was a secondary carcinoma of the breast destroying the pars nervosa, but which left the anterior lobe and the pars intermedia intact. Such reports tended to support the pituitary origin of the syndrome, but also to foster the idea of a hyper-secretion due to irritation.

The demonstration by van der Welden and Farini of the anti-diuretic effect of pituitary extract enabled subsequent clinical cases to be investigated from this point of view, and Goldzieher (1913) described a case of destruction of the posterior lobe and stalk by a gumma. Such cases were interpreted as resulting from a deficiency in posterior lobe secretion. Similar cases with destruction of the posterior lobe, with or without concomitant damage to its stalk or its epithelial investments, were reported between 1913 and 1927, but in most of such reports there was failure to examine the hypothalamus, and so the interpretation remained one of purely

pituitary deficiency. Such a viewpoint was emphasised by the results of experimental work. Verney and his collaborators from 1925 to 1936 supported the role of the posterior pituitary and showed that the anti-diuretic action of posterior lobe extracts was a direct one upon the kidneys and that this action was not dependent upon the integrity of the nerve supply to these organs.

Arranged against this purely pituitary origin of diabetes insipidus there was the experimental work of Camus and Roussy (1913-25), Bailey and Bremer (1921), Houssay (1918), and others. Many of these investigators showed that removal of the pituitary was not followed by polyuria, but rather by a diminution in water output, whilst they claimed that damage to the overlying brain—variously localised by different authors—was followed by a polyuria with low specific gravity in every way resembling the clinical syndrome of diabetes insipidus. Few pathologists, however, had carried out any histological examination of the hypothalamus in human cases, and though Staemmler (1932) and others had published suggestive cases, the hypothalamic theory was far from being accepted.

My own material consists of nine cases which were studied at post-mortem. Table II shows the pathological lesions in these cases.

TABLE II

Case 1	F.30	Operative trauma
Case 2	M.57	Secondary carcinoma
Case 3	F.54	Encephalitis
Case 4	M.37	Secondary sarcoma
Case 5	F.50	Destruction of hypothalamic nuclei—? post encephalitis
Case 6	M.19	Ramsay Hunt's juvenile paralysis agitans
Case 7	M.43	Localised inflammatory softening
Case 8	M.52	Syphilitic meningitis
Case 9	F.36	Boeck's sarcoidosis of meninges

The distribution of the lesions is shown in Table III.

TABLE III

	CASE								
SITE OF INJURY	1	2	3	4	5	6	7	8	9
Supra optic hypophyseal tract	+	+	+	+	+	—	+	+	+
Nucleus supra opticus	—	—	+	—	+	S1	+	—	—
Pars tuberalis	+	+	—	+	—	—	+	+	+
Pars nervosa	+	+	—	+	—	—	S1	—	+
Tuberal nuclei	—	—	+	—	—	+	+	—	+
REACTION TO PITUITRIN	+	+	—	+	+	—	—	+	UNKNOWN

In all nine cases the anterior pituitary was intact. Fig. 13 illustrates the extent of these lesions as determined by serial section. Cases 1, 3, 5, 6, and 7 seemed to indicate that a purely hypothalamic injury of whatever cause would result in the appearance of the syndrome. Such results stimulated experimental work and Alexander and I were successful in producing a permanent polyuria in fourteen dogs. At the same time, Ranson and his co-workers in America were also investigating this problem, and with one or two exceptions our results and ideas are in agreement.

It is therefore possible to summarise the current views as to the pathogenesis of diabetes insipidus. The secretion of the anti-diuretic hormone in the median eminence, the stalk, and the posterior pituitary is governed by the supra-optic-hypophyseal tract. It would appear that the supra-optic nucleus, possibly through its rich vascular bed, is stimulated by the water needs of the body (fig. 17). When it is necessary to conserve water, the discharge of antidiuretic hormone is mediated by this nervous mechanism. If the nervous receptor mechanism—i.e., the supra-optic nuclei—is destroyed, and note that such destruction must be bi-lateral, the need of the body remains unappreciated: there is no discharge of hormone and a continuous polyuria. The nervous control of secretion may also be destroyed by interruption of the nerve tract, and the more nearly complete this interruption is, the more severe will be the loss of secretory control. Similarly, destruction of the posterior pituitary, its stalk, and the median eminence, i.e., the structures innervated by the supra-optic fibres, will result in an inability to produce hormone. In other words, diabetes insipidus is essentially a hormonic disturbance, but such disturbance is often caused by damage to that part of the hypothalamus which, through its nervous pathways, controls the secretion of the hormone. Here then we see an interesting relationship between the nervous and endocrine systems—a relationship which we also see illustrated, though much less clearly, in regard to fat metabolism and sex.

The problem is, however, not quite so simple. Some cases of diabetes insipidus in man do not react to pituitrin. I have had the opportunity of studying three such cases, and reference to Table III will show that, although associated with hypothalamic lesions, the extent of the nervous damage is somewhat different in its distribution and tends to extend more posteriorly to involve the tuberal nuclei. Thus in one case the polyuria was at first controlled, but subsequently became refractory. Post-mortem study would suggest that this sequence was associated with the gradual extension of the lesion. Our present knowledge does not permit a reasoned explanation of such cases (Biggart, 1937).

In other patients the polyuria may gradually disappear, or alternatively one finds, at post-mortem, lesions which might be expected to produce a polyuria in the complete absence of the syndrome. Von Hann (1918) was the first to give an explanation for these cases. In nine patients in whom the whole pituitary was destroyed, no diabetes insipidus was present. He concluded that the anterior pituitary played a part in the evolution of the syndrome, and considered that even in the presence of the essential lesion in the pars nervosa, polyuria would not develop unless the anterior lobe was at least partially intact. Numerous other

authors have presented evidence in favour of this concept. I have now seen three cases in which a secondary deposit of carcinoma had destroyed completely the anterior lobe, the posterior lobe, and stalk, and yet the measurement of urine output revealed an oliguria (Biggart, 1938, 1939). In two dogs which had shown polyuria for 222 and 113 days respectively, the pituitary was removed, with a dramatic disappearance of the polyuria (Biggart and Alexander, 1939). Similar results have been recorded by Keller, Noble, and Hamilton (1936), whilst there is the often observed fact that permanent polyuria does not develop after hypophysectomy. Whether or not this means that the anterior lobe possesses a diuretic function, or whether the general depression of metabolism consequent upon the removal of the pituitary results in a reduction of water intake, is not yet quite certain.

Fat Metabolism.—Since Fröhlich's description of dystrophia adiposo-genitalis there have been numerous case reports of obesity developing as the result of disease of the pituitary-hypothalamic complex. Most often the lesion has involved both the endocrine gland and the adjacent nervous tissues and so it has not been possible to show what part the hypothalamic damage has played in the development of the adiposity. One, however, occasionally encounters patients who develop obesity following encephalitis lethargica, post-measles encephalitis, and chorea—in all of which the lesion is confined to the nervous tissue and in which no damage can be demonstrated in the anterior pituitary. It would thus appear that a purely hypothalamic obesity exists. Such may well be the basis for the by no means uncommon syndrome of juvenile adiposity, with or without some degree of sexual infantilism, but unassociated with disturbances of growth or vision. The normal rate of growth would seem to indicate a competent anterior pituitary, and their subsequent history that the lesion responsible was of functional rather than of organic origin.

The frequent association of polyuria with adiposity suggests that the lesion responsible for both disturbances lies in the anterior hypothalamus, and as Table IV shows, our diabetic dogs developed an excessive gain in weight.

TABLE IV

DOG	PRE-OPERATIVE WEIGHT (KILOS)	POST-OPERATIVE WEIGHT (KILOS)	GAIN IN KILOS
W	9.6	15.5	5.9
13	10.0	12.0	2.0
21	7.5	13.0	5.5
24	9.0	13.3	4.3
27	7.0	11.2	4.2
38	10.25	13.0	2.75
46	9.5	12.8	5.8

Brooks (1938) and Scharrer (1938) also claim to have produced disorders of fat metabolism by bilateral lesions in the anterior hypothalamus. Gildea and Man (1940) found the blood lipoids abnormal in about half of their patients with hypothalamic lesions.

On the other hand, emaciation may be seen when the damage to the hypothalamus is extensive. Thus the obesity of encephalitis may give way to cachexia, and this sequence of events is not uncommon with the epidermoid tumours of the pars tuberalis. In a recent case of boulimia, the patient, a woman of 37 years, weighed less than four stones. At post-mortem she was found to have a syphilitic encephalitis with marked inflammatory lesions throughout the hypothalamus (fig. 18).

Unfortunately, pituitary lesions may be associated with similar disturbances. The basophil adenoma is often associated with obesity: the characteristic case of Simmond's disease with emaciation. It is not yet possible to differentiate clearly between hypothalamic and pituitary disturbances of fat metabolism, though the observation of Gildea and Man (1940) suggests that a high content of fatty acids and cholestrol is more frequently found in the blood in hypothalamic disease.

Here, as with temperature and water metabolism, there is obviously an integrated balanced mechanism for the control of fat. The presence of a similar controlling mechanism in the anterior pituitary has suggested that the hypothalamus and anterior pituitary are linked by nerve fibres, but the failure to demonstrate such fibres prevents the acceptance of such an explanation. Barcroft has pointed out the frequency with which there is in the body duplication of function. Indeed, he believed that duplication is a definite feature in the architecture of function 'the more impressive because it is achieved in such different ways.' Can it be that here in the pituitary-hypothalamic mechanism we have another example of this feature? Such a viewpoint, however, demands an integration of these two mechanisms. The means whereby such integration is obtained are not clear.

Sex.—Sexual dystrophies are found associated with both hypothalamic and pituitary lesions. In most human cases the lesion responsible has damaged both structures and so rendered it impossible to localise clearly the site responsible for the sexual dystrophy. However, I have found normal anterior pituitary glands in three cases of Fröhlich's dystrophy, where tumours arising at the upper pole of the pars tuberalis had damaged the anterior hypothalamus. Similar cases have been reported by Riddoch (1928), Dott (1938), Cushing (1932), Stewart (1938), and others. It is of interest that in our dogs, which were subjected to bilateral damage of the anterior hypothalamus, some of the animals not only developed obesity, but also sexual disturbance. One female, maintained for over a year following the operation, never developed œstrus and at post-mortem showed atrophy of the uterus and ovaries. Two males showed extensive degeneration of the germinal epithelium and complete absence of spermatogenesis. In all these animals the anterior pituitary was intact.

In man, the Lawrence-Moon-Biedl syndrome, characterised by obesity, retinitis pigmentosa, mental deficiency, and genital dystrophy is frequently stated to be due to hypothalamic disturbance. I have had the opportunity of examining one case.

The anterior pituitary was normal. Some of the vessels in the hypothalamus showed a peri-vascular cuff of lymphocytes and there was some fall-out of cells, but the changes were not sufficiently definite to allow of any conclusion.

It is not so generally known that lesions of the hypothalamus may result in precocious puberty. Usually in such cases search is made for adrenal, ovarian, or pineal tumours. The occasional association of this syndrome with pineal tumours has done much to perpetuate the thesis that the pineal continues to possess endocrine symptoms. Actually an analysis of the cases of precocious puberty associated with these tumours shows that the syndrome is related to the site and not to the nature of the tumour. The occasional occurrence of the syndrome as a sequel of encephalitis lethargica emphasises the possibility of a pure nervous lesion being responsible for what at first sight appears to be an endocrine disturbance (Stern, 1922, Wimmer, 1924). Such a possibility is further emphasised by the appearance of similar symptoms in association with tumours of the floor of the third ventricle. In such cases where an accurate description of the lesion has been given, it has been found to involve the mamillary bodies, and the hypothalamus posterior to the tuber cinereum. One of the most interesting of such cases is that of Capell and Dott which occurred in a female. "At six months old she began to have fits and to menstruate. At nine months there was enlargement of her breasts, which reached adult proportions when she was four years of age. At a year old she had pubic and axillary hair and began to grow rapidly. At four and a half years old she was as tall as a child of seven." She died at the age of eight years and was found to have an astrocytoma, replacing the floor of the third ventricle between the posterior wall of the tuber cinereum and the posterior margins of the mamillary bodies. There was no hydrocephalus.

Here, once again, we have clinical and pathological evidence of an integrating mechanism. The anterior nuclei would appear to be concerned with the stimulus to sex development: the posterior with its inhibition. Destruction of one group permits the other to overact and therefore results in an abnormal expression of sexual development.

Emotion.—There has always existed amongst students of the human mind a materialistic group who, dissatisfied with psychological abstractions, have sought to locate the 'instincts' or 'emotions,' the mind or the soul in some particular body organ. Thus Aristotle taught that the 'entelechy' of the organism dwelt in the heart: Erasistratus placed it in the cerebellum: Descartes in the pineal—the seat of the soul. Herophilus, in a prophetic mood three hundred years before Christ, decided upon the region of the third ventricle. "It would be," as Massermann (1943) writes, "an odd commentary, if after two milleniums of laborious research, we must concede that Herophilus's designation of the third ventricle was within two millimetres of being right." More recently, Cushing (1932) has written "here in this well concealed spot . . . lies the very mainspring of primitive existence—vegetative, emotional, and reproductive—on which, with more or less success, man has come to superimpose a cortex of inhibitions."

The problem is not easy. Animal experiment is difficult to interpret and clinico-

pathological correlations have so far been inconclusive. There can be no doubt that psychic disturbances are commonly seen in patients with lesions involving the hypothalamus. Psychic disturbances such as Korsakoff's syndrome are to be seen in Wernicke's encephalopathy, where the chief lesions are in the corpora mamillaria. Psychic disturbances are not uncommon in patients with other hypothalamic lesions, but in general the lesions are large and are difficult to utilise in localisation. The emotional reactions seen in encephalitis lethargica, varying from excitement or uncontrollable rage to an apathetic placidity, may be of hypothalamic origin, but the widespread nature of the inflammatory process renders it impossible to dogmatise. The common dissociation, however, between intellectual ability and emotional disturbance tends to place the lesions at a subcortical level. With tumours, manic conditions, euphoric states, flight of ideas, anger, have all been seen. In a case of teratoma of the third ventricle described by Alpers (1937), the patient was irritable and irresponsible and showed periods of excitment followed by periods of fatigue. Foerster has seen manic episodes develop during the manipulation of a third ventricle tumour. Gagel (1936) is convinced that a manic condition can be produced in man by stimulation of the anterior hypothalamus. The posterior hypothalamus reacts to trauma by mental dullness, loss of interest, and eventually somnolence. Dott (1938) reported episodes of meaningless laughter in association with a posterior hypothalamic tumour.

Animal experiment, however, has not been without value. The early observation of Goeltz (1892) that the decerebrate dog occasionally reacted to even gentle handling by behaviour suggestive of fear or rage, has been confirmed and extended by a number of workers. Chief amongst these has been Bard (1928), who showed that this "sham rage" could be elicited in animals from which all parts of the brain cranial to the hypothalamus had been removed. In other words, it would appear that the expression of anger is dependent upon the integrity of the hypothalamus. Later work by Ranson and his school (1935) has shown that stimulation of the hypothalamus results in dilatation of the pupil, erection of the hair, snarling, lashing of the tail, biting, clawing, and fighting movements. Here, indeed, we have the appearance of rage, yet it would be wrong to assume, as so many have done, that the hypothalamus is actually the seat of this emotion. All that the human or experimental evidence allows us to deduce is that this area is concerned with the expression of the emotions, and that in this, as in the other functions we have considered, it acts as a co-ordinating centre for the neural and hormonal mechanisms of conative and emotional expression.

In order to complete our thesis of the co-ordinating and integrating functions of the hypothalamus it would be necessary to discuss its relationship to carbohydrate metabolism, to conditions of oxygen-lack, the formation of food stores within the body, the blood pressure, the mobility of the gut, and all the manifold reactions mediated through the autonomic nervous system. There is already abundant evidence that all of these controls are exercised in the last analysis by the brain, and our present knowledge suggests by that particular part of the brain at which we have been looking to-night. Often it appears that there is a pressor balanced by a depressor mechanism, and that in general one tends to be situated in the anterior,

and the other in the posterior hypothalamus. I hope that the evidence culled from clinico-pathological correlation and chronic experiment has convinced you that the maintenance of the internal environment in face of a frequently changing external environment is brought about by this hypothalamic centre. This centre might be said to be analagous to the headquarters of a great and successful army. No matter how the battle may fluctuate the welfare of the whole army is guaranteed by the co-ordination and integration of its various units and their functions. In man, however, unlike the army headquarters, most of this co-ordination is unconscious and therefore probably more efficient.

As we are doctors concerned with the general health of the public it is tempting to ask what has been the general benefit of this co-ordinating mechanism. Normally we are unaware of the functioning of the hypothalamus. It is only when disease attacks this centre or when the external environment varies so greatly from its normal range that symptoms and signs resulting from loss of co-ordination and integration become apparent. If we look again at Table I we shall see that in all such instances it is the higher levels of the central nervous system which suffer. Bernard in his original conception of the internal environment stated that "la fixité' du milieu interieur est la condition de la vie libre," and with Barcroft one must conclude that 'la vie libre' which results from the constancy of the internal environment is the state which permits of mental activity. "Each century, and now each decade, add emphasis to the antithesis between the complete insignificance of man when considered as part of the material universe, and the astounding ascendancy to which his intellect has attained in comprehending the universe in which he is placed."

"Of that intellectual ascendancy, 'la fixité du milieu interieur' appears to be the, or at least a condition : Of that intellectual ascendancy, 'la vie libre' is no inapt description."

Whilst the hypothalamus, therefore, enables us, within broad limits, to "bring to the diet of the day's sights and sounds the wine of our own temperament," it is obvious that there must be a range to these limits. The wider the limits within which we insist our hypothalamus shall co-ordinate and integrate, the greater must be the strain upon its mechanism. It is not surprising that these mechanisms eventually fail. Over-stimulation, long continued, appears to be deleterious to most organs. Here, indeed, may be the explanation of the diseases of modern civilisation. Just at the time when Pasteur's prophecy that disease might be banished appears more likely than ever to be fulfilled—when sulphonamide, penicillin, streptomycin, and the others which the coming decades will bring, are wiping out the bacterial causes of disease—just at this time our integrating centres are being exposed to more and more unphysiological strain, and high blood pressure, arterial disease, and peptic ulcer take an increasing toll from our declining years.

In a magnificent way we have rebelled against nature's regime, forgetting that

"To everything there is a season
And a time to every purpose under Heaven :
A time to be born, and a time to die,
A time to keep, and a time to cast away."

Here, at the very inception of the service to provide positive health for all, is our most urgent, and, I fear, our most long-term problem.

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Fig. 1

The base of the brain, to show the floor of the third ventricle, the optic nerves, the corpora mamillaria, and pituitary stalk.

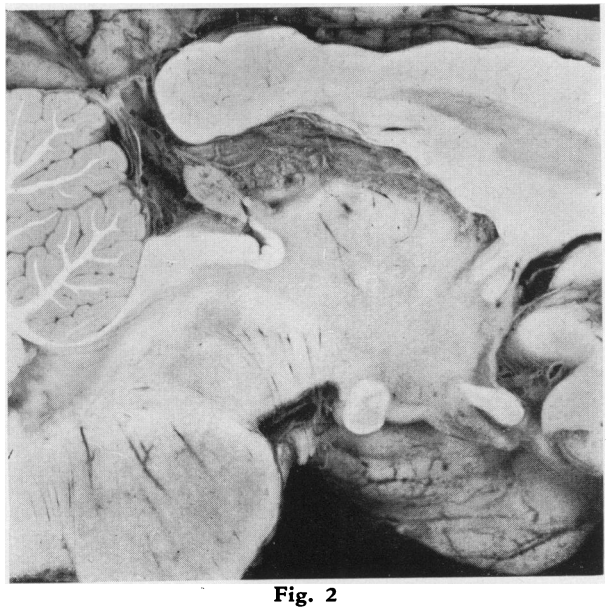

Fig. 2

Sagittal section through the third ventricle showing the optic chiasm, pituitary stalk, pineal, and general relationship of the hypothalamus.

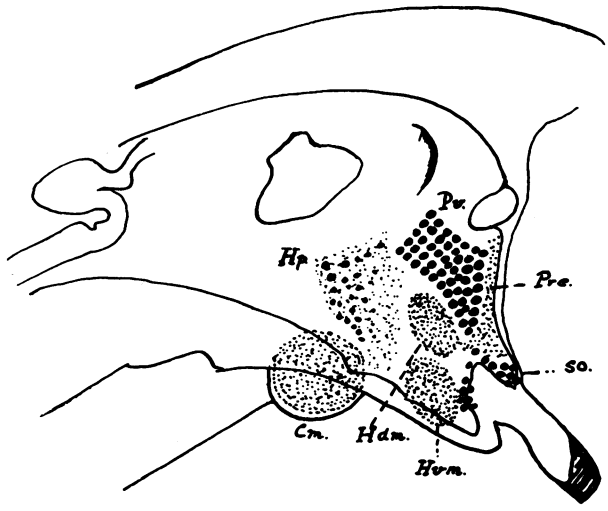

Fig. 3

Diagram to illustrate the position of the hypothalamic nuclei (after Le Gros Clark). Cm = corpus mamillarium, Hdm = dorso medial nucleus, Hvm = ventro-median nucleus, Pre = preoptic nucleus, Pv = paraventricular nucleus, So = supra-optic nucleus.

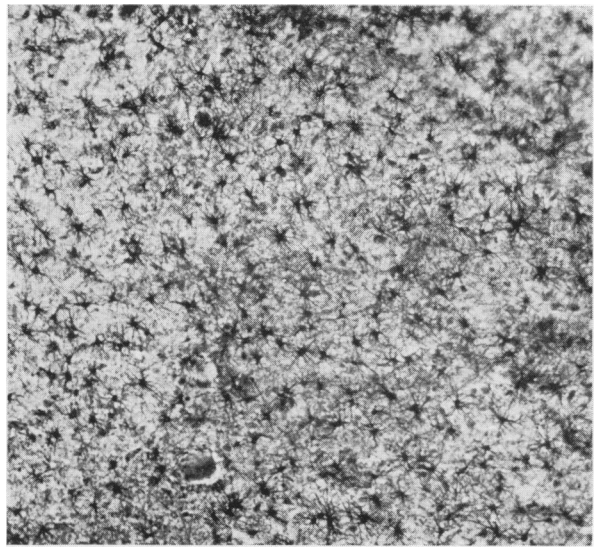

Fig. 4

Hypothalamus in case of subacute encephalitis lethargica to show proliferation of glial cells. Cajal's gold sublimate.

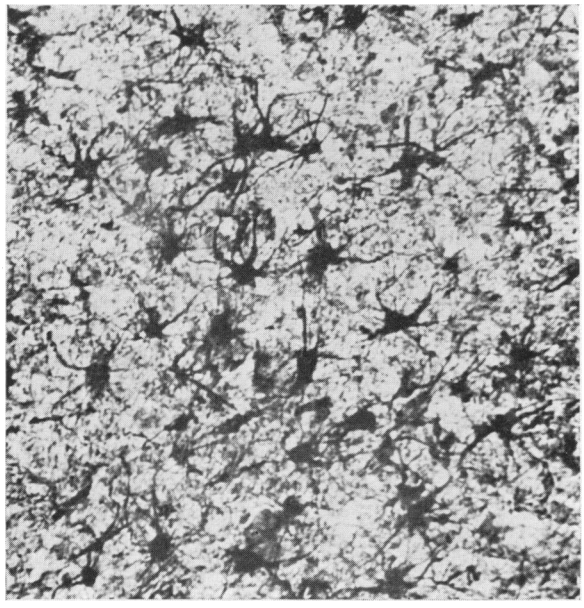

Fig. 5
Hypothalamus. Syphilitic meningo-encephalitis to show gliosis. Cajal's gold sublimate.

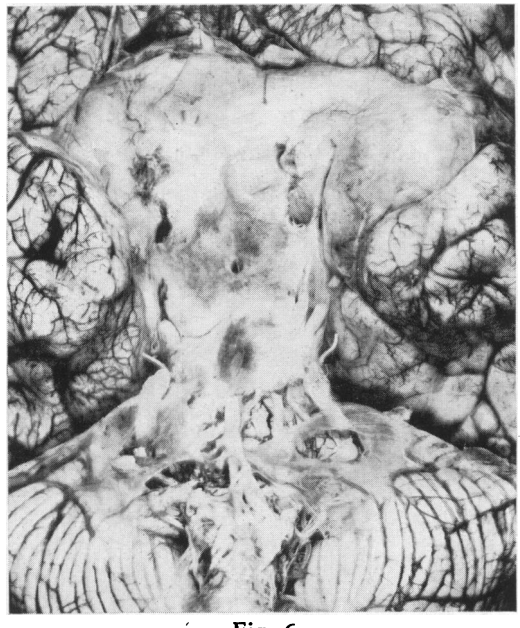

Fig. 6
Glioma replacing the whole hypothalamus. Female, aged 12. Absence of hypothalamic symptoms.

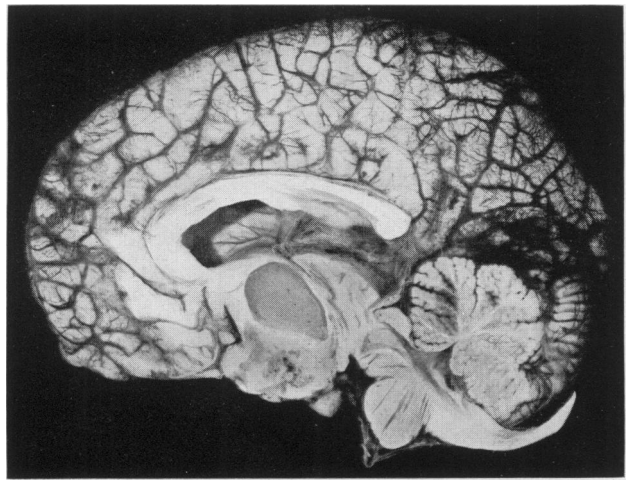

Fig. 7
Cystic astrocytoma replacing entire hypothalamus. Male, aged 11. Only symptom was somnolence.

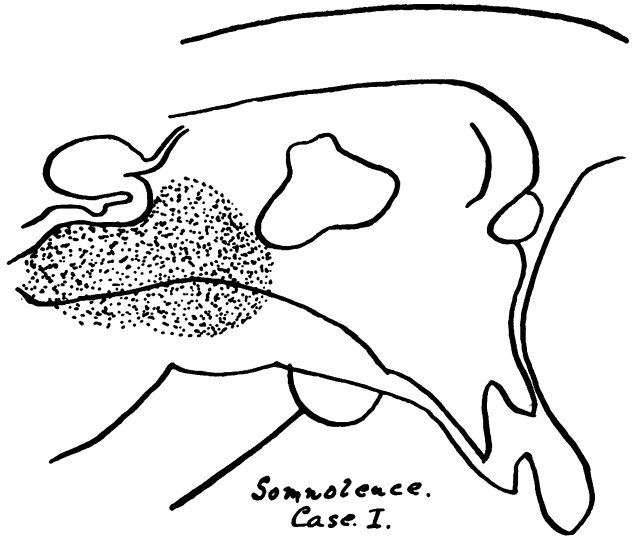

Fig. 8
Female, aged 35. Site and extent of ependymoma associated with somnolence.

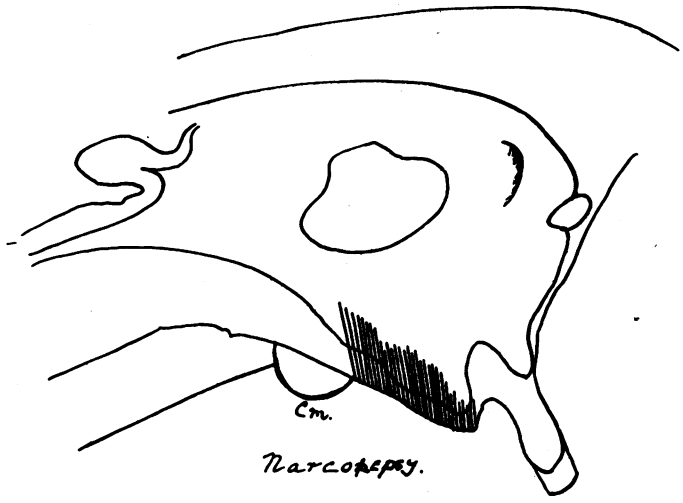

Fig. 9
Female, aged 50. Site of softening associated with narcolepsy.

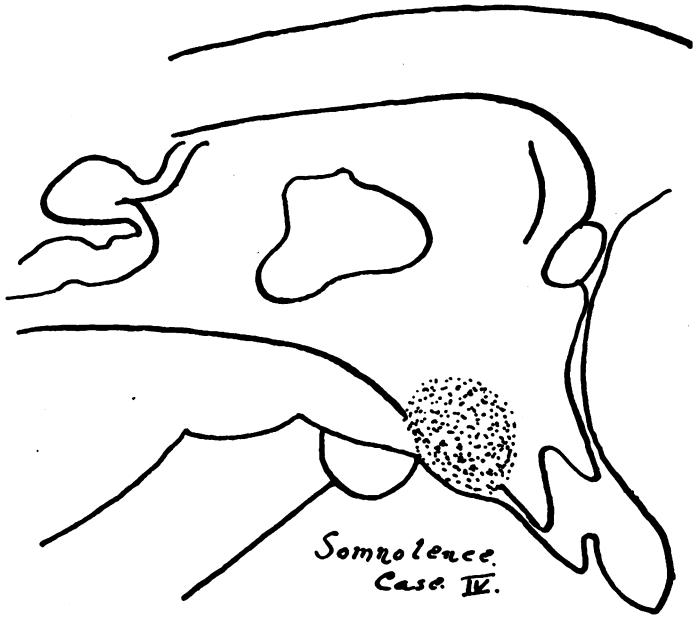

Fig. 10
Secondary bronchiogenic carcinoma associated with somnolence. Site and extent of lesion.

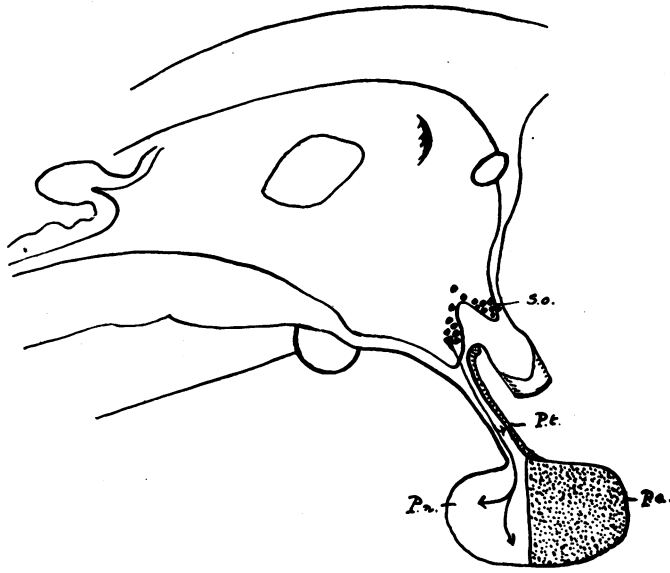

Fig. 11
Diagram to illustrate the known hypothalamic pituitary relationships.

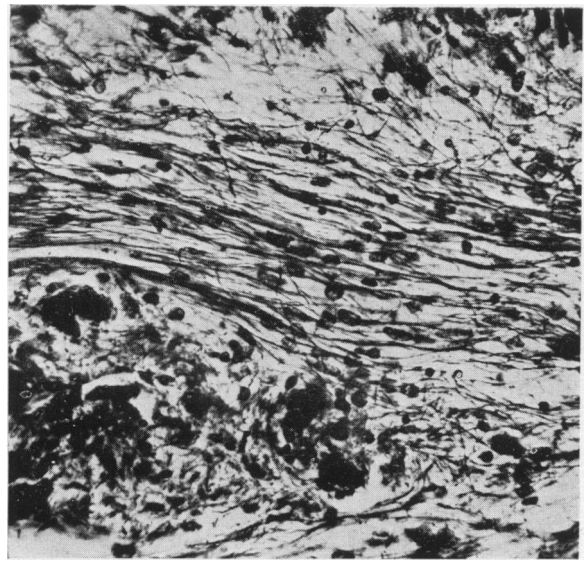

Fig. 12
The supra-optic hypophyseal tract in the human pituitary stalk. Cajal's reduced silver.

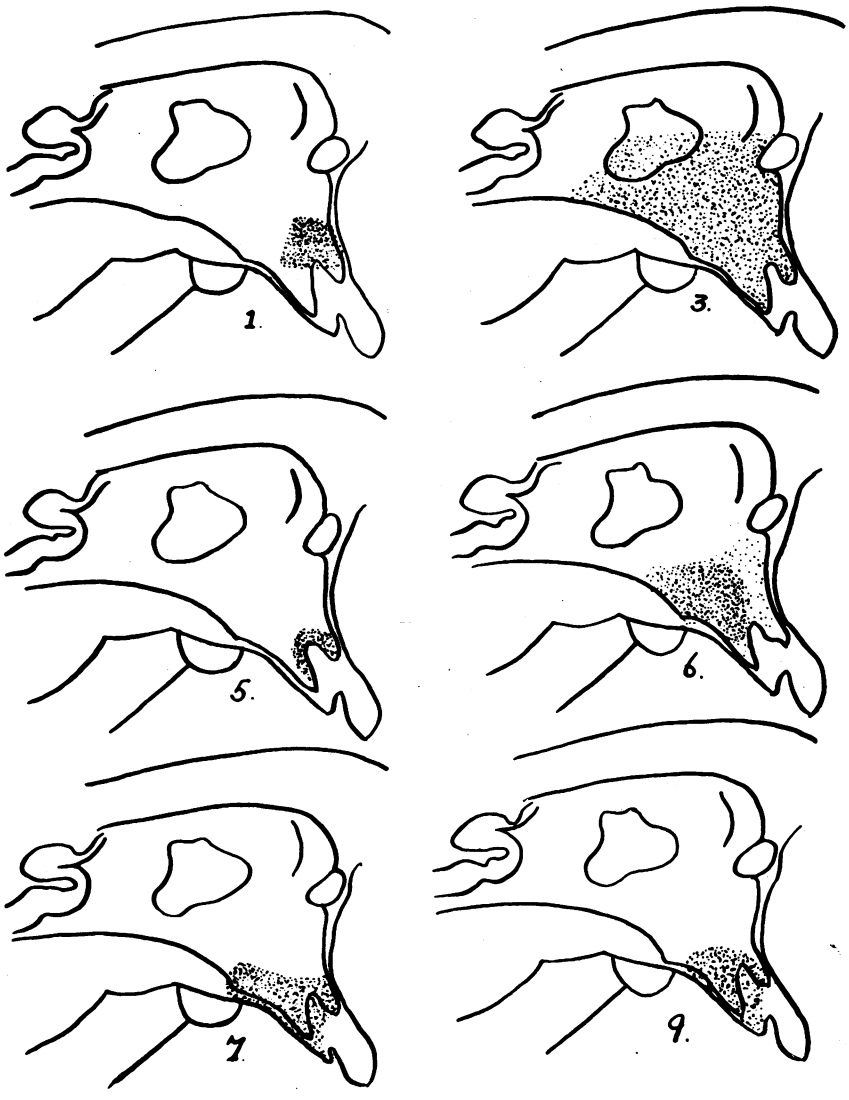

Fig. 13
The site of the hypothalamic lesion in six human cases of diabetes insipidus.

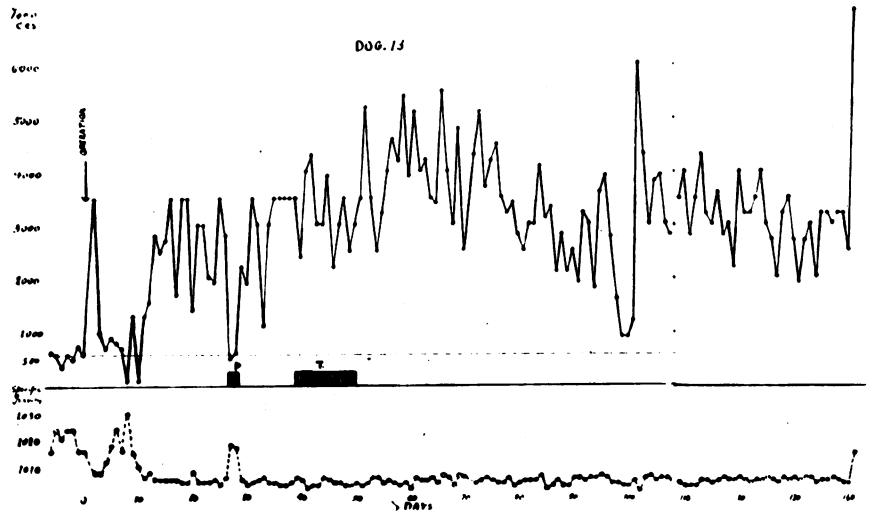

Fig. 14

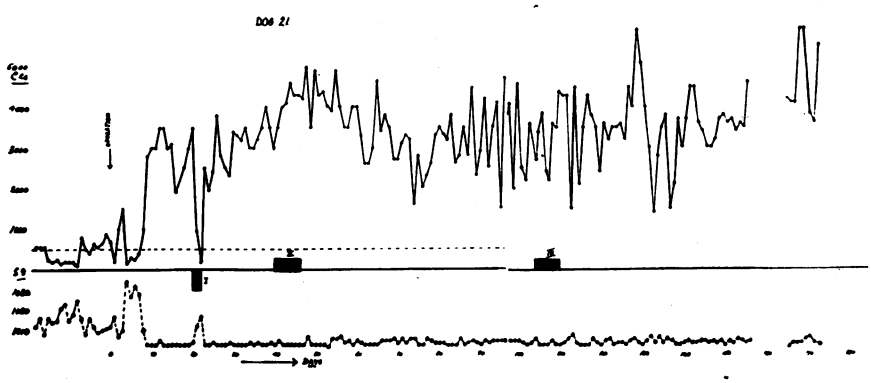

Fig. 15

Experimental diabetes insipidus (dog) following bilateral puncture of the anterior hypothalamus.

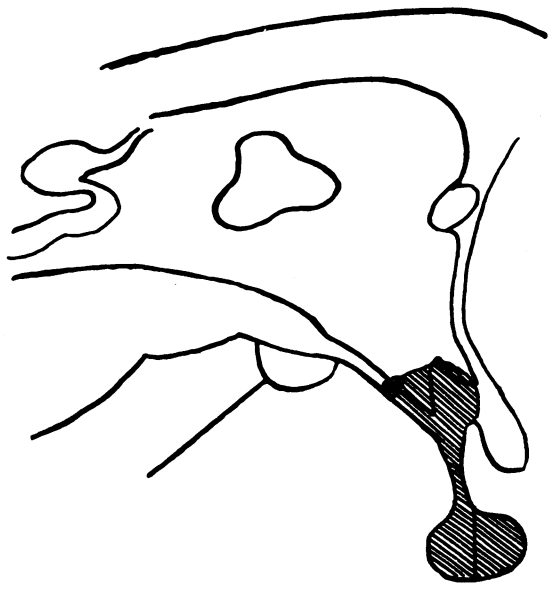

Fig. 16
Site of secondary carcinoma with presence of oliguria. No history of polyuria was obtained.

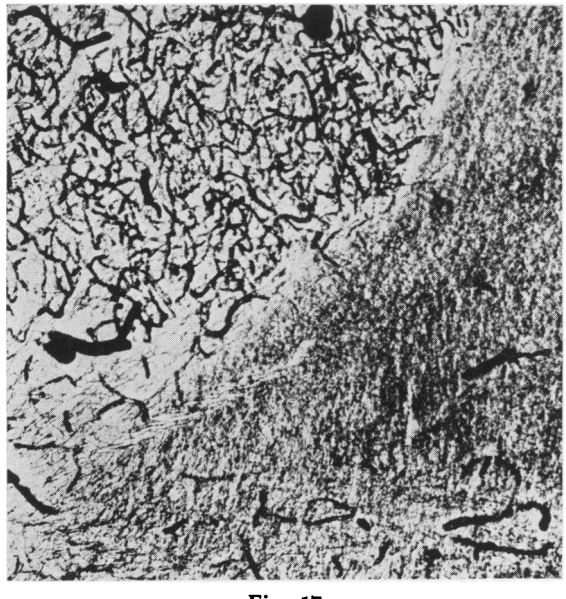

Fig. 17
To illustrate the vascularity of the supra-optic nucleus Lepehne-Pickworth stain.

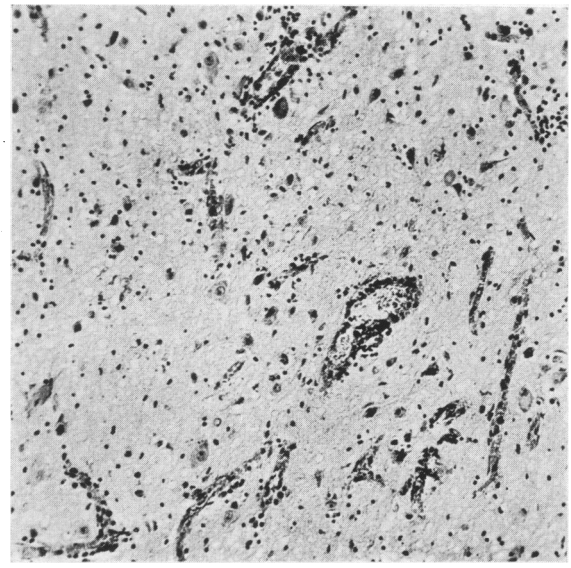

Fig. 18

Syphilitic meningo-encephalitis. Case of extreme emaciation showing extensive hypothalamic involvement.

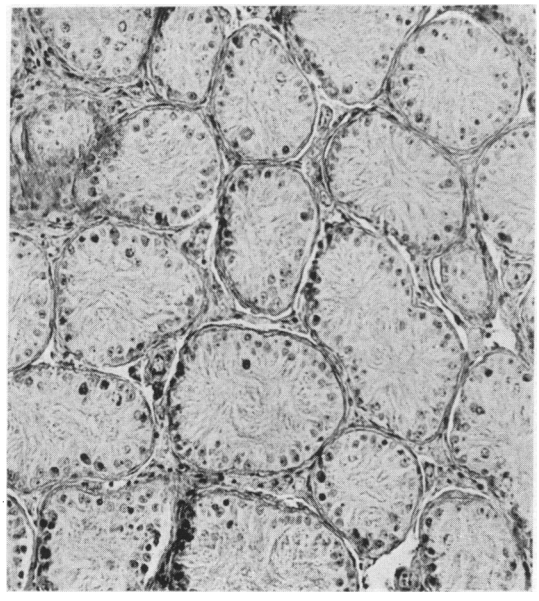

Fig. 19

Atrophy of testes in dog following anterior hypothalamic punctures. The pituitary appeared normal.

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GOOD HEALTH WITH DIABETES. By Ian Murray, M.D., F.R.F.P.S G., F.R.C.P.E., and Margaret B. Muir, S.R.N. Pp. 40. 1947. Edinburgh: E. & S. Livingstone Ltd. Price 2/-.

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ESSENTIALS OF FEVERS. By Gerald E. Breen, M.D., D.P.H., D.O.M.S. Second Edition. Pp. xi+351. 1948. Edinburgh: E. & S. Livingstone Ltd. 15/-.

THIS is an excellent account of the fevers. They are dealt with fully, but without unnecessary material. The subject is treated throughout from the practical angle of the practitioner confronted with the diagnosis of such cases. The illustrations, including the colour plates, are by the author, and have all the prime virtue of representing strikingly the conditions they are intended to portray, which is more than can always be said for the medical illustrations of the professional artist who is not a clinician. The nomenclature of some of the organisms such as the eberthella typhi is perhaps a little strange to the unaccustomed retina, but that is a fault that lies more with the reader. This should prove a most useful book to student and practitioner alike. R. W. M. S.

Presentation of Honorary Fellowships of the Ulster Medical Society

11th December, 1947

In presenting the Honorary Fellows to the President, Mr. G. R. B. Purce, Professor W. W. D. Thomson said :—

A decade has almost passed away since in this hall I had the great privilege as President of the Ulster Medical Society to install Sir Humphrey Rolleston, Mr. A. B. Mitchell and Sir Robert Johnstone as honorary fellows. Since then no names have been added to that ever jealously guarded list, which, alas, by the passing of these three and of Sir Arthur Hurst, Sir Almroth Wright and Professor T. Sinclair, has been reduced to only two : Sir Thomas Houston, the greatly beloved doyen of the medical profession in Northern Ireland, and Brigadier J. A. Sinton, unique in that he is the only individual to have ever held in his own person the highest military honour—the Victoria Cross, and the greatest scientific distinction —the Fellowship of the Royal Society. The Ulster Medical Society is very proud of its roll of Honorary Fellows, which includes such names as William Stokes, Joseph Lister, William McCormick, George Makins, Peter Redfern, William Whitla, James Lindsay, and Wm. St. Clair Symmers. To-night it is once again my treasured privilege to present to you, Sir, six distinguished colleagues to grace the roll still further. Two are men who have in other schools, by their work and writings, become household names throughout the medical world and who have found time during their busy lives to come to Queen's as Extern Examiners on frequent occasions, often during the war years when travelling was difficult; four are sons of our own Alma Mater who have in their respective spheres added to the reputation of our medical school, who have taught successive generations of students the art of medicine, and who have deserved well of this society to which in the past they have given generously of their time and experience, and of which they have, each one, occupied the presidential chair.

PROFESSOR FRANCIS JAMES BROWNE

The other day while sorting out an ancient press I came across a long-forgotten book—a prize for good attendance at Anahilt Sabbath School, which bore a date in the eighteen nineties. It was one of a series of biographies of famous Americans in vogue in those days as prizes or gifts to fire the noble ambition of youth. This one was entitled : "Benjamin Franklin, or From Printing Office to the Court of St. James." At once I thought how interesting and inspiring a volume could be written : "Francis J. Browne, or From a Club Colliery Practice in Abertillery to a Professorial unit in London"—the story of how Professor Browne made his escape from the shackles of club practice in the Ebbw Fach Valley, a tale unique in these days when the portal to consulting via general practice is but rarely taken.

In the latter years of the nineteenth century, F. J. Browne used to make his daily journey from his home in Tullybogley, near Manorhamilton, to attend the famous seminary, Foyle College, Londonderry. Here he had as school mates, Sam Irwin and Charles Lowry. It is a remarkable fact that three of our new honorary fellows were at Foyle together.

After a careful investigation of the fees of the various medical schools, F. J. left the banks of the Foyle for the banks of the Dee, and qualified in Aberdeen. Leaving the granite city for the coalmines of Monmouthshire, he worked there till the outbreak of the first world war, when he joined the R.A.M.C., contracted dysentery, and was invalided out. We find him next in Edinburgh working for the M.D. The late Mr. J. W. Ballantine was only too glad to welcome so keen a recruit and the invitation was accepted to act as House Surgeon in the famous gynæcological wards, 35 and 36, of the Edinburgh Royal Infirmary. He threw himself with enthusiasm into this work and in addition undertook the pathology of the unit—a huge task, but one which laid the foundation for his unrivalled knowledge of gynæcological pathology. During this period he captured the Fellowship of the Royal College of Surgeons of Edinburgh; the M.D. of Aberdeen, with highest honours; and a few years later the Doctorate of Science. He was appointed assistant physician to the Royal Maternity Hospital, in charge of the ante-natal department. Some twenty years ago he became Director of the Obstetric Unit and Obstetric Surgeon in University College, London, and Professor of Obstetrics and Gynæcology in London University.

His output of work has been prodigious, and to-day he is the acknowledged British authority on ante-natal care. His textbook "Ante-Natal and Post-Natal Care" has reached six editions and is the holy writ of every student of this subject. On one occasion when C. G. Lowry was giving a demonstration in the Royal Maternity Hospital on albuminuria of pregnancy, he asked a student for a prescription suitable for such a condition. It was given correctly except that, as the flavouring ingredient, chloroform water was suggested. "Well," said C. G., "chloroform water is pretty innocuous, but after all chloroform is a liver poison and we are enjoined 'to abstain from all appearance of evil.' Who said that?" The student replied at once: "Oh, F. J. Browne, Sir."

And so, raised to the level of St. Paul, I ask you, Mr. President, to present to Professor F. J. Browne his triptych as Honorary Fellow of the Ulster Medical Society.

JAMES ANDREW CRAIG

Perhaps no area in Ulster has produced from its towns and farmsteads, lashed by the rough salt-laden gales of the Atlantic, more doctors, clergy and schoolmasters than the Route. Even after three centuries the descendants of the Scottish settlers from Argyll and Kintyre maintain their traditional regard for education.

Surely these hard-headed and uncompromising but, withal in time of need, soft-hearted and open-handed Presbyterians from the Route, laconic in speech and intolerant of shams, are the Ulster Scots about whom the late Lord Rosebery said: "When I come to the branch of our Scots race which has been grafted

into the Ulster stem, I take off my hat with veneration and awe. They are, I believe, without exception, the toughest, the most dominant, the most irresistible race that exists in the universe at this moment."

And from this stock sprang James Craig. Coming to Queen's a very young lad, he took the M.B. degree in the old R.U.I. with first-class honours—no mean feat considering the competition was against all Ireland. On that occasion, James Craig and another Route man, Tom Houston, were given "an upper pass" in medicine. In the R.U.I. an upper pass entitled the recipient to sit a second and much stiffer examination for honours in the specified subject. Both had received the tip that syringomyelia was a likely question. Now in those days this disease had but recently been recognised and had not yet reached the standard textbooks. The two lads from the Route agreed together that, if asked about the subject, they would not answer, as they considered the question an unfair one. The tip proved correct, and each in turn, with perfect faith in the other, vouchsafed no answer.—"What's bred in the bone won't out of the flesh." The examiners must have had some sense of humour, or of shame, as both candidates received first-class honours!

Sensing, like a true Ballymoney man, an opening in diseases of the eye, ear, nose, and throat, the mantles of McKeown and Nelson quickly fell upon his shoulders. He was appointed to the staff of the Royal Victoria Hospital, lecturer in ophthalmology at Queen's, President of the Irish Ophthalmological Society, and member of the editorial council of the British Journal of Ophthalmology. His meteoric career was watched with admiration, not unmixed with envy. One late afternoon, shortly after I had put up my plate and was feeling happy, as I had seen a patient and earned one guinea (as the fee for consultation then was), I met Mr. Craig in University Square. We walked together to the pillar-box, into which he inserted a huge pile of letters. As he turned away he said: "A unique event has happened to me this afternoon." From one trouser pocket he took thirteen sovereigns, from the other thirteen shillings. "I have, of course, often seen more than thirteen patients in one afternoon, but never before has each patient paid me with a sovereign and a shilling." My solitary guinea suddenly felt very lonely.

Past students will always remember his uncanny skill in diagnosis and the gentle touch of the master hand in operations of the greatest delicacy. They will repeat tales of his ready wit, a trifle caustic and biting like his native gales, but often unhurtful, being beyond the intelligence of the victim. I like best the story of the medical student, who when asked to draw the optic disc of a patient, produced a weird and unrecognisable sketch. "Ah, I see you are a Cubist," said Mr. Craig. "No," replied the student, "I am a County Antrim man like yourself."

Since his retirement from active duties in hospital and in the university, Mr. Craig seems as busy as ever. During the war he returned to his work in the hospital, giving invaluable aid to a depleted staff. Friday evening still sees him enjoying his game of bridge in the Union Club and Saturday finds him playing his erratic golf at the Royal County Down, of which club he is a past captain.

Mr. President, I present to you James Craig, doyen of the ophthalmic surgeons in Northern Ireland.

SAMUEL THOMPSON IRWIN

When I first knew S. T. Irwin he was in the full vigour of young manhood. He had established at Queen's a great tradition in sport as an international rugby forward; in scholarship as a brilliant student; in social service as a past president of practically every college society. As the college magazine puts it: "Sam Irwin is the all-round man of Queen's. He turns his hand to everything and with success." I quote again from "Q.C.B.," describing a hard-fought international match: "In the forward ranks Sam Irwin was Sam Irwin and more so: he had a bloody nose and a vengeful look and he played like the international hero he is. We no longer feel any surprise at the impossibility of withstanding the wild rushes of the Irish forwards." In these latter days S. T. Irwin has lived again his rugby days in watching the prowess of his sons and son-in-law, but golf has ousted football as his active pastime, and as captain of the R.C.D. Golf Club he has attained a position of great honour in the golfing world.

Since his now distant student days he has gone from strength to strength, his reputation as a surgeon has grown at home and abroad. To-day he is the leader of the surgical world in Northern Ireland and his work in abdominal surgery and in orthopædics has placed him among the foremost exponents of these specialities.

Probably quite a number in this room, including myself, have had personal experience of his skill and grateful memories of his gentle and sympathetic personality.

Looking back on my long friendship with S. T. Irwin, I think his outstanding characteristic is his imperturbability. Sir Wm. Osler has described equanimity as the greatest attribute a medical man can possess: coolness and presence of mind under all circumstances; calmness amid storm; clearness of judgement in moments of grave peril. In health and in sickness (for he himself has looked death in the face), in work and play, in happy days and in days clouded with anxiety, he has remained calm and fearless, unflinching and steadfast—imperturbable.

1947 has already seen his name appear in the Birthday Honours List as Companion of the British Empire. Before its expiry we honour a great surgeon and a devoted son of Queen's by the award of the Honorary Fellowship of the Ulster Medical Society.

CHARLES GIBSON LOWRY

C. G. Lowry does not possess the placid nature of his fellow Limavadian. Although like Timothy "from his mother's knee he has known the Holy Scriptures," yet he parts company with St. Paul on the subject of suffering fools gladly. Rather he has adopted as his guiding motto in life: "Prove all things: hold fast that which is good," and he frequently quotes a free translation of this text as rendered by his father: "Always study to do the right thing." To C. G. thoroughness is next to godliness.

Lowry was appointed to the Chair of Midwifery in 1920. At that time only twenty-six beds were available in Belfast for maternity work, and these in a small, antiquated, dark and depressing hospital in Townsend Street. The infant mortality rate in Northern Ireland was a scandal. Ante-natal clinics were unknown. The

after-care of the newly born left much to be desired. Lowry determined that all this must be changed. The story of how this was finally brought about, largely by his vision, wisdom and pertinacity, has been told elsewhere, and to-day the Royal Maternity Hospital stands as a splendid memorial to his tenure of the chair.

Professor Lowry always took the greatest pains in the preparation of his lectures, and generations of students have acclaimed him as a great clinical teacher. His ambition was to turn out good clinicians in whose hands mother and babe would be safe. His students learnt from his example the art of patient history taking and of gentle manual examination. Lowry always insisted upon an exhaustive survey of the whole patient, for he was a great physician before he became a great obstetrician.

I have heard it said that in recent years our medical school lacked among its teachers "a character"—one about whom stories of idiosyncrasies cluster. To me, however, C. G. is "a character," and as long as his old students meet and talk of bygone days, stories of his doings, sayings and Biblical allusions will be repeated and there will be no more popular story than the one of how one hot summer day when the heat in the theatre of Ward 17 was terrific, C. G. asked the sister to telephone to the engineer to have the temperature adjusted, adding: "my compliments to him, and say this theatre is only fit for Shadrach, Meshach, and Abednego." Sister looked puzzled by this postscript, and C. G. said: "You know who these gentlemen were?" She shook her head. He then asked the entire class, and they all pled ignorance except the last student, who replied brightly: "They sound like three Abyssinians." (Mussolini had just invaded Abyssinia).

Dostoevsky tells us that "the second half of a man's life is made up of nothing but the habits he has accumulated during the first half." And truly C. G. in his seaside home in Ballywilliam seems to justify this sweeping assertion. His gardener complains: "Yon professor of mine keeps me that busy redding up, I have no time to put in"; his scalpels have been but replaced by pruning knives and seccateurs equally sharp and shining; the roots of his cabbage seedlings are steeped in salts of mercury to kill any potential organisms of "club-root"; his seeds are sown in sterilized soil; his fruit trees are sprayed six or seven times every year against every conceivable pest. This meticulous husbandry results in his carrying off the first prize for the best crops in the local show, just as in former times he won first place in the gratitude and affection of the mothers of Northern Ireland.

Some months ago, Professor Lowry, your friends presented you with a striking and life-like portrait of yourself; Glasgow has honoured you by the Honorary Presidency of its Obstetric Society; Edinburgh, by the Honorary Fellowship of its corresponding Society; the Royal College of Obstetrics and Gynæcology has made you an Honorary Fellow. To-night the Ulster Medical Society honours itself by admitting you to its Honorary Fellowship.

HOWARD STEVENSON

The centenary of the discovery of the use of anæsthetics in surgery was celebrated this year. In pre-anæsthetic times the most famous and most sought after surgeons were those who handled their knives with the greatest speed and dex-

terity. The measure of a surgeon's skill was recorded in seconds. Although the urgent need for rapidity in surgery is no longer a vital necessity, yet an operation carried out with speed and with apparently effortless manual adroitness always excites the admiration of the onlooker. Such an operator was Mr. Howard Stevenson. A common remark in the east wing of the Royal at lunch would be: "Howard took out a gall-bladder in so many minutes this morning," and someone else would say: "Just wait and time his next thyroid and you will get a surprise."

Although Howard Stevenson never sought or played for popularity, yet he is one of the most beloved members of our profession. He possesses a great gift for friendship. Pupils and housemen vied with one another to belong to his unit in hospital on account of its happy atmosphere. One of his house surgeons happily summed up the matter: "we all adore Howard—he is such a great gentleman."

All through his professional career Mr. Stevenson had a flair for administrative duties. He gave up much time to the secretaryship and chairmanship of the medical staff of the Royal Victoria Hospital and to corresponding offices in the Ulster Medical Society. It was thus natural that parliamentary duties should attract him and he became member of parliament for Queen's. As Chairman of the Select Committee of the Government which inquired into the health services of Northern Ireland and as Chairman of the Health Advisory Council, he has given invaluable services to the welfare of the community.

The medical profession owe him a special debt of gratitude for his quiet, unobtrusive work during the committee stage of the Northern Ireland Health Services Bill. His popularity and influence in the House; his logical explanation to members in the lobbies of reasons underlying the various amendments suggested by the medical profession was of far more value in gaining sympathy and support than long speeches from the floor of the House.

It will give you, Mr. President, very special pleasure to present Mr. Howard Stevenson with the Honorary Fellowship of this Society. For many years you have been happily associated with him in your surgical work in the Royal and you have succeeded him as chief in wards 19 and 20.

HENRY LETHEBY TIDY

To-night we follow the injunction of the son of Sirach as handed down to us in Ecclesiasticus: "Honour a physician with the honour due unto him; for the skill of the physician shall lift up his head and in the sight of great men he shall be in admiration; let him not go from thee."

To-night we refuse to let Sir Henry Tidy leave us; a friend well tried; many times our external examiner in medicine; scrupulously just; conscientiously painstaking; we grapple him to Ulster medicine with the Honorary Fellowship of our Society. We honour Sir Henry for his skill as a physician, a skill which as Physician Extraordinary to the King, is available not only to His Majesty, but also, when Physician and Dean of the Medical School of St. Thomas', was given to the humblest of King George's subjects; we honour him also for those qualities of head and heart which Hippocrates tells us every physician should possess—learning, wisdom, humanity and probity.

Henry Tidy is not an easy man to get to know : he does not wear his heart upon his sleeve; he possesses an air of aloofness; he has the power of concealing his thoughts and feelings. Once after an oral examination, a disgruntled student exclaimed : "I might have been playing poker with him for all I could tell by his face whether I was right or wrong." It was only after fourteen years of brief and casual contacts that I discovered the real Tidy. The unmasking took place quite suddenly in 1927, the year when the Association of Physicians first met in Belfast. He was then Honorary Secretary of the Association and came over a few days previous to the meeting to see if our local preparations would pass muster. Business satisfactorily transacted, we motored to Newcastle. That forenoon the Mountains of Mourne were sulky and had hidden themselves in mist. We went to the golf club for lunch. There we encountered some jovial spirits at the nineteenth hole who induced two temperate men to imbibe perhaps not wisely, but too well. But on leaving the clubhouse all inhibitions had been removed. Slieve Donard and Slieve Bernagh revealed themselves in all their glory; the whins shone like gold in the beauty of a bright May day; the real Tidy, chatty, enthusiastic, full of the joy of life, stood enthralled by the beauty of it all; he had become Harry, I—W. D., and so it has remained until this day.

Do you ever ponder how fitting or otherwise a man's name may be as an index of his character? Take, for instance, our President; could any name be more unsuitable than Purce for a surgeon who is often quite forgetful that such an article exists and should be filled? Whereas Sir Henry Tidy fits his name exactly. His mind is like a tidy desk; each paper in its proper pigeon-hole; every fact filed and available at a moment's notice. How else could the author of the "Synopsis of Medicine" keep it up-to-date, edition after edition, or the editor of the "Medical Annual" do the same for it year after year? I cannot vouch for the accuracy of the story told by an old St. Thomas' man that a bet was made and accepted among the house physicians that if Dr. Tidy were to be summoned at 3 a.m. for an emergency in the wards he would not arrive as spick and span as for his ordinary ward round. The bet was lost, for the unconscious subject of the wager arrived shaved and groomed as if for a visit to Buckingham Palace.

Tidy's "Synopsis of Medicine" has become proverbial for its accuracy, conciseness, and comprehensiveness. In the recent educational number of the Lancet, however, a story is told, doubtless untrue, of an Indian candidate sitting for the M.R.C.P. in which questions are often asked which cannot be answered straight out of textbooks. This candidate left the examination hall in anger three minutes after the written examination started. On his way out he pounded the question paper with his fist in front of the invigilating censor and exclaimed indignantly : "This is not in Tidy."

Sir Henry, you hold numerous and great distinctions : Physician Extraordinary to the King; Knight Commander of the Illustrious Order of the British Empire; Commander of the Legion of Merit (U.S.A.); Commander of the Order of the White Lion (Czechoslovakia); Major-General and lately Consulting Physician to the British Army; President of the Inter-Allied Conference on War Medicine; Past President of the Association of Physicians of Great Britain and Ireland and of

the Royal Society of Medicine; and Consulting Physician to St. Thomas' Hospital. Only a few weeks ago we in Ulster noted with special interest you had become an Orangeman—Grand Officer of the Order of Orange Nassau. We trust you will treasure the Honorary Fellowship of the Ulster Medical Society as a token of the esteem and affection with which you are held by your many friends in Northern Ireland. Mr. President, I beg to present Sir Henry Tidy.

REVIEWS

AIDS TO DIAGNOSIS AND TREATMENT OF DISEASES OF CHILDREN.

By F. M. B. Allen. Eighth Edition. 1947. London: Baillière, Tindall and Cox.

This miniature textbook, originally written by the late Dr. John McCaw, won for itself a distinguished place in British pædiatric literature, and the present edition is in every way a worthy successor.

The volume continues to lose bulk (a rare virtue in modern textbooks), but remains an authoritative and practical exposition of present-day pædiatric trends. It is well balanced, lucid in expression, and free from obscure theories, and we commend it to the student or practitioner in search of concentrated, accurate, and easily absorbable knowledge.

ANÆSTHESIA. Pp. 41. 10s.

This quarterly Journal, which is the official publication of the Association of Anæsthetists of Great Britain and Ireland, is still in its infancy, the first number being published in October, 1946—the centenary year of anæsthesia.

Under the able editorship of C. Langton Hewer, it is already proving a great asset to British anæsthetists, who have had to rely mostly on American anæsthetic journals to follow the rapid advance in all types of anæsthetic and analgesic techniques which has taken place in recent years.

It fills a much-needed want in that it provides for a quicker and fuller expression of "recent advances" in anæsthetics, with which neither the textbook nor overloaded columns of the general medical press could cope.

The "abstracts from current literature" is an invaluable section of the Journal, although some of the original papers are over a year old.

There has been a lack of original research work in the contributions so far, but, no doubt, this will be remedied as the Journal gains wider recognition. W. M. B.

DISEASES OF THE CHEST. By Robert Coope, M.D., B.Sc., F.R.C.P. Second Edition. 1948. Edinburgh: E. & S. Livingstone Ltd. Pp. 508.

The first edition of this book has met with much warm favour, and there is little to add about this second edition.

In spite of its considerable size from the student's point of view, this book is far from tedious, as very many points are explained in very full detail. From the therapeutic standpoint the first edition was well up to date, and there is little fresh comment necessary.

The book includes an atlas of X-ray plates. As in the case of most textbooks, these are positives. I sometimes wonder whether it would not be better to publish negatives, as it is seldom that in our ordinary work it is the positive we study. R. W. M. S.

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The "abstracts from current literature" is an invaluable section of the Journal, although some of the original papers are over a year old.

There has been a lack of original research work in the contributions so far, but, no doubt, this will be remedied as the Journal gains wider recognition. W. M. B.

DISEASES OF THE CHEST. By Robert Coope, M.D., B.Sc., F.R.C.P. Second Edition. 1948. Edinburgh: E. & S. Livingstone Ltd. Pp. 508.

The first edition of this book has met with much warm favour, and there is little to add about this second edition.

In spite of its considerable size from the student's point of view, this book is far from tedious, as very many points are explained in very full detail. From the therapeutic standpoint the first edition was well up to date, and there is little fresh comment necessary.

The book includes an atlas of X-ray plates. As in the case of most textbooks, these are positives. I sometimes wonder whether it would not be better to publish negatives, as it is seldom that in our ordinary work it is the positive we study. R. W. M. S.

Famine Fevers in England and Ireland*

By Lieut.-General Sir William MacArthur, K.C.B., D.S.O., M.D., D.Sc., F.R.C.P.Lond., F.R.C.P.I.

After the generalized famine fevers had come to an end in England they continued to scourge Ireland for centuries, where their course may be taken as a repetition of the happenings in England in earlier times. During the eighteenth century and part of the nineteenth, large numbers of the Irish peasantry lived in a deplorable state of poverty; lacking reserves, one or two bad seasons might suffice to cause a widespread famine. Such national calamities befell, for instance, in the years beginning 1739, 1800, 1816, and 1846. With each famine there came a dreadful epidemic of fever which broke out with such regularity that its advent was confidently predicted when the famine began. Corrigan, of "Corrigan's pulse," popularized the saying "No famine, no fever"; here "fever" signified not some scattered cases, or localized outbreaks—these were everyday affairs—but a great and rising tide of pestilence. These epidemics were typhus, with some varying admixture of relapsing fever, the latter disease usually being most in evidence at the beginning and at the end of the epidemic. In times of scarcity, short of a major famine, extensive epidemics mainly of relapsing fever prevailed at times; but the more general and intense a famine, the more did typhus tend to predominate.

Apart from any lowering of resistance due to hunger, the circumstances of famine produced conditions ideal for the multiplication and spread of lice. The ceaseless rain which often brought about the famine, soaked the footed peat, and in cottage and cabin the fires which customarily burned day and night went out. The occupants had no means of heating water to wash themselves and their clothing, even had they found the heart to try, with death all about them. To keep out the cold they piled on all the rags of clothing they could find, and wore them day and night. They huddled together for warmth, and even those ordinarily cleanly enough became infested with vermin. The rotted potatoes, the nettles and dock leaves eaten raw for lack of firing brought on famine diarrhœa and predisposed to dysentery. Typhus,

* Reprinted from the "Journal of the British Archæological Association," by kind permission.

[1] "Plague" here signifies bubonic plague, primarily a disease of rats, and transmitted to man by fleas. The characteristic inflamed glands show themselves most frequently in the inguinal region, whence "bubo"— , the groin. It affects communities civilized enough to build towns and villages, but not civilized enough to keep them clean. In England in the past it was common knowledge that plague was most likely to break out in warm summers, i.e., a temperature that favours the infection and activity of fleas. Boate, Cromwell's "Doctor of Physick to the State in Ireland," wrote: "The plague which so often and so cruelly infecteth England . . . is wonderfully rare in Ireland, and hardly seen once in an age"—a relative immunity possibly accounted for by the generally lower summer temperature in that country.

Typhus and relapsing fever are conveyed from the sick to the healthy by lice. Both infections propagate most actively in conditions of destitution, squalor, cold, and overcrowding, which favour the breeding and spread of these insects, and epidemics are outstandingly associated with famine. Older names for typhus were jail fever, spotted fever, spotted ague, Irish ague, etc. Originally "ague" did not mean malaria, but continued fever, and was often applied to typhus, as in Macbeth's "Till famine and the ague eat them up."

always smouldering somewhere, flared up and spread. Hoards of starving families deserted their homes and took to the roads in search of food, carrying typhus with them wherever they went. These migrants congregated in the poorer parts of the towns; they swarmed round the charity "soup-shops"; they crowded out the hospitals and the jails, for many committed minor offences in the hope of being sent to prison where at least there was food. In such ways there resulted that "concentration of contagion" which was recognized as productive of typhus at its worst.

The following quotation[1] shows the horrors of times of pestilence more strikingly than any figures of mortality could do. The letter, signed "N. M. Cummins, J.P.," was written from Cork on 17th December, 1846—at a date when the famine had still two years to run :

> "To His Grace, Field Marshall, The Duke of Wellington. My Lord Duke, Without apology or preface, I presume so far to trespass on Your Grace as to state to you, and, by the use of Your illustrious name, to present to the British Public, the following statement of what I have myself seen within the last three days :—Having for many years been intimately connected with the western portion of the County of Cork, and possessing some small property there, I thought it right, personally, to investigate the truth of the several lamentable accounts which had reached me of the appalling state of misery to which that part of the country was reduced. . . . Being aware that I should have to witness scenes of frightful hunger, I provided myself with as much bread as five men could carry, and on reaching the spot I was surprised to find the wretched hamlet deserted. I entered some of the hovels to ascertain the cause, and the scenes that presented themselves were such as no tongue or pen can convey the slightest idea of. In the first, six famished and ghastly skeletons, to all appearance dead, were huddled in a corner on some filthy straw, their sole covering what seemed a ragged horse-cloth and their wretched legs hanging about, naked above the knees. I approached in horror, and found by a low moaning they were alive, they were in fever—four children, a woman, and what had once been a man. It is impossible to go through the details, suffice it to say, that in a few minutes I was surrounded by at least two hundred of such phantoms, such frightful spectres as no words can describe. By far the greater number were delirious, either from famine or from fever. Their demoniac yells are still ringing in my ears, and their horrible images are fixed upon my brain. My heart sickens at the recital, but I must go on. In another case . . . my clothes were nearly torn off in my endeavours to escape from the throng of pestilence around, when my neckcloth was seized from behind by a grip which compelled me to turn. I found myself grasped by a woman with an infant, just born, in her arms, and the remains of a filthy sack across her loins—the sole covering of herself and babe. The same morning the police opened a house on the adjoining lands, which was observed shut for many days, and two frozen corpses were found lying upon the mud floor *half-devoured by the rats*. A mother, herself in fever, was seen the same day to drag out the corpse of her child, a girl about twelve, perfectly naked, and leave it half covered with stones.

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[1] *Irish Journ. Med. Sc.*, Jan., 1938.

In another house . . . the dispensary doctor found seven wretches lying, unable to move, under the same cloak—one had been dead many hours, but the others were unable to move either themselves or the corpse. To what purpose should I multiply such cases? If these be not sufficient, neither would they hear who have the power to send relief and do not, even 'though one came from the dead' . . ."

The terror that these visitations of typhus left behind can be realized from an incident that happened when I was staying in western Ireland as a boy. The peasantry of the district were poor, but there was nothing in the way of destitution, and there had been no typhus locally for a generation. None the less, when the arrival of a lady convalescing from rheumatic fever was expected, my host warned me that her malady must be spoken of as "rheumatism," for the mere mention of the word "fever," however qualified or explained, would cause a panic and lead to a boycott of the house and all its inhabitants.

The point that I wish to make is that if the detailed descriptions of these later famine fevers in Ireland were taken and compressed to the space of half a page, the resulting account would be identical with, say, William of Newburgh's story of the great English famine fever of 1196. Crying out that the hand of God was lifted against the people of Christendom, the chronicler goes on to relate that the bodies of those dead of hunger corrupted the air, thereby causing a raging pestilence which did not spare even the rich, and for the destitute cut short the long torment of hunger. The fever "that is called the ague" crept about, seizing so many in the course of a day that those left could hardly minister to the sick, or bury the dead; and so forth. And if these Irish records were reduced still further to the limit of a few lines we should then have a replica of the brief accounts of famine fever given in the Anglo-Saxon chronicles.[1] It is my belief that the widespread epidemics of fever in early England, which were definitely part of a widespread famine, were of the same nature as the later famine fevers in Ireland.

The Yellow Pestilence, Pestis Flava, or Buidhe Chonaill. This great mortality is most widely known under the name employed by the Irish annalists, the Buidhe Chonaill.[2] It is often identified with bubonic plague, a view I formerly accepted, though with occasional misgivings. Being familiar with the disease, the question recurred to my mind, "Why should plague be called yellow?" To meet this difficulty I wondered for a time if "Buidhe" here might have been used in an intensive sense without reference to colour, like "Black" in "The Black Death," for the word has this usage in spoken Gaelic. This far-fetched conjecture, however, was ruled out by the facts that the annalists equated Buidhe Chonaill with Crón Chonaill (*crón* meaning saffron-coloured), and latinized both names, Pestis Ictericia;

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[1]Zinsser, *Rats, Lice and History*, 278, objected to my translation of *drif, Anglo-Saxon Chronicle*, A.D. 1087, by "fever," and alleged it meant "diarrhœa," here copying Ingram's mistake, unfortunately disseminated in a popular translation of the *Chronicle*. The Rushworth Codex—a Latin MS. of the Gospels with a word-for-word AS. translation interlineated—makes the meaning clear. One example: Matt. viii, 15, "et dimisit eam febris" is translated, "and forlet hiæ sio drif." This is final.

[2]Buidhe, pronounced "bwee," is the common word for yellow. The second element is pronounced much as written; the chroniclers treat this archaic word as the equivalent of *pestis* and *mortalitas*.

and the same pestilence was called in Britain the Pestis Flava. Consequently, "yellow" must be accepted in the literal sense of colour, and as indicating some epidemic disease with jaundice as an outstanding symptom.

In this connexion there are three great pestilences to consider: (1) the Plague of Justinian; (2) the mysterious Buidhe Chonaill; (3) the epidemic recorded by Bede. (1) This pandemic which began about A.D. 543 was bubonic plague, as is clear from Gibbon's account, without going farther afield. In Ireland the disease was called Blefed, not Buidhe Chonaill, and is recorded there as having swept away the noblest third of the human race. (2) The Buidhe Chonaill followed close on Justinian's plague, the date given in the annals varying by a few years in the neighbourhood of A.D. 550, which suggests that there may have been more than one visitation. Of all the great epidemic diseases, plague is by far the most easily recognized because of the characteristic buboes and the great pain often caused by these swellings. If this pestilence had been of the same nature as Justinian's plague which preceded it by only a very few years, no one then alive could have failed to be aware of the fact. It is strange, therefore, that a new name should be introduced, and a name that, applied to plague, seems meaningless. I believe that the chroniclers made use of a different name because they were recording a different disease. (3) Bede's plague, which began in A.D. 664,[1] was bubonic in nature, as is shown by a passage in the *Life of St. Cuthbert* which implies that swellings in the thigh (inguinal buboes) were a usual symptom of the infection. Some of the Irish chronicles employ the name Buidhe Chonaill for this epidemic also, a label that has been responsible for much confusion and misunderstanding, for it has been assumed that since this outbreak, known to have been plague, was given this name, then the original Buidhe Chonaill of a century before was plague too.

It is essential to remember that the historical records of those early times exist only as late copies or recensions of the original manuscripts. Where several copies of the same chronicle have survived,[2] the note, "to wit, the Buidhe Chonaill," referring to the plague of 664, has been added as a gloss in one copy, but not in the others. This shows that the name did not appear in the original text from which the several copies were derived. There is no doubt in my mind that the association of the name Buidhe Chonaill with the plague of 664 began as a gloss long after the event, made on the mistaken assumption that the pestilence had been of the same nature as that recorded in the preceding century.[3] If it had in fact been such as to merit the descriptive name of the Buidhe Chonaill in Ireland, presumably the name Pestis Flava would once more have been attached to its manifestations in Britain. This is not so.

The error would be a trivial offence in comparison with some of the enormities to be laid to the charge of transcribers. The "Leper Hospitals of Armagh"—the

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[1] In Ireland, recorded as breaking out in August, 664, a summer "of extreme heat."

[2] E.g., *Ann. Ulst.* The name is interpolated in *Chron. Scot.*, I suggest by Mac Firbis, as his transcript of the Mac Egan MSS. has the same addition.

[3] Since this was written, an examination of the earliest existing MSS. shows that the gloss "Buidhe Chonaill" for the plague of 664 did not appear until some date after the end of the eleventh century, thus confirming the opinion given above.

ecclesiastical capital of Ireland—are renowned because they are supposed to antedate by several centuries all similar foundations in Europe. I have shown elsewhere that the "Leper Hospitals of Armagh" are fantasies of the imagination, and never existed in fact. The whole story is built up on two mistakes. In one, an archaic Gaelic word meaning "oratories" was translated into late Latin as "hospitals." A translator into English then proceeded to paint this lily, and the "hospitals" of the Latin text became "leper hospitals" in the English translation. And that is the beginning and the end of the famed—and fabulous—"Leper Hospitals of Armagh."

What could the Yellow Pestilence have been? Clearly it was some contagious malady capable of giving rise to a "great mortality" extensive enough to have involved both Britain and Ireland, with jaundice as a common and striking feature. Within my knowledge there is only one infection that could possibly fulfil all these requirements, and its identity with the Yellow Pestilence, so far as I am concerned, was first suggested by an old man in Co. Donegal a few years ago. As a child, I heard many tales of "The Famine" (1846-8), during which my grandfather, like so many doctors, after performing prodigies of devotion, caught typhus himself. Later, and especially when as a student of medicine I had seen typhus demonstrated, I spent many nights listening to stories told by aged survivors of the famine and fever, more vivid and instructive than anything to be read in printed books. Knowing nothing at that time of the ancient Buidhe Chonaill, doubtless I missed many pointers to its identity. The man I mention could not remember the Famine, but he had been brought up in a world dominated by memories of that terrible time, and his knowledge, which I could check at many points, was wide and accurate. In conversation one day he said that I had asked much about the spotted fever in the famine, but along with this there was another disease which he had heard his parents and other old people talk of many times, and that was the Fiabhras Buidhe, the Yellow Fever. It was given this name, he explained, "because those who caught it were coloured yellow with the jaundice." A light broke in on my mind and I exclaimed, "The Buidhe Chonaill—relapsing fever!"

Jaundice as a complication may occur in relapsing fever, especially in attacks of a severe type. In some outbreaks it is rare, in others common. As different varieties of the causal organism are found in different countries, it is wise to restrict oneself to what is known to have actually happened in the British Isles. In 1843, a year of scarcity in Scotland, relapsing fever "of great severity" prevailed all over the country including the Hebrides, and in most areas the disease was not obscured by associated typhus. Jaundice occurred so commonly that when this "new disease" broke out in Glasgow, where about one in eight of the inhabitants was attacked, it was popularly supposed to be tropical yellow fever imported from the West Indies, regardless of the fact that it had first appeared in country districts of East Fife. Anderson, of Glasgow, wrote an excellent description of relapsing fever, which was based solely on his experience of this one epidemic, fortunately for my purpose. Because of the frequency of jaundice, he classified the disease as he saw it, in his group of "Billious Fevers," bracketing it with tropical yellow fever, though he

recognized that the two diseases are distinct. Graves, of "Graves' Disease," declared that his [mistaken] opinion "as to the identity of the cases of yellow fever occurring in the Irish epidemic of 1826-27, with the yellow fever of warmer climates" was "singularly and remarkably proved" by this Scottish epidemic, "in which cases of yellow fever were very frequent." Other medical authors wrote to the same effect.

Anderson, in the account mentioned above, gives as "the characteristic symptom" in "serious cases": "Hepatic fullness and tenderness, evidencing more or less congestion of the liver; general jaundice, often very deep."

I consider it beyond all reasonable doubt that the "mortalitas magna" of the sixth century, named at the time the Pestis Flava and the Buidhe Chonaill, was a severe form of *relapsing fever,* with jaundice common enough to dominate the general picture of the disease.

REVIEW

A TEXTBOOK OF MENTAL DEFICIENCY. By A. F. Tredgold, M.D., F.R.C.P., F.R.S.(Ed.). Seventh Edition. London: Baillière, Tindall & Cox. 30s.

DR. TREDGOLD'S book may be described as the standard British textbook on mental deficiency, and this, the seventh edition, has been thoroughly revised and brought up to date. For example, in the section on intelligence tests, the useful Drever-Collins tests for the deaf find a place, and Raven's progressive matrices are mentioned.

The book is both thorough and comprehensive. The form for case-taking is particularly good, and gives an excellent classification for temperamental disposition. A general practitioner, consulted as to the possibility of mental deficiency in a young child, would find the table of normal developmental data very handy. The photographic illustrations are first-class.

Dr. Tredgold rightly stresses the close relationship between mental deficiency and other forms of mental abnormality, and in particular the special liability of mental defectives to suffer from other forms of mental disorder. This, in fact, is one of the reasons why all psychiatrists should have a grounding in his subject.

In an interesting chapter on the Criminal Responsibility of Aments, the defects of the McNaghten Rules as they are at present interpreted in England, when applied to mental defectives accused of murder, are clearly shown.

One defect of the book as a British textbook is that only the law as regards England is given, neither the law as regards Scotland nor as regards Northern Ireland being mentioned.

As one reads of all that is being done in England for mental defectives, one becomes more conscious than ever of the reproach to one's profession that so far so little has been done in Northern Ireland as regards this problem. D. B. M. L.

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Recent Advances in the Surgical Treatment of Cancer

By RONALD W. RAVEN, O.B.E., F.R.C.S

Surgeon to the Royal Cancer Hospital (Free),
Surgeon to the Gordon Hospital for Rectal and Gastro-Intestinal Diseases.

THE control of cancer is one of the great problems which confronts our profession to-day. The seriousness of the situation is revealed by the fact that more than seventy thousand persons die from the disease each year in England and Wales. This number of deaths in one year is greater than that caused by bombs and rockets during a period of nearly six years of warfare. In the control of cancer, work must proceed in three directions, namely, research into the cause and cure of the disease; education of the public regarding the warning symptomatology and the facilities which are available for diagnosis; and the provision of facilities for complete treatment.

Important advances have been made during recent years in the surgical treatment of cancer in various sites of the body and new regions have been opened up to surgery. There is also a tendency to extend the scope of these operations so that patients are now being treated who were pronounced inoperable hitherto. Due regard must be given to certain factors which have contributed to these surgical developments. The introduction of new anæsthetic agents and improvements in anæsthetic technique have played an important part, and patients are able to undergo prolonged operations with a minimal degree of "shock." The use of controlled respirations has enabled the surgeon to intervene in the chest and carry out thoracico-abdominal operations on the œsophagus and stomach. Another feature is the pre-operative study and treatment of the patient, especially from the physiological viewpoint, so that he is brought to the operation theatre in the optimum physical condition compatible with the disease. Attention is given to such problems as fluctuations in body-weight; the blood picture, including an estimation of the plasma proteins and ascorbic acid content; the degree of dehydration, and the state of the blood chlorides. A critical review is made of the functions of the heart, lungs, and kidneys. In order to increase the vital capacity of the chest, breathing exercises are supervised by the physiotherapist and abdominal exercises are also performed. Chronic respiratory infections are treated with the appropriate chemotherapeutic agent and inhalations of penicillin are of value. Before operations on the intestines are performed, a course of sulphasuxidine is given to the patient. An accurate record is kept of the patient's intake of calories and a balanced diet is given. When necessary, blood and plasma transfusions are administered, and infusions of amino-acids are required in certain cases.

Carcinoma of the Oesophagus.—The development of the surgical treatment of carcinoma of the œsophagus is one of the most important advances of the present decade. For a long period, interest in this subject was kept alive by the publication of an occasional successful case of surgical extirpation at long intervals of time,

but there were those who looked into the future with hopefulness and confidence.

The plight of these patients is illustrated by a study of the end-results of other methods of treatment. Thus in a large series of cases which were analysed recently, I found that after gastrostomy, 53.2 per cent. of patients were dead within three months of operation, and 75 per cent. within six months. Following treatment with high voltage X-irradiation, 55 per cent. of patients are dead within six months, but this form of therapy is of palliative value.

The majority of patients are over the age of sixty and present the general problems associated with surgical operations in the aged. A number of patients over the age of seventy have been operated on with success, and with careful pre- and post-operative care, many of them stand the operation well.

A study of a large series of cases shows that in many instances there is a long delay between the onset of symptoms and attendance at hospital for treatment. The onset of the disease is insidious and is probably silent for a certain length of time before indefinite symptoms are noticed, such as abnormal sensations beneath the sternum, an aching or burning pain, a queer feeling on swallowing, and perhaps a fleeting sensation of a food or liquid hold-up. No effort must be spared to detect the early case, and the institution of surgical treatment as soon as possible. Patients who are usually suitable for operation are those with a short history, partial dysphagia, minimal loss of weight, and in good physical condition. The patient with complete dysphagia, wasted, anæmic, and perhaps cachectic, is often beyond radical surgical help. There are borderline cases where an exploratory thoracotomy should be performed in order to determine operability.

Regarding the incidence of metastases, autopsy was performed in a series of one hundred and eight cases and metastases were found in 57.4 per cent. Even though no metastases are present, the growth in the œsophagus may be adherent to vital structures, including the descending aorta or the root of the lung, so as to preclude removal. This has been our experience in a number of cases of exploratory thoracotomy.

Surgical Exposure of the Oesophagus.—In the development of the surgery of this organ it was essential to determine the best exposure of the various segments; this was carried out by O'Shaughnessy and Raven in 1935, and much of this work is now standardized.

The Cervical Oesophagus.—Exposure is obtained by a collar incision; the left lobe of the thyroid is mobilized upwards to the right, the cartoid sheath is retracted laterally, and the œsophagus is easily identified.

The Thoracic Oesophagus—Thoracic Inlet to Bifurcation of Trachea.—Exposure is obtained by a right transpleural approach after removal of portions of the right second and third ribs. The vena azygos vein is divided between ligatures and the œsophagus is seen lying behind the trachea, above the right bronchus.

At the Bifurcation of Trachea.—The œsophagus is exposed by a right transpleural approach after removal of the right sixth rib. When the vena azygos major is divided, the œsophagus can be followed upward to a higher level.

Bifurcation of Trachea to Diaphragm.—The œsophagus is exposed by a left transpleural approach after removal of the left eighth rib. The organ is identified lying between the descending thoracic aorta behind, and the pericardium in front.

Transthoracic Partial Oesophagectomy—Carcinoma of the Lower Third.—Carcinoma of the lower third of the œsophagus is the most suitable site for surgical excision and œsophago-gastric anastomosis. A left thoracotomy is performed through the bed of the eighth rib, the rib above and below being divided to facilitate exposure. The mediastinal pleura covering the œsophagus is incised, and an adequate length of the organ is mobilized. It is necessary to ligate and divide one definite arterial branch from the aorta. The diaphragm is incised from the œsophageal hiatus, forwards and to the left, and the peritoneal cavity is opened. The lymph nodes along the lesser curvature of the stomach and around the cœliac axis are examined; if enlarged, they must be removed with the specimen. The proximal half of the stomach is mobilized and the stomach is divided at the junction of the proximal quarter with the distal three quarters. The opening in the stomach is closed with a double layer of continuous sutures of catgut. At this stage the stomach is displaced upwards into the chest and a suitable site is chosen for the œsophago-gastric anastomosis. The posterior layer of sutures unites the sero-muscular wall of the stomach to the muscular wall of the œsophagus; these sutures are of fine silk, spaced one-eighth inch apart, and are not tied too tightly. The œsophagus is then divided and the growth removed. The œsophagus and stomach are united with interrupted sutures of silk, care being taken to approximate the mucous membranes of the organs. Finally an anterior layer of interrupted sutures of silk unites the sero-muscular wall of the stomach with the muscular wall of the œsophagus. The diaphragm is closed with interrupted sutures of catgut around the stomach and the mediastinal pleura is repaired. The diaphragm is pressed downward to its maximal excursion, and if this manœuvre causes tension on the anastomosis, the left phrenic nerve is crushed. Five grammes of penicillin-sulphathiazole powder is introduced and the chest is closed with drainage.

Carcinoma of the Middle Third.—This is an unfavourable site because of the proximity of the lung root, and a laparotomy is necessary in order to mobilize the stomach so that it can be drawn into the chest for an œsophago-gastric anastomosis. After this is done the thoracotomy is performed through the bed of the right sixth rib, the rib above and below being divided to facilitate exposure. The vena azygos major is divided between ligatures and the growth is mobilized with the œsophagus down to the diaphragm. The stomach is then drawn into the chest through the œsophageal hiatus, the growth and distal œsophagus being excised and an œsophago-gastric anastomosis carried out. Care is taken to anchor the stomach securely to the mediastinal pleura in order to prevent tension on the anastomosis. The chest is closed with drainage.

Carcinoma of the Oesophagus between the Thoracic Inlet and Bifurcation of the Trachea.—The stomach is mobilized as before and a thoracotomy is performed by excision of portions of the anterior aspects of the second and third ribs. The subsequent steps in the operation are the same as in the preceding method, and

it is possible to bring the stomach as high as the root of the neck for the œsophago-gastric anastomosis.

These operations represent an important advance in the treatment of this great killing disease; the five-year survival rates will be awaited with much interest

Carcinoma of the Stomach.—The importance of reaching a better understanding of this disease is illustrated by the fact that during the year 1942 a total number of 12,737 persons in England and Wales died as a result. A study of the survival rates during the past decade shows an improvement which is accounted for by several factors. The extension of radical surgery has opened up the possibility of cure to a larger group of patients. These developments include the performance of total gastrectomy when the neoplasm involves the greater part of the organ or has metastasized to the lymph nodes high up on the lesser curvature to such an extent that a wide excision is necessary. The operation has also been extended to include adjoining viscera which are involved in the malignant process. For example, a portion of the transverse colon and meso-colon, segments of the liver, pancreas, or spleen can be excised. There is one important advance I wish to stress, namely, the development of the operations of transthoracic partial œsophago-gastrectomy with œsophago-gastric anastomosis and transthoracic total gastrectomy with œsophago-jejunal anastomosis. The former operation is performed in cases of carcinoma of the gastric fundus and cardia. The technique is the same as described for carcinoma of the lower third of the œsophagus. Care is taken to excise the regional lymph nodes, giving special attention to the groups situated along the lesser curvature of the stomach and the cœliac axis group. The whole of the great omentum is removed; in some cases there is infiltration of the gastro-splenic omentum, the spleen being pulled towards the stomach; splenectomy is therefore indicated. Transthoracic total gastrectomy is indicated for the more extensive or diffuse forms of carcinoma; care is taken to remove the various groups of lymph nodes which may be the site of metastatic disease. Continuity of the alimentary canal is restored by an œsophago-jejunostomy. It is my practice to bring a loop of jejunum through the transverse mesocolon and unite the end of the œsophagus to the side of the jejunum, using interrupted sutures of silk. Immediately above the transverse mesocolon an entero-enterostomy is performed. The diaphragm is closed around the jejunal loops and the chest is closed with drainage.

In an endeavour to secure early cases of carcinoma of the stomach greater attention should be paid to gastric ulceration and the possibility that early malignancy may be present. It is often difficult to differentiate between a benign and malignant gastric ulcer even on gastroscopy, and present methods of diagnosis should be improved. If a gastric ulcer does not show good signs of healing after careful conservative treatment over a period of one month I believe that surgical treatment should be instituted.

Cancer of the Rectum.—The surgical treatment of this disease has attracted a good deal of attention during recent years, and important developments have occurred. The synchronous abdomino-perineal operation has become popular. Using this technique, the operative time is diminished, the average case being

completed in one hour. There is a more distinct advantage, in my opinion, for in the case of a carcinoma of doubtful operability due to local fixation, it is most helpful to carry out the separation of tissues simultaneously from the abdominal and perineal aspects. With this technique it is likely that an increased number of neoplasms of borderline operability will be removed satisfactorily.

Radical Excision with Conservation of the Sphincters.—There is a tendency at the present time to perform a greater number of this type of operation in certain patients in order to avoid the institution of a colostomy. It is emphasized that these operations must also be of a radical nature and the lymphatic areas excised with the growth.

Anterior Resection of the Rectum.—This operation may be performed for a carcinoma situated at the recto-sigmoid junction or in the rectum not less than 10 cm. from the anal orifice. An exploratory laparotomy is carried out through a low left rectus incision and the usual investigations concerning the growth and its extensions are made. The patient is placed in the Trendelenburg position and the peritoneum is freed from the lateral and medial aspects of the pelvic colon, and finally anteriorly between the base of the urinary bladder and recto-sigmoid junction in a male, or across the posterior aspect of the cervix uteri in a female. Both ureters are identified and isolated. The lateral and medial aspects of the pelvic mesocolon are incised, beginning at the level of the origin of the superior hæmorrhoidal artery. The superior hæmorrhoidal artery and vein are then ligated and divided, care being taken to place the ligature distal to the origin of at least one of the sigmoid arteries arising from the inferior mesenteric artery. Mobilization of the pelvic colon with adjacent tissues containing lymph nodes is carried out by passing the hand into the hollow of the sacrum and lifting these structures forward. The portion of bowel involved is resected without intestinal clamps and continuity restored by an end-to-end anastomosis, using one layer of sutures. In order to avoid tension at the suture line the descending colon can be mobilized by dividing the posterior parietal peritoneum on its lateral aspect as high as the splenic flexure. The region of the anterior aspect of the sacrum is drained and the peritoneum is reconstructed around the bowel immediately above the anastomosis to form a new pelvic floor. It is advisable to institute a temporary transverse colostomy at the end of the operation which can be closed if the anastomosis is satisfactory after a period of six weeks.

Regarding the ligation of the superior hæmorrhoidal artery in this operation, it can be stated that the colon lying below the brim of the true pelvis will remain viable, even though the marginal artery is also ligated. The distal portion of the bowel is supplied adequately by the middle and inferior hæmorrhoidal arteries. Dixon at the Mayo Clinic has had an extensive experience of this operation, and states that careful pre-operative care has reduced the operative mortality rate from 19.4 to 2.4 per cent.

Abdominoperineal Proctosigmoidectomy.—This operation has been developed largely by Babcock and Bacon of Philadelphia. In this operation the sigmoid colon, which forms the inguinal colostomy in the Miles operation, is brought through the

perineum, the perineal and anterior sphincter muscles are permitted to assume their normal positions, and the sigmoid unites with the anus, leaving the patient with a functional anus. Describing his experience with this procedure, Babcock states that a few days after the operation the patient realises when the lower bowel has filled and requires emptying and can contract the sphincters voluntarily. Nearly all the patients after four to eight weeks are able to discard a protective pad for most, if not all, of the time. Regarding the technique of the operation, the abdominal dissection is carried out as in the Miles' procedure, but after the rectum is mobilized and the meso-sigmoid divided, usually between the first and second sigmoid arteries, the sigmoid proximal to its divided mesentery is tested for viability. The sigmoid is mobilized so that a portion of about 12 cm. which is sufficiently viable can reach from the level of the sacral promontory through the pelvic floor. It may be necessary also to mobilize the descending colon by dividing the posterior parietal peritoneum on its lateral aspect. Babcock describes a manœuvre of value—a soft tape of folded gauze measuring one metre long and four centimetres wide is tied around the sigmoid at the level of proved vascularity, and the ends are packed into the pelvis on the posterior aspect of the rectum. This gauze controls capillary oozing, serves as a guide in the perineal part of the operation, and enables traction to be made on healthy bowel. The pelvic peritoneal floor is reconstructed around the colon, after the rectosigmoid has been placed in the pelvis. The abdomen is then closed in the usual way.

For the perineal part of the operation, the patient is placed in the lithotomy position, the usual toilet is carried out, and an incision is made in the posterior midline from the tip of the coccyx, to a point three-quarters of an inch posteriorly to the anal orifice, dividing all the tissues, including the levatores ani, and thus opening the pelvis where the gauze tape attached to the sigmoid is identified. It is noted that the internal and external sphincters are not divided. The rectum is divided at the ano-rectal junction; the upper edge is caught by a series of hæmostatic forceps as it is divided. The levatores ani muscles are elevated and cut laterally from the rectum, and the urethra and prostate, or vagina, are separated anteriorly, thus allowing the rectum and sigmoid to be withdrawn. The bowel is excised to a point six centimetres distant from the skin, and the sigmoid colon is drawn through the anus so that the point marked by the gauze lies at the anal orifice. The levatores ani muscles are sutured in the midline, using interrupted sutures of thread without constricting the bowel, and the rest of the wound is closed. Care is taken to carry out this closure so that it is possible to insert a finger between the bowel and the sutured pelvic floor. When the pelvic wound is considered to be infected, the region of the anterior aspect of the sacrum is drained.

At about the tenth day the protruding bowel is removed by dividing it with the cautery, two centimetres beyond the skin, providing the perineal wound has healed satisfactorily. The patient is instructed to exercise the anal sphincters, and faradic stimulation is beneficial. Usually he will not be able to retain liquid or semi-liquid bowel contents and should take a quickly acting laxative, such as sodium sulphate

(8 grams in water, 120 c.c.), every second to fourth day on rising. After a period of two months an enema is substituted for the laxative, at intervals of two to five days, depending upon the habits of the patient. Most patients have little or no soiling at this period and can discard the protective pad. If the anus tends to constrict, dilatation should be carried out. Finally, satisfactory defæcation may be established without an enema, a mild aperient being given.

The perineal dissection has been modified by Bacon, who carries out a trans-anal operation. The anal margin is retracted with forceps in four quadrants, so that the ano-rectal line can be seen, and using small scissors, a circular incision is made through the anal skin immediately below the ano-rectal line. The sphincter muscle is identified, teased aside, and retracted; a transverse incision through the fascia propia, which is adherent to the periosteum of the lower end of the sacrum, will mobilize the rectum posteriorly. Clamps are then placed on the distal opening of the partially mobilized distal bowel, and traction on these clamps will cause tension in the levatores ani muscles, which are clamped high, divided, and ligated. The superficial and deep transverse perineal muscles anteriorly are retracted upward, and the rectum is separated from the prostate until the base of the bladder is reached. In the female, the recto-vaginal septum is separated until the upper part of the posterior wall and the uterus is exposed. The rectum and lower sigmoid can now be withdrawn through the anus, the antero-lateral pelvic floor is reconstructed, and the perineal and anterior sphincter muscles resume their normal positions. The region of the anterior aspect of the sacrum is drained for forty-eight hours, and the sigmoid is divided as before, the subsequent treatment being as described.

Regarding the operative mortality from the operation of procto-sigmoidectomy, Babcock records a figure of 4.5 per cent., and Bacon 5.9 per cent. The latter author states that in recent cases, sphincter continence is appraised conservatively at 95 per cent. of the normal.

The End-Results

Anterior Resection of the Rectum.—Dixon has reported three-year survival rates on cases operated before 1940, and considers that the results are better at the present time. He has worked out his figures for each stage of the disease as classified by Dukes, and gives the following :—

Group A—81.5 per cent; Group B—54.3 per cent; Group C—44.8 per cent.

Abdomino-Perineal Proctosigmoidectomy.—Bacon has reported the end-results of this operation in a series of eighty-one cases as follows :—

Three-year survival rate, 58.6 per cent; five-year survival rate, 50.2 per cent.

Carcinoma of the Breast.—The most important advance in this subject is the recognition of the various types of the disease, and the correlation of the method of treatment with the type of disease. In the management of these cases the surgeon and the radiotherapist join together. The following methods of treatment are advocated.

Carcinoma Localized in the Breast (Stage I).—In the early forms of carcinoma

before the regional lymph nodes are involved, the treatment is radical mastectomy with a meticulous dissection of the axillary lymphatics. Attention is called to the necessity for a complete pathological examination of all the tissues removed. It is my practice to identify the various groups of axillary lymph nodes—along the lower border of the pectoralis major muscle, at the insertion of the pectoralis minor muscle, and along the axillary vein—and the apical fibro-fatty tissue, by means of coloured silkworm gut. Every lymph node in the specimen is examined histologically : this means an average of fifteen.

Carcinoma of the Breast and Axillary Lymph Nodes (Stage II).—In this variety of the disease it is important to give a complete pre-operative course of high-voltage X-irradiation to the breast and regional lymph node areas. During the period of from four to six weeks after the end of this treatment, a radical mastectomy is performed.

Paget's Disease of the Nipple.—A complete course of pre-operative high-voltage X-irradiation is given and followed, as before, by radical mastectomy.

Massive Carcinoma of the Breast.—A complete course of high-voltage X-irradiation is given.

Ulcerative Carcinoma of the Breast.—The initial treatment is a complete course of high-voltage X-irradiation. A review of the case is made four weeks after the completion of treatment. If the ulcer has healed, is mobile, and the axillary lymph nodes are mobile, a radical mastectomy is performed. If histological examination of the regional lymph nodes reveals viable carcinoma cells, a post-operative course of high-voltage X-irradiation is given.

Carcinoma of the Breast with adjacent Skin Nodules.—The only treatment of this form of the disease is a complete course of high-voltage X-irradiation. These cases must not be treated by surgical operation because of the great risk of dissemination.

Carcinoma of the Pancreas.—The history of the development of the operation for carcinoma involving the ampulla of Vater, the common bile duct, and the pancreas, is an interesting study, and reveals the daring surgical thought displayed in the early part of this century. The first successful attempt to excise a carcinoma of the ampulla with portions of the duodenum and head of the pancreas, followed by implantation of the pancreatic and common bile ducts in the line of suture of the repair of the duodenal defect, was carried out by Halstead in 1899. Kehr carried out experimental work in 1914 and proposed resections of the pancreas, with implantation of the pancreatic stump into the distal end of the resected bowel. He looked towards the future with confidence, saying: "The time will come when such a technical triumph will be achieved." Other workers in this field made important contributions, and a real advance was made in 1935 when Whipple, Parsons, and Mullins published an account of their two-stage operation for removal of the duodenum and head of the pancreas, for a carcinoma of the ampulla. Several modifications were reported subsequently by Whipple, until in 1940 he successfully resected the duodenum and head of the pancreas as a one-stage operation. Brunschwig

was the first to perform successfully a radical pancreatico-duodenectomy for carcinoma of the head of the pancreas. In a discussion recently with Whipple in New York concerning these problems, he confirmed his belief that a one-stage operation is the method of choice. The reasons are as follows:—The difficulties of extensive, and in some cases massive, vascular adhesions at the second and more difficult stage are avoided; the dangers of two separate operations are avoided; and the danger of hæmorrhage and post-operative oozing is controlled by pre-operative vitamin K therapy.

It is advisable to anastomose the divided proximal end of the common bile duct with the jejunum by an end-to-side technique rather than an anastomosis of the gall-bladder and jejunum. It is stated that cholecyst-gastrostomy is liable to be followed by an ascending infection of the biliary system, and when the common bile duct is ligated, a biliary fistula may develop owing to slipping of the ligature. The pancreatic duct should be implanted into the loop of jejunum, but the anastomosis need not be absolutely watertight. The epithelium of the pancreatic duct unites readily with that of the jejunum.

The operative mortality of these operations remains high and the survival period after operation is disappointing. Every effort must be made to reach a diagnosis in cases of carcinoma of the pancreas before the onset of obstructive jaundice.

Radical Surgery in Advanced Squamous Carcinoma.—Experience in the treatment of certain forms of squamous carcinoma has taught that radical excision may give excellent results. Some of these lesions are unsuitable for irradiation therapy, and in others this form of treatment has failed to arrest the disease, consequently radical surgery is the only alternative to lingering suffering, with a fatal culmination.

Carcinoma of the Tongue.—There are certain types of carcinoma which do not respond favourably to irradiation therapy; these include those with chronic superficial glossitis where the Wasserman reaction is positive. Again, the lesion may recur after irradiation therapy, or after partial glossectomy. In such cases, attention is called to the value of total glossectomy with a block dissection of the regional lymph nodes.

Carcinoma of the Larynx.—It is the usual practice to treat cases of intrinsic carcinoma of the larynx with irradiation therapy, but there are those in which this fails to cause disappearance of the lesion, or it may recur. The operation of total laryngectomy is recommended for these patients.

Carcinoma of the Petrous Bone.—Carcinoma of the ear is a serious problem; there are difficulties in irradiation when bone is affected. A wide excision of the affected region will probably give the best results, followed by skin grafting at a later date.

Carcinoma of the Penis.—Carcinoma of the distal end of this organ will usually respond quite well to irradiation therapy, or partial amputation can be performed. There is a type of case where the corpora are diffusely infiltrated as far back as the pubic bone and is unsuitable for irradiation therapy. Complete amputation of

the penis should be performed and the result may be very gratifying. The regional lymph nodes are treated along the usual lines.

Conclusion

"These are thoughts of things which thoughts but tenderly touch," and it is a real pleasure to visit this important surgical centre built up by those great surgeons, Robert Campbell, A. B. Mitchell, Thomas Sinclair, Andrew Fullerton, S. T. Irwin, and Professor P. T. Crymble. How glad I am to find my old friend Harold Rodgers as the present Professor of Surgery. In the hard year of 1942 I had the privilege of addressing this Society, the subject being "Recent Advances in the Treatment of Cancer," and comparing that address with my subject matter this evening, it is obvious that important progress has been made. We have not reached our goal where cancer is concerned, and the way will be long and hard before this secret is finally wrested from Nature. New paths are being explored and we await with great interest the developments and results of various forms of chemotherapy—eventually this may be the real therapeutic answer. There is a great need to-day for a closer integration of the experimental and clinical methods of investigation, for at present there is a tendency for them to form two divergent streams, one not knowing what the other is doing. The task before us is not simple, but the solution will be found, and in the meantime we must "press on where truth begins to dawn."

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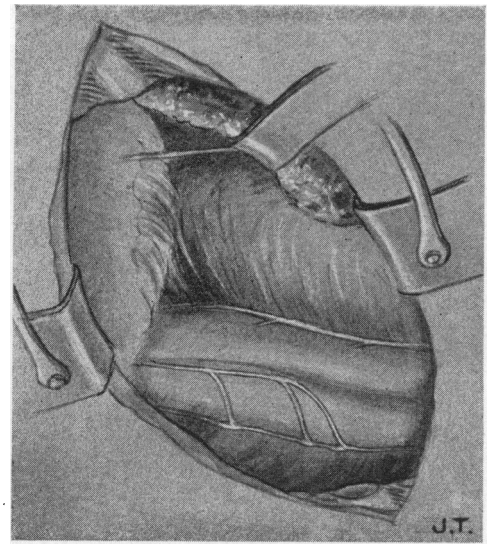


Fig. 1
The left transpleural exposure of the œsophagus.

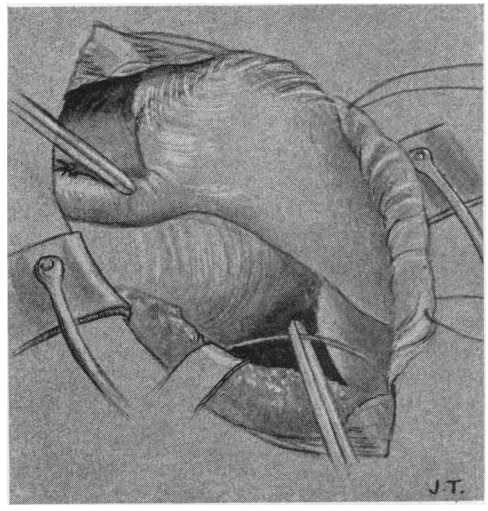


Fig. 2
Mobilisation of the œsophagus and stomach after incision of the diaphragm. The left phrenic nerve is being crushed.

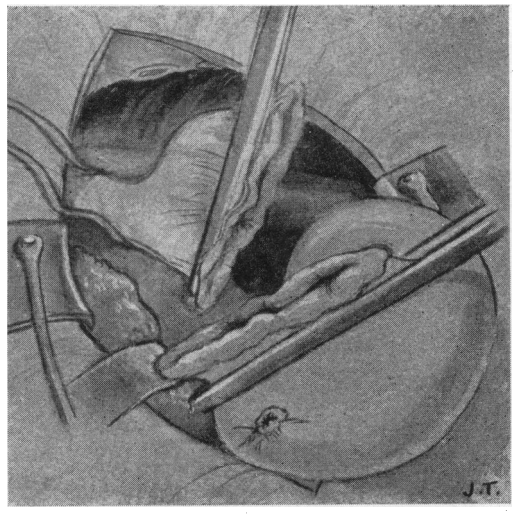


Fig. 3

The stomach has been divided at the junction of the upper and middle thirds.

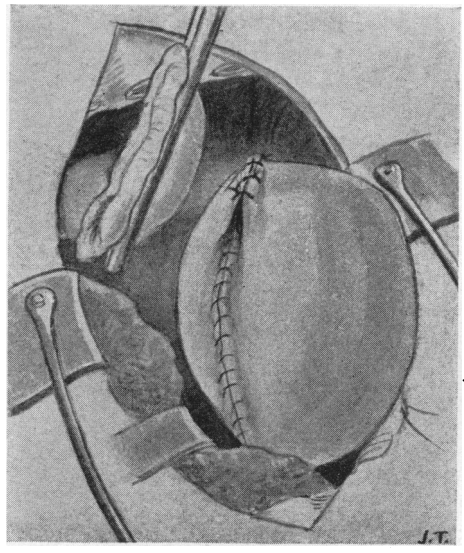


Fig. 4

The distal portion of the stomach is closed with a double layer of continuous sutures.

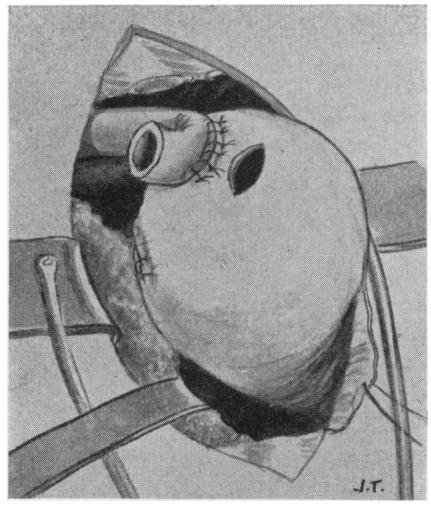


Fig. 5

The œsophago-gastric anastomosis. The growth has been removed. The œsophago-gastric anastomosis commenced with a posterior layer of interrupted sutures.

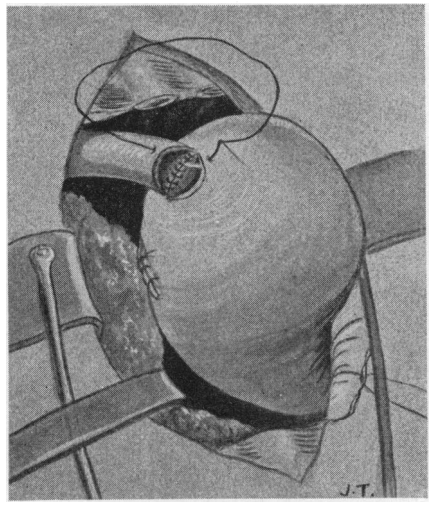


Fig. 6

The œsophago-gastric anastomosis—the divided end of the œsophagus is being united to the new orifice in the stomach by interrupted sutures.

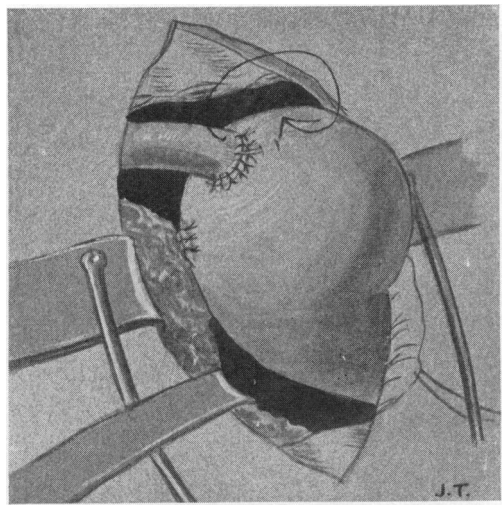


Fig. 7

The œsophago-gastric anastomosis—anterior layer of interrupted sutures.

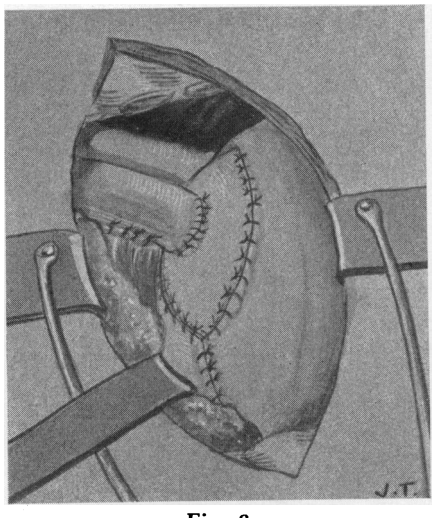


Fig. 8

The diaphragm is closed around the stomach with interrupted sutures. The mediastinal pleura closed.

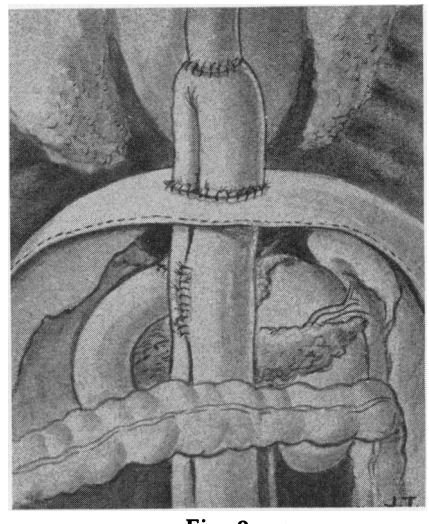


Fig. 9

The œsophago-jejunal anastomosis with je juno-jejunostomy after total resection of th stomach.

Sympathectomy for the Relief of Pain

By JOHN A. W. BINGHAM, M.CH., F.R.C.S.(ENG.)

DURING the past two sessions of this Society papers have been read on sympathectomy in the treatment of essential hypertension and of peripheral vascular disease. The purpose of this paper is to review briefly the place of sympathectomy in the treatment of certain types of pain.

I—VISCERAL PAIN.

The pain of visceral disease is one type of pain in which sympathectomy is sometimes of value. It is not difficult to understand why this should be so; for pain nerves from almost all viscera travel in the sympathetic chain and pass through sympathetic ganglia on their way to the spinal cord.

One might choose as examples of visceral pain that may be relieved by sympathectomy quite a number of conditions, such as some cases of primary dysmenorrhœa, or cases of obscure renal pain, or possibly some cases of pain from inoperable malignant disease. I wish, however, to deal particularly with the relief of otherwise intractable cardiac pain, for of all the conditions for which sympathectomy may be employed the results in cases of cardiac pain are perhaps the most striking and most successful.

CARDIAC PAIN.

The anatomy of the nerve supply to the heart is illustrated in fig. 1. This shows that there are three cervical cardiac nerves passing between the superior, middle, and inferior cervical sympathetic ganglia and the heart; and also direct thoracic cardiac nerves which pass directly between the upper four or five thoracic ganglia and the heart. The existence of the cervical cardiac nerves has been known for almost three hundred years, but the direct thoracic cardiac nerves were described only in 1927. All cardiac nerves, whether they pass to cervical sympathetic ganglia or to thoracic ganglia, are, as shown, derived from upper thoracic cord segments. Afferent fibres have not been demonstrated in the superior cardiac nerve, but the other cardiac nerves contain both efferent and afferent fibres. The efferent fibres are vaso-motor and cardiac accelerator in action; the afferent fibres convey pain impulses from the heart as a result of ischæmia of cardiac muscle. These cardiac sensory nerves, indeed all visceral afferent nerves, resemble in many respects somatic sensory nerves. They have their cells of origin in posterior root ganglia; they connect with posterior horn cells in the cord; a single neuron passes between the cord and the cardiac plexus, for, unlike true efferent sympathetic nerves, they pass through sympathetic ganglia without interruption; and they consist mostly of myelinated nerve fibres, with the same rate of electrical conduction as other sensory fibres. For these reasons they have come to be generally regarded as belonging, not to the true physiological sympathetic system, but to the posterior root somatic system of nerves.

The first attempt to relieve cardiac pain by sympathectomy was made by Jonnesco in 1916, and his first report of a small series of cases was published in 1920. Jonnesco excised the whole cervical sympathetic chain, the superior, middle, and inferior cervical ganglia. During the next few years a variety of operations were employed. Some surgeons excised only the superior cervical ganglion; others divided cervical cardiac nerves; others divided branches of the vagus; and various combinations of

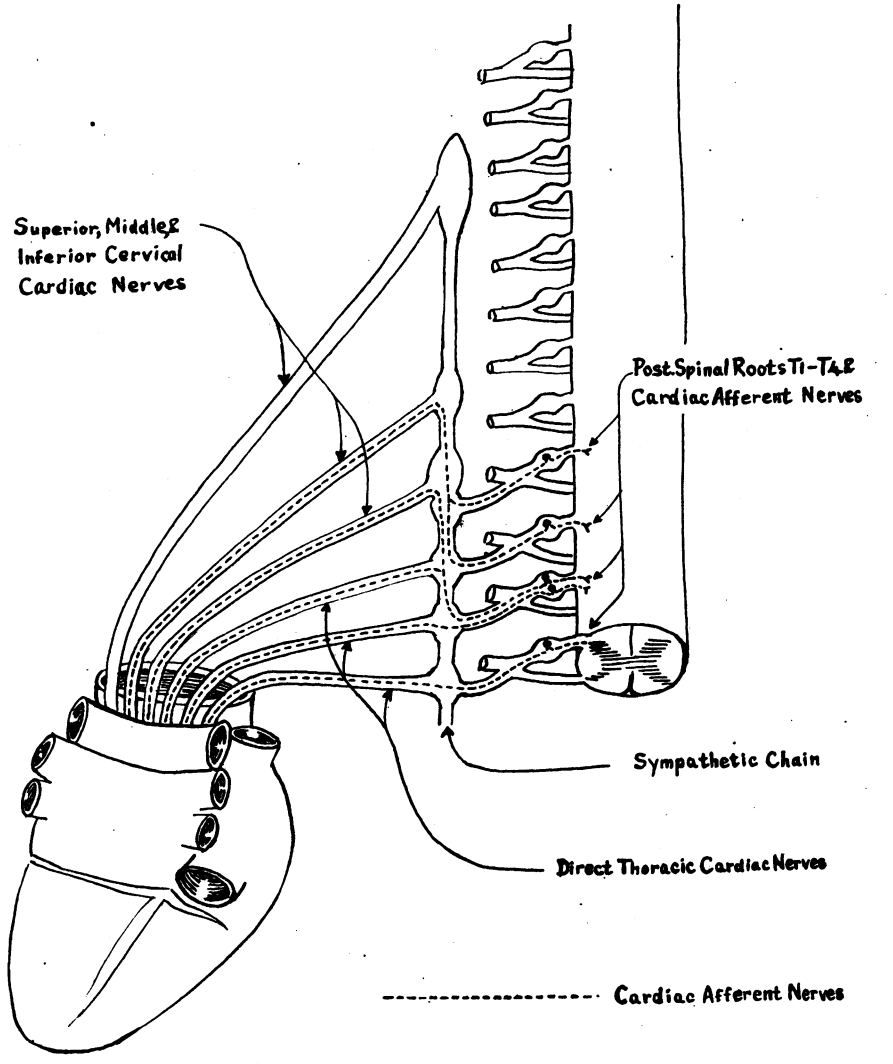


Fig. 1.—Nerve supply to the heart, showing the pathway of cardiac afferent fibres.

(Redrawn with some alterations by permission of J. C. White, M.D.)

these different procedures were carried out. Leriche, and after him many others, treated these cases by excision of the stellate ganglion alone.

We can see from fig. 1 that Jonnesco's and Leriche's operations interrupt some pain nerves from the heart, but not all; and, as would be expected, they are not always successful. Leriche is reported to have had fifty per cent. satisfactory results in twenty-seven cases. We can see that to interrupt all, or practically all, pain pathways it is necessary to excise the upper four thoracic ganglia. An alternative operation would be to divide the upper four thoracic posterior roots; and this has been done in a few cases with complete success. But this is a more severe operation than sympathectomy, and it is, therefore, a less attractive proposition in patients who suffer from cardiac pain. Some of these patients do, however, stand operation surprisingly well: Leriche in the series of twenty-seven cases already referred to, had no operative mortality. Nevertheless, there are many sufferers from severe cardiac pain who would be bad risks for any operative procedure, and it is fortunate that it has proved possible to effect a lasting interruption of the sympathetic chain without operation. This can be achieved by alcohol injection along the sides of the vertebral bodies in the region of the sympathetic chain.

To relieve cardiac pain by this means, by paravertebral alcohol injection, four needles are introduced below the transverse processes of the upper four thoracic vertebræ with their points against the sides of the vertebral bodies, 5 c.c. 1 per cent. procaine are injected through each needle and followed by 5 c.c. of absolute alcohol through each needle. As a rule injection is necessary only on the left side; but occasionally, if pain should continue to be felt on the right side after left-sided pain has been relieved, injection on the right side may be advisable; and occasionally injection on the right side alone is sufficient. This method of treatment of cardiac pain, which may be called a chemical sympathectomy as opposed to an operative sympathectomy, was introduced by Swetlow in America in 1926.

Paravertebral alcohol injection has become the most frequent method of interrupting the sympathetic chain in these cases. White and Smithwick (1942) report that in the Massachusetts General Hospital over a period of several years alcohol injection was carried out sixty-eight times for cardiac pain and an operative sympathectomy only six times. In these sixty-eight cases there were a few deaths from coronary infarction shortly after the injection. Of the remaining cases in only about nine per cent. was there any return of severe pain, and in these it was clear that interruption of the sympathetic chain had been only temporary and that failure was due to inaccurate placing of the injection. In all cases in which there was lasting interruption of the sympathetic chain, as shown by the hand on the side of the injection remaining hot and dry, there was lasting relief of cardiac pain.

Alcohol injection has some disadvantages as compared with operation. In the first place, it is not so certain to be permanent. It has been found that 5 c.c. absolute alcohol produces a scar only one centimetre in diameter, and, therefore, the needle through which the injection is made has to be placed within half a centimetre of the sympathetic chain to produce a permanent block. The second disadvantage is that troublesome pain sometimes results from irritation of intercostal nerves by the

alcohol. In fig. 2 it can be seen how closely situated are the sympathetic chain and the intercostal nerves, and it is almost inevitable, therefore, that a paravertebral alcohol injection should result in intercostal nerves being bathed in alcohol. If the injection is accurately placed, these nerves are not permanently interrupted. Some pain radiating round to the front of the chest is, however, not uncommon; but it is usually not severe, and only occasionally does it persist. This is, however, perhaps the chief disadvantage of paravertebral alcohol injection. Nevertheless, in most patients with cardiac pain the advantages of alcohol injection outweigh the disadvantages.

The following two personal cases illustrate what may be achieved by this procedure.

CASE 1.—W. R. H., male, aged 49, started having frequent attacks of cardiac pain in September, 1945. Pain was felt in the epigastrium, up the centre of the chest, and down both arms. It was severe, was associated with dyspnœa, and was brought on by even slight exertion. He stated he couldn't walk for more than a few hundred yards without pain. He had been under medical treatment at home and as an out-patient at the Royal Victoria Hospital, but eighteen months later he was still completely disabled by his attacks of pain.

January 8, 1947: Procaine-alcohol paravertebral injection, T1-T4 (left), produced all the signs of sympathetic paralysis. There was pain from irritation of intercostal nerves for a time, but this was never very severe and has almost completely disappeared.

When seen recently, eleven months after the injection, the signs of a sympathetic block were still present. The patient has had complete freedom from his previous attacks of severe pain. He still gets anginal attacks. These he recognizes by shortness of breath and by a feeling of suffocation, and sometimes during these attacks he gets slight pain in the lower part of the left side of his chest, about the fifth or sixth rib. This is presumably due to a thoracic cardiac nerve passing to a sympathetic ganglion below the level of the alcohol block. These anginal attacks are much less frequent than before the injection and the patient's exercise tolerance has considerably increased : he can now walk three and four miles without trouble.

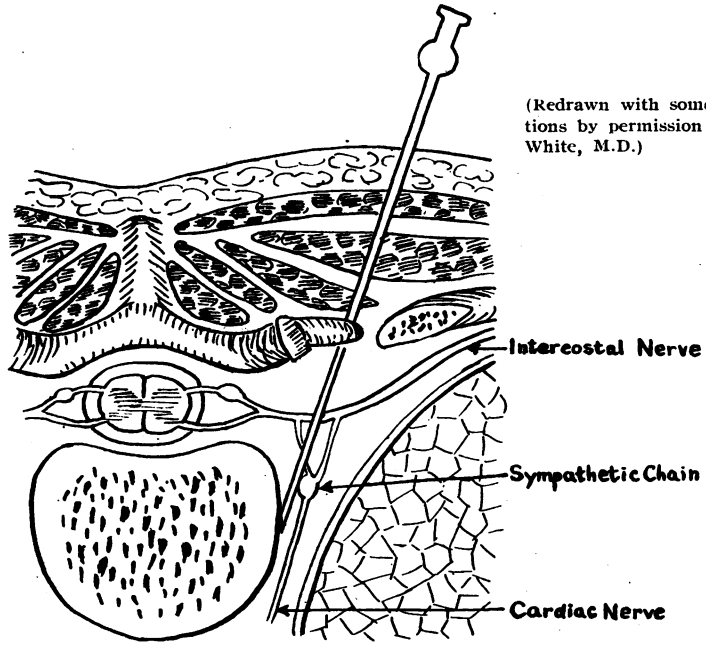
CASE 2.—Miss M. D. H., aged 50, who had well-marked aortic regurgitation, started getting frequent attacks of pain about three years before I saw her in November, 1946. During these three years she had had attacks of pain practically every day, usually in the morning or at night, and sometimes more than once in a day. Pain was felt mostly in the right side of the chest, right arm, and right scapular region, and came on at rest as well as on exercise. There had been a thorough trial of medical treatment, but she still had attacks of pain almost every day.

November 25, 1946: Procaine-alcohol paravertebral injection, T1-T4 (right).

A year later this patient wrote, quite spontaneously, to say she was keeping very well. She said, "It's absolutely marvellous not having that severe pain night and morning." She also illustrates the increased activity that is possible for these

patients when their pain is relieved. She wrote that before the injection "I was really afraid to go out to anyone's house in case the pain would come on, but now I can visit my friends in comfort."

It is sometimes said that relief of pain in these cases is dangerous, as it removes a warning signal. However, it is found that these patients continue to have the sensation of an attack even when all pain is relieved, and this suggested danger does not seem to be a real one.



(Redrawn with some alterations by permission of J. C. White, M.D.)

Fig. 2.—Paravertebral Injection.
The relationship of the sympathetic chain and intercostal nerves is shown.

Another question that might perhaps be discussed is whether sympathectomy improves the blood supply to the heart by dilating coronary vessels or by preventing spasm of coronary vessels. Many published case-reports point out that, quite apart from relief of pain, anginal attacks seem to come on less frequently and to be less easily produced after sympathectomy; and it would, therefore, seem from clinical evidence that interruption of sympathetic nerves to the heart actually improves coronary circulation. But nearly all animal experiments appear to demonstrate that sympathetic nerves to the heart are not vaso-constrictors but vaso-dilators, so that removal of sympathetic impulses should not prevent spasm of coronary vessels. A few experiments have given other results, but these are in the minority. All that can be said at present, it would seem, is that this question has not been finally decided.

II—Pain of Causalgic States.

Another group of cases in which sympathectomy is of value for the relief of pain are cases of persistent pain and tenderness following various kinds of trauma. Pain and tenderness in the area of distribution of an injured nerve and phantom pain and stump tenderness following amputations are perhaps the best known of these conditions. In severe cases the pain is characteristically burning in character, and the word "causalgia" was originally coined by Weir Mitchell at the time of the American Civil War to describe this burning pain following nerve injuries (Mitchell, 1872).

It has during recent years been realized, however, that cases with less severe pain, or even without spontaneous pain and with only tenderness in the distribution of an injured nerve, are fundamentally similar in nature and differ from the more severe cases only in degree. These milder cases have been described by Homans (1940) as cases of "minor causalgia." It has also come to be realized, for example by Miller and de Takats (1942), that there are other kinds of trauma than injuries to main nerve trunks which in occasional cases lead to a similar clinical picture. The principal features of these conditions are the development in the affected part of pain, which in severe cases is burning in character, of tenderness, dusky or reddish cyanosis, increased sweating, and shiny, atrophic skin. This picture is seen very occasionally after sprains and fractures involving joints, and the condition in these cases has for long been known by such terms as Sudeck's atrophy or painful post-traumatic osteoporosis. It is also sometimes seen after exposure to cold, as in cases of frost-bite, trench-foot, or immersion-foot; and it sometimes develops in cases of venous thrombosis or vascular injury. It seems possible that the only difference between cases of classical causalgia and these conditions is that in the case of joint injuries the injured nerves, instead of being main nerve trunks, are terminal branches supplying joint capsule and ligaments; and that in the case of frost-bite or trench-foot the cause of nerve damage is exposure to cold rather than direct injury; and that in the case of vascular thrombosis or injury passive œdema or ischæmia of nerves is responsible for the development of the causalgic state. In addition to presenting the same clinical features, these conditions resemble one another in their response to sympathectomy : in many cases this operation produces complete or satisfactory relief of pain and tenderness, but in others little or no benefit results.

These causalgic states present a number of very interesting and intriguing problems that have for long proved difficult to solve. Without touching on the problem of why a small percentage of patients suffering from these injuries (it is only a very small percentage) should develop persistent pain and tenderness, there is the difficulty of explaining why sympathectomy should ever be of benefit, and, as it does provide relief in some cases, why it should in other cases fail to do so. It is not possible in a short paper to discuss the various views that have been put forward; but I might perhaps state that I believe there is evidence to prove that when sympathectomy relieves pain and tenderness in these causalgic states it does so, almost always, in the same way as it relieves cardiac pain—by interrupting

the pain pathway.[1] Evidence in support of this view has been presented elsewhere (Bingham, 1946 and 1947). But however this may be, the important point to realise is that in some cases, in my experience about 60 per cent. of cases, satisfactory relief may be obtained by sympathectomy, and that in the remaining cases little or no benefit results. The accompanying table shows the results I obtained from sympathetic block or sympathectomy in patients with causalgic pain following amputations or peripheral nerve injuries when I was treating these cases during the recent war. It can be seen that in 60 per cent. of the total number interruption

RESULTS OF SYMPATHETIC BLOCK OR SYMPATHECTOMY.

Type of Case	Number of Cases	Satisfactory result	Little or no relief
Amputation Causalgia	16	9 (56%)	7 (44%)
Causalgia from P.N.I.	14	9 (64%)	5 (36%)

of the sympathetic chain produced satisfactory relief of pain and tenderness. Similar results have been obtained in other centres, though in some a rather higher percentage of good results would seem to have been obtained. I ought perhaps to explain that there is no very sharp dividing line between the cases who get satisfactory relief and those who do not. All degrees of relief occur, from those who are completely relieved of all pain and tenderness to those who get no relief at all. The only person who can possibly say whether there has been satisfactory relief of pain or not is the patient himself. Among my cases, 60 per cent. thought that interruption of the sympathetic chain brought them a satisfactory measure of relief.

It is important to realize that there is this considerable percentage of patients in whom sympathectomy is without benefit, because it is essential, if one is to avoid doing a considerable number of unsuccessful operations, that whenever sympathectomy is being considered in these cases a preliminary procaine block of the sympathetic chain should invariably be carried out. It has been my experience that the degree of temporary relief obtained by a procaine injection indicates with complete accuracy what will be the result of an operative sympathectomy. In these causalgic conditions an operative sympathectomy is to be preferred to alcohol injection. These patients are usually good operative risks, and the increased certainty of a permanent result and the freedom from the pain of an alcohol neuritis would seem to make it much the better form of treatment. I have, moreover, come to the conclusion that these patients who develop persistent pain from nerve injuries are particularly liable to develop pain from any form of nerve irritation and that in them the danger of persistent pain from alcohol injection is very considerable. Sometimes repeated procaine sympathetic blocks, and occasionally even a single procaine injection, provide a surprisingly long period of relief. But relief by this means is usually short-lived.

When sympathectomy is required for causalgic pain in the upper limb I now

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1 Observations I made during the war on a case of causalgia following a vascular injury suggest that occasionally sympathectomy may be of benefit in cases of this particular type by abolishing reflex vaso-spasm and so producing an increase in blood supply to ischæmic nerves (Bingham, 1946).

employ an anterior operation with an incision above the clavicle, rather than a posterior operation such as that described by Smithwick; for I have found that in some of these patients the posterior incision gives rise to troublesome pain and tenderness.

During war-time, in dealing with service patients, most cases of a causalgic nature that one sees are patients with wounds involving main nerve trunks or with major amputations. In civilian surgery, however, such patients are not common, and causalgic states are more often seen following lacerations of fingers or finger amputations. During the past year I have seen five such cases. Interrupting the sympathetic chain was successful in two of these; in the other three sympathetic block had little, if any, effect on pain or tenderness.

The following case of causalgia following a median nerve injury that was brought about in a rather unusual way illustrates the relief that may sometimes be achieved by sympathectomy in causalgic states.

Mrs. F. M., aged 36, had had a hysterectomy on May 6, 1947. Following the operation she was, for some reason, given an infusion of six pints of glucose-saline into her left arm. It would seem from subsequent events that some glucose-saline had been given intraneurally rather than intravenously. During the infusion she developed pain in her hand. This persisted, and was still present when I saw her over three months later, and was sufficiently severe to interfere with sleep. It was a constant, burning pain, mostly in the thumb, index and middle fingers. At times she experienced spasms of even more severe pain. There was also occasionally a pulling, cramp-like pain in the hand. There were, in addition, signs of a partial median nerve paresis, with muscle weakness and impaired sensation in the index finger and thumb. The whole hand was somewhat cyanosed, and the index finger and thumb were tapering, with smooth, atrophic skin. The thenar eminence and the palm of the hand were tender. Joint movement, as on attempting to grip, increased pain, and in consequence her hand had become somewhat stiff. She habitually kept a cloth wound round her hand for protection, in a way that many patients with causalgia do.

Procaine block of the left sympathetic chain at the level of the second thoracic ganglion produced immediate relief of pain in the hand. Relief lasted four to five hours.

September 6, 1947: Resection of left sympathetic chain through an anterior approach from below the stellate ganglion to below the third thoracic ganglion.

Following this operation the patient no longer had any burning or pulling pain in the hand. She occasionally had a tingling sensation in the middle and index fingers and in the thumb. There was no tenderness. She could grip without pain, and the stiffness of her fingers was improving when she left hospital eight days after operation. Sensation in the index finger and thumb were still impaired. Two and a half months after operation this patient wrote that she remains free from pain except for occasional tingling in the index finger and thumb. She considers her operation a success.

I wish to emphasize again, however, that there are cases of causalgia, with clinical features exactly the same as those found in cases that can be relieved by sympathectomy, in which this operation is of little or no benefit. The treatment of these cases is often very unsatisfactory and very disappointing.

Summary.

1. The relief that may be obtained by sympathectomy or sympathetic alcohol block in cases of intractable cardiac pain and in some cases of causalgic pain following trauma of various kinds is described.

2. Interruption of the upper dorsal sympathetic chain relieves cardiac pain by interrupting the pain pathway from the heart. It it uncertain whether coronary circulation is improved.

3. The view is expressed that when sympathectomy relieves causalgic pain it does so also by interrupting a pain pathway.

4. Case reports are presented to illustrate the value of sympathectomy in these conditions.

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The most striking addition to the book is the chapter on the treatment of epilepsy and cognate disorders, giving a clear interpretation of the value of the electro-encephalogram in the diagnosis and treatment of these conditions. The recommendation that epileptics should live as full a life as possible is one which should be more widely known by doctors and patients alike.

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The Nursing Services of Northern Ireland *

By A. T. ELDER, M.D., B.HY., D.P.H.
Deputy Chief Medical Officer, Ministry of Health and Local Government, Northern Ireland

INTRODUCTION

TOWARDS the close of 1947, it was my privilege to read a paper on Public Health Nursing in the Province to student Health Visitors at the College of Nursing in Belfast, and to follow this some weeks later with an outline of the Midwifery Services at the College of Midwives.

This, the third and final talk, seeks to cover briefly the development of the whole field of our Nursing Services, and to dwell more especially on Home Nursing and the effects of the new legislation on the District Nursing Services and Voluntary Associations.

HISTORICAL NOTE

Though organised nursing was begun about a hundred years ago in the British Isles, to-day we catch a glimpse of the first outline of a completely integrated Service.

In Britain and America, Midwifery and Home Visiting were begun quite appreciably before Public Health and Industrial Nursing. It is true that 1843 saw Oliver Wendell Holmes stressing the infectious nature of childbed fever, but it was not till 1860 that Florence Nightingale started the first Endowed Midwifery Training School at St. Thomas' Hospital in London. District Nursing dates to about the same time, for in 1859 William Rathbone had begun it in the eighteen districts of Liverpool; the first really important national contribution came in 1899 with the foundation of the Queen Victoria Jubilee Institute for Great Britain and Ireland.

But it must not be forgotten that the "Medical Charities" Act of 1851 in Ireland had seen a beginning, in the Poor Law Service, of Domiciliary Midwifery.

In the realm of Home Nursing almost the whole initiative has been taken in Ulster by the Voluntary Societies, and in this field no one would seek to minimise the splendid work which has been done in the past. There are approximately one hundred District Nursing Associations in Northern Ireland, which, with a few exceptions, are affiliated to the Queen's Institute of District Nursing.

It is somewhat invidious to single out one Society for special mention, but perhaps it would be unfair to omit to mention the work of the Belfast District Nurses, whose Society for providing nurses for the sick poor in Belfast was instituted in 1874. During the year 1946 the nurses of this Society attended 1,800 patients and paid 80,923 visits. These figures, taken from the Charities' Year Book, give some idea of the magnitude of the task undertaken.

The year 1897 saw the initial attempts at forming an *Industrial Service* by John Wanamaker in his shop in New York, and by Cadbury in England. *Public Health Nursing* may be said to have begun with Professor Bodin and Dr. Dufour in France

* An address to the Nursing Profession of Northern Ireland delivered on 14th April, 1947, in the Grand Central Hotel, Belfast, under the auspices of the Queen's Nurses' League.

towards the close of the nineteenth century, and with the opening of the St. Helen's Milk Depot in England in 1899.

You will see that from the actual start of organised services till the nineties, a period of about thirty years had passed. We turn again through thirty years to see the next big move in 1918 with the Maternity and Child Welfare Act, followed by, in 1919, the first formation of the English Ministry of Health to replace the Local Government Board, and the placing of the Central Midwives' Board under the control of the new Ministry.

Nearly thirty years later again sees the first comprehensive nursing service of 1948 in all parts of the United Kingdom.

While these four peaks in the Graph of Steady Progress, in themselves each merely marked a definite decisive step towards unification, one must realise that, set against the background of Infinite Time, or even the Christian Era, the development of our Nursing Services has taken place with almost alarming rapidity.

Present-Day Legislation

You should know the chief effects of the new legislation, so, without, I hope, boring you with details, I have summarised the main Acts and Sections thereof which you must not fail to study.

(a) *The Health Services Act (Northern Ireland) 1948.*

Part II, *Section 15* Sets a duty on the newly created Northern Ireland Health Services Board to prepare lists of medical practitioners willing to provide medical assistance for Midwives when required under Sub-section (1) of Section 22 of the Midwives (Ireland) Act of 1918.

Section 17 Gives the same Board powers to establish Health Centres, but it is important to note that the staffing of the Health Authority portions of such Health Centres remains with the Health Authorities, even though the buildings may have been provided by the Board.

Part III, *Section 21 (2) (b)* Gives to a newly created Northern Ireland Hospitals Authority powers to set up, amongst other things, *nursing services* for the hospitals of the Province.

Part IV, *Section 38* Places a duty on every Health Authority to provide nursing services for expectant mothers, domiciliary midwifery, general health visiting work not only for young children and expectant mothers, but for persons suffering from illness, and for giving of advice to the healthy for the prevention of the spread of infection, and finally, as soon as the Ministry of Health and local Government after consultation with the Health Authorities considers practicable, for nursing services for persons who require nursing in their own homes.

(b) *The Public Health and Local Government (Administrative Provisions) Act, Northern Ireland, 1946.*

This Act establishes the eight Health Authorities working through Statutory Health Committees, one for each County and one each for Belfast and Londonderry.

It transfers certain functions from local authorities of lesser degree to these Health Authorities under, viz.—

The Midwives (Ireland) Act, 1918.
The Midwives and Nursing Homes Act, N.I., 1929.
The Notification of Births Act, 1907.
The Notification of Births (Extension) Act, 1915.

Under section 20, Notification of Births will be extended to Rural Areas, thus completing the picture in regard to Birth Notification.

Section 12 gives a Health Authority powers to appoint officers necessary to allow the Health Authority to carry out its functions, and under this Section can be appointed County Nursing Officers, Dental Officers, etc.

(c) *The Tuberculosis Act (N.I.), 1946.*

Section 2 of this Act empowers the newly created Northern Ireland Tuberculosis Authority to provide training for nurse-students in tuberculosis work, and the appointment of staff to carry out transferred duties is given in Para. 10 (6) of Part II of the First Schedule.

(d) *The Education Act (N.I.), 1947.*

The appointment of school nurses is implied in Section 42 of this Act, although the specific duty of appointing staff is not definitely laid down in so many words. (See Section 89 (3) of Education Act.)

The power of appointment is, however, contained in Section 12 of the Administrative Provisions Act now that transfer of School Services to Health Authorities has taken place.

Hospital Nursing

There are in the Province approximately seventy hospitals, at present rate-aided or voluntary, which will come under the N.I. Hospitals Authority on the 5th July. In these there were employed on 2nd March, 1948, 1,246 trained nurses in all branches, excluding student nurses (900), probationer (assistant nurses) (41), and pupil midwives (90).

How far are these numbers adequate for the task? The Red Book puts the number of hospital beds in the Province at seven thousand approximately. Clearly then we could double the number of nurses employed without any hint at overstaffing!

There are two categories, however, where definite shortages appear; first amongst trained Sister Tutors; and secondly amongst the Tuberculosis Nurses, where an acute shortage at present prevents the opening up of much needed additional beds. This latter problem is not, of course, confined to Northern Ireland, but is being experienced throughout the United Kingdom.

A valuable recruiting campaign was carried out by the Ministries of Labour and National Insurance, and Health and Local Government in 1947, in which the Ministry's Nursing Officer, Miss Robinson, took part. A similar campaign may be carried out this year.

At the same time, valuable work in interesting girls of secondary schools in Northern Ireland in the value of Nursing as a career is being completed by Miss Robinson together with Miss M. E. Grey, the Area Organiser of the Royal College of Nursing in Northern Ireland.

Industrial Nursing

Turning for a moment to the realm of Industrial Nursing, there were in 1943, twelve thousand Industrial Nurses in the Uuited States of America, but whether these were all certificated, industrial nursing history does not say, since theAmerican system is rather different from ours. Northern Ireland has made a useful start and the Province now possesses about thirty qualified nurses engaged in industry, of which number thirteen possess the additional Certificate in Industrial Nursing.

I am led to believe, following on a recent visit to London, that that is a relatively good proportion compared with other parts of the United Kingdom. Courses for this were organised by the College of Nursing in 1947.

From America comes an estimate of the total need for nurses in the Industrial and Public Health fields of one Public Health Nurse to every two thousand of a population of all ages.

An Industrial Nursing Board of Studies, formed under the auspices of the Royal College of Nursing in London, has, as advisers, several Professors of Social Medicine, and it is hoped that our new Professor of Social Medicine of Queen's University will be able to play an active part in this and so bring Northern Ireland into the general picture.

Domiciliary Nursing Service—Centralised Administration by the Health Authorities

It is clear by Section 38 of the Health Services Act that a duty is imposed on the Health Authorities to make provision for domiciliary nursing services, and it is equally clear that Section 12 of the Administrative Provisions Act gives the Health Authority power to appoint officers for the service.

As regards the appointment of County Nursing Officers, the Ministry of Health and Local Government, by circular letter, gave advice to the Health Authorities, which has subsequently formed the basis of conditions of appointment.

According to the Ministry's letter, applicants should have the S.R.N., S.C.M., and H.V. qualifications, be ten years qualified in their profession, and have spent at least two years in a supervisory capacity and in charge of nursing personnel.

Up to date, County Nursing Officers have been appointed in Down, Antrim, and Tyrone.

The County Nursing Officer will supervise administratively all Domiciliary Nursing Services within the County, and will work under the direction of the County Medical Officer of Health.

She clearly cannot take a technically active part in any one branch of nursing, and so it is proposed to appoint a Senior Midwife, a Senior Health Visitor, or both in each County, acting under the County Nursing Officer. These will be officers actively engaged in the practice of their own branch of the profession. The possession of the Health Visitor's Certificate was clearly an essential, since she will have to operate in the future all the School Medical Services as well as the pre-school medical services at present acknowledged.

Health Visitors

Health Visitors are required for four distinct types of work :—

(a) Expectant mothers and young children.—The employing authorities for this purpose now being the eight Health Authorities already mentioned.

(b) School Medical Work.—The employing authority is now the Health Authority, and not the Education Committees as was the case prior to 1st April, 1948.

School services may be divided into those of a preventive nature, such as School Health Visiting, Inspection and Follow-up Service, for which a Health Visitor's Certificate will be necessary in the future in all probability, and those of a clinical nature, confined to work in school clinics, for which a Health Visitor's Certificate will not be required.

(c) The General Population.—Under Section 38 of the Health Services Act (N.I.), 1948, already mentioned, the employing authority is the Health Authority.

(d) Tuberculous Patients.—The employing authority being the Northern Ireland Tuberculosis Authority under the Tuberculosis Act (N.I.), 1946.

A combination of duties under (a), (b), and (c) may be possible, following the transfer of school medical services from the Education Committees to the Health Authorities, under the powers conferred on the Minister of Health and Local Government by the Administrative Provisions Act.

Position as Regards Trained Health Visitors

A Ministry of Health and Local Government circular of 10th March, 1948, sets out the approved initial establishment of Public Health Nurses for all categories of duties for the Province as a whole at 479, and for the Health Visiting Nurses at *184*. To meet this *latter* need there are now twenty-four Certificated Health Visitors, twenty-seven in training, and I am informed that the College of Nursing has received ninety-seven applications for a full-time course of training for the Health Visitor's Certificate from newcomers, and twenty-seven applications from existing uncertificated employed Health Visitors for a part-time course of training.

In accordance with requirements, approval is being sought from the Ministry of Health in England for such a part-time course to be given here in Belfast. Further full-time courses will, of course, be given, which need no additional Ministry approval.

It must be made clear, however, that such a part-time course is not available

except to those nurses already engaged in Health Visiting work in the Province, and all newcomers must undertake the full-time course of study.

Health Visitors over a certain age and already employed will be allowed to continue in Public Health work without the need for obtaining a Certificate, but there may be some difference in salary.

Nurses temporarily employed at present in Public Health work, including school health visiting work, without a H.V. Certificate, can only continue on a temporary basis, subject to their obtaining a certificate.

Recently Miss Cameron of the New Zealand Services, during a visit to Stormont, stressed the need for the right type of recruit to the Health Visitors' Service; the need for people with tact, vision, personality, and educational gifts. She further mentioned that in New Zealand the Health Visitor extended the value of her service by undertaking all Diphtheria Immunisation work.

I do not suggest we should do this here, but the trend is interesting.

Domiciliary Midwifery

I have dealt with this fairly fully in another paper, but, briefly, we should note that in 1946 there were 30,135 births in the province, and nearly 18,000 of these occurred in the six counties. Outside Belfast and Londonderry only 25 per cent. of births occur in hospital, the proportion being about 50 per cent. in Belfast.

There are, according to the Midwives' Roll in Northern Ireland, about 680 Midwives certificated and engaged actively in midwifery practice. Allowing one midwife for every 66 births (Midwives Salaries (Rushcliffe) Committee Recommendations) taking place at home, some 365 midwives would be required for a full-time service.

At least 250 more *as a minimum* are required in our hospitals.

Now the Ministry, by its circular of 10th March, allows an establishment of two hundred domiciliary midwives who may be recruited by the Health Authorities between now and March, 1950, without further reference to the Department.

Why, you will say, has the Ministry not permitted recruitment to the full desirable figure all at once?

Well, first of all, there are certain variable factors.

(a) The extent to which District Nursing Associations will be co-operating with Health Committees.

(b) The extent to which lying-in accommodation in hospitals will have been provided by 1950 (the Ministry, for its part, ranks this as first priority in the development of general hospitals).

(c) The number of midwives available.

(d) The extent to which the public will take advantage of the services offered.

As regards numbers available in the domiciliary field, there are 132 (approximately) midwives employed by Boards of Guardians, who will, no doubt, be absorbed immediately, and it is interesting to note that 23 of these are Queen's Institute Nurses.

Now, the picture of the needs and availability of staff differs greatly from County to County. In Armagh, for instance, and probably in Down, the numbers available exceed the numbers required for a full-time service—in Armagh, quite appreciably. In other Counties the position may require an intake to fill the public service.

We do not know to what extent private midwifery will be demanded once the public service begins, but it easier to increase staff than to reverse the process. Hence the Ministry's cautious approach as regards employment in the public services.

However, where the need arises for revision of the numbers of midwives engaged, the door is left open for further discussion with the Health Authority concerned. Again, the Ministry has called for Outline Proposals from the Health Authorities by circular letter, and from such returns as will be received it will be possible to forecast to some extent the needs of each area.

It would clearly be difficult for anyone to say more than this possibly for another year or more, till the reaction of the public to the new services becomes crystallised.

In passing, may I draw your attention to a "Survey of Childbearing" carried out by a Joint Committee of the Royal College of Obstetricians and Gynæcologists and the Population Investigation Committee in England, Wales, and Scotland in 1946.

From this it appears that the costs of childbearing are high and that more is being spent at present on baby clothes and equipment than on professional fees. It is clear that "provision of free medical care will not greatly relieve the cost of childbearing." For this reason, I say, some degree of private nursing, more than we imagine, may continue even after the institution of a public service.

Home Nursing Services

This branch of the nursing services may be envisaged as developing in three directions :—

(a) General Home Nursing under Section 38 of the Health Services Act.

(b) Tuberculosis Home Nursing under Section 2 of the Tuberculosis Act.

Home Nursing for the tuberculous patient is very important here in Northern Ireland, where we are some hundreds of beds short of Institutional requirements.

A case could possibly be argued for a full-time home nursing service employed by N.I.T.A. in Belfast, but as regards numbers, these are relatively few compared with those required for general nursing, and in the Counties it might be better for the General Home Nursing Services to undertake this work on behalf of N.I.T.A.

Indeed, owing to difficulties in the recruitment of nurses into the services for tuberculous work, such an arrangement over-all might be well worthy of consideration by the Health Authorities and N.I.T.A. in collaboration.

(c) Specialised Home Nursing under either Section 38 or Section 42 of the Health Services Act for the Prevention of Illness in the homes of the people.

Examples of such specialised nursing are—

(i) Fever Nursing.

(ii) Care of premature babies.

(iii) Nursing of babies and young children suffering from gastro-enteritis.

As regards the numbers of nurses required for this service and numbers already available, let us turn for a moment to look at the London County Council proposals. These were published in June, 1947.

Briefly, the L.C.C. proposed that all arrangements already undertaken by Nursing Associations shall continue during the ensuing twelve months as a trial period. General nursing in the home forms 85 per cent. of the work of the thirty-two Voluntary District Nursing Associations. This work continues on an agency basis on behalf of the L.C.C. The suggestions of the L.C.C. for adoption of this agency basis were as follows :—

(i) The Council to make annual grants, on terms to be mutually agreed, subject to prior submission of estimates, statements of income, etc.

(ii) Staff to be paid on the conditions and at the rates fixed by the Nurses Salaries (Rushcliffe) Committee or other appropriate wage-fixing authority.

(iii) The question of the admission to the Council's Superannuation Fund of staff in the employment of the Associations to be considered in the light of the National Health Service Superannuation Regulations, 1947, and any other appropriate circumstances.

(iv) The identity of each association to be preserved and responsibility for its administration retained by its voluntary committee, subject to (a) the Council being represented on its committee by a member and/or an officer; (b) the Council having the right to arrange for inspection by its officers, from time to time, of the services and facilities offered.

I shall presently indicate how matters might develop logically in Northern Ireland.

The number of nurses affected on home nursing duties in London was approximately three hundred and fifteen.

Now, taking the numbers of patients affected, each patient received an average of three visits during 1946, and each nurse paid an average of about three thousand visits per annum. Working on the same basis, the Ministry of Health and Local Government here in Northern Ireland made an assessment of the possible needs of a full-time service for the Province, but the remarks given under Domiciliary Midwifery Services apply equally well here, and it should be realised that the numbers given for immediate recruitment into the public services in Northern Ireland are a deliberate under-assessment, subject to review as the position becomes clearer over the next two years.

The following table given in the Ministry's circular letter to Health Authorities of 10th March, 1948, gives the whole position as at present envisaged in regard to numbers of staff to be recruited by Health Authorities up to March, 1950, without further recourse to Ministry approval.

Home Help Services

As nursing in the homes of the people cannot be satisfactory where there is an insufficiency of other help in the home, the Health Services Act makes provision for this by allowing a Health Authority to develop a Home Help Service.

In England and Wales provision for Home Helps was already made in respect of expectant and nursing mothers by the Public Health Act of 1936 in England.

Ministry of Health circular letter 179/44 admitted reimbursement of expenditure in regard to all who needed home helps under Defence Regulation 68E.

A further circular letter of June, 1946, urged the use of Voluntary Associations as participants, and the Oxford and other W.V.S. schemes came into being. Of thirty-four Home Help Schemes in operation in 1947, twenty-four were administered by the W.V.S. The basis of such schemes was the recruitment of the right type of woman into a social service, giving fair weekly rates of pay, definite hours of work, sickness benefit, and even superannuation.

The Worcester Scheme, outlined by Mrs. Moore-Ede in 1947, states that £3. 3s. is paid for a forty-two-hour week, and £1. 13s. for a part week of twenty-two hours.

The women wear coat, cap, green overalls, and rubber aprons.

Importance was laid on a short course of training to include invalid cookery, washing of modern fabrics, how to make the best use of rations, and the place of the home help in the Health Team.

Co-operation with the Welfare Visitor was stressed. To this I would have added co-operation with the Domiciliary Nursing Services—Health and Home Nursing and Visiting.

An Administrative Memorandum, "200," of the Ministry of Education envisaged an eventual six months' course of study under the National Institute of Houseworkers.

Some Authorities draw a distinction between Home Helps and Domestic Helps.

The Belfast Home Help Service was begun in October, 1943, exclusively for expectant and nursing mothers, with twelve Home Helps. The service now boasts seventy Home Helps.

The rate of pay is eight shillings per day for a six-day week, and after three months' satisfactory service the Home Help becomes eligible for half pay for any period of time when she is not in full employment.

Efforts are being made to inaugurate courses of training throughout Northern Ireland through the medium of Technical Colleges.

Housing of Nurses Engaged in Domiciliary Work

Section 71 of the Health Services Act empowers Health Committees, subject to the approval of the Ministry, to provide residential accommodation for their officers, or for officers of a voluntary organisation providing services.

As general guidance, the Ministry has advised Health Authorities that—

(i) Housing Authorities might be asked to allocate houses to nurses if they are eligible to be considered for tenancies under the Housing Acts and Regulations.

(ii) Health Committees' long term plans for building clinics (in consultation with the General Health Services Board under Section 17 of the Act) might include living accommodation for nurses.

(iii) A watch might be kept for the possible purchase of a house which might serve as a Nurse's House and Clinic or as a Nurses' Hostel.

(iv) In exceptional cases in very remote areas it might be necessary to take and maintain apartments for a nurse.

Transport

Travelling allowances in accordance with the Health Committee's scheme will be allowed.

As regards the provision of cars and autocycles, there is no legislation which authorises Health Committees to purchase and supply cars nor to offer loans to officers for this purpose. All experience points to the direction of private purchase by the officer (with a suitable lump sum and mileage allowance).

Again, in the review of the London County Council Services it is clear that of three hundred and fifteen nurses doing home nursing in the district, only ten use cars. In some cases the car is the property of the nursing association. Here is a case in point where further proposals are awaited from Health Authorities, and also where supplementary transport arrangements by way of car purchase by the voluntary associations taking part in the service, can make a radical difference to a difficult situation.

Salaries

Salaries payable are those outlined in the Second Report of the General Nurses Committee for Northern Ireland, but it should be noted in regard to Domiciliary Midwives that no salary is as yet defined for the new service, and secondly, payment is envisaged on a salary basis, not a *per capita* basis for the service as a whole. There may be an exception made in a few instances for existing midwives who wish to continue in limited practice for a few years on the present basis of £4 per case.

No compensation for loss of private practice for Midwives is envisaged.

On page eighteen of the Second Report referred to will be found a recommendation that the salaries payable should follow the lines of the English Service. If this is done, the doubly qualified nurse (S.R.N., S.C.M.) will receive the same salary as the Health Visitor, namely, £330-£435 per annum.

Transfers from Other Services

As regards the possibilities of nurses in full-time service in Local Authority Services in Great Britain transferring to the Northern Ireland Services, it must be admitted that until a Superannuation Act comparable to the 1937 Act in Great Britain is passed, preservation of rights to a transfer value of services is not possible, except possibly for the Tuberculosis Services under the N.I.T.A., and for which provision was made in the Tuberculosis Act.

Section 61, Sub-Section (2) of the Health Services Act, however, enables arrangements to be made in due course whereby health service employees transferring to

the Health Service in Great Britain, or *vice versa*, can do so without loss of rights.

Again, there must be kept in mind the Safeguarding of Employment Act in Northern Ireland which normally limits permanent employment to those born in Northern Ireland. Residence permits of "open date," however, can be granted by the Ministry of Labour and National Insurance where circumstances warrant it to allow of entrants from Great Britain to the services of the Province, as has been done in the case of the new County Nursing Officers.

Superannuation as Affecting Employees in the New Health Service

Section 61 of the Act provides for the setting up, in accordance with Regulations to be approved by Parliament, of a Superannuation Scheme for persons engaged in the new Health Service. These Regulations are at present being drafted, and as soon as they are available, copies will be furnished to the Queen's Institute and your comments invited.

As regards Hospital Nurses it is proposed to follow the precedent set in the English and Scottish Superannuation Regulations, and to give to nurses at present in the Federated Scheme for Nurses and Hospital Officers, appropriate credit for their previous service.

Superannuation as Affecting Local Government Employees

You will recollect that in the King's Speech to Parliament at the opening of the present session, a new Superannuation Bill for Local Government employees was promised.

Those Queen's Nurses who come into Health Authority service and payment should become eligible to participate in the present Health Scheme if engaged in whole-time employment in a permanent capacity.

The question of recognition of previous superannuable service in the Queen's Institute or other private pension scheme must await consideration in connection with the new Bill.

Existing superannuation rights of whole-time Dispensary Midwives employed by Boards of Guardians are, of course, protected.

Position of Voluntary Associations in Relation to the New Services

Turning now to the position of the District Nursing Associations, let us see if the London County Council Scheme could apply here.

(i) Firstly, the Health Authorities could make grants to cover the salary of staff, use and provision of equipment, residence of staff, and expenses of any clinic in existence, or deal with the financial obligations in a much more direct fashion.

(ii) Salaries could be made uniform in alignment with the recommendations of the General Nurses' Committee, Northern Ireland (Report No. 2).

(iii) The identity of each Association can be maintained, but it would be obviously necessary for the staff to work under the professional direction of the Health Authority's Chief Nursing Officer and Medical Officer of Health, and be subject to inspections by these officers.

(iv) The question of admission to the Health Authority's superannuation fund is clearly possible under the new Regulations, but recognition of previous superannuated service would, as I have already pointed out, have to await the passage of a new Supperannuation Act.

(v) The resources of the Voluntary Associations can and should be used to supplement the services where deficiencies in their respective areas exist.

(vi) Members of District Committees could be co-opted to serve on sub-committees of Health Authorities for special purposes such as Child Health or Nursing.

The precise way in which the Health Authorities propose to institute Home Nursing Services is contained in their Outline Proposals submitted to the Ministry of Health and Local Government on 15th April, 1948, and, after considering representation from the various interested Associations, the Ministry will indicate the extent of approval to the schemes on the 5th July, the date on which the Health Services generally will come into operation.

Training

Training and Registration of Nurses is governed by the rules of the Joint Nursing and Midwives Council of Northern Ireland.

There are three training schools—the Royal College of Midwives (Northern Ireland Council), Royal College of Nursing (N.I.), and the Queen's Institute of District Nursing.

Ten scholarships each of £100 were given by the Ministry of Health and Local Government in 1947 to candidates for the Health Visitors' course run by the Royal College of Nursing, while two scholarships of £65 each were given for Midwifery candidates for the Teacher's Certificate in Midwifery.

Northern Ireland has recently gained representation on the Health Visitors' Training and Examination Committee of the Royal Sanitary Institute, meeting periodically in London.

Dr. McKinney, County M.O.H. for County Down, speaking at Bangor on March 11, has stressed the need for a Central Training Body for post-graduate and district training.

I understand that recently a meeting of representatives of all three Training Schools took place in Belfast in order to negotiate the formation of such a Central Training Body.

I would only add these two thoughts—(1) that such a body should be a matter purely for the nursing profession, subject to approval of standards of training by the Joint Nursing and Midwives Council; and (2) that extra-mural affiliation with the Queen's University for the institution of Diplomas in Nursing of a scope equal to, if not wider than, that of the London and Leeds University Diplomas, should be sought.

Conclusion

What can I say in conclusion! We have come a long way since the middle of last century when maternal mortality was of the order of 25 per cent. "in hospitals" (Agnes Pavey)

APPENDIX

Approved Maximum Establishment of Public Health Nurses 1948-1950

Health Authority	No. of Health Districts	M. & C.W.	H.V.	Schools Nursing	Total Preventive	School Clinic	Midwifery	Home Nursing	Total Treatment	Grand Total
Antrim - - -	5	15	5	5	25	5	35	7	47	72
Armagh - - -	3	9	3	5	15	3	20	4	27	42
Down - - -	6	18	6	6	30	6	37	8	51	81
Fermanagh - -	2	6	2	2	10	1	10	3	14	24
Londonderry - -	3	9	3	3	15	3	20	4	27	42
Tyrone - - -	5	15	5	5	25	5	24	6	35	60
Belfast County Borough - -	—	27	9	18	54	9	45	27	81	135
Londonderry County Borough -	—	6	2	2	10	1	9	3	13	23
	—	105	35	44	184	33	200	62	295	479

Both infant mortality and maternal mortality rates in Northern Ireland now compare very favourably with other parts of the United Kingdom. We are not the best, but not far behind the leaders, and the new services, particularly the local government ones, are not even under way!

In no other part of the United Kingdom is the establishment of local government services and of general health services taking place simultaneously.

The Nursing Services have received recognition on the Northern Ireland Hospitals Authority by the appointment of Miss Melville, and the importance of nursing as a calling needs no stressing now-a-days.

There are difficult times ahead, but if you bear in mind two things—(1) the duty which has been imposed by Act of Parliament on Health Authorities; and (2) that, whatever is done, is done primarily for the benefit of the public, and not the individuals operating the services, I have no doubt that you will bring to your everyday problems a serenity of outlook and firmness of purpose that alone will produce a truly great service.

I am indebted to Dr. James Boyd (Chief Medical Officer), Dr. E. Armstrong and Mr. John Oliver, for very helpful criticism; and to the Ministry of Health and Local Government for permission to publish this document.

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Poliomyelitis in Northern Ireland—1947 with Special References to Epidemiology

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This paper is intended simply as a record of the more important features of the epidemic of poliomyelitis in Northern Ireland in the summer and autumn of 1947—the worst epidemic yet recorded in this country.

Incidence in Previous Years

Before 1947 no large-scale outbreak of poliomyelitis in Northern Ireland was recorded, but available records show that sporadic cases occurred each year since 1923. A table (No. 1) showing the statutory notifications and registered deaths in the years 1937-46 is given, but there are good reasons for believing that the true incidence was much greater than the numbers of statutory notifications. Four of the sixty-seven local authorities in Northern Ireland did not make the disease notifiable until recently; three in 1941, and one in 1948. The figures in the table are, therefore, incomplete, in that about 41,600 of a total population of nearly 1,333,000 are excluded before 1942; and subsequently 5,600 of the population are excluded. More than 25 per cent. of confirmed cases in the recent epidemic were not notified by statutory means, and there is evidence that at least 50 per cent. of cases occurring in the early part of 1947, prior to the epidemic, were not notified. It is probable that similar or even greater percentages of the total number of cases were not notified in previous years, when the disease was not given comparable publicity. That such difficulties in the notification of this disease are not confined to Northern Ireland is shown by the findings of Nelson and Aycock. They concluded that of 2,263 paralysis cases coming to the Harvard Infantile Paralysis Commission from 1928 to 1941, 23 per cent. were not officially reported; each year reporting was less than 50 per cent. complete for January to May inclusive, but 90 per cent. complete for August, and improved during an epidemic; further, it was most defective in localities of under 2,500 population.

Case mortality rates in Table I are unusually high. Average figures for many recorded epidemics vary from 9 per cent. to 15 per cent., and a search revealed extremes of 1.5 per cent. and 33 per cent.; the latter figure (admittedly of little value statistically) being obtained from statistics of an outbreak in Rhodesia involving only nine cases in a small community of whites. References to the sporadic disease from a statistical point of view are few, and comparable figures for sporadic cases could not be found. Landon, in a study of two hundred cases of sporadic poliomyelitis in New York City, reports that the sporadic disease differs in no essential feature from the epidemic variety. Levadite and Hornus tested the virulence of poliomyelitis virus in different seasons and found it constant; they express the opinion that any modifications should be attributed to seasonal varia-

TABLE I

STATUTORY NOTIFICATIONS OF POLIOMYELITIS AND DEATHS FROM THAT DISEASE DURING YEARS 1937 TO 1947 INCLUSIVE, SHOWING CASE MORTALITY RATES AS A PERCENTAGE

	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947
Statutory Notifications	11	11	12	4	20	16	14	13	37	22	202*
Deaths	5	3	3	4	12	9	6	2	14	7	30
Case Mortality percentage, assuming all cases to have been notified	45.4	27.3	25	100	60	56.2	42.8	15.4	37.8	31.8	14.9

* This is the number of notifications received by normal statutory channels and not the total number of cases which are known to have occurred.

tions in the host. The small numbers involved in the years 1937-46 and the absence of comparable figures based on sporadic cases in other countries make it impossible to draw definite conclusions from the case fatality rates given above, but the uniformly high figures suggest incomplete notification in those years. Lastly, the disease is specially looked for in epidemic periods and it is probable that many mild and non-paralytic cases (if the latter do occur, apart from epidemics), are missed in non-epidemic periods.

To sum up: any estimate of the incidence in previous years in Northern Ireland must be speculative. The indications are that 50 per cent. or more of the cases with some degree of paralysis are not notified in non-epidemic periods, and that many more cases occur in winter and spring than the recorded figures show.

Administrative Action During the 1947 Epidemic

There is reason to believe that more than 90 per cent. of cases in the recent epidemic were notified to the Ministry of Health and Local Government; partly by statutory methods, but mainly in response to a request by the Chief Medical Officer of the Ministry to all medical practitioners that a copy of the notification should be sent direct to the Ministry. The statutory system of notification whereby the doctor making the diagnosis notifies the Medical Officer of Health, who then notifies the Clerk of the local authority, and who in turn forwards notifications weekly to the Ministry, is obviously unsatisfactory during an epidemic. Had it not been for suspicions aroused by the knowledge of the increasing weekly incidence in England and Wales, a considerable delay in appreciating the onset of an epidemic in Northern Ireland might have resulted. In mid-July, however, a rapid survey of all fever hospitals was carried out, and the results indicated an unusual prevalence of poliomyelitis. The Chief Medical Officer, in his circular letter to

practitioners, drew attention to the increasing prevalence, stressed the importance of early diagnosis and treatment, with special reference to rest in the early stages, and suggested that all suspects should be isolated, as infectivity is greatest in the early stages. A review of the case sheets of hospital patients was initiated a few weeks later. The situation and the working efficiency of all respirators were checked and a satisfactory redistribution effected. Lastly, arrangements were made for the provision of beds in the Ministry's Emergency Hospital at Musgrave Park, Belfast, for patients from any part of Northern Ireland who required orthopædic treatment. The question whether or not it was desirable to close schools, swimming baths, cinemas, etc., was left entirely to the local Medical Officer of Health.

Summary of Statistics of the 1947 Epidemic

Between 16th June and 31st December, 1947, 266 confirmed cases of poliomyelitis occurred in Northern Ireland, and there were thirty registered deaths from the disease in this period—a case fatality rate of 11.3 per cent. 296 notifications were received in this period, but in thirty of these cases the illness was subsequently diagnosed as caused by other diseases. Of the 266 confirmed cases, 160 were males and 106 females: 236 cases, or approximately 90 per cent., were admitted to hospital. Age distribution in more detail is given below, but it is of interest to note that 122 cases were under ten years of age, 44 were in the 11 to 15 age group, and 91 were over 15. Roughly two-thirds of the cases were under 15 years of age.

Antecedent Conditions

The epidemic showed the customary seasonal prevalence and died away with the onset of colder weather. The date of onset of the first recorded case in Belfast was 16th June.

A study of the notifications of infectious disease immediately before 16th June, 1947, reveals no remarkable features. Outbreaks of measles and whooping cough noted in the last quarter of 1946 and the first quarter of 1947 showed a steady decline in the second quarter of 1947.

Meteoro-climatic conditions were somewhat unusual in that the general rainfall was 156 per cent. above average for the months of April and May, and 159 per cent. above average for June. The mean temperatures for April, May, and June were respectively 1.2°F., 2.2°F., and 1.7°F. above average, and similar conditions prevailed in July. That the excessive rainfall is of any significance in so far as the epidemic is concerned is doubtful; indeed, August was exceptionally dry, hot, and sunny, being probably the warmest August on record, yet weekly incidence showed no significant fall. The one common feature in the weather during these months was a slightly higher temperature than usual. Once again, therefore, poliomyelitis in epidemic form occurred during warm weather in a mild climate. It should be remembered, however, that many winter epidemics have occurred—Iceland, 1945-46 and 1946-47; Montevideo, 1922-23; West Virginia, 1916-17; Alberta, 1939; and more recently in France, 1947-48.

Course and Spread of the Epidemic

In England and Wales the epidemic began at the end of May, some three or four weeks earlier than in Northern Ireland. The concentration of early cases in and around Belfast and the subsequent east to west spread across the country suggest that the epidemic spread from England. Tables II, III, and IV, and a graph of the weekly incidence illustrate the course and spread of the epidemic.

Sixteen of the first twenty cases occurred either in Belfast or within a twenty-mile radius of that city, the exceptions being cases in Crossmaglen, Banbridge, Cookstown, and Moneymore. The first two cases occurred within three days and were fifty miles apart. Then followed two more cases in the vicinity of Belfast and, fourteen days from the onset of the first case, one in Moneymore. The next twelve cases were within a twenty-mile radius of Belfast:

On 18th July a case occurred in Cookstown, five miles from Moneymore: From that date until 21st August, a period of five weeks, twenty-five cases occurred within a ten-mile radius of Cookstown. This undoubtedly constituted the most intense local epidemic, and it was followed by a lull of three weeks, except for one case (Coalisland, 29/8/47). A second, though less intense, outbreak occurred between the 11th September and the 29th October, when seventeen cases occurred in seven weeks in the same locality.

The characteristic features of this spread have been repeatedly noted in the literature; namely, simultaneous appearance of cases in different places, local foci of intensity in the epidemic, a severe primary rise followed by a period of quiescence, and then a secondary, less intense, rise in the incidence. The same features can be observed again as the epidemic spread farther west. Prior to the 26th of July, 1947, there

TABLE II

Location and Date of Onset of First Thirty Cases

NO.	LOCATION	DATE OF ONSET	NO.	LOCATION	DATE OF ONSET
1	Belfast	15/6/47	17	Belfast	17/7/47
2	Crossmaglen (Co. Armagh)	18/6/47	18	Cookstown (Co. Tyrone)	18/7/47
3	Belfast	21/6/47	19	Belfast	18/7/47
4	Lisburn (Co. Antrim)	24/6/47	20	Banbridge (Co. Down)	18/7/47
5	Moneymore (Co. Londonderry)	29/6/47	21	Holywood (Co. Down)	19/7/47
6	Donaghadee (Co. Down)	30/6/47	22	Cookstown (Co. Tyrone)	19/7/47
7	Bangor (Co. Down)	2/7/47	23	Aughnacloy (Co. Tyrone)	19/7/47
8	Killinchy (Co. Down)	3/7/47	24	Birches, Portadown (Co. Armagh)	19/7/47
9	Crumlin (Co. Antrim)	4/7/47	25	Cookstown (Co. Tyrone)	20/7/47
10	Belfast	5/7/47	26	Cookstown (Co. Tyrone)	22/7/47
11	Craigavad (Co. Down)	8/7/47	27	Portrush (Co. Antrim)	22/7/47
12	Antrim (Co. Antrim)	10/7/47	28	Magherafelt (Co. Londonderry)	22/7/47
13	Helen's Bay (Co. Down)	11/7/47	29	Belfast	24/7/47
14	Belfast	11/7/47	30	Belfast	24/7/47
15	Belfast	12/7/47			
16	Donaghadee (Co. Down)	16/7/47			

TABLE III

MONTHLY INCIDENCE IN SELECTED LOCALITIES TO ILLUSTRATE EAST-WEST SPREAD

	Belfast County Borough	Cookstown Urban and Rural District Co. Tyrone	Dungannon Urban and Rural Districts Co. Tyrone	Omagh Urban and Rural Districts Co. Tyrone	Londonderry County Borough	Irvinestown Rural District County Fermanagh
June -	2	—	—	—	—	—
July -	14	7	—	—	—	—
August -	23	11	8	3	3	—
September	12	3	1	10	—	—
October -	4	5	3	2	2	3
November	2	3	1	3	—	1
December	3	—	—	2	—	—
TOTALS	60	29	13	20	5	4

TABLE IV

ILLUSTRATING THE FOCI OF MORE INTENSE EPIDEMICS IN CERTAIN LOCALITIES

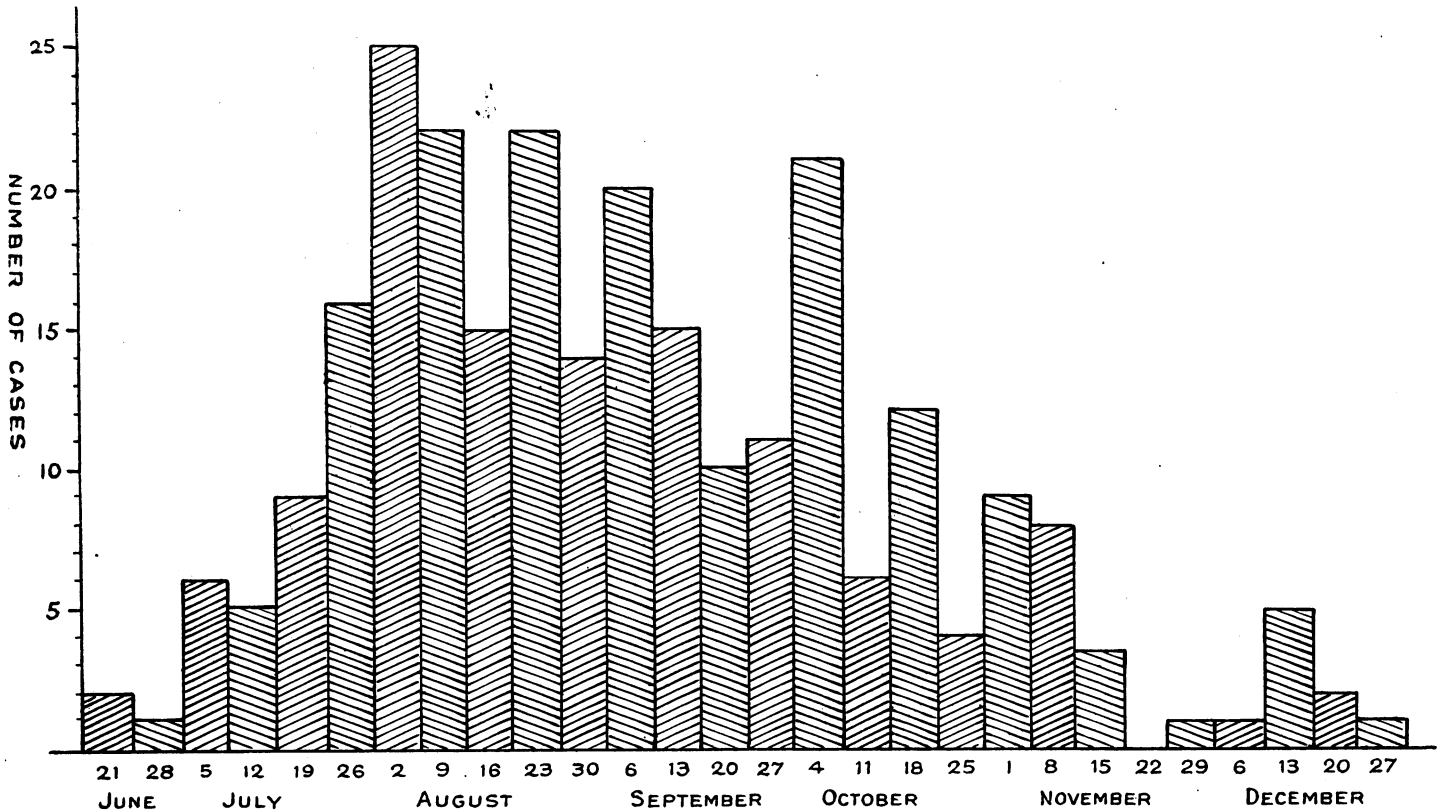
	Cases	Population (1937 Census)	Incidence per 100,000
Belfast County Borough - - - -	60	438,086	14
Cookstown Urban and Rural Districts -	29	19,018	152
Omagh Urban and Rural Districts - -	20	35,984	57
Magherafelt Rural District - - -	16	31,093	51
Dungannon Urban and Rural Districts -	13	28,464	45
Ballymena Borough and Rural District -	11	45,400	24
Limavady Urban and Rural Districts -	11	17,370	63
Downpatrick Urban and Rural Districts -	10	32,993	30
Newtownards Urban and Rural Districts -	9	39,196	23

were no cases west of a line from Aughnacloy to Limavady. On that date a case occurred in Strabane, five days later a case in Newtownbutler, and two days later one in Londonderry County Borough. A comparatively high incidence developed in Omagh Rural District early in September.

Dornedden, in referring to these features in the spread of poliomyelitis in Germany during the years 1928 to 1932, notes that in a post-epidemic year cases often appear in districts bordering on the epidemic centre. No adequate reason can be offered to explain the very uneven distribution of the disease.

EPIDEMIC OF POLIOMYELITIS IN NORTHERN IRELAND, YEAR 1947

SHOWING WEEKLY INCIDENCE OF CONFIRMED CASES BY DATES OF ONSET



Incidence Compared with that of Similar Epidemics in Other Countries

The incidence of confirmed cases in Northern Ireland was 20 per 100,000 of the population—slightly higher than 18 cases per 100,000 in the 1916 U.S.A. epidemic, but far short of 58 which Norway had in 1941, or figures of 44 for Sweden and 41 for Switzerland in 1944. In the following table uncorrected notifications are used, as corrected figures are not available for the other countries in the United Kingdom.

TABLE V

To Compare the Uncorrected Notifications of Poliomyelitis Received Between 21st June and 31st December, in England and Wales, Scotland, Eire, and Northern Ireland

	Total Notifications (Uncorrected)	Incidence per 100,000
England and Wales	8,977 (approx.)	22
Scotland	1,675 (approx.)	34
Eire	171 (approx.)	6
Northern Ireland	296	22

The similarity of rates in England and Wales and Northern Ireland is remarkable. It is interesting to note that in 1945/46 a less intense epidemic involved Eire without spreading appreciably to Northern Ireland, and that the 1947 epidemic in Northern Ireland did not spread to any measurable extent to Eire. In England and Wales the corrected quarterly figures expressed as a percentage of the uncorrected notifications are fairly constant at 91 per cent. The corresponding figure for Northern Ireland in the present epidemic is 90 per cent.

In the autumn of 1947 there were two other epidemics of unusual intensity in Europe, one in Berlin and one in Austria.

Age Incidence

Cases have been reported in the literature in all age groups from infants seven days old to adults. The youngest and oldest patients in the present epidemic were aged three months and fifty-one years respectively. In nine cases no information about age was available.

TABLE VI

Incidence by Age Groups of 257 of the 266 Confirmed Cases

Age	Number of Cases	Per Cent. of Total
0-1	6	2.2 per cent.
1-5	63	24.6 per cent.
5-10	53	20.6 per cent.
10-15	44	17.1 per cent.
15-20	18	7.0 per cent.
20-25	19	7.5 per cent.
25 and over	54	21.0 per cent.

It is noteworthy that more than 35 per cent. of the patients were over fifteen years of age and more than 20 per cent. were over twenty-five years of age: approximately 27 per cent. were pre-school age children and 37 per cent. were children of school age.

Windorfer stated that "age shifting" seems to depend on the length of time the disease has been epidemic or non-epidemic in a region and on the extent and number of the epidemics; on the other hand, as the worst epidemics have occurred in countries where sanitation is at a high level and model districts seem to be as exposed as poorer localities, it has been suggested that a higher percentage of "non-immunes" has developed in older age groups as a direct result of improved food handling and sanitation (Burnet, 1945).

Certainly a fall in the prevalance of the enteric fevers has taken place concurrently with an increase in the incidence of poliomyelitis, and in St. Helena, (1946), where the disease was previously unknown, children under five were little affected and most cases occurred in the age group 10-25.

In epidemics before 1910, 60 per cent. to 90 per cent. fell in the age group 1 to 5 —hence the name *infantile paralysis*. From 1910 until the St. Helena epidemic (1946), Windorfer's view appeared to be borne out by the findings in many epidemics. For example, Paul, Trask, and Salinger noted an appreciable difference between the infant morbidity rate in the two epidemics in the city of Newhaven, Connecticut, in the years 1916 and 1931. In 1916, 13.5 per cent. of all cases occurred in infants under one year, whereas in 1931 only 0.5 per cent. occurred in this age group.

The only hypothesis to fit the facts now available is that in an initial epidemic in virgin country there is a universal age distribution, subsequent epidemics affect principally younger age groups because the older age groups have a larger percentage of immunes. As the sanitation of the region improves this percentage falls, and there is a shift again to the older age groups.

Sex Incidence

It is generally stated that the disease shows a higher incidence in males than in females, and the male/female ratio in this epidemic is 1.5 : 1. The male/female ratio arrived at by the International Committee, following their investigations in 1932, was 1.3 : 1.

Mortality Rate

There were thirty deaths during the epidemic—nineteen in the third quarter of the year and eleven in the last quarter—giving a case-mortality rate of 11.3 per cent. The following case-mortality rates were recorded for epidemics in Germany (Dornedden, H.) :—

12.8 per cent. in 2,840 cases (1927)
15.1 per cent. in 996 cases (1928)
15.0 per cent. in 1,157 cases (1929)
9.5 per cent. in 1,363 cases (1930)
11.2 per cent. in 1,613 cases (1931)
8.4 per cent. in 3,735 cases (1932)

Figures for recorded epidemics vary (as already stated) from 1.5 per cent. to 33 per cent., and it would appear that the rate in this epidemic is within average limits. There were no deaths from the disease in the first five months of the year. The thirty deaths occurred as shown in the following table :—

TABLE VII

LOCALITIES IN WHICH DEATHS OCCURRED WITH CASE-MORTALITY RATE IN EACH LOCALITY

	DEATHS	NUMBER OF CASES	CASE MORTALITY
Belfast County Borough -	4	60	6.7 per cent.
County Antrim - - -	7	41	17.1 per cent.
County Armagh - - -	3	7	42.9 per cent.
County Down - - -	9	42	21.4 per cent.
County Fermanagh - -	1	8	12.5 per cent.
County Londonderry - -	2	37	5.4 per cent.
County Tyrone - - -	4	71	5.6 per cent.

Three of the deaths in Tyrone occurred in Cookstown Rural District.

It is often stated that poliomyelitis receives an unjustifiable degree of publicity in the press during an epidemic and that this, when associated with the name *infantile paralysis,* produces an unwarranted dread of the disease, especially in mothers of young children. The following table shows that, even during an epidemic, poliomyelitis is not the most important cause of death or invalidism in the community.

TABLE VIII

SHOWING DEATHS FROM POLIOMYELITIS AND SEVERAL OTHER CAUSES (1942 TO 1947)

	1942	1943	1944	1945	1946	1947
Poliomyelitis - - - -	9	6	2	14	7	30
Tuberculosis (all forms) - -	1,259	1,190	1,164	1,058	1,099	971
Whooping Cough - - - -	64	113	95	76	65	97
Cerebro-Spinal Fever - - -	70	44	25	28	26	17
Typhoid and Para-Typhoid Fevers -	7	12	19	6	9	10
Road Accidents - - - -	210	146	146	113	93	88
Other Accidents - - - -	399	367	344	328	344	324
Total Accidental Deaths from Violence	609	513	490	441	437	412

ENVIRONMENTAL INVESTIGATION

The complete lack of susceptible laboratory animals in Northern Ireland precluded any attempt at a complete investigation.

It is well known that in all fully investigated epidemics, cases of associated febrile illness of an indeterminate character in known contacts far outnumber the clincally recognisable cases of poliomyelitis; the work of Paul and Trask in 1933, and Casey and others in Chicago more recently, has produced good evidence that most of these illnesses are, in fact, due to the virus of poliomyelitis. Indeed, Casey

thinks that 98 per cent. of poliomyelitis is a mild, widespread, highly communicable disease of young children, and the Scottish Health Bulletin (November, 1947) goes so far as to describe poliomyelitis as "not a disease, but rather an unusual complication of a common symptomless or almost symptomless disease." The hypothesis is that dissemination of the virus is accomplished mainly by respiratory means by successive individuals acting as virus reservoirs, each for short durations, and each distributing virus to relatively few persons; every degree of pathological response in infected individuals is envisaged—from no response at all, or perhaps a slight fever of a few hours duration, an ache in the back, transient headache and anorexia, or general aches and pains—to the severe classical case familiar to all practitioners.

This theory of the disease would appear to be the one which correlates best with the usual course and spread of epidemic poliomyelitis, as described for this epidemic : it is obvious that any attempt at complete environmental investigations of the disease based on this hypothesis can be made only by large teams of trained investigators, working to a definite plan and with the aid of an adequate laboratory service and sufficient susceptible animals. None of these prerequisites is available in Northern Ireland.

Advocates of a theory of alimentary spread invoke in support of their theory the usual seasonal incidence of epidemics; flies (as carriers); the distribution of faeces by railways; authenticated milk-borne epidemics; the transient presence of the virus in the throat compared with its prolonged excretion in the faeces, and its concentration in the oro-pharynx as opposed to the naso-pharynx. It may be that both respiratory and "alimentary carriers" spread the disease.

There appears to be little support for an hypothesis that the virus is water-borne, although it is known that some strains of the virus are not vulnerable to the concentrations of chlorine ordinarily employed in the purification of domestic water supplies. Maxcy and Howe, writing in the Sewage Works Journal, November, 1943, state that the epidemiological pattern differs significantly from that of other diseases known to be water-borne.

Our knowledge of virus disease in general, and of poliomyelitis in particular, will need to be greatly enlarged before this controversy can be settled, but the first hypothesis seems to fit in best with the known facts. Singularly little attention seems to have been directed to the sporadic disease. It is to be hoped that many further investigations on the lines of those made by Paul, Trask, and Casey will be carried out, with special reference to the known contacts of the sporadic disease.

In this epidemic all the Belfast County Borough cases were investigated fully on the usual lines by the Medical Officer of Health and his staff, but no significant findings were obtained. A discussion with Medical Officers of Health in other areas revealed that any direct connection between cases was exceptional.

The number of nurses employed in fever hospitals who were at risk in the early stages is not accurately known, but about 140 fever nurses are employed. The total number of persons, including medical and lay staff, coming in direct contact with patients in hospitals is not available. 236 patients were admitted to fourteen fever hospitals outside Belfast and two fever hospitals in Belfast. Patients with paralysis were transferred to surgical units from three weeks to several months

after admission to fever hospitals. Strict barrier-control was instituted in all hospitals. More than 65 per cent. of cases were admitted on or after the fourth day of illness; about 20 per cent. were admitted on the third day; and about 12 per cent. before the third day. Only one member of a hospital staff, a nurse, contracted the disease during the epidemic, but no conclusions can be drawn from one case, as the infection may have been contracted anywhere.

Numerous cases of siblings contracting the disease were noted, but as there is no means of telling which is primary and which secondary, any data on this subject are of little value. In investigations on the incubation period of poliomyelitis it is too often assumed that the first case to show symptoms is the first case to be infected.

If the universal, or almost universal, distribution of the virus is accepted, why do so few develop the clinically recognisable disease? Numerous records of second attacks of the disease suggest either that the immunity conferred by one attack is specific for only one strain of the virus, or that it is not as "solid" an immunity as had been thought. Apart from immunity, various theories of susceptibility have been propounded; varying from those based on vitamin or other dietary deficiency to those grounded on glandular abnormalities or other inherent physiological defects. Cases closely associated with pregnancy are quoted to support the latter theory. Two cases associated with actual pregnancy were noted in the present epidemic : another case contracted the disease on the ninth day of the puerperium, and at least three were mothers of infants a few months old. In this connection, the results obtained by Gordon at Harvard are of interest (Daley) : the giving of œstrogens reduces by one-third the death rate in mice to challenging doses of poliomyelitis virus. Further, the progeny of these mice are immune and mice suckled by the progeny of mice which have had the œstrogens are also immune. The possibilities of this work are immense, but results obtained with the Lansing strain in mice are, unfortunately, far removed from practical measures for prevention of the disease in humans.

Review of Hospital Cases

Of the 266 confirmed cases, 236, or approximately 90 per cent., were admitted to hospital. The case sheets of 190 of these have been reviewed. As many patients have been discharged since review and many are still in hospitals in different areas, a complete statistical analysis is not possible.

Approximately 80 per cent. of the hospital cases, or 71 per cent. of the total cases, were included in the investigation. Of these

21 per cent. were non-paralytic on admission.
36 per cent. were non-paralytic on discharge.
10 per cent. died.
35 per cent. had severe degrees of paralysis involving prolonged stay in hospital.
19 per cent. were of intermediate or mild degrees of paralysis.

It is known that two of the total of 30 deaths occurred outside hospitals, but it

is likely that a high percentage of the other patients (28) treated at home were non-paralytic. On this assumption, at a rough estimate it would seem that approximately 35 per cent. of all cases were non-paralytic, 11 per cent. died, and 54 per cent. had some degree of paralysis; more than half of the latter being mild or intermediate grades of paralysis.

It will not be possible for a considerable time to come to assess the ultimate results in so far as paralysis is concerned.

Symptomatology

Records of 184 cases were examined. The frequency of some signs and symptoms recorded is given in the following table :—

Headache - - -	102	55 per cent.
Backache - - -	53	28 per cent.
Vomiting and Nausea -	84	45 per cent.
Retention of Urine - -	30	16 per cent.
Nystagmus - - -	20	11 per cent.
Stiffness of Neck - -	106	57 per cent.

Classifying the cases as Brain-stem or Spinal, the latter predominated in proportions of approximately three Spinal to one Brain-stem.

Records of Laboratory Investigation of Cerebro-Spinal Fluid

In 136 of the cases investigated, the findings in the cerebro-spinal fluid were recorded. The fluid was clear, and under pressure in the vast majority of cases, a few being listed as slightly turbid and a few as blood stained. 87 per cent. showed protein above 45 mg. per cent., and in 91 per cent. leucocytes were present in numbers varying from 450 per case to "a few"; lymphocytes and polymorphs were in varying proportions.

Conclusions and Recommendations

Many measures aiming at the control of poliomyelitis have been instituted as a response to public pressure rather than as the result of scientific conviction. If, as appears probable, it is a highly communicable disease with a universal distribution, measures designed to prevent the individual's coming in contact with the virus would have to be on such a scale as to disrupt the whole economic and social life of the community. Even early segregation of the suspect patient will result in little or no reduction in the total virus circulating in the adjacent population. Nevertheless, this segregation should be effected as early as possible in illness where the disease is suspected, especially during epidemics, and the maximum degree of rest enforced on the individual patient, as it is reasonably certain that this measure will limit residual paralysis.

Doubts have been expressed about the efficacy of pasteurisation of milk in killing the virus, and as authentic cases of spread by milk are known to have occurred in local epidemics in other centres, it might be suggested that during an epidemic all milk should be boiled immediately before it is used. It is unlikely, however,

that milk can be an important factor in the spread of such an epidemic as that experienced in Northern Ireland in 1947.

Flies are carriers of the virus during an epidemic, but large-scale experiments with D.D.T. to effect an appreciable reduction in the fly population during epidemics have produced no noticeable effect on the total incidence. It is, however, reasonable to recommend domestic anti-fly measures.

General measures for the prevention of enteric disease are considered desirable; patients should be nursed with strict barrier-control.

Swimming entails violent exercise, and for this reason should be discouraged during an epidemic; but pools might be left open and the matter left to the good sense of the public once a warning has been issued.

The epidemic in Northern Ireland appeared to progress whether schools were open or closed. In fact a large number of cases occurred when the schools were closed, and there was no evidence to suggest spread in any particular school.

Experience in other countries suggests that another epidemic of similar extent, or even a more severe one, is a distinct possibility within the next few years, if not next summer. The present incidence in England and Wales, which has remained well above the average for the winter season, is suggestive of another epidemic next summer.

An improved system of notification will come into effect this year in Northern Ireland, and in the future accurate figures of actual cases should be available. Earlier recognition of epidemics should be possible. It is important to inform medical practitioners generally if there is an increasing incidence. District Medical Officers may be able to obtain useful data on associated febrile illness.

The disadvantages of too much publicity in the Press have been stated, but a greater appreciation of the disease by the public probably leads to a reduction in the number of undiagnosed paralytic cases, and therefore to earlier orthopædic treatment.

Summary

1. The epidemic of poliomyelitis which occurred during the summer and autumn of 1947 in Northern Ireland is reviewed; the seasonal incidence, age and sex incidence, total incidence, case mortality rate, course and spread of the disease are discussed, with special reference to modern hypotheses on the epidemiology of the disease. The likelihood of future epidemics is mentioned.
2. The recorded incidence in previous years in Northern Ireland is stated. It is suggested that the incidence in those years was much greater than recorded figures suggest.
3. Various data obtained from a review of the hospital case sheets of 190 cases which occurred during the 1947 epidemic are given.

I wish to express my thanks to Dr. Boyd, Chief Medical Officer of the Ministry of Health and Local Government, for encouraging me to publish this paper; to Dr. Elder, Deputy Chief Medical Officer, and to Dr. Armstrong, Senior Medical Officer, without whose help and criticism the paper would never have been written;

to Dr. Barron, Medical Officer of Health, Belfast, and his staff; and to the medical staff of a large number of hospitals for their ready co-operation at all times.

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REVIEW

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In spite of the difficulties of the times, the authors have succeeded in maintaining and, in many respects, surpassing the excellence of previous editions. This comprehensive textbook has found favour, not only with undergraduate medical students and graduates reading for a certificate or diploma in public health, but also with medical officers of health and other public health officers who find in it a wealth of information bearing on every aspect of public health work.

The book is clearly written and the implications of complicated sanitary law are much simplified by the easy style of approach to administrative problems connected with both personal services and environmental work.

The chapter on hospitals and hospital administration contains much useful information, but the limitation of control of local authority hospital services, brought about by the National Health Services Act, will now render the subject matter of the chapter of less interest to the medical officer of health.

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S. B.

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S. B.

Insulin Shock Therapy in Schizophrenic States

By Robert Thompson, M.B., B.Ch.(Belf.), D.P.M.(Lond.)
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Introduction.

In 1935 Sakel of Vienna* introduced hypoglycæmic insulin shock therapy for schizophrenic states, following upon some experiments he had made with this method of treatment in cases of drug addiction. The treatment at once commanded attention because of undoubted recoveries in patients whose prognosis had hitherto been most unfavourable, but the general adoption of the treatment, especially in the British Isles, was extremely tardy and was no doubt influenced by the considerable difficulties of technique and the not inconsiderable attendant risks. For a number of years it was considered essential to be able to carry out immediate blood sugar estimations in the course of treatment, and for this and other reasons smaller hospitals felt the treatment to be outside their range. However, with more experience, the dangers and difficulties became more clear-cut, and the treatment is now rapidly taking root. In February, 1946, we first undertook this treatment in Armagh Mental Hospital, and this paper is an attempt to give the result of our experience of the first year's working.

Technique.

I must emphasize at the outset that any remarks I may make under this heading must only be regarded as elementary and introductory. Those who wish to undertake this treatment will read and re-read the account of technique given by Sargant and Slater, but no amount of reading will replace actual personal experience, and a minimum of a fortnight's course at a clinic where this treatment is being carried out should be regarded as absolutely essential.

Patients undergoing treatment receive their injections of insulin at 7 a.m. fasting, every day except Sunday, beginning with ten units and increasing daily until the coma dose is reached. In Armagh we increase by ten units only up to one hundred units and afterwards by twenty units. By this method it appeared that coma doses were reached at lower levels than when jumps of thirty to forty units were made, and, of course, other things being equal, the lower the coma dose the greater the safety.

Following his injection, at varying intervals from one and a half to three hours, the patient passes into a pre-coma condition known as sopor. It is important to recognize this and to note the exact time of its onset. Sopor can most conveniently be described as the first sign of mental disturbance produced by the insulin injection; the patient is hazy or incoherent in his remarks although he attempts to pay attention to what is said and will follow movement with his eyes. At the same time he

*It is significant that the same laboratory which gave us the malarial treatment of general paralysis about a quarter of a century ago should now be responsible for a second great advance in psychiatric treatment.

is usually sweating profusely and twitching or jerking, or making explosive noises with his mouth, or requiring restraint on account of great restlessness or impulsiveness. In patients who are completely unco-operative the onset of sopor must be judged by assessing the degree of the latter symptoms.

At varying intervals from the onset of sopor, but usually somewhere between fifteen and forty-five minutes, coma supervenes. It is absolutely imperative to note the exact time of the onset of coma, and the judgment as to when the dividing line between sopor and coma has been passed is, to the inexperienced, often a matter of considerable difficulty and emphasizes the need for practical experience in this treatment before it is undertaken. Accounts in textbooks rightly draw attention to the absence of response to auditory, visual, tactile, and pain stimuli when coma is reached, with often the presence of a Babinski response, but I think it is safer and wiser to note immediately the time one is satisfied that a *clinical* coma has been reached and to measure the duration of coma from that time, rather than to depend upon physiological responses which are by no means absolutely uniform. Kalinowsky and Hoch give a simple dictum which is well worth keeping in mind —"The patient is in coma if it is impossible to establish contact with him."

When coma is reached the patient, of course, fails to respond to auditory stimuli; he does not answer or turn his head when his name is shouted into his ear, although he may open his eyes. Similarly if his eyes are open he will not follow one with them, but will stare blankly in front of him, or, what is often deceptive, move them aimlessly from side to side. Pain responses are usually elicited by pressure on the supraorbital nerve, and a concerted, purposive action to pull away the hand is usually regarded as a sign that the patient is not in coma. However, as I have already stated, I am not partial to these refinements of testing, as I think it is of supreme importance to note when a clinical coma has been reached, otherwise the total duration of the coma may far exceed what is safe.

It is important also to remember that the pattern of coma differs from patient to patient, although it usually remains more or less constant for the same patient. Only a proportion of patients display the classical signs of coma, that is, quiet, deep breathing, usually accompanied by profuse sweating and salivation. Some keep up continuous jerking movements, sometimes so violent as to require restraint by three or four nurses; others make continuous grunting or explosive noises with facial grimaces, while again others moan, squeal, or shout almost continuously, although they are completely unresponsive to any stimuli. Sweating and salivation are perhaps two of the most constant signs, apart from loss of response to stimuli. Sweating almost always begins in the sopor stage and is usually profuse. Salivation is a very constant and useful sign, and when it is observed coma, if not present, is imminent, and should be expected within five minutes; the patient has lost the swallowing reflex and saliva pours from an angle of the mouth. For this reason the head should be kept turned to one side. In exceptional cases, though, it is well to remember that coma may supervene without either sweating or salivation, the so-called "dry coma" of Kalinowsky and Hoch.

When satisfied that coma has been reached the time should be noted on a black-

board, placed in a prominent position in the ward. On this blackboard will also be noted time of onset of sopor, time of feeding, and time of awakening. When a number of patients are being treated it is only by constant reference to the blackboard that mistakes can be avoided. At the end of the morning's session the results of treatment are entered in the permanent records. As soon as the patient is fully awake he is thoroughly dried, given warm, dry clothing, and immediately afterwards given breakfast.

Interruption of Coma.

The usual practice is to allow only five minutes coma on the first day, increasing by five minutes daily up to a maximum of about thirty minutes. There may be some advantage in prolonged comas in exceptional cases, but unless there seems something specially to warrant it our practice now is to interrupt at the end of twenty minutes. The safety of this treatment so greatly depends upon the avoidance of shock, to which I shall refer later, that every precaution against shock must be observed, and, other things being equal, the amount of shock is usually directly dependent upon the duration of the coma.

Coma is interrupted by passing a nasal tube into the stomach and giving a feed of 20 oz. 33 per cent. glucose. (Sugar will do equally well—7 oz. of sugar being dissolved in boiling water, water added to make up to one pint, and all kept warm—almost hot—and ready for immediate use.) It is essential to make sure that the nasal tube is in the stomach before giving the feed. The safest plan is to draw off a little of the stomach contents and test with litmus, but as this procedure is often difficult and time-consuming, and other patients may be awaiting their feed, a simpler plan is to give a blast of air into the stomach by means of an ear syringe; the "plop" of air can be distinctly felt by the hand placed over the epigastrium. Apart, of course, from any test, the nasal tube, once it has passed the glottis, should run freely and quickly into the stomach, and there should be no coughing or respiratory embarrassment whatever.

Following the nasal feed, the exact time of waking must be noted. It is stated by some authorities that the patient should be awake twenty minutes after the nasal feed, but I now think this period is far too long. Where the coma dose of insulin has not been excessive or the actual coma too prolonged, it will usually be found that the patient will respond to his name shouted into his ear five minutes after feeding, and if there should be no response ten minutes after feeding suspicion regarding the dosage or the duration of the coma should be aroused. If the patient is still in coma at the end of twenty minutes then intravenous interruption should be practised forthwith. One hundred c.cs. of a 33 per cent. *intravenous* glucose solution will usually bring the patient out immediately, often before the needle is withdrawn. If it should fail, then the condition has passed into irreversible coma, a highly dangerous condition, and this will require repeated intravenous glucose injections, large quantities of 5 per cent. glucose in saline transfusions, and many other measures spread over perhaps the next twenty-four or forty-eight hours before consciousness is regained, if at all.

In some hospitals the practice is to give the patient a second nasal feed at the

end of twenty minutes if the first one does not act, and only to interrupt intravenously if the second feed fails in another twenty minutes. There can be no question but that this procedure often works, but in my opinion it carries with it great risks. If the second feed fails to act then the coma has been lengthened another twenty minutes with that additional amount of shock. Intravenous interruption may now bring the patient round temporarily, but the amount of shock present may have stopped all absorption from the stomach, with the result that as soon as the intravenous glucose is used up he again relapses into coma, and for the next eight or ten hours at least one will be up against the problems of irreversible coma. If intravenous glucose is given without exception at the end of the first twenty minutes a severe degree of shock is usually avoided, with the result that absorption from the stomach continues, and no further intravenous interruptions are needed.

This question of shock in insulin therapy seems to me to be the cardinal one from the point of view of the safety of the patient. It goes without saying that the patients must be nursed in a comfortably heated ward and sufficient staff must be present to avoid exposure and chilling in the phases of restlessness; hot water bottles also may be required. It is important too that the daily carbohydrate intake remains absolutely uniform. These patients usually develop voracious appetites and, if allowed, will indulge in enormous meals. It is believed that such indulgence completely upsets the insulin requirements, with the result that excessive coma doses may be needed.

One essential point in the avoidance of shock is to endeavour to induce coma at the lowest level possible, and, when this has been obtained, to be on the alert to reduce the dosage if (a) the patient goes into coma too early (under $2\frac{1}{4}$ hours from injection is our rule), or (b) there seems any undue delay in coming round following the nasal feed. Frequently when the coma dose has been reached, which in our experience has varied from thirty to four hundred units, the dose can be progressively reduced, the patient apparently becoming more sensitive to insulin. It is, of course, equally important not to reduce the dose below the coma level, as the patient then merely has a few most uncomfortable hours in the treatment unit without any benefit. The most essential point, however, which I will risk repeating, is not to miss the onset of coma and thus to give the patient a longer period of coma than the agreed time. Unduly prolonged coma would appear to be *the* danger almost irrespective of the dose of insulin which produces it.

Complications.

A peripheral circulatory failure has been described. This will be treated on the usual lines with, of course, immediate intravenous interruption of the coma (the necessary apparatus should be at hand for cutting down on a vein, in case of collapse of the latter). This condition is probably another manifestation of shock in a more acute form, and should be guarded against by the measures already described.

A fit in the course of sopor or coma is not regarded as a complication, but calls

for immediate termination of the coma by nasal feed. The occurrence of a fit is often thought to speed up mental recovery.

Any sign of cardiac or respiratory embarrassment will, of course, call for immediate termination of the coma, as will also such symptoms as cyanosis, vomiting, or wild excitement. If coughing or stridor appears it is important to deal with it immediately, perhaps merely by altering the position of the head, pushing the jaw forward, and seeing that saliva does not trickle back into the larnyx. Stridor not thus relieved calls for immediate termination by nasal tube or intravenous glucose, and an airway should be at hand. A point worth remembering is that respiratory embarrassment which fails to respond to simple measures will often yield immediately to the passage of a nasal tube, before any glucose is given. The explanation of this is not very clear.

It is well also to interrupt if sopor continues for an hour without coma developing, or if the patient relapses into coma after awaking spontaneously, or in the presence of persisting tremors. In all cases whether or not coma has supervened a sugared feed should be given at the end of three and a half hours; comas occurring after this period are believed to entail considerably greater risks.

The one dreaded complication, however, of this treatment is, of course, the passing of the patient into a condition of coma from which he cannot be taken by intravenous glucose, that is the so-called "irreversible coma." I have indicated the main outlines of the treatment of this condition, and I do not propose to enter into details, as anyone undertaking this treatment will familiarise himself with the excellent account given by Sargant and Slater. In our series we had two such cases and one was particularly stubborn, requiring repeated intravenous glucose injections, transfusions of 5 per cent. glucose saline, coramine, adrenaline, withdrawal and replacement of glucose in stomach, etc., over a period of eight hours before consciousness was regained. With our improved technique I do not think either of these two cases would have occurred. In one case the insulin dosage was pushed up much too rapidly, with the result that the coma dose was excessive. In the other case the patient took a full twenty minutes to recover from coma for five successive days, and the significance of this was not appreciated or the insulin dosage reduced.

A not infrequent minor complication which, if unobserved, could be extremely serious, is what is called "after-shock." The patient makes a good recovery from the initial coma, but relapses again, usually within the period three to eight hours, but sometimes as long as twelve or fourteen hours from the morning coma. The alert nurse notices the patient becoming pale and beginning to sweat, and gives a sugared drink which corrects all the symptoms. Sometimes coma supervenes so rapidly that a nasal tube has to be passed. The condition, however, *if observed,* is not serious, but the danger is that an inexperienced night nurse may think the patient is asleep. For this reason, therefore, all insulin patients must sleep in full observation in an open ward and be in the charge of an experienced night staff, who will be on the look-out for symptoms of after-shock and will be on the alert to report anything at all out of the ordinary. Also, of course, patients, no matter how far recovered mentally, cannot leave the hospital except in the charge of a nurse.

Choice of Patient.

As this treatment is tedious and not without risks, it follows that its use should be restricted to those whom it is likely to benefit and who are unlikely to improve by other methods. In practice this nearly always means the early case of schizophrenia, and to psychiatrists it is more than gratifying that, after upwards of one hundred years search, a treatment for this condition has at last been found which offers some promise of cure. When electric convulsion therapy was introduced its brilliant results in depressive cases, especially of middle life, failed to hide the disappointment that it seemed relatively ineffective in schizophrenia. There is no doubt, however, that if insulin therapy is instituted early in this psychosis, that is, before there is time for permanent and irremediable scarring, and if given in full coma dosage over a relatively lengthy period, arrest and apparent complete cure may be brought about in a considerable percentage of cases. It is important, in my opinion, to start the treatment early for more reasons than one. These patients are very often, in the early phases, extremely restless, confused, resistive, sleepless, etc., with the result that unless insulin therapy is immediately begun following admission, sedatives, forcible feeding, restraint, seclusion, etc., all may be required in the first few weeks. The effect of this is to break any slight psychological rapport which the patient may have reached with his doctors or his surroundings, and the task of reconstituting this may be formidable.

Although electric convulsion therapy is of relatively little value in schizophrenic states and insulin shock therapy is not often required in depressive conditions, the two methods of treatment are not mutually exclusive. In schizophrenia periods of retardation, depression, stupor, restlessness, and sleeplessness are often greatly benefited by a few electric shocks, and these are given as and when required during the course of insulin.

In Armagh we have now treated a number of young adults displaying either manic or melancholic features. In the case of two young adults who exhibited recurrent attacks of mania the treatment appeared to give them much greater insight than following spontaneous recoveries, and so far they have not relapsed. In several other cases of adolescent hypomania insight was regained rapidly with corresponding marked physical improvement. Depressive conditions, too, in young adults often respond much better to insulin than to E.C.T. Sometimes these patients show poor physique, and if given E.C.T. only respond temporarily. Under insulin the weight goes up steadily, and with recovery the personality appears to be completely stabilised. Whether or not these early manic or depressive attacks have a schizophrenic basis is not an easy question to decide, but, in my opinion, the important point is that an insulin course, either to promote recovery or to insure against future dangers, would almost seem essential in any psychotic illness of early life, excluding, of course, such conditions as feeblemindedness, epilepsy, or organic states.

Results.

Carefully analysed statistics, as reported by Tennent, and covering some thousands of patients and controls, have established the fact that the immediate

recovery rate in insulin-treated groups is from three to five times that of control groups. In later years this disproportion would appear to lessen owing to relapses in the treated group, but in one carefully selected series of cases the distant recovery rate remained twice that of the control group.

In our first year of working twenty-four patients were treated, in whom 678 comas were induced, or an average of twenty-eight comas per patient. In our experience this was a fairly constant average, as in the recovered group the patients required from nineteen to forty-four comas, with an average of twenty-nine* per patient. Allowing for the time when the patient is working up to his coma dose, and also allowing for a number of days when the patient will unaccountably fail to go into coma, it will be seen that a fair average course of treatment extends from two to three months. Again, when it is realised that large numbers cannot possibly be treated at the same time—a safe maximum for an experienced team I would put at seven patients—the smallness of the number treated in our first year becomes explicable. Here I might remark that as small hospitals could not furnish two expert teams we found no objection whatever to treating both sexes in the same unit, suitably screened off, of course.

Of the twenty-four patients treated thirteen made complete recoveries, but as four of these recoveries were in manic-depressive patients the total recovery rate in the schizophrenic group was nine patients out of twenty treated. Of the latter number three were established cases of paraphrenia of many years duration, and one was an old-standing schizophrenic upon whom a leucotomy had been done in another hospital several years previously. I think one can reasonably omit these four cases, which will alter our final result to nine recoveries in sixteen relatively recent cases of schizophrenia. In all of the seven failures the disease appears to have been definitely arrested, and three who display paraphrenic symptoms with good personality are being considered for leucotomy.

To those not actively interested in psychiatry this result may not appear impressive, but when it is realised that prior to the adoption of insulin therapy a recovery rate of ten to fifteen per cent. was all that could be hoped for, it will be seen that the result, even allowing for the smallness of the numbers, is distinctly encouraging. Moreover, and this I think is an extremely important point, the patients were completely recovered within a couple of months of initiating treatment, and recovery did not come about, as in former years, after months or years of restlessness, confusion, stupor, destructiveness, and acute mental suffering to both patients and relatives.

The following three cases are fairly typical of our experience. In all of them E.C.T. was also tried at one time or another, but while relieving symptoms it became obvious that something more was needed to effect recovery. In other cases where the schizophrenic symptoms were more typical equally good results were obtained with insulin alone.

E. E. Adm. 12/10/45. Female. Single. Age 20. In semi-stuporose condition on admission. Sleepless. Refusing food. On account of refusal of food and sleeplessness

* From further experience we now aim at a minimum of forty comas per patient.

we were driven immediately to try the effect of E.C.T., and over the next five months patient had seventy convulsions. We fully realised we were not getting anywhere with E.C.T., but it was impossible to leave it off. When discontinued patient became extremely restless, confused, impulsive, and agitated, struggling and shouting all day long, and as she was a poorly nourished, asthenic type there was considerable danger of collapse. With E.C.T. nursing was relatively easy. This was the state of affairs when insulin shock therapy was begun on 4/3/46. Over the next three months patient had twenty-two comas, but it was only towards the end of the course that a definite improvement was noted, although nursing become much easier and only seven additional treatments by E.C.T. were required. (Insulin appears to have a decidedly sedative effect.) Early in June all affective loss had disappeared and patient was cheerful, pleasant, and fully occupied with knitting, etc. She was discharged on 22/6/46 and has remained well.

B. M. L. Adm. 17/2/46. Female. Married. Age 20. There was a history of a slight breakdown following birth of first baby one year before admission. On admission patient was confused and disorientated, crying and agitated, sleepless, and refusing food. Again on account of the latter symptoms E.C.T. was tried, and over the next two months patient had twenty-one convulsions. With E.C.T. appetite and sleep remained satisfactory, and patient kept on the whole reasonably placid and contented, but considerable mental retardation with affective loss remained in evidence and outlook for recovery was poor when insulin therapy was begun on 21/5/46. Over the next five weeks patient had twenty comas, and from the beginning her progress was remarkable, her weight increasing by fourteen pounds over the first twelve days. Insulin therapy was discontinued on 22/6/46. Patient remained cheerful, rational, and fully occupied, and was discharged on 7/7/46. Has remained well.

F. O'H. Adm. 2/4/46. Male. Single. Age 20. Farm Labourer. Depressed and hallucinated on admission. Thought people were following him and that voices were telling him he was going to die. In view of the depressive symptoms five convulsions of E.C.T. were given in the ten days following admission, but as there was no improvement insulin therapy was begun on 24/4/46. Patient had thirty-seven comas in all, and his progress was steady and satisfactory almost from the beginning of treatment. For the last two weeks of treatment he was cheerful, rational, and well occupied, and had regained full affective touch with his environment. Discharged 10/8/46. Has remained well.

Conclusion.

I have endeavoured to give a brief account of our experience to date with Insulin Shock Therapy in schizophrenic and other states. It will, I think, be appreciated that this treatment calls for considerable care and skill, but, granted the latter, it would not appear that the risks, though definite, are formidable. In Armagh to date we have induced over one thousand comas in some forty patients, and beyond the two complications already described there were no other untoward features. In any case one must always balance the risks against the almost certain mental deterioration of the patient, with the probability of a lifetime's stay in a mental hospital.

Before concluding I should like to express my thanks to my Assistant Medical Officer, Dr. B. P. Glancy, for all his work in connection with the introduction of this treatment, and also to my nursing staff, whose interest and enthusiasm surmounted all difficulties.

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The Surgical Aspects of Hæmatemesis and Melæna

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SINCE the year 1928, when one performed a partial gastrectomy on a young man who appeared to be dying from a bleeding gastric ulcer, I have adopted the following Creed and preached it for nineteen years. Having stated the Creed, one had to admit that the opportunity to practise it had never presented.

CREED

Fatal hæmorrhages take place from the left gastric artery or from the gastro-duodenal artery. Where the bleeding is due to a gastric ulcer, the left gastric artery should be ligatured near its origin. Where the bleeding is due to a duodenal ulcer, one should ligature the gastro-duodenal artery, if one can find it.

A recent case enabled me to put this Creed into use, but before giving details one might refer to the views of standard British textbooks and articles.

Rose and Carless, 1940—"As regards the treatment of hæmorrhage, the surgeon must never be tempted lightly to undertake operative measures in the hope of finding and dealing with the bleeding point. Reliance must be placed on the usual medical measures. When the bleeding has ceased and if the patient's condition justifies it, one may explore the abdomen for other sources of trouble."

Bailey and Love, 1935—"In hæmorrhage occurring from acute gastric ulcers, operation is never indicated. In the case of a chronic ulcer the type of operation which is likely to prove the means of saving most lives is a direct attack upon the ulcer in the shape of opening the stomach, inserting sutures so as to obliterate the ulcer, and thus compress the bleeding vessel."

Thomson and Miles, 1939—"Excision of the ulcer is the ideal treatment, and, in the case of gastric ulcer, the usual operation. It is often most easily effected by a partial gastrectomy."

Handfield-Jones and Porritt, 1943—"Immediate operation recommended by Finsterer of Vienna is not accepted in this country. Operation must follow for every chronic ulcer, after successful medical care has tided a patient over the emergency. Experience has shown that a partial gastrectomy after severe hæmorrhage with a hæmoglobin count as low as 35 per cent. to 40 per cent. is not so hazardous as might be imagined. The decision to operate being made, a constant drip-blood transfusion is started immediately and continued throughout the operation and for twenty-four hours afterwards. *The results of any less radical procedure are not satisfactory.*"

Illingworth, 1943—"The urgent treatment of actively continuing hæmorrhage from an ulcer is a problem to which there is no acknowledged solution.

"There is wide divergence of opinion, and some condemn operation, while others favour its use in many cases. It is accepted that conservative treatment leads to cessation of the bleeding in the majority of the patients, especially in the younger-age groups, but in an increasing number of older patients the bleeding continues or recurs and leads to extreme exsanguination and death. In these cases it is clearly desirable that an attempt should be made to ligate the bleeding vessel. The abdomen should be opened under local anæsthesia. If the ulcer proves to be duodenal, one should enclose the pylorus by an encircling catgut ligature and perform gastro-jejunostomy.

"If the ulcer proves to be in the stomach, a gastrectomy may be considered, but is generally too severe a tax on an exsanguinated patient. Failing this, the most satisfactory method is to *ligate the left gastric artery and any large branches of that vessel running towards the ulcer.*"

Post-Graduate Surgery, Vol. I, 1936—Page 582—"the conclusion may be drawn that in most hands surgical treatment in the presence of severe hæmorrhage from a peptic ulcer is unjustifiable, the danger to life from operation being greater than the danger from bleeding when left alone. When the hæmorrhage fails to be controlled by medical treatment it requires courage and conviction to pursue a path of apparent inaction. It is in such circumstances that surgery is sometimes undertaken as a last desperate measure from an illogical sentiment that 'something must be done.' Operation thus postponed until a state of exsanguination is reached becomes still more dangerous. Even when it is undertaken early, the risk of fatality is increased thereby and the scale perhaps turned against an otherwise recovery." Page 588—"In cases of gastric ulcer the ideal treatment is partial gastrectomy, and this operation should be carried out wherever possible. There must be a direct attack upon the ulcer."

Gordon-Taylor: British Journal of Surgery, Vol. XXV, October, 1937—"My own predilection nowadays is for gastrotomy, an opening of sufficient size being made to enable the gastric mucosa to be thoroughly inspected; the individual bleeding vessels are controlled by ligature or mattress sutures inserted from inside the viscus; the erosions which are the source of the hæmorrhage have been usually found towards the lesser curvature of the stomach." (Page 404)

"I am most anxious to protest that the treatment of ulcer hæmorrhage is not synonymous with partial gastrectomy. There is no one technique appropriate to every case for which operation has been judged necessary; the object of surgery is to arrest hæmorrhage, and I have at times availed myself of such varied surgical measures as gastrotomy or duodenotomy, with ligature of the bleeding vessel or vessels from the mucous membrane aspect; pyloric occlusion and gastro-jejunostomy; sleeve resection; gastrectomy, local or partial; gastro-duodenal resection; Finsterer's resection for exclusion; excision of duodenal ulcer, with some form of plastic operation of the pylorus; and jejunostomy.

"The ligature of the gastro-duodenal artery in continuity in cases of bleeding duodenal ulcer has been found a useful adjunct" (pages 413 and 416).

Gordon-Taylor: British Journal of Surgery, Vol. XXXIII, April, 1946—"There

are even laudable signs of some dissatisfaction to-day among certain physicians concerning the results of medical treatment, including transfusion, in the more fatal chronic gastric (and perhaps duodenal) ulcer hæmorrhages in males over fifty, and there is an evident disposition to invite and seek surgical aid for these cases."

"Blood transfusion given at the rate of about forty drops a minute is, perhaps, the most valuable single factor in the saving of life."

Summary of seventy-one operations performed for bleeding chronic peptic ulcer shows an operation mortality of 18 per cent.

Avery Jones: British Medical Journal, September 20 and September 27, 1947—Three operations in the first series of 400 cases and all three cases died. In a second series of 267 cases there were seven operations (partial gastrectomy) with one death. This second series consisted of specially selected cases, a group which showed a high mortality (over fifty—free from medical complications—a brisk recurrent hæmorrhage—evidence of chronic ulcer).

Case Report

B. H., a man aged 22. Admitted to the Ministry of Health Emergency Hospital, Belfast, in June, 1946, with a six-months history of pain in the lumbar spine. The X-ray revealed caries of the fourth lumbar body, and he was placed on a plaster bed, in full lordosis. Subsequently he developed a right psoas abscess.

August 16, 1947—Dyspepsia appeared and took the form of pain twenty minutes after food. Relieved by ulcer diet and alkalies.

September 2, 1947—First hæmatemesis: Bright red blood ʒxxv. Hæmoglobin 74 per cent.

September 9, 1947—Blood transfusion: two pints (drip).

September 10, 1947—Milk drip via Ryles tube. Hæmoglobin 94 per cent.

September 11, 1947—Second hæmorrhage ʒxxi, blood mixed with milk. Pulse 150.

September 12, 1947—Hæmoglobin 40 per cent.

September 14, 1947—Blood transfusion: one pint (drip).

September 16, 1947—Third hæmatemesis of coffee grounds and ʒiii blood. Seen by P. T. Crymble and further medical treatment advised.

September 22, 1947—Hæmoglobin 37 per cent.

September 23, 1947—Fourth hæmatemesis, food and blood mixed. Pulse 150.

September 24, 1947—Seen by P. T. Crymble and operation arranged for following day. Pulse 120. Hæmoglobin 30 per cent. Blood transfusion (thirty drops to the minute) started and continued for forty-eight hours, before, during, and after operation.

September 25, 1947—Operation 4 p.m.

ANÆSTHESIA—Pentothal N_2O, O, cyclopropane, tubarine hydrochloride 15 mgm.

Right paramedian incision—Inspection of stomach revealed—

(a) An unusual development of vessels radiating laterally, medially, and downwards on the anterior wall of the stomach from a point on the lesser curve, one inch from the incisura angularis, and on the cardiac side. One large leash of vessels descended from this same area on the posterior surface of the stomach and was seen after tearing through an avascular part of the lesser omentum.

(b) An increased deposit of sub-peritoneal fat on the above described portion of lesser curve.

(c) Palpation of the stomach revealed no fixation of the lesser curve and no ulcer crater could be felt. There did appear to be some thickening of the lesser curve in the suspicious area.

(d) The duodenum was normal on inspection and palpation.

Eight vascular strands were ligatured as they radiated from the suspicious area, seven on the anterior surface, and one on the posterior surface. These vessels seemed to disappear from view by penetrating the muscular coat. Some of them were veins accompanied by arteries.

The left gastric artery was now sought on the cardiac lesser curve. An opening was made in the anterior layer of the lesser omentum, and with the left thumb in this opening, and the left forefinger in the bursa omenti minoris, the pulsating artery was palpable. It could be separated from the lesser curve and was the size of the radial artery. A path around it was made by a dissector, and along this an aneurism needle was passed. The artery was now ligatured with strong silk and the abdomen closed.

The operation lasted about half an hour and the patient appeared to be none the worse for it.

September 26, 1947—Blood drip discontinued, six pints having been given. Hæmoglobin 64 per cent. Pulse 116.

September 27, 1947—Pulse 120. Tongue dry, sweating profusely, and not drinking well. Intravenous saline drip started.

September 28, 1947—Better. Drip discontinued, having received four litres. Vitamin C given, two milligrams daily.

September 29, 1947—Vomited ℥iii altered blood. Hæmoglobin 30 per cent. Blood drip restarted.

September 30, 1947—Drip stopped. Ferri sulph. started by mouth. Pulse 110.

October 2, 1947—Pulse 88.

October 3, 1947—Pulse 84. Hæmoglobin 47 per cent.

October 10, 1947—Pulse 80. Hæmoglobin 50 per cent. Feeling well and taking full light diet.

November 6, 1947—Hæmoglobin 89 per cent. Red blood cells 4,710,000.

Analysis of the Case Records

of the cases of hæmatemesis or melæna, admitted to the medical wards of the Royal Victoria Hospital, Belfast, during the ten years 1937 to 1946.

Number of cases	307
Number of medical recoveries	274 (89 per cent.)
Number of medical fatalities	30 (9.7 per cent.)
Surgical recoveries	2
Surgical fatalities	1

Medical Fatalities

Twenty-two of these were hopeless from the point of view of surgery, and for one or more of four reasons—

(a) Death on the day of admission, or the day after.

(b) Bleeding from a ruptured varicose vein at the lower end of the œsophagus, secondary to cirrhosis of the liver.

(c) The advanced age of the patient, 70 or over.

(d) The sudden death of a patient who appeared to be progressing satisfactorily.

Eight cases might have been saved by an operation.

1. William H., 44—Epigastric pain for five weeks. One hæmorrhage. Died two weeks after admission. Post-mortem—Lesser curve ulcer with eroded vessel in its base.
2. Annie C.—Recent hæmatemesis. Death one week after admission. Post-mortem—Half-inch lesser curve ulcer, three inches below the cardia.
3. Female, 57—Indigestion one week. Hæmatemesis on day of admission. Melæna. Hæmoglobin 30 per cent. Death two weeks after admission. No post-mortem.
4. Robert S., 65—Indigestion forty years ago. Hæmatemesis seven years ago. Five recent bleedings, and death on the fifteenth day after admission.
5. John B., 58—Indigestion off and on for eleven years. Pain after food, and melæna. Two months ago treated for duodenal ulcer. Hæmoglobin 24 per cent. Death on the nineteenth day after admission. No post-mortem, but one suspects the gastro-duodenal artery.
6. Samuel W., 57—Severe epigastric pain for six weeks. Melæna and black vomit four days before admission. Died on the fifth day. No post-mortem, but one suspects bleeding from the gastro-duodenal artery.
7. James S., 52—Died two weeks after admission for hæmatemesis. History suggests duodenal ulcer.
8. Male, 50—Ulcer trouble for years. Six recent recurrent hæmatemeses. Pulse 104 or less. Hæmoglobin 25 per cent.

Medical Recoveries

Twenty-five of the 274 medical recoveries left hospital with a pathological condition of the upper abdomen suitable for surgical treatment. Many physicians take

the view, and quite rightly so, that if an operation is necessary, it should be postponed until the patient has recovered fully from the bleeding. Fifteen of the twenty-five were suffering from obstruction to the outflow from the stomach and would have benefited subsequently by a gastro-enterostomy; four of the twenty-five had gall stones, removal of which might have avoided further bleeding; four had gastric ulcer suitable for partial gastrectomy; one required appendicectomy; and one required thorough examination, including laparotomy.

Duration of Symptoms.—In 164 of the cases, symptoms of stomach trouble had been present for one to thirty years. The symptoms included epigastric pain, vomiting, hæmatemesis, or melæna.

Tubercular Disease.—Twenty-nine of the cases gave a history of some tubercular affection, which took the form of pleurisy, hæmoptysis, or skeletal disease.

Family History.—A history of stomach trouble was obtained, in near relatives, in eleven cases. They included perforations, pyloric obstruction, gastric ulcer, and hæmatemesis.

Previous Operations.—Twenty-one of the cases gave a history of previous stomach operation. In nine of these gastro-enterostomy had been performed, and in five a perforation had been closed. In the remainder, the nature of the operation is unknown.

Trauma.—Two cases traced the hæmatemesis to injury.

Banti's Disease.—This condition accounted for four cases, and it is interesting to note that in all four cases the spleen had been removed previously, without stopping the hæmatemesis.

X-Rays

One hundred and sixty-eight of the cases were examined by opaque meal and X-ray, with the following results—

Normal	87
Duodenal Ulcer	55
Lesser Curve Ulcer	16
Gall-stones	3
Gastro-enterostomy	4
Pyloric Neoplasm	2
Death	1

X-rays are a valuable guide to the source of the bleeding, but the patient may be too ill for this examination, and the opaque meal may fail to show any ulcer. The absence of a positive X-ray report should not deter the surgeon from operating, as he should be able to rely on the living pathology to distinguish between a gastric and a duodenal ulcer.

Difficulties in Prognosis

The following two cases illustrate the difficulties in placing, or omitting to place, a case on the danger list.

The unexpected recovery—

James K., 56—Symptoms for twenty years. Hæmatemesis nineteen years ago. Two recent attacks of bleeding; one before admission, and one after.

15/9/46—Hæmoglobin 21 per cent.

16/9/46—Blood transfusion.

19/9/46—Blood transfusion.

21/9/46—Hæmoglobin 18 per cent. Pulse 124. Blood transfusion.

24/9/46—Hæmoglobin 30 per cent. Rapid recovery.

The unexpected death—

Henry H., 53—Epigastric pain for four months relieved by food. One attack of melæna and hæmatemesis before admission, and no recurrence. Pulse never exceeded 120. Hæmoglobin never went below 35 per cent. Died two weeks after admission.

Analysis of the Autopsy Reports

on eighteen cases of fatal hæmatemesis carried out in the Pathology Department of the Royal Victoria Hospital, Belfast, in the years 1937-1947

Males	14	Tubercular disease of lung, or pleurisy	3
Females	4	Trauma	1
Aged 70 or over	4	Gastro-enterostomy— Recent 2; old 1	3
Under 40	1	Recent or old perforation	2
Left gastric	7	Might have been prevented	2
Gastro-duodenal	10	Might have been saved	8
Cancer	1		

Note

A. The preponderance of males in the proportion of 14 to 4.

B. Those that might have been saved by ligature of an artery without gastrotomy or gastrectomy—eight out of eighteen.

1. Woman, aged 64—Died on fourth day from left gastric bleeding. Ligature of the left gastric might have saved.
2. Man, aged 59—Died on thirteenth day from gastro-duodenal bleeding. Ligature of the gastro-duodenal artery plus a gastro-enterostomy might have saved.
3. Man, aged 67—Died on ninth day following a successful gastro-enterostomy, which had been performed for the relief of pyloric hour glass and duodenal ulcer. Death was due to hæmorrhage from the duodenal ulcer, and might have been prevented by ligaturing the gastro-duodenal artery at the time of the gastro-enterostomy.
4. Man, aged 47—Died nine days after admission from bleeding duodenal ulcer. Might have been saved by ligature of the gastro-duodenal artery.
5. Man, aged 47—Died on fourth day from bleeding duodenal ulcer. Might have been saved by ligature of the gastro-duodenal artery.

6. Man, aged 48—Died from a bleeding lesser curve ulcer. Suitable case for ligature of the left gastric artery.
7. Woman, aged 53—Died on sixth day from a bleeding lesser curve ulcer. Suitable case for ligature of the left gastric artery.
8. Man, aged 50—Died on the ninth day from a bleeding duodenal ulcer. Suitable case for ligature of the gastro-duodenal artery.

C. Those that might have been prevented.

1. Man, aged 50—Duodenal perforation closed six months before the hæmorrhage. Death two days after admission from bleeding duodenal ulcer. Posterior gastro-enterostomy plus ligature of the gastro-duodenal artery, two months after the perforation, might have prevented the fatal bleeding.
2. Man, aged 33, with a five-year history of severe dyspepsia. Died on second day from a large bleeding pyloric ulcer. An early partial gastrectomy might have prevented the onset of bleeding.

D. Gastro-enterostomies.

1. Death due to peritonitis following a gastro-enterostomy for the relief of a bleeding duodenal ulcer.
2. Death from a bleeding duodenal ulcer nine days after gastro-enterostomy, for the relief of a pyloric hour glass contraction.
3. Gastro-enterostomy sixteen years ago. Death on day after admission from bleeding duodenal ulcer. Note the persistence of the duodenal ulcer in the presence of a gastro-enterostomy.

E. Recent or old perforation of duodenum.

1. Duodenal perforation closed six months before admission. Died on the second day from erosion of the gastro-duodenal artery.
2. Man, aged 69, who died on the day after admission from a perforated duodenal ulcer, complicated with bleeding from the ulcer.

Conclusions

1. A dangerous case of recurrent hæmatemesis was restored to convalescence by ligature of the left gastric artery near its origin.
2. The living pathology disclosed at operation enabled the surgeon to recognise the bleeding area.
3. Hæmatemesis and melæna are treated in the medical wards with a mortality of 9.7 per cent.
4. Of the 30 medical fatalities in a series of 307 cases of hæmatemesis or melæna, 8 cases might have been saved by operation.
5. The recognition of the dangerous case suitable for surgical intervention is a difficult problem, as some cases die which appear to be progressing satisfactorily, whilst other cases recover, without operation, which are going steadily downhill. One can rule out the hopeless group—age over 70, death

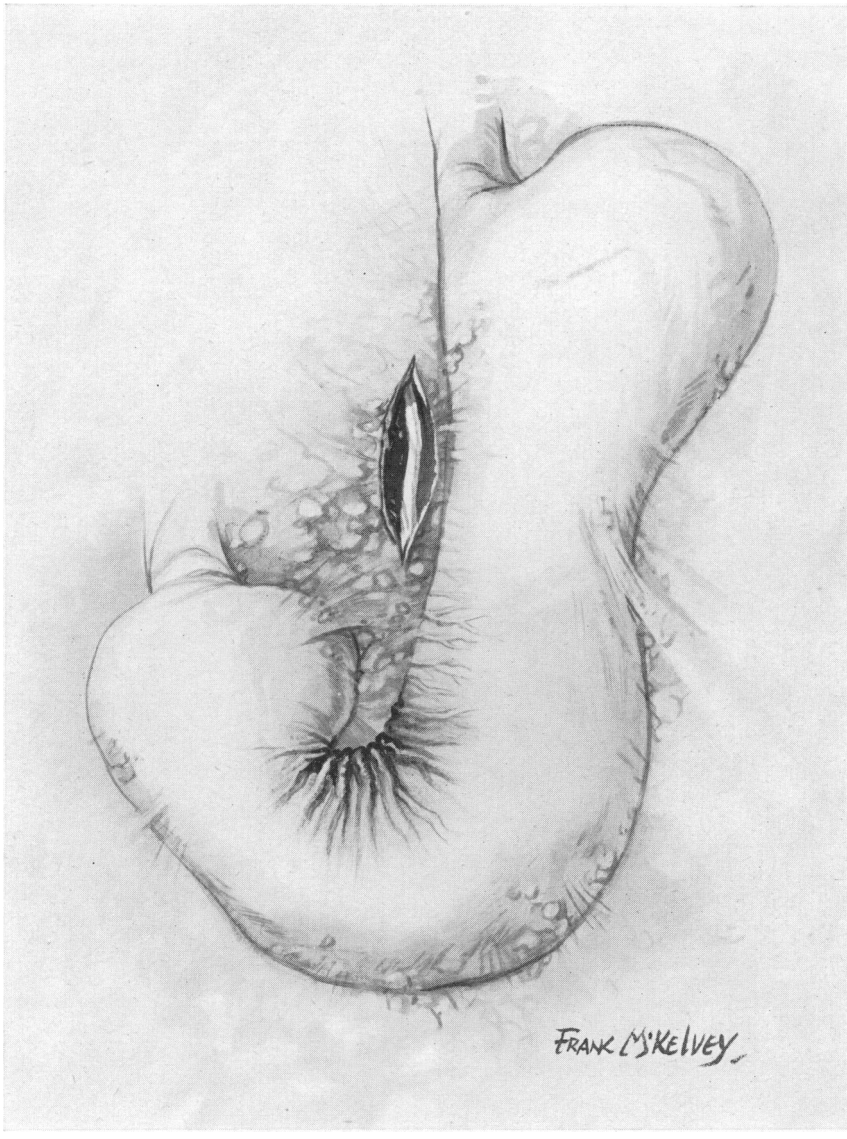
in the first two days, œsophageal varices, and one is now left with a small group, who exhibit the following—

Age under 70; recurrent hæmatemesis in spite of blood drips, milk drips, and Witts diet; hæmoglobin below 30 per cent.; persistent pulse around 120.

This is the section suitable for ligature operation.

6. As a middle course between medical treatment, pure and simple, and gastrectomy, one would suggest Operation Ligature.
7. A study of the autopsy reports on eighteen cases of fatal bleeding from the stomach or duodenum, suggests that eight of these cases would have been suitable for the ligature operation.
8. Twenty-five of the two hundred and seventy-four medical recoveries left hospital with a pathological condition of the upper abdomen suitable for surgical treatment at some subsequent date.
9. Attention is drawn to the formation of new subperitoneal venous channels in the region of a gastric ulcer. The normal routes of venous return are obstructed by thrombosis, and the new diversion routes are a guide to the surgeon.

Finally I should like to thank Dr. McVicker, Dr. Fenton, and Mr. Bennett for the very efficient blood transfusion service; Dr. Miller, the anæsthetist; the physician, Dr. Strong, who referred the case to the surgeon; and Mr. Frank McKelvey, R.H.A., who painted the illustration from a sketch made by the surgeon.


FRANK McKELVEY

Hospitals Here and There

By R. S. Allison, v.r.d. m.d., f.r.c.p., d.p.m.

In May and June of last year I was one of those nominated to represent the Royal Victoria Hospital on a visit to some European hospitals. The delegation, which consisted of members of the Board of Management and of the Visiting Staff of the hospital, had been instructed by the Board to enquire into hospital conditions abroad so that the plans under consideration for our own future building operations should be modified, if necessary, in the light of the experience gained. We were fortunate in having with us our consulting architects and, both in the first part of the tour to France and Switzerland, and in the second part to Denmark and Sweden, representatives of the Ministry of Health of the Government of Northern Ireland. All told, some twenty hospitals were visited and these included such well-known examples of modern architecture as the Beaujon Hospital, Paris; the Bürgerspital, Basle; the new Kantonenspital, Zurich; the Gentofte and Orthopædic Hospitals, Copenhagen; the Hospitals at Roskilde and Hillerode in Denmark; and the Carolinska and Södersjukhuset at Stockholm.

Notes are being collected to form a comprehensive report of the many details we studied concerning hospital construction, lay-out, organisation, and working methods. This paper contains one's own personal impressions of the ways in which modern hospitals abroad differ from hospitals at home. It also discusses how these differences may possibly affect our attitude towards rebuilding in the future. There are hospitals in Great Britain and Northern Ireland which are superior in design to the usual types seen in most places. But this difference between individual hospital designs at home is slight when compared to that which exists between the modern continental hospitals and hospitals in Great Britain and Northern Ireland as a whole.

The differences between individual hospitals at home lie chiefly in points of detail; the principles are more or less the same. When hospitals at home are compared with modern hospitals abroad, fundamental principles are involved in the difference. One might say, indeed, that if the trend of thought in modern hospital design in Europe to-day embodies principles which constitute real advances, then all over Great Britain and Northern Ireland our hospitals are far behind the times. It is for us to decide. If we conclude that the modern continental type of hospital is to be desired, then considerable reorientation of our views will be necessary before any rebuilding is considered. This generalisation is particularly true of Switzerland, Denmark, and Sweden, where conditions have favoured hospital development. Thus, in these countries compulsory health insurance for the people has been in force for many years. The insurance schemes are not nationalized. The individual is at liberty to choose his own insurance society much in the same way as he would do were he insuring a motor car. Thus for some considerable time funds have been accumulating which have been available for expenditure on health

schemes, and especially on hospitals. Some of the countries mentioned have been spared the ravagecs of war. Most important, all of them have been fortunate in having men of prescience and ability who have played no small part in stimulating the public desire to improve hospital services. One thinks especially in this connection of Hjalmar Cederström, the Swedish architect who was responsible for the design and planning of the Södersjukhuset at Stockholm.

Material Factors in Hospital Planning

The present situation as regards labour and building materials has had its counterpart in previous experience, though it is doubtful if the shortage in these respects has ever before reached the same scale. In the past, builders had bricks, stone, and wood, but no steel or reinforced concrete. Building in the vertical plane had to be limited. When it was wished to expand a hospital, this was done on the horizontal plane, the new buildings being placed adjacent to the old on the so-called "pavilion" system. In this century, the introduction of steel and concrete on a large scale, together with the improvements which have been effected in lift or elevator facilities, has led to an extension of the "block" system in design, so that building can now be carried out in the vertical plane to a much greater extent than formerly. I do not feel qualified to discuss the architectural points in favour of one system as against the other—the Pavilion as opposed to the Block system. It will be obvious, however, in the latter system, that less ground space is needed and that, both from the point of view of the sick and of those in charge of them, less time will be taken in going about the hospital. The only relevant medical consideration is whether it is desirable to treat all kinds of patients in the same building. Does the pavilion system not lend itself more to the treatment of infectious diseases, pulmonary tuberculosis, psychiatric patients, etc.? Further, quite apart from the task of providing accommodation for the sick, it may be asked should not the administrative offices and the kitchens be housed in separate buildings?

In the hospitals we visited which were built on the pavilion system, either in part or in whole, e.g. the Carolinska Hospital, Stockholm, and the Gentofte Hospital, Copenhagen, it was noteworthy that all the buildings which stood separate were connected to each other by means of covered corridors, along which staff, patients, and food could be circulated thus making it unnecessary ever to emerge into the open when going from one "pavilion" to another. Food was prepared in the main kitchen (which being in a separate building was well ventilated) and transferred by heated food trollies to the different units, in many cases along underground passages. My own impression after seeing examples of both block and pavilion-designed hospitals is that the block plan is superior. At the Södersjukhuset, Stockholm, a fine example of this style, the main kitchens and food stores are on the top floor of the hospital, a site admirably suited for getting rid of smells and for good ventilation and lighting. It was noted that care had been taken in the construction of the building to sound-proof the kitchen floor from those beneath, which accommodated the patients. Having the kitchen in this novel situation meant

that food could be distributed easily and expeditiously to the wards beneath by lifts especially designed for the purpose.

To return to the question of segregation of certain types of patient—as regards psychiatric cases, at the Carolinska Hospital, Stockholm, at Upsalla, at the Bispejhospital, Copenhagen, and the Kommunehospital Aarhus, this plan is adopted. The psychiatric department in each instance is in a separate building. The reason given is that such patients require quietness and seclusion. At the Södersjukhuset, Stockholm, and the new Kantonenspital, Zurich, in contrast, either a whole floor or a portion of a floor in the main hospital block is reserved for psychiatric patients and there are adjoining departments on the same floor or in the same wing for neurological and neurosurgical cases. The isolation or seclusion of such patients seemed to be as good in the block type of hospital as it was in hospitals of the pavilion type. The material facilities which such an arrangement offer are indeed better, for X-ray, laboratory services, and theatres are all provided under the same roof. The only disadvantage one can see is that the patients have no direct access to a garden or airing ground, being of necessity confined to a floor which may be some stories high in the main building. The problem is a difficult one to decide therefore, and it may be that the best solution lies in having one floor or part of a floor in the main hospital block set aside for acute psychiatric cases and to provide a separate pavilion adjacent to the main hospital block for the bulk of such cases in whom preliminary investigations had been completed and treatment is required.

It will be obvious that the same holds true for the accommodation of contagious or infectious diseases—the majority of these cases are best treated in special hospitals set aside for the purpose. But provision should be made in the main hospital block for some such beds because of the need for isolation facilities in situ. At the Bürgerspital, Basle, and at Zurich, both teaching hospitals, this is the plan adopted and it has the additional advantage of providing easily accessible clinical material for the instruction of students.

The tendency we observed in all the hospitals which had adopted the block system was to retain eye, ear, nose, and throat cases within the main building and not to segregate them in separate pavilions. Whether this is really necessary or not it is difficult to say. A large number of beds must be provided because of the requirements and this adds appreciably to the size of a block hospital. Most of the work of teaching in these subjects is done in out-patients.

There is another point which must be mentioned when discussing material factors in hospital planning. At the new Kantonen Hospital, Zurich, now under construction, they have erected (in light inexpensive materials) a typical ward unit which is in use, the idea being to find out how it works in practice before the decision is taken to build with more solid materials. This seems an admirable idea. Nothing could be more absurd than the practice adopted in the past of constructing the interior of hospitals on a long-term basis. By the very nature of its function an interior hospital design must be sufficiently elastic to meet with changing needs. An interior style of private dwelling house may excite admiration for a century or more, but the lay-out of the interior of hospitals must depend on the progress of

medicine, the advances that are made in one form of treatment or another, and these are ever changing. The same is true of the interior decoration of hospitals. In many hospitals at home the walls are treated with a durable paint which will last for many years. What we want from our designers is an inexpensive yet elegant preparation for the decorating of walls which may be reapplied when the hospital undergoes its periodic cleaning. An important point when considering material aspects of hospital planning, therefore, is that we should decide which type of hospital we wish to have—a block-designed hospital or a hospital built in the pavilion style. Having done this and worked out the number of beds required and the size of the individual units, the permanent structure should be erected, but instead of honeycombing the interior with stout walls to form compartments that must be permanent because of their sturdy construction, we should encourage our architects to introduce some of the ideas of "Meccano" in interior design. Thus, if a lay-out be found to have certain defects in the course of ensuing years it may be scrapped promptly at little cost and replaced by a better design. Sound-proof materials are essential. The interior of hospitals should be treated like the interior of ships; that is, in such a way that the walls between apartments may be taken down and rearranged without undue labour or expense should the need arise as the result of practical trials over a test period.

The Hospital and the Community

Probably the most important factor influencing hospital planning in the past has been the needs of the community. We have had two chief types of hospital; the voluntary hospital and the county or municipal rate-aided hospital. In the mediæval period hospitals were few and were largely under the control of the Church, being carried on in connection with monastic houses and convents. Such establishments were the prototypes of the present-day "voluntary" hospital, i.e.,, institutions supported by charitable bequests and created by the piety, enthusiasm, or other worthy motive of interested persons and not through realisation of the community as a whole of the need for such institutions. The introduction of municipal or county rate-aided hospitals represented the awareness of the community as a whole for the need of such institutions and it is natural that we should find these first in connection with poor-law institutions, and with the treatment of infectious diseases. But, municipalities and county boroughs have been slow to recognise the needs of the community for general medical and surgical hospital beds as well as for specialist services, and at the present time the facilities provided lag far behind in these respects. In future, the principal consideration is likely to be the number of hospital beds it will be necessary to provide for a community and how these beds must be apportioned between the general medical, surgical, maternity, and other specialist services. In Denmark we learned that they aim to provide six beds (general medical and surgical) for each 1,000 of the population, and this excludes provision for cases of pulmonary tuberculosis, mental disease, and infectious diseases. On this basis in Northern Ireland, with a population of 1,279,245 it will be necessary to provide approximately 7,660 general hospital beds. At present, approximately 4,500 beds are available in the Six Counties for these purposes.

Turning to another problem of significance in hospital planning—the ideal number of beds which a hospital should contain—one of the largest hospitals we visited was the Södersjukhuset, Stockholm, with 1,200 beds. This arrangement appeared to work well and was based on the principle of combining two 600-bed hospitals built on the block system and placing them side by side with a common administrative and servicing system. Yet in other centres we heard the view expressed that a general hospital of over 1,000 beds was too large. The Bürgerspital, Basle, with its 760 beds certainly appeared to be more near the ideal size. It is, of course, not economic to build multiple small hospitals with 50 to 100 beds on account of the reduplication of laboratory, X-ray, and other services necessary. We found, however, that the 200 to 250-bed hospital commanded favour, especially in country districts, where it served a wide area less densely populated than an urban district. In determining the size of a hospital, therefore, much will depend on the types of case it is proposed to treat.

Hospital Planning for the Patient

It is in this respect that one noticed the greatest difference between the modern European hospital and our own; the new hospitals all conveyed the impression in their design and lay-out that the patient had been given first consideration. Is this simply an expression of the tendency of the age to demand more creature comforts, more luxury in internal designing? I think not.

The tendency in medicine and surgery to-day is to recognise the importance of psychological influences in sick persons, and to shorten as much as possible the period of disability that must result from an illness. Exceptions are made to this rule, of course, as in the case of pulmonary tuberculosis and subacute rheumatic infections, where prolonged rest is necessary for cure. But as a general rule the aim is to mobilise the patient as soon as possible and to avoid creating unnecessarily, during treatment, conditions which may induce invalidism or retard his return to ordinary life. When a patient enters hospital he severs his contact with everyday life. For the time being he is like the traveller who departs on a journey, or the exile in a distant land. Unlike these persons, however (whose horizon is extended), the patient's world contracts and becomes bounded by the four walls of the sick ward. From the time he enters hospital he lives only among other sick persons, some of them less ill, others much more ill than himself, many in great pain, not a few dying. In these strange surroundings he has to eat, sleep, perform the necessary functions of nature—all in comparative public—and at the same time be patient towards his own affliction. That sick persons usually succeed in adjusting themselves to hospital conditions is only a tribute to the human capacity for adaptation. That many patients dread coming into hospital, and that in many instances considerable mental tension is induced, no one will deny. In time, of course, such patients may no longer mind be wakened at an early hour to have their beds made; they may grow accustomed to the nightly disturbances caused by the entry of new patients; most difficult of all, they may even succeed in conquering their dislike for the bedpan. The point we recognise to-day is that insomuch as a patient may have to adjust himself to hospital conditions, he will require probably

an equal or a greater period of rehabilitation before he can adjust himself once more to ordinary life. This, I believe, is the real reason underlying the modern tendency in hospital planning abroad. It is to banish in the patient's mind any sense of fear or unreality in his environment; in short, to create conditions of living not so very different from that to which he is accustomed at home.

The Ideal Size of Wards.—At a very early stage in hospital development it was, of course, customary to put more than one patient in the same bed. The decision that each patient must have a separate bed was probably taken not so much for humane reasons as because of recognition of the dangers of infection from one patient to another. In the eighteenth and nineteenth centuries hospital wards were constructed to hold large numbers of patients. Probably the only limiting factor in their size was the estimated range of vision of the overworked nurses in charge. The regulations regarding floor and air space were based solely on physiological requirements and with regard to the risk of cross-infection. To-day it is still common to find a nursing sister taking charge of 50 to 100 patients who are gathered together in one unit of two or more large wards. Thus, to quote the words of one Swedish hospital authority : "Under the old system you have patients sleeping, dying, and snoring all over the place." What is the ideal size for a hospital ward? An answer which appeared satisfactory was given to this question in Stockholm : The ideal sizes are one-bed, two-bed, and four-bed wards. One-bed wards are required for very sick, noisy, and delirious patients—patients in fact who are too ill to care whether they have company or not. It is recognised, however, that the majority of patients prefer company, hence the preponderance of four-bed wards in the new hospital designs. Why four beds and not six? Two reasons were given. First, as to lighting, with three beds a side the ward is too deep for all parts to get their share of sunlight. Second, with six beds two of the patients will be placed in the middle and have no corner to turn to when they wish to be quiet. Patients, it was pointed out, are very much like passengers in a railway carriage : they like a corner to themselves; hence the advantage of the four-bedded ward. Larger-sized wards were condemned on the grounds that it is bound to lead to the introduction of patients who will disturb the others and to more risk of cross-infection. With a preponderance of four-bed wards it is possible to select patients with a regard to their suitability to be nursed with each other. As regards the difference in cost between building four and six-bed wards we were interested to learn that this amounted to not more than one per cent. of the total cost.

Effect of Small Wards on Nursing Arrangements.—More nurses are required or else their work must be lightened as much as possible by labour-saving devices. In the Södersjukhuset, the Bürgerspital, and other similar modern hospitals we visited both these modifications had been introduced. No nursing sister was expected to look after more than thirty patients. In some hospitals the number was less and it is to be noted that in Great Britain and Northern Ireland the General Nursing Council has accepted the principle that 25 to 30 patients is the ideal nursing unit. In the nurses' office in each unit of thirty beds (comprising for example two one-bed wards, four two-bed wards, and five four-bed wards) electric

light signals indicated where the services of nurses were required by patients. Coming into the corridor the nurse could see the light illuminated over the door of the ward concerned, the patient having pressed a button at the bedside in the first instance. Whilst in the ward the nurse could indicate her presence there or summon extra help by means of the same system of light signals. I made particular enquiry in each hospital I visited to find out if this system worked satisfactorily, if in fact any serious mishaps had occurred owing to a patient not being able to signal because of his being suddenly taken ill or because of a technical fault. Without exception, doctors and nurses had no faults to find. The only possible objection mentioned was that when several patients "rang" for a nurse simultaneously she had no way of telling which patient was in most urgent need of help.

Whilst speaking of nursing arrangements perhaps one may digress for a moment to comment on the favourable impression we received of nurses' homes and living conditions, especially in Denmark. In this country the nurses' living conditions and freedom when off duty compare very much with that enjoyed by university undergraduates at home. In the living quarters we found usually a most attractive dining-room and other public rooms furnished in modern style, and every nurse, even the most junior probationer, had her own room, in the interior decoration of which it was clear she had been allowed considerable latitude for the exercise of personal tastes. Nurses' uniforms were invariably smart and designed on modern lines. A high educational standard is demanded of candidates on entry and there is no dearth of volunteers.

Patients' Comforts.—In the one, two, and four-bed wards in all the hospitals visited the beds were placed parallel to and not facing the source of light (usually at the end of the ward). This arrangement, of course, does away with glare. The beds themselves were of the usual hospital pattern and had either four rubber-tyred wheels (with locking device) or wheels at one end and a jacking-up device at the other so that the bed could readily be pulled out from its place and wheeled noiselessly elsewhere. Beside each bed was the push-button electrical visual signalling device for summoning help. Individual bed lights were provided in some hospitals, not in others. All patients had their own bedside table-cum-cupboard and in one hospital (Bürgerspital, Basle) they had a bed table which could readily be converted into a book rest by turning a screw in the upright supporting it. A notable feature of many hospitals was that each patient had his or her own wardrobe, these being set into the wall of the ward on either side. In some hospitals each patient had his own bedpan, in others individual bedpans were not used and efficient steam sterilisers were provided in the sluice opposite the ward for sterilisation after preliminary cleansing in a special wash place. When not in use, bedpans were stacked on a spiral metal coil of heated tubes which kept them warm and ready for use.

We were disappointed in most of the hospitals visited to find that no forward step had been taken to improve upon the archaic system of using bedpans in open wards, the patient receiving only the scanty protection provided by screens, or being compelled to perform this essentially private act in public. In the Söders-

jukhuset they had advanced some way to abolishing this nuisance by providing special "clyster" rooms for bed patients. Thus, when a patient desired to use the bedpan his bed was wheeled out of the ward across the corridor to the special room provided, where the function was performed in private. This was a good idea, but we know that the cult of the bedpan in hospital is overdone and that to many patients the act of getting out of bed will cause less physical embarrassment than trying to empty the bowels in the recumbent position. In the hospital at Roskilde in Denmark—a thoroughly efficient and up-to-date institution—this principle was both recognised and put into practice. They had a special wheeled chair which was brought to the bedside, the patient being placed in it and then wheeled to the W.C. The seat of the chair had the centre cut out and was so high that it just fitted over the edge of the pan of the water closet when the chair was wheeled into position. Similar devices should be introduced in our own hospitals so that the disagreeable and embarrassing habit of performing this function in public may be abolished. No extra work for the nurse is incurred, and bedpans, except when required for the most helpless or sick, may be discarded or stored in the hospital museum together with other historic pieces of medical and surgical equipment.

A feature, both appertaining to patients' comfort and to that most necessary aspect of all treatment—rehabilitation, which was found in all the new hospitals, was the provision of day rooms for patients no longer confined strictly to bed, but able to get up and move about as a preparation to going home. Perhaps the best arrangement was that at the hospital at Wadenswil in Switzerland. This was a small county type of hospital built on the block system with 200 beds. At the south end of each corridor from which the wards led off was a semicircular day room, well-furnished with tables, chairs, a bookcase, flowering plants, and having glass windows on the perimeter so as to admit the maximum of sunlight.

Another good idea (Bürgerspital, Basle) worthy of introduction in any new hospital plans was the arrangement for admitting new patients. When a unit was on "take in" during the day, patients were admitted direct to the unit after preliminary examination in the out-patient department. At night, however, they were not sent up to the ward concerned, but were kept in special wards reserved for this purpose beside the receiving room. The usual night staff on duty for casualties attended to them and the next day they were wheeled up to their wards, the beds having been sent down the previous evening all ready with hot water bottle, bedclothes, temperature chart, and other requirements in their proper position. The sleep of patients in the wards was thus not disturbed at night by the entry of new patients.

On the outside and affixed to the doors of the wards containing one, two, and four patients were cards giving the names of the patients. Visitors would enquire for their friends or relations in the entrance hall, where a porter was in attendance for this purpose. He had a card index turntable device which gave the location of every patient in hospital. Some similar system should be in use in every large hospital for the guidance of visitors, and we might also copy the example of hospitals abroad in providing in the entrance hall kiosks or small shops where

papers, confectionery, and flowers could be purchased. At the Södersjukhuset, Stockholm, they go so far as to provide a day nursery for the children of visitors to the hospital.

Special Departments—Out-Patients

This century has seen an enormous expansion of the ancillary side of hospital work. Usually in old hospitals most of the space was allocated to wards and little or none was left over for ancillary services. As a result, new or special departments have had to be introduced piecemeal and when or where opportunity offered. Rarely has it been possible to allocate adequate space to them. In the modern block type of hospital the ancillary services connected with the ward work are usually placed on the north side of the main block, and special departments are housed in the basement floor of the main block, and in a separate treatment wing leading off the main block. This treatment wing is usually placed so as to project at right angles on the north side from the middle of the block. One floor of it may be devoted to operating theatre suites, one to laboratories, another to the X-ray department, another to the physiotherapy department with occupational therapy and rehabilitation centres. A point that struck us most favourably was the amount of space allocated to these departments, and especially to the X-ray department. At the Bürgerspital, Basle (760 beds), and the Södersjukhuset, Stockholm (1,200 beds), more than ten times the space allocated at the Royal Victoria Hospital was given to the X-ray department. At small hospitals, e.g., Roskilde, with 250 beds, the space allowed was about three times as great as at the Royal. At the Södersjukhuset and Carolinska Hospitals, Stockholm, there is sufficient room so that each clinical department of the hospital has its own section for viewing X-ray films. Every day the staff men with their assistants visit the department to examine X-ray films relating to their own patients, a conference taking place between them and one or other of the radiologists. A detail invariably attended to in the lay-out of the rooms for barium meals and enemas is the provision of a W.C. for the convenience of patients.

The same liberal outlook was seen in the lay-out of physiotherapeutic departments both in Switzerland and in Scandinavia. There is undoubtedly considerable difference of opinion as to the value of mud baths, hot packs, water douches, ultraviolet light, and Finsen rays. These are methods of treatment upon which continental authorities lay great stress, but all will be in agreement with the necessity for some provision of this kind with proper changing rooms and rest rooms for patients, for deep pool baths, and for a gymnasium especially equipped with a view to rehabilitation of the partially disabled.

The laboratories, biochemical, clinical, pathological, and the departments of morbid anatomy were not much different from our own. All the operating theatres were situated on one floor of the treatment wing. There were "clean" and "dirty" theatres, either a single pair or multiples of a pair, depending on the size of the hospital, one theatre being placed on either side of a sterilising room. There was always a room in this suite for performing endoscopic examinations and there were plaster rooms together with the usual surgeons' changing rooms and offices.

The out-patient departments differed greatly from hospital to hospital. All had a common denominator of spaciousness unknown in our departments at home. Another outstanding feature was the universal provision of dressing rooms, two to three dressing rooms being placed conveniently to each examination room, so that this could be in continual use and the delay caused by having to wait for patients to dress and undress avoided. The best plan from the point of view of design appeared to be the out-patient departments at the Hospital Beaujon, Paris, and the Orthopædic Hospital at Aarhus in Denmark. At the large Södersjukhuset, Stockholm, out-patient clinics worked daily, and here, as at other centres, the appointment system is in operation, not more than six new and ten old patients being seen by the staff of any one department at one session. This arrangement contrasts with the practice at the Beaujon Hospital, Paris, where over a hundred patients are often seen at the medical polyclinic in the day—conditions more closely corresponding to our own figures at home. A notworthy feature of all the out-patient clinics visited was the provision of rest rooms for patients, a small clinical pathological laboratory with technician, screening room for X-ray of chests, E.C.G. room, and rooms for carrying out gastric analysis, etc.

A particularly good feature observed at the Bürgerspital, Basle, was the provision of a restaurant attached to the special diet kitchen for out-patients, e.g., diabetics, gastric patients, and others who could have their meals there whilst being graded, thus saving hospital beds, or after discharge from hospital pending arrangements being made at home.

The Teaching Hospital and Students

No mention has been made of the clinical facilities offered to medical students on the continent or how these compare with our own. One saw little of the familiar ward round, with students clustering round beds. Great attention is given to the demonstrations of cases in large lecture theatres where a student (the clinical clerk in charge of the case) reads the history and details the clinical findings. These findings are then checked and commented upon by the chief of the clinic, a physician or surgeon as the case may be. We saw students writing case notes and examining patients in the wards, though whether entry to the small four-bed wards would prove more difficult than to the usual big wards we have in this country it is difficult to say. Ward rounds with a large class, however, would clearly be impossible and the clinical demonstration of physical signs in acute disease may suffer, for it is obvious that very ill patients cannot be moved into a demonstration room or lecture theatre. Thus, by improving the lot of patients in hospital so that they are treated more on a "private" than on a "public" basis, difficulties may be created in teaching students which it should be our endeavour to overcome. An extension of the existing system of resident pupilships might answer the case—students being required to do a period of one month's residence in their first hospital year, as well as two months in their second or third hospital years. This would familarise them with hospital routine and give them more confidence in approaching patients, so that the closed doors of the multiple small wards would not serve as a deterrent to their visiting of the sick.