MAY, 1953

THE ULSTER MEDICAL JOURNAL

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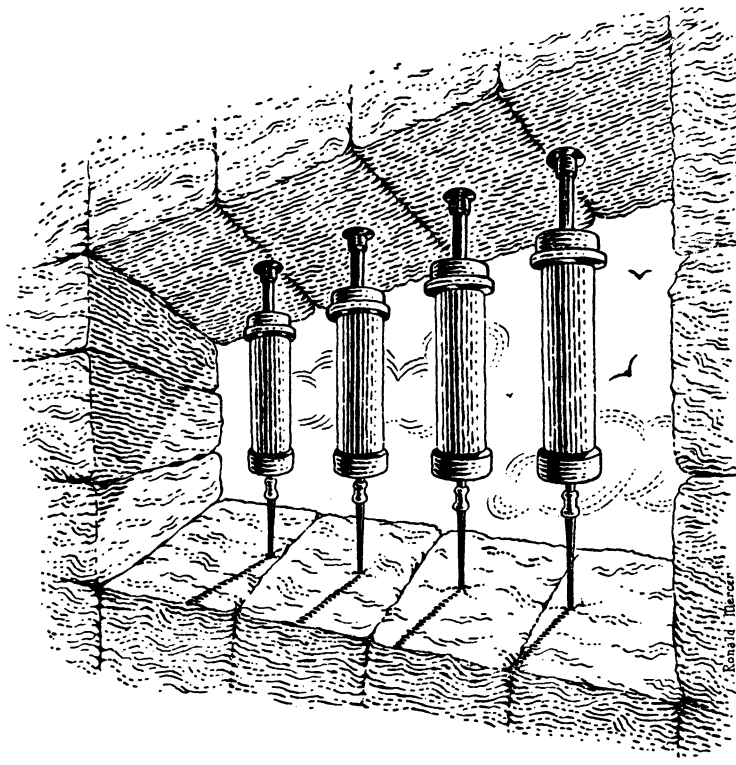

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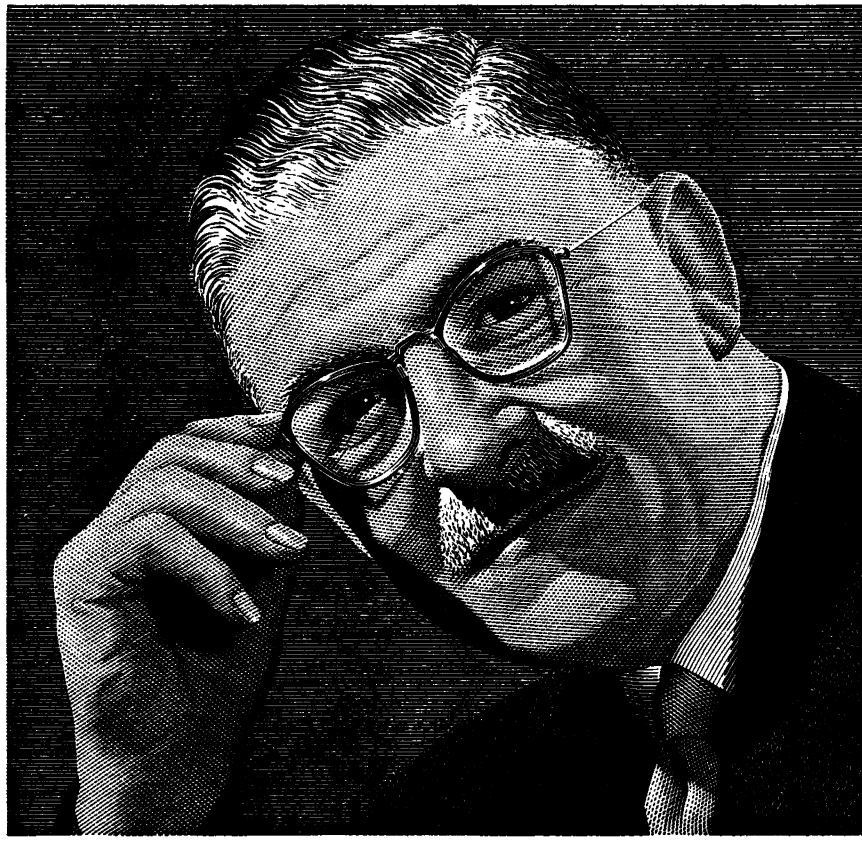

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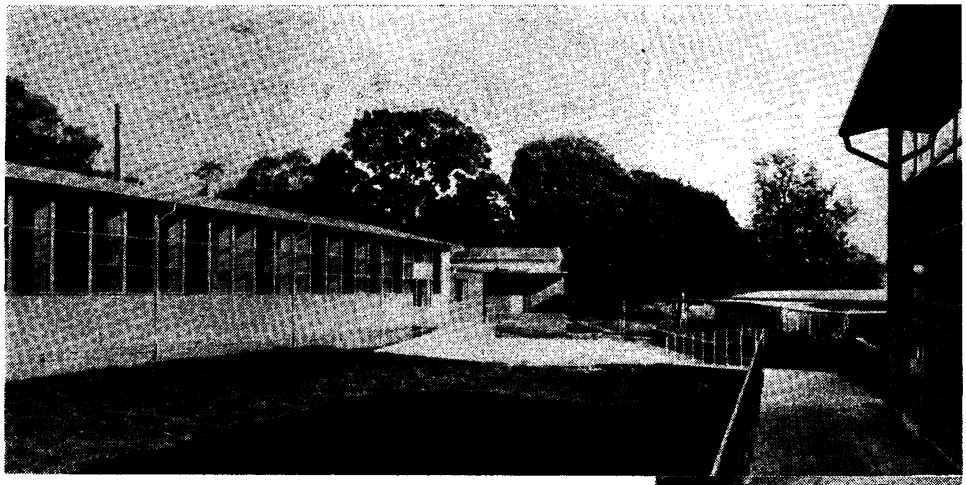

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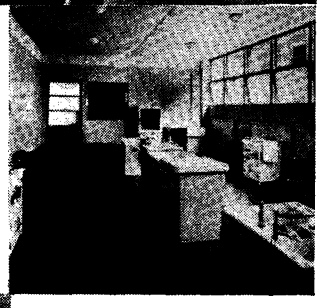

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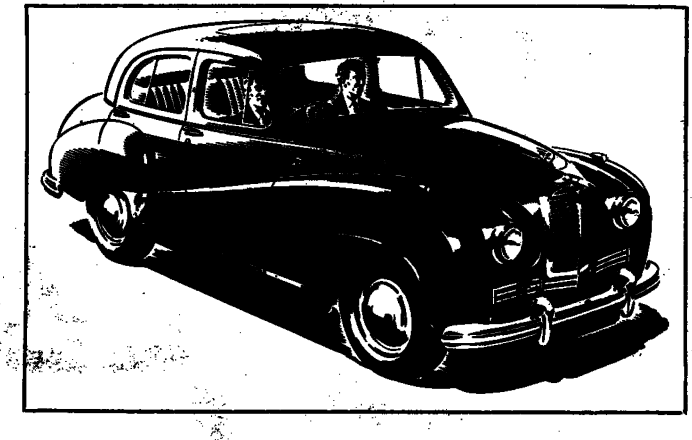

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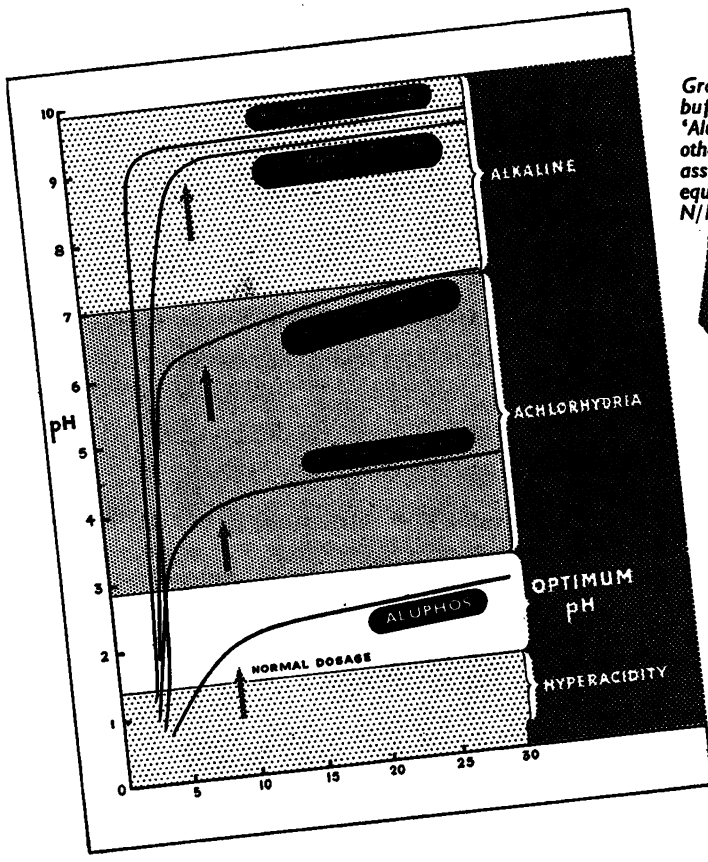

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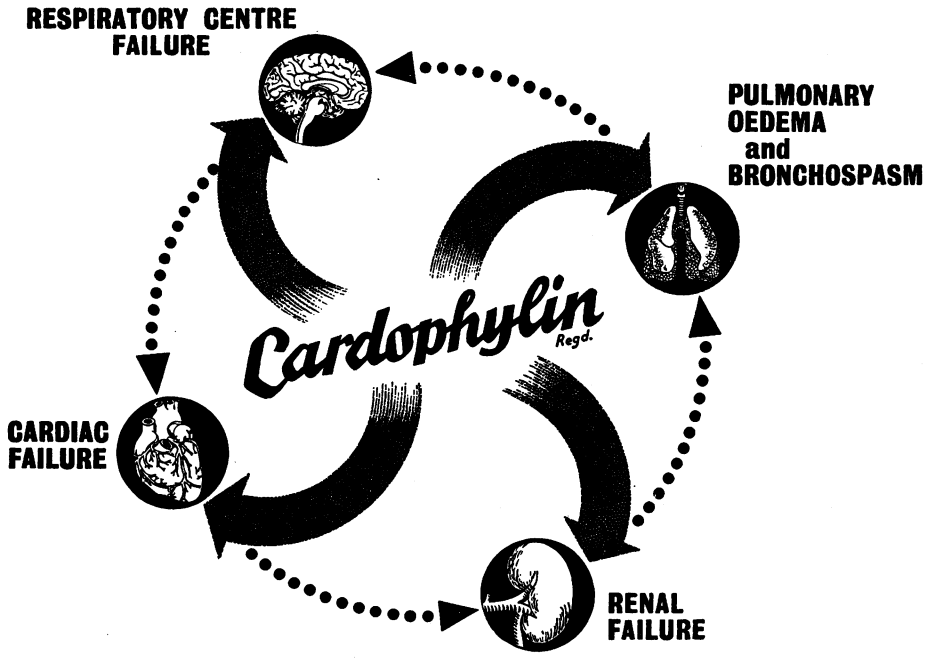

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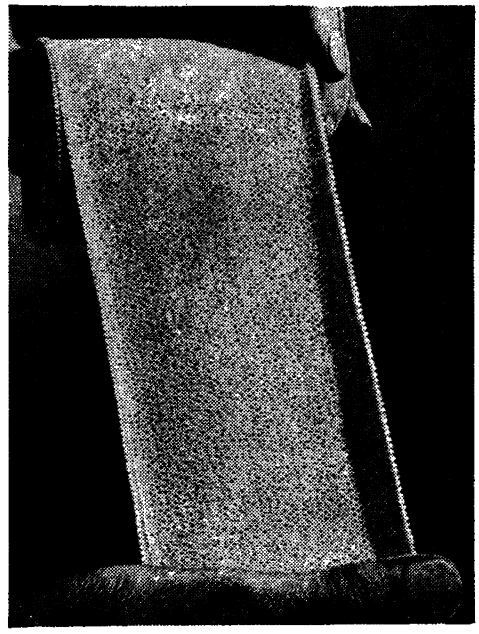

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THE
ULSTER MEDICAL JOURNAL

PUBLISHED ON BEHALF OF THE ULSTER MEDICAL SOCIETY

Vol. XXII 1st MAY, 1953 No. 1

Primary Glaucoma as a Vascular Disease

By Sir Stewart Duke-Elder, K.C.V.O.
Director of Research, Institute of Ophthalmology, London

The James A. Craig Prize Lecture, Queen's University, Belfast

As a rule in commencing a lecture of this type one starts by extolling the great figure by whom the lecture is founded or to whom it is dedicated, and as a general rule his fame is gradually being enveloped in the mists of the past: the lectureship thus acts after the manner of infra-red or radar emanations, as it were, to re-establish contact with the retreating figure. This can be a delightful and profitable enterprise, but my privilege to-day is much more exciting; for the founder of this lecture is here among us, apparent by the ordinary visible part of the spectrum, looking hale and hearty, and appearing younger than I am myself.

This puts me in a little difficulty as to what to say. The formula for the receding figure in the mist was easy—de mortuis nil nisi bonum. When the subject of your esteem is sitting in front of you, is the opposite applicable? I hope not; for it would indeed be difficult to find.

And since you know him much better than I do, I will confine myself to saying that his characteristic and delightful gesture of founding this Prize and Lecture is typical of the tradition of medicine wherein service has always had its complement in generosity. Of service he has given much to this University, to medicine, and in particular to ophthalmology; and a lectureship of this kind is of more than ordinary value. It is of material benefit in so far as it will serve as a focal point in perpetuity, so that new thoughts and new advances in our science of ophthalmology can be integrated. And it is also of spiritual value in so far as it interweaves the factual basis of our science with the interest and warmth of human affection, and thereby transforms our conception of it.

And it is surely fitting that a lectureship of this type should be inaugurated in Belfast; for here ophthalmology is taught and respected in a unique way among our Universities. For this, of course, James Craig has been largely responsible; and it is only right that I should congratulate him on his achievement and this foundation; and you on your fortune through your association with him.

That I should be asked to come from London to be the first to pay tribute to the spirit of this lectureship is indeed a privilege such as has rarely been offered me; and I appreciate the compliment more than I can easily say. I am told that the Prize is given for an original contribution to ophthalmology; and perhaps I can repay the compliment most happily by telling you of some of the things which at present interest me most in some research work we are carrying out, partly in the laboratories and partly in the research clinics, at the Institute of Ophthalmology, on the problems of glaucoma.

One of my reasons for choosing this subjcet, which may appear to be somewhat specialized for an audience which is not entirely ophthalmological, is that it exemplifies a tendency that is widespread in medicine, to mistake empiricism for fundamental truth. It is often very difficult to escape this easy tendency; for although we all pay lip service to the truism that an understanding of disease should be based on a sound knowledge of normal function, that medicine should be the hand-maid of physiology, the fact remains that our knowledge of the normal is often perfunctory and too often negligible. And when we are faced with patients with clamant symptoms demanding immediate relief, we would be failing in our duty if we did not apply every means available, even although we knew some of these means were based on premises we know are empirical or even suspect to be wrong. There is, however, sometimes a tendency among surgeons who are zealous in their craft, and sometimes for this reason the most able technically, to forget the empiricism of their methods, to think that by relieving a symptom they have cured a disease, and consequently to suffer disappointment because, despite their efforts, the more deeply-seated disease process goes on.

The problem of glaucoma is, of course, one of considerable antiquity, but since the chance and completely empirical demonstration by von Graefe in the 1850's of the effectivity of the operation of iridectomy in relieving the tension of the eye in certain cases, and, finally, after the pathological studies of Max Knies and Adolph Weber in Germany in 1876, who remarked histologically an obstruction to the circulation of the intra-ocular fluid at the angle of the anterior chamber in advanced cases of the disease, the consensus of ophthalmological opinion for almost a century has been practically unanimous in insisting that the essential feature of glaucoma was raised tension; its immediate local cause an embarrassment of drainage of the aqueous humour; and its adequate treatment measures by drugs or operation to improve the drainage. The problem was, therefore, one for the surgical plumber rather than for the medical physiologist. It must be admitted, however, that if the be-all and end-all of glaucoma resided in a raised tension and the raised tension itself were dependent upon the efficacy of drainage

of the intra-ocular fluids, then surely the anxieties of five generations of ophthalmologists and the tragedy of blindness that has overtaken countless numbers of their patients could be mechanically relieved by sufficiently enthusiastic surgery.

Let us start off by suggesting that a raised tension is merely a complication occurring in a more fundamental disease, and that the configuration of the angle of the anterior chamber merely a feature which aids the incidence and may increase the drama of this complication. If this were so, the concentration of the whole of our thoughts and energies almost exclusively on the aspect of drainage —important though it may be—may explain the undeniable fact that, in comparison with other diseases dependent upon a mechanical maladjustment amenable to surgical correction, the prognosis of glaucoma, taken as a whole, is bad.

In many forms of secondary glaucoma an obstruction of the angle of the anterior chamber undoubtedly exists. This is seen in its purest form in buphthalmos, when the angle is congenitally malformed, or in an epithelial ingrowth after a perforating wound. But in primary glaucoma the case is probably different. It is certainly true that once the disease is well established, an organic obstruction does occur in this region. In the congestive type of primary glaucoma it is usually due to a crowding of the narrow angle by the swollen tissues of the root of the iris and the ciliary body. In simple glaucoma it is probably the result of sclerosis of the tissues in the trabecular region—I say "probably" because we do not know for certain. But I am to suggest in this lecture that in both types of primary glaucoma these phenomena are really end-results — incidental in the ætiology although very important in their clinical effects—and that the primary cause of both types of the disease is an instability of the vascular control of the eye.

In the consideration of this problem a logical starting-off point is a study of the regular and rhythmic variations of tension which occur in the normal and glaucomatous eye.

The normal diurnal variation in intra-ocular tension, which never exceeds 5 mm. Hg, is a well-known phenomenon which has not received sufficient attention. It would seem that in this respect each individual has a characteristic rhythm which is obstinately maintained in spite of all environmental variations, and that both eyes vary together. It is important that the curve is unaltered by bodily posture or activity, and is unaffected even if the patient's habits are suddenly reversed and he remains up at night and spends the day in bed. Osmotic changes are not at fault for the rhythm is unaffected by rest or work, by changing the times or the richness of meals, or by feasting or fasting. Nor is the size of the pupil, which might hinder the flow of the aqueous humour at the angle of the anterior chamber, an effective factor, for it has been found that the rhythm occurs whether the pupil is fixed in dilatation or contraction by atropine or pilocarpine, if the continuity of the iris is broken by an iridectomy or a coloboma, or even if this tissue is congenitally absent in aniridia. Any action of light upon the ocular capillaries is negatived by the same monotonous persistence of the rhythm if a brilliant light is maintained all night and the day is spent in dark-

ness. It has been suggested that massage of the eye by muscular movements through the day aided the circulation of the intra-ocular fluid and lowered the pressure of the eye, while the relative immobility during sleep has the opposite hypertensive effect owing to stagnation of the aqueous humour; but again, the maintenance of the characteristic rhythm of the pressure despite the reversal of habits has disproved this.

The only circumstance in fact which has been shown to alter the incidence of these oscillation is a long-term and fundamental change of habits, for if a complete reversal of the habits of work and sleep are established over some time, a similar reversal of the variation in ocular tension occurs. It would, indeed, seem most probable that the basis of these diurnal changes is associated with the rhythmic variations which so commonly occur both in vegetable and in animal life — affecting, for example, sleep, the temperature, diuresis, the electrolytic content of the blood, and other basic functions. It would seem that each individual has a characteristic rhythm which is obstinately maintained, and that both eyes

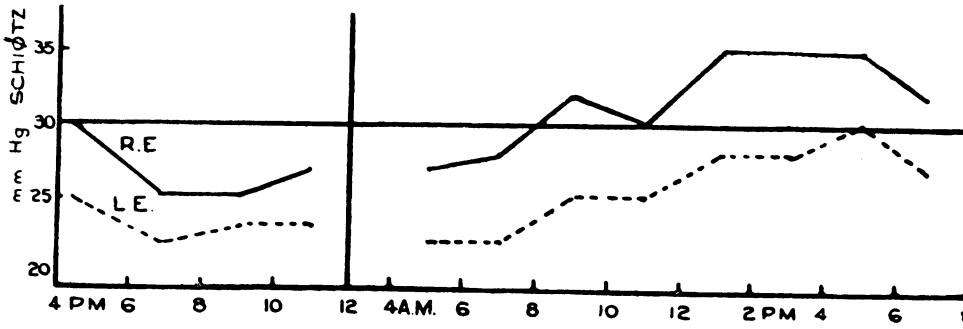

Fig. 1.
A typical diurnal phasic variation in glaucoma. The case is one of simple glaucoma showing a rising type of curve towards the afternoon. Abscissæ, ocular tension; ordinates, time of day.

habitually vary together, circumstances which make it likely that the periodic alteration is determined by a habitual hypothalamic rhythm imposed upon the organism by long-standing environmental conditions. The fact that such rhythms as the diurnal variation in temperature are apparent in the newborn infant indicates that these fluctuations are very fundamental and probably innate.

However that may be, it would seem that a regulating mechanism must exist which tends to maintain the intra-ocular pressure at a physiological level, within a slight habitual rhythmic variation, in spite of the drastic interference which operative procedures may entail. In early cases of glaucoma the first alteration in tension is not so much a rise as a distortion and exaggeration of this normal diurnal variation. It is as if the glaucomatous eye has lost some power of vascular control so that, instead of the normal slight variation of tension, a gross and uncompensated swing occurs.

Let us illustrate this from primary simple glaucoma. By simple glaucoma I mean the slowly progressive and insidious type of case characterized, in addition to the changes in ocular tension, by field defects and cupping of the disc from a relatively early stage of the malady, without congestion or episodic events, asymptomatic until its late stages, or associated only with vague but constant visual difficulties.

In this type of the disease three typical variations occur in the curve of the tension. First, a falling type of curve characterized by a high tension in the morning decreasing later in the day occurs in some 20 per cent of cases of simple glaucoma. In a second group the opposite phenomenon of a rising type of curve occurs in some 25 per cent of cases (Fig. 1). Finally, in a third group, comprising some 55 per cent of cases, a double variation appears in the daily curve which

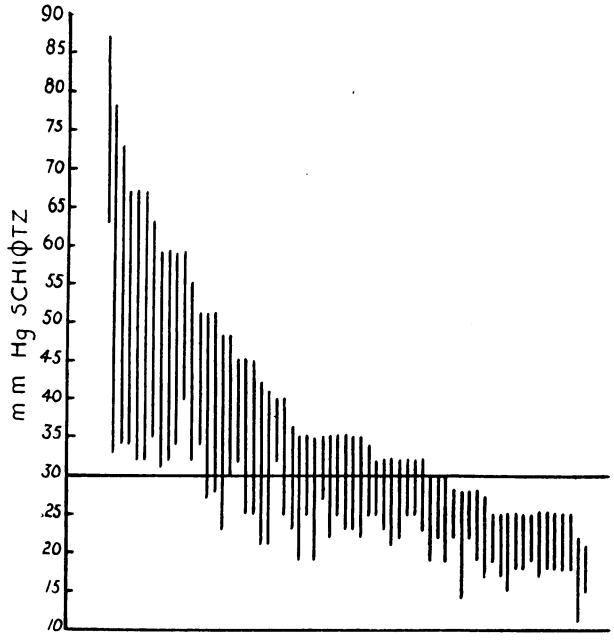

Fig. 2.

The excursion of the phasic variations in 63 cases of simple glaucoma represented by the height of the vertical lines. It will be noted that in a significant number of cases the tension is always below the limits generally accepted as normal, but the excursion is greater than 5 mm. Hg.

may, in a sense, be regarded as a combination of the other two types. These variations in simple glaucoma may be very dramatic. In Fig. 2, each vertical line shows the variations between the peak and base tension in a series of sixty-three unselected eyes affected with this type of the disease which had not been subjected to operation, either because they had recently come under observation, or because

c

they appeared clinically not to be deteriorating with miotic treatment. In this series the greatest phasic variation was 45 and the smallest 5 mm. Hg during a period when miotic treatment had been stopped. In general, the higher the base pressure the greater the phasic excursion. It is important that in 18 cases the tension was never above 30 mm.—a significant proportion of almost 30 per cent.—and in two cases it remained consistently below 25, the level generally considered normal.

So far then as simple glaucoma is concerned, if I were to define it in terms of the ocular tension, I would say, not that it was a condition characterized by a high tension—above 30 mm. Hg, above 25, or what you will—but that it was characterized initially by an instability of tension which shows a diurnal phasic variation of more than 5 mm. Hg, a state which—usually but not invariably—results in a permanent increase of tension. I would stress that in its early diagnosis, the height of the tension is always below the level generally accepted as normal.

Before we leave this rhythmic variation in simple glaucoma there are several points which deserve attention. In the first place, the rhythm in its general sense is not fortuitous but is characteristic of the individual. It is independent of blood pressure, of age, sex and refractive condition, nor does it have any relation to the width or narrowness of the angle of the anterior chamber, phases as great occurring with proportionate frequency in cases with wide as with narrow angles. Moreover, it is seen in the earliest stages of the disease, often before any clinical evidences of glaucoma are apparent, as may be seen by its occurrence in an eye which seems clinically to be normal but whose fellow has obvious symptoms of the disease. It is also of unusual interest that, in general, the same individuality of the phasic variation is preserved after a successful drainage operation although the excursions are damped down.

Let us now turn to congestive glaucoma. By congestive glaucoma I mean that type of disease which, in contrast to simple glaucoma with its insidiously progressive course, is episodic in its nature, which occurs preferentially in females of an anxious disposition at an earlier age than the simple type of the malady, that shows no changes in the visual fields or optic discs until the disease is far advanced sometimes into the chronic congestive or the absolute stage, that usually has a narrow angle of the anterior chamber, and that is characterized initally by irregularly occurring rises in tension associated with transient attacks of halos and mistiness of vision which may culminate in an acute and incompensated attack of raised tension. While simple glaucoma is slowly and insidiously progressive, congestive glaucoma is violent and turbulent in its course; the former causes blindness quietly almost before its victim is aware, the latter with all the tragic drama of a catastrophe.

The investigation of the tension in such cases shows a characteristic evolution which can be divided into three stages.

In the first stage, which sometimes lasts for many years, the tension is generally normal, and it is important to remember that, in distinct contrast to simple glaucoma, it shows merely the normal but no abnormal diurnal rhythm.

Occasionally, however, a sudden rise of tension occurs, appearing as an isolated incident. It occurs particularly towards the end of the day, usually when the patient is tired or worried or excited. A family crisis, a business worry, an exciting game of cards, or a visit to the cinema are typical adequate stimuli. This phase may last for years; occasionally, however, an acute congestive attack may suddenly develop which the patient cannot fail to remark.

A second stage is reached when unusual events are not required to excite such a variation of tension, and a regular phasic rhythm sets in wherein, if no treatment is given, the tension may rise, regularly and periodically, every day to

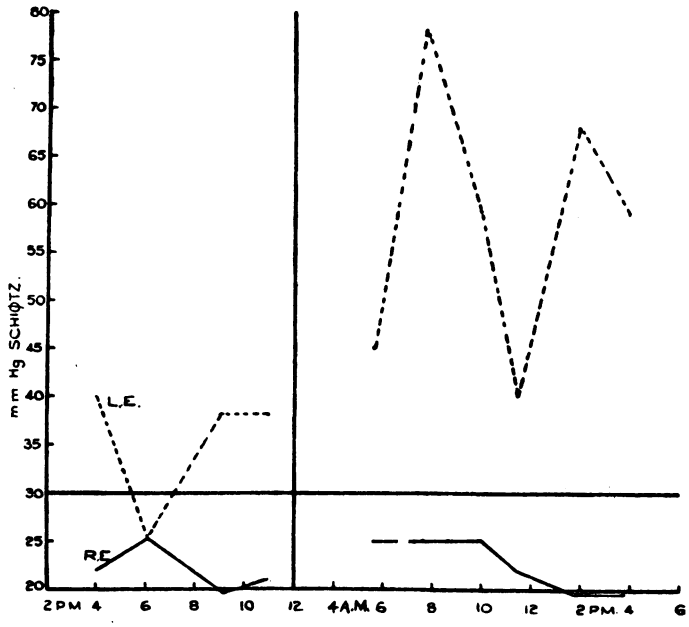

Fig. 3.

The excursion in a case of advanced congestive glaucoma affecting the left eye (dotted line). The right eye (continuous line) shows no pathological rise of pressure but a pathological variation indicating the presence of vasomotor instability.

heights sometimes of 60 or 80 mm. Hg. Again the eye remains white without congestion, and the patient meantime often suffers no inconvenience except regularly occurring and transient halos and mistiness of vision (Fig. 3). At this stage the height of the phasic rhythm of tension is usually controlled within adequate limits by miotics, but the character of the rhythm remains. This state of affairs may last for years. The optic discs remain pink and show no sign of cupping and the fields, both peripheral and central, are unimpaired, so that no disability—beyond the use of miotics—is experienced by the patient, nor does

objective harm affect the eyes. It is interesting, however, that after treatment with miotics has been begun, a failure in the natural control seems to be reached much more rapidly so that on the withdrawal of the drug, the tension rises rapidly to dangerous heights, and at this stage in the disease a congestive attack is likely to ensue.

The final stage is reached when miotics, even the most powerful, are without hypotensive effect; the tension suddenly rises and remains so; visual symptoms become sufficiently clamant to demand attention, and an acute strangulating circulatory crisis supervenes, unless it is forestalled by surgery. Something happens in the course of the usual transient, self-limited attack so that it becomes irreversible : some margin is crossed over which there is no easy return. There is one point of crucial importance which is not often stressed. In the ordinary prodromal attacks, whether they be intermittent and occasional or periodic and regular, there is no pain, there is little or no congestion, and the eye is white, and yet the tension is often 60 mm. Hg, and may occasionally reach 80. In the true congestive attack, the eye may certainly on occasion, be immeasurably hard, but the tension is often less than 60; and yet the eye is painful and intensely congested. Something new has happened : the whole clinical picture has changed; and the difference is qualitative not quantitive.

The pathological picture presented by a case such as this, when the eye has been examined shortly after an acute attack, is typical. It is obvious that the primary fault lies in an intense vaso-dilatation of the whole of the uveal circulation, associated with enormously increased capillary permeability and swelling of the tissues. The pathological picture shows that congestion affects particularly the ciliary body, wherein the blood vessels show a great dilatation with deposition of fibrin around them, and the entire ciliary region is so swollen that the root of the iris is pushed forward against the cornea, sometimes obliterating the angle of the anterior chamber. A discussion of this catastrophic phenomenon is not really germane to our immediate subject; but it may be that the prodromal phasic variations are due to a periodic sympathetico-tonia; it may be that when this becomes sufficiently frequent or severe, and the tension rises sufficiently high to cause tissue-damage, histamine-like substances are liberated and their effects upon the circulation change the entire picture.

In the meantime, let us enquire into the cause of these peculiar variations of tension which appear to be fundamental in primary glaucoma. It is certain that their cause does not lie in the width or narrowness of the angle of the anterior chamber, for similar variations occur whether the angle is wide or narrow, and in the same eye the angle remains of the same width during a rising and a falling phase of tension. Nor can it be due to a structural sclerotic impediment to drainage, for such an organic change cannot be effective at 10 o'clock and ineffective at 12 o'clock in the same day. Organic changes certainly develop at a later stage; but initially and fundamentally the cause must be equally variable as the effect, that is, it must be functional in nature.

These pressure changes could be due to one of three things—(1) a variation in the capillary blood pressure; (2) a variation in the volume of the intra-ocular fluid; or (3) a variation in its drainage.

With regard to the first question, it is impossible to see the uveal capillaries clinically or to measure the pressure within them, and the only evidence on this point which can be brought forward is indirect. The only part of the circulation we can observe is the exit veins as they emerge on the sclera, and invariably, contrary to what is frequently stated, and completely contrary to what happens in the congestive crises of acute glaucoma, in the early phasic stages a rise of tension is always associated with a constriction and a fall of tension with a dilatation of these vessels. It is also to be remembered that the entire uveal tract is virtually erectile tissue wherein arterioles of considerable size empty themselves into venous channels by direct anastomosis with little or no dichotomous branching. For this reason changes in vascular pressure will have dramatic effects and changes in capillary pressure will be readily reflected in the exit veins.

With regard to the second point, the formation of aqueous, recent work, on which there is now a considerable degree of unanimity, would seem to point to the conclusion that the intra-ocular fluids are formed by a basic process of controlled diffusion across the blood-aqueous barrier (essentially the ocular capillary walls), a process on which is superimposed a secretion elaborated in the ciliary region. Diffusion across the blood-aqueous barrier can be explored by studying the rate of the leakage of fluorescein into the anterior chamber after the dye has been injected intravenously. Normally the transfer of this substance across the blood-aqueous barrier follows a standard curve. With the exception of the acute crisis of congestive glaucoma, the phasic variations in tension in both simple and congestive glaucoma are associated with no significant alteration in the permeability curves, nor is it related in any way to the height of the ocular tension in a particular case, even although it may vary at different times of the day from 30 to 70 mm. Hg. We can, therefore, conclude that increased capillary permeability and increased diffusion do not enter into the causation of the periodic rises of tension in primary glaucoma.

It is of considerable importance that this mechanism is effective in certain types of secondary glaucoma—as in the inflammatory variety (hypertensive iridocyclitis) —and it is also interesting that the fluorescein pours into the anterior chamber in the acute congestive crisis of congestive glaucoma — but this, as we have suggested, is an entirely different mechanism from that seen in the early phasic stages.

Let us now consider any possible variation in secretion. If fluorescein is instilled into the conjunctival sac it diffuses through the cornea and appears in the aqueous humour in a concentration sufficient to be measured optically with considerable accuracy, and then slowly disappears. Its concentration and disappearance in the normal eye follow a fairly regular time-curve lasting some 18 hours. In glaucoma, if the tension is rising or high, the concentration of fluorescein in the aqueous remains high for a very much longer period. If the tension falls,

either spontaneously or on the exhibition of miotics, the concentration of fluorescein rapidly falls. If we were to assume that the rise in tension is due to over-secretion of new aqueous humour — which, of course, would contain no fluorescein — while the drainage facilities remained constant, a dilution of fluorescein in the anterior chamber would result; the concentration of fluorescein derived from the cornea during a period of high tension, and its disappearance with the fall of tension, prove that the increase of tension is not due to excessive secretion of aqueous but, suggest that it is due to a blockage of drainage, the relief of which accompanies the fall in tension.

This brings us to the drainage channels. A blockage of these channels may occur, first, at the angle of the anterior chamber if the root of the iris is pushed against the cornea. This can be shown not to occur in the early phasic stages of the disease of congestive glaucoma, although it does occur in the acute congestive crises. In the second place, a blockage may occur in the trabecula which may become impervious or sclerosed; this frequently happens in advanced cases of simple glaucoma, but cannot account for the early variable rise and fall. Finally, a functional block would occur if the pressure in the episcleral veins rose so that it became higher than the pressure in the anterior chamber. In the first two sets of circumstances it is possible that drainage may continue at a higher pressure level, but in the third case when the pressure in all the venous exits is raised, drainage would be impossible since aqueous cannot run from a lower pressure level in the anterior chamber into a high pressure vein.

Clinical observations show this to be the case, for in this respect the aqueous veins which drain directly from the canal of Schlemm into the episcleral veins emerging directly from the eye form a delightful and most accurate natural manometer. It can be observed clinically that in the increasing phase of tension there is little or no flow through the aqueous veins, the flow is of average dimensions when the tension is level no matter what the height may be, and that it is greatly increased in a decreasing phase. Similarly, if the glass-rod test is employed to a laminated aqueous vein, while a blood-influx phenomenon is the usual finding in the ascending phase when the recipient vessel of an aqueous vein is compressed, the conditions are reversed in the same vein in the descending phase, so that an aqueous influx is common (Fig. 4). That means that the venous pressure is higher than the aqueous in an ascending phase, and lower in a descending phase.

Finally, an occasional reversal of flow may occur spontaneously. An aqueous vein may appear laminated, containing for some distance parallel columns of aqueous and blood which have not yet intermingled, in a steady phase of tension: in these circumstances, the pressure of aqueous in the anterior chamber must equal the pressure in the vein. In the ascending phase of tension the same vein may become filled with blood, indicating a rise in the venous pressure; in the descending phase the flow may again become laminated and the vessels may eventually become filled with clear aqueous, indicating that in this phase the venous pressure has fallen below the aqueous pressure.

It would, therefore, seem obvious that, without the occurrence of any organic changes, the drainage of the aqueous humour is embarrassed or even abolished in the ascending phase of tension owing to the high venous pressure, an embarrassment which is relieved intermittently when the venous pressure descends, but would be unrelieved if the circulatory changes became permanent.

All this points definitely to a vascular change being responsible for the phenomenon. Let us enquire how it can be controlled.

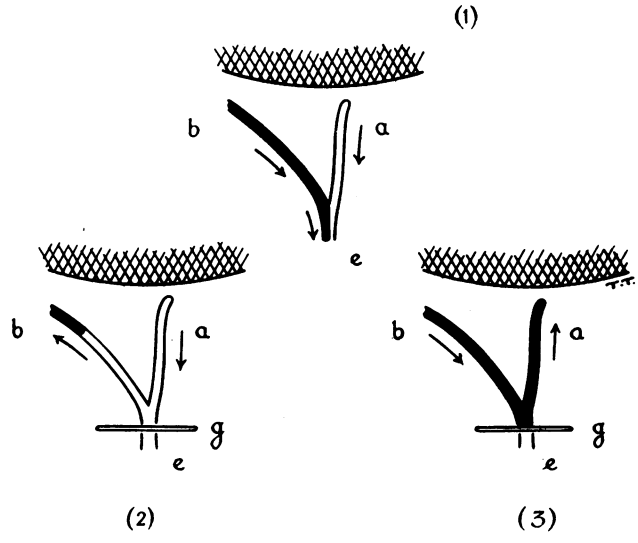

Fig. 4.

THE GLASS-ROD TEST. (1) Shows the normal condition. (*a*) Represents an aqueous vein full of clear fluid; (*b*) a blood vein full of blood; they join together to form a laminated vein filled partly with blood and partly with aqueous when the pressure in both feeding vessels is approximately equal.

Any gross difference in pressure is revealaed when the recipient vessel (*e*) is obstructed by pressure from a small glass rod (*g*). If the pressure in the aqueous vein (that is, in the anterior chamber) is greater than the pressure in the blood vein (that is, in the exit veins of the eye) there will be a reflex of aqueous from *a* to *b*, as seen in (2). If these pressure relationships are reversed there will be a reflex of blood into the aqueous vein, as seen in (3).

In the first place, the entire phasic variation is abolished if the ciliary ganglion is infiltrated with procaine. This, of course, abolishes both the sympathetic and parasympathetic nerve supply to the eye. It is also of interest that if the ciliary ganglion on one side is blocked in this way the phasic variation in the other eye is also damped down or ceases altogether, a fact which shows that this phasic variation is mediated between the two eyes by axon reflexes, an effect one sees in other connections. In the second place, a similar abolition of the phasic variation occurs on blocking the stellate ganglion in the neck, which indicates

that the sympathetic is primarily at fault. Similarly, an abolition of the phasic rises occurs after the administration of drugs which block sympathetic activity, such as hexamethonium or dibenamine, but in this case the evidence is somewhat obscured by the general fall of blood pressure.

Finally, we have the evidence of the hypotensive effect of cholinergic drugs such as pilocarpine and eserine. This has been known for a long time, and the classical view has always been that they act essentially by opening up the angle of the anterior chamber and thus encouraging draining by contracting the pupil. To some extent and in some cases, this is doubtless true, particularly in cases wherein the angle is narrow and temporarily embarrassed in an acute congestive attack. But this does not explain their effectivity in the more numerous cases wherein the angle is all the time demonstrably open; or when, on the contrary, it is organically closed by complete peripheral synechiæ; or when the sphincter of the iris is thrown out of action by an operation; or in cases of aniridia when the iris is absent or virtually so.

In addition to their miotic effects, however, these drugs produce a capillary dilatation and the opening out of new capillary districts, which, for the time being, may be functionally closed. This can well be seen by the naked eye in the iris of the albino rabbit. Normally in the iris of this animal, large radial vessels running from the circle of the iris are easily visible, with, however, only a few small vessels near the pupillary margin. On the instillation of pilocarpine or eserine, the picture is quite changed, for large numbers of dilated capillaries are seen among the terminal arcades. This effect is due not only to the dilatation of the few vessels previously seen, but to an apparently vast increase in their number.

The same effect can be observed by studying the permeability of the ocular capillaries before and after the instillation of pilocarpine in animals or man. In animals, for example, a particulate dye, such as Trypan blue, does not ordinarily get into the anterior chamber, but after the administration of eserine, the blue dye can be seen heavily staining the aqueous humour. In man this is most easily demonstrated by the technique we have already mentioned earlier in this lecture, of injecting fluorescein intravenously and observing the rate at which it appears in the anterior chamber in the beam of the slit-lamp when it is seen that the permeability is very considerably increased. This vasodilatory action of pilocarpine and eserine can be readily verified clinically after the instillation of these drugs by the observation of capillary dilatation in the conjunctiva, by the increase in the vascular pulse of the eye as registered with the tonometer, and very beautifully and dramatically by the apparent altered rate of the peri-foveal circulation as seen entoptically.

This effect is also seen in the behaviour of the aqueous veins after the instillation of miotics, for then a dilatation of these veins can be observed as well as an increase in their current. Indeed, these miotic drugs sometimes act so dramatically as to cause a change in the direction of flow so that a vessel which, before their instillation, seemed to be a blood vein, after their instillation becomes an obvious

aqueous vein; and in many vessels, on the application of the glass-rod test, an aqueous influx phenomenon can be observed after their use when before it could not.

If the phase of rising tension in glaucoma is due to a phase of irritability and constriction of the capillary circulation which induces a high capillary-venous pressure—a phase of sympathetico-tonia—while the phase of falling tension is associated with a recovery from this phase of irritability wherein the circulation resumes its normal equilibrium, it may seem reasonable to suggest that the essential action of miotics in these circumstances is to combat this irritable state, to counteract the adrenergic state by a cholinergic action, to cause a capillary dilatation and to open out capillary channels which have been temporarily occluded, so that the blood is dissipated over a wide capillary bed in such a way that its hydrostatic pressure is lowered and the pressure in the venous exits falls.

To summarize—it seems probable that the early stages of glaucoma of both types are characterized by a condition of vascular instability, periodic phases of sympathetico-tonia wherein a raised venous capillary-pressure occurs, being followed by phases wherein circulatory control reasserts itself.

In congestive glaucoma the changes are irregular, turbulent and dramatic, depending for a long time on specific stimuli which excite a condition of sympathetico-tonia; but since for a long time they are intermittent and since, in the quiet intervals, the circulation is adequately maintained, the eye as a rule maintains its integrity and its function for a longer period. But if the phases become a constant habit and the intermissions become incomplete, eventual damage is done; and if at any time they overstep themselves so that in an acute crisis circulatory strangulation becomes insupportable, the damage may be sudden and catastrophic.

In simple glaucoma the variations are regular, spontaneous, but slowly and remorselessly progressive, and they are accompanied by, or may even cause, organic changes of sclerosis in the ocular circulation. The first phase is associated with instability of tension, the second with its permanent elevation. So long as these vascular changes are intermittent and the circulation returns periodically to normal, so long as the eye gets periodic rest periods, its function may survive. But if these changes pass from the functional to the organic, from the reversible to the irreversible stage when compensation becomes difficult, infrequent and eventually impossible, permanent damage results. In the end the capillary circulation almost disappears, and all the tissues of the eye, including the trabeculæ at the angle of the anterior chamber and the tissues of the optic nerve, become degenerated and sclerosed; and even although, at this stage, if the tension—which may never have been very high—is surgically relieved, the degeneration and sclerosis may progress so that blindness—virtual or complete—may result.

That is not to say, of course, that the control of tension by operative treatment at as early a stage as possible is useless. Within the limits of our present knowledge, it is the only thing we can do; and if the raised tension is allowed to remain

and progress, most of those eyes would go blind. The poverty of our results is merely a natural result of our confining ourselves to relieving a symptom—albeit an important symptom—and leaving the primary disease untouched. To conceive glaucoma in terms of the drainage of the aqueous only, as is the habit among so many of us to-day, is to base our therapeusis on the evidence of the gross pathology which disease has left behind it, rather than on the more subtle initial changes depending on the underlying disordered physiology. The derangement of mechanics which appears as an end-result is so much more obvious than the initial failure in function: a rearrangement of mechanics is easy and since it gives relief, by all means let us practise it; but whatever we may say to our patients, do not let us say to ourselves that in this rearrangement we have solved the underlying problem or cured the disease. It may be that in the future we may be able to do better, but until that time comes, I am sure that Dr. Craig, with his great weight of wisdom and experience, will agree with me when I say, It is not what we say to others, particularly if they require psychological support, but what we say to ourselves, that really matters.

REVIEWS

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The Clinical Value of Radioactive Isotopes

By E. E. POCHIN, M.D., F.R.C.P.*

The Robert Campbell Oration, delivered on 26th February, 1953

I AM very much honoured by your invitation that I should deliver an oration in this valuable and distinguished series that has been established in memory and honour of the life of Robert Campbell, and I wish to speak of the clinical value of radioactive isotopes.

In the year in which the Robert Campbell memorial orations were founded, Rutherford had already detected faint scintillations on the screen of a chamber in which nitrogen atoms were being bombarded with helium nuclei (Rutherford and others, 1930). These scintillations were due to the formation of oxygen atoms from nitrogen, and the first isotope had been artificially produced.

The ensuing thirty years have seen this subject develop in a way, and with a speed, that would have satisfied Campbell's instinct for the application of new knowledge and techniques; with the first radioactive isotope being prepared in measurable quantities in 1934 (Fermi and others, 1934), used in animals and in man soon after, and by 1942 in the treatment of human disease (Hamilton and Lawrence, 1942; Hertz and Roberts, 1942). Since then the clinical uses of these materials have increased rapidly. My title, however, is not the clinical uses, but the clinical value, of radioactive isotopes, for it has become obvious in the last few years that certain isotopes had more than a purely experimental interest and, to-day, their clinical use is essential, in the sense that certain of our patients will be improperly treated or inadequately investigated, without their help. And so I shall speak mainly about the methods that are of direct clinical importance. Even so, I shall need to illustrate rather than to enumerate all the present applications of radioisotopes in clinical medicine. I will be dealing in particular with radioactive iodine, which was one of the first to be produced, and to be used in therapy, and which is one in which my own department has been interested. It is perhaps a fitting example, also, since it has important applications to the investigation and surgery of the thyroid gland, which Robert Campbell so much advanced by his surgical skill and published work.

I would like to start by explaining the meaning of some of the rather unfamiliar terms that are used in this subject, and those of you who are accustomed to work with isotopes and their radiations will, I hope, excuse this. So, firstly, what exactly is an isotope? You will remember, perhaps, that different atoms differ, not only in the weight of their nuclei, but also in the size of the electrical charges on them.

*Based in part on work undertaken for the Medical Research Council, London, in the Department of Clinical Research, University College Hospital Medical School, London.

Now it is the nuclear charge, and not the nuclear weight, which determines the chemical properties of the atom. For example, any atom with a charge of 53 units on the nucleus will have 53 electrons in their orbits round the nucleus, and these will give it the chemical properties of iodine, whatever the nuclear weight may happen to be. In fact, we know of atoms of every atomic weight from 124 to 137, but all having a charge of 53, so that all these different atoms are forms of iodine, and are known as its isotopes (Table I). Now, only one of these iodines, that with

TABLE I.

PROBABLE ISOTOPES OF IODINE.

Charge.	Weight.	Half-period of Radioactive decay.
53	122	4 minutes.
,,	124	4 days.
,,	125	60 days.
,,	126	13 days.
,,	127	STABLE.
,,	128	25 minutes.
,,	129	(long).
,,	130	13 hours.
,,	131	8 days.
,,	132	2 hours.
,,	133	22 hours.
,,	134	54 minutes.
,,	135	7 hours.
,,	136	2 minutes.
,,	137	22 seconds.

atomic weight 127, is stable; all the rest are unstable, and undergo radioactive decay more or less rapidly. It is thus only iodine 127 that normally occurs in the thyroid or in nature. But the other and radioactive isotopes can be prepared by physical methods, for example, in the plutonium pile. The most convenient for clinical purposes is iodine 131, of which half undergoes radioactive decay within every eight days. In just the same way, radioactive forms of sodium, carbon, phosphorus, potassium and most other important elements are available, and all of them are chemically indistinguishable from the corresponding normal elements.

Now the advantages of this are evident. We can give a dose of radioactive iodine in the knowledge that the body cannot distinguish it chemically from ordinary iodine; it will go exactly where ordinary iodine is going, it will be metabolised at the same rate, and will be shared between thyroid and kidney in the same proportion as for ordinary iodine. Yet, although its chemical metabolism is identical, its presence can be detected by means of its radioactivity with very great sensitivity; or, if large quantities are given, its radiations can be utilised to produce intense local radiation and tissue destruction at the sites where the

isotope is most highly concentrated. These radioactive iodine atoms form, in fact, the perfect "fifth column"; we send them out in uniforms which make them indistinguishable from the enemy, with whom they mix and move freely; and we equip them with wireless transmitters, so that they can signal their movements, and therefore his movements, continuously. Or, if we send out large numbers, they return with the enemy to all his sites of concentration and proceed to blow them up.

We must distinguish between these rôles of intelligence and sabotage, between our use of the isotope's radioactivity for its detection or for tissue destruction at the sites where it is selectively concentrated. And with radioiodine this distinction is clear-cut, since it requires about one thousand times as much of the isotope to cause effective tissue destruction as it does to allow useful measurement of thyroid function. (Table II.)

TABLE II.

^{131}I

TEST DOSES		THERAPY DOSES	
$\frac{1}{100}$	$\frac{1}{10}$	10	100 Millicuries
(10)	(100)		(microcuries)
Tests of function	Maps of distribution	Graves's disease	Thyroid carcinoma
measurement of radioiodine		partial	total
quantity	localisation within thyroid, etc.	destruction of a strongly I-concentrating tissue	weakly

It will be seen that the diagnostic tests with which we shall be concerned require only small fractions of a millicurie, whereas radioiodine therapy requires many millicuries. I should mention that a millicurie of any radioisotope is the amount in which atomic disintegrations are occurring as frequently as in a millicurie of radium, that is, in a milligram of radium in equilibrium with its products; so that in each millicurie of any radioactive isotope, about forty million atomic disintegrations are occurring each second. With the test doses of radioiodine, the irradiation outside the thyroid is quite negligible, and even within the thyroid it may be no higher than is received by large areas of the body during two minutes' X-ray screening after a barium meal or in the chest clinic. To the patient, the radiation hazard of the smaller test doses at least is as negligible as in many routine radiodiagnostic procedures. Rather larger test doses are needed to map out the distribution of iodine within the thyroid gland or in the neck, but they are still without detectable effect on thyroid or any other function. Even at the much

higher level of dosage for therapy in Graves's disease, where the thyroid will receive several thousand rœntgens of irradiation, blood changes are not normally seen and the menstrual periods are undisturbed; and they are normally uninfluenced even by the higher doses still that are required for thyroid carcinomata, which do, however, produce a transient depression of the blood lymphocyte count, lasting for perhaps a fortnight.

Let us consider in turn the uses of isotopes for simple tests of function, for mapping the distribution of elements within the body, and for various types of therapy.

I will illustrate first how a radioactive isotope can be used to give a simple measure of thyroid function. When radioiodine is taken by mouth, most of what is lost from the body is excreted in the urine, and most of what is retained is concentrated in the thyroid. If, therefore, we give a dose of radioiodine having measured its radioactivity, and collect the urine excreted for the next forty-eight hours and determine its total radioactivity, we can calculate the proportion of the ingested radioiodine that has been lost from the body, and therefore the proportion that has been retained by the thyroid. But since the thyroid cannot distinguish radioiodine from normal iodine, this is a valid measure of the iodine avidity of the gland (Skanse, 1949; Fraser and others, 1953). This is a simple measurement, taking perhaps ten minutes to perform, and the radioactivity of liquids can be determined with ease and sensitivity, so that small doses can be used.

But you may say that you do not wish to rely on the complete collection of urine and that you want to estimate the thyroxine output rather than merely the iodine uptake of the gland. Suppose, therefore, that a known dose of radioiodine is given, and forty-eight hours later a plasma sample is taken. If we precipitate the thyroxine content of this plasma with a protein precipitant, and measure the radioactivity of this precipitate, we can deduce the amount of our radioiodine which, in the intervening two days, has been incorporated into thyroxine and discharged into the plasma. In normal subjects, less than 0.4 per cent. of the dose is protein-bound by this time as thyroxine per litre of plasma, whereas higher concentrations of up to 5 per cent. per litre are regularly reached in hyperthyroidism, owing to the more rapid thyroxine production in this condition (Goodwin and others, 1951). We may recognise from this test certain merits of the isotope technique: we give our radioiodine by mouth and identify its arrival in the plasma; we determine its actual concentration in plasma and, by simple fractionation, its concentration in a particular chemical form; and, since we know the moment and the only moment at which this type of iodine was given, we can establish a value for the rate of synthesis of the radioactive thyroxine and therefore of thyroxine as a whole, since the two forms of iodine are indistinguishable chemically and metabolically.

It is clear that measurements of this kind have a wide application in clinical medicine, and many are already being used. Radioactive iron may be given orally in different chemical forms (Moore and others, 1944) or in different types of

anæmia (Dubach and others, 1948), and its efficiency of absorption estimated from plasma samples; or radioiron given intravenously, to measure its degree and speed of incorporation into hæmoglobin and the red cell (Finch and others, 1949). Red cells can be made recognisable by labelling with radioactive phosphorus (Reeve and Veall, 1949), chromium or iron (Gibson and others, 1946), and injected intravenously in known amounts so that the blood volume, the total red cell volume of the blood, can be deduced from the radioactivity of blood samples withdrawn after circulatory mixing has occurred. The same principle allows the total exchangeable sodium or potassium of the body, for example, in Addison's disease, to be measured, by allowing a known quantity of the appropriate isotope, radiosodium or radiopotassium, to mix throughout the body, and then establishing its concentration in a sample of plasma. The procedure is indeed widely applicable to measuring the absorption of any suitable element, for example, through the wall of the gut, the skin or the capillaries, and into the plasma, the urine, the C.S.F. or the amniotic fluid; and many such uses have been developed (Low-Beer, 1950). It can be extended to cover the absorption or movement of chemical compounds or biological structures, if these can be labelled by the attachment of a radioactive element which remains stably attached during the course of the observation. Moreover, the scope of such methods can clearly be usefully extended if the circumstances or value of the test call for examination by biopsy. In fracture of the neck of the femur, the vascularity of the femoral head can be established by administration of radiophosphorus several hours before operation. If, at operation, the isotope is found to be well concentrated in bone from the head of the femur, it indicates that there must be an adequate circulation to the femoral head, but if not, the head is likely to have inadequate circulation and avascular necrosis will probably occur later (Tucker, 1950).

By an obvious extension of this method, radiophosphorus is proving of value during operations for cerebral tumour. Probably because of their higher cellularity and vascularity, many such tumours are found to develop higher concentrations of phosphorus, and therefore of radiophosphorus, than normal cerebral tissue. If a patient has received radiophosphorus before operation, the higher radioactivity of tumour than normal tissue can be recognised if a probe incorporating a counter is passed into it (Selverstone and others, 1949). Morley and Jefferson (1952) have recently described the practical value of this in determining the extent of tumour infiltration at operation.

All the methods we have discussed so far depend on measuring the radiations of material which can be placed in contact with a suitable counter tube, whether the material is a liquid sample of plasma or urine, or the cerebral tumour tissue into which a counter is introduced. Most radioisotopes, however, also emit a form of radiation, gamma radiation, which will penetrate several inches of tissue with little reduction in intensity. This immediately throws open a further range of investigations, which are often of considerable clinical value and importance. If a test dose of radioiodine is given intravenously or by mouth its arrival in the thyroid

can not only be detected, but can be measured and followed quantitatively by a Geiger counter placed in front of the neck opposite the gland. Moreover, if this counter is suitably shielded with lead, it will measure radiations from radioiodine in the thyroid, but those from radioiodine in other positions will be stopped by the lead. The Geiger counter itself consists simply of a glass tube containing two wires with a potential difference between them, but insulated from each other so that normally no current flows. When, however, a radiation from a disintegrating atom passes through the tube, it momentarily ionises the gas in the tube and a brief current flows. The frequency with which such currents flow thus corresponds with the number of atoms disintegrating, which in turn is proportional to the amount of the radioactive isotope present. So the counting rate varies simply with the amount of radioiodine in the thyroid and, with suitable calibration (Myant and others, 1949), can be expressed as a given percentage of the dose in the gland at the time.

May I illustrate this method by a test we use in the diagnosis of hyperthyroidism (Pochin, 1950)? The patient drinks a small dose of a radioiodine solution. Two hours later she returns and measurements are made with a counter opposite the neck, and opposite some other body area such as the thigh. Now, clearly, the more active the thyroid, the more radioiodine will have been taken up by the thyroid in these two hours, and the less will be left in the rest of the body, as indicated by the thigh. A simple ratio of the neck to the thigh counting rate seems in fact to give as useful diagnostic information as the basal metabolic rate, being greatly raised above normal in most hyperthyroid patients. The test involves about five minutes' measurements in the out-patient clinic. Even the dose need not be calibrated exactly, since the result depends simply on a ratio of two counting rates measuring the proportion of the dose that is in the thyroid to that which is left in the rest of the body two hours after administration. And the radiation received by the thyroid is comparable to that received by the whole abdomen during the barium meal examination.

Many other applications of external counting have been or are being developed—timing the rate of venous flow by injecting radiosodium at the ankle and recording its arrival at the groin (Payling Wright and others, 1948); timing the absorption of drugs from an injection site (Reiner and others, 1943); studying the lymphatic removal of colloid or protein material; and measurement of circulation time from one ventricle of the heart to the other (Prinzmetal and others, 1949). Or if radiosodium is injected into a pedicle skin flat (Barron and others, 1951) and is found to be rapidly removed through one end of the pedicle, an efficient circulation must have been established through this end; and by detecting the vascularisation of flaps in this way the transfer and establishment of such grafts can be safely accelerated, and the patient's stay in hospital and in plaster is often more than halved by using this test.

It is an obvious extension of these measurements of the total amount of radioisotope in a given region to map out in more detail how it is distributed within the region. This requires rather higher doses of radioisotope and shielding of the

counter so that the amount of isotope under the skin at each point can be measured without interference from that in adjacent areas. With suitable equipment and quite moderate dosage, it is easy to map the outlines of a retrosternal goitre (Fig. 1), the process involving perhaps twenty minutes' work, a few days after administration of a test dose. It may also be useful to determine in this way the size of the thyroid, the activity of different parts of the gland, and even sometimes its position in the neck in those hyperthyroid patients requiring thyroidectomy, but in whom the gland is not palpable (Fig. 2).

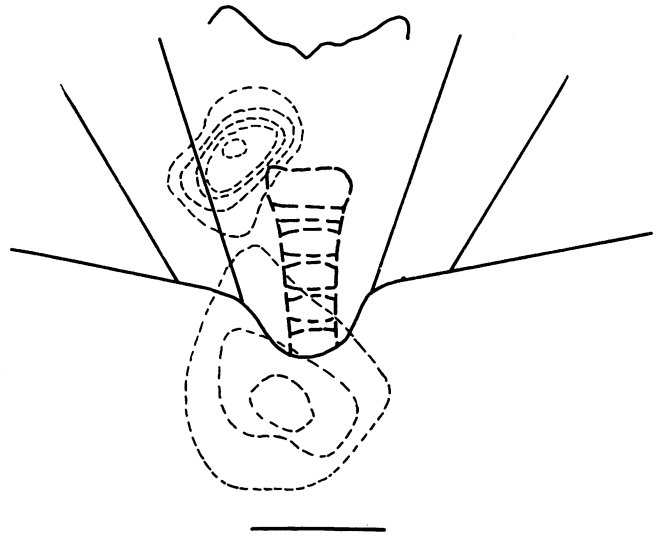

Fig. 1

Map of areas of radioiodine concentration (contours of equal activity shown by interrupted lines) in the neck, indicating retrosternal extension of the thyroid gland.

Although most techniques of mapping are concerned with radioiodine and thyroid tissue, several such procedures are of value in the control of other types of radio-isotope treatment as will be discussed later; and the method is of wide application. Certain cerebral tumours concentrate diiodofluorescein, of which the iodine, if radioactive, may be detected by counters external to the skull, although at present without great accuracy (Belcher and others, 1952). The placental site can be identified in placenta prævia if the circulating blood is labelled with radiosodium (Browne and Veall, 1950), and it is reported that the utilisation of oral iron in bone marrow or in the body iron stores may be followed by counts over liver, spleen and bones after ingestion of radioiron.

It appears, therefore, that the radioisotopes offer a versatile range of methods for examining many functions of the living body without significant radiation hazard. Whether these depend upon fluids removed from the body, or on biopsy, or on external counts over the body, the measurements can be strictly quantitative,

they refer to material administered at a known time and they sample the normal body metabolism without disturbing it, thanks to the sensitivity of the detection methods and the small doses of isotope that can be given.

When, however, we turn to the therapeutic applications of the radioactive isotopes the emphasis is entirely different, although the underlying principles are the same. We are now seeking, as in all radiotherapy, to achieve intense radiation where it is required, with as little radiation as possible elsewhere in the body. Now with almost all the isotopes used therapeutically, it is the beta radiation which

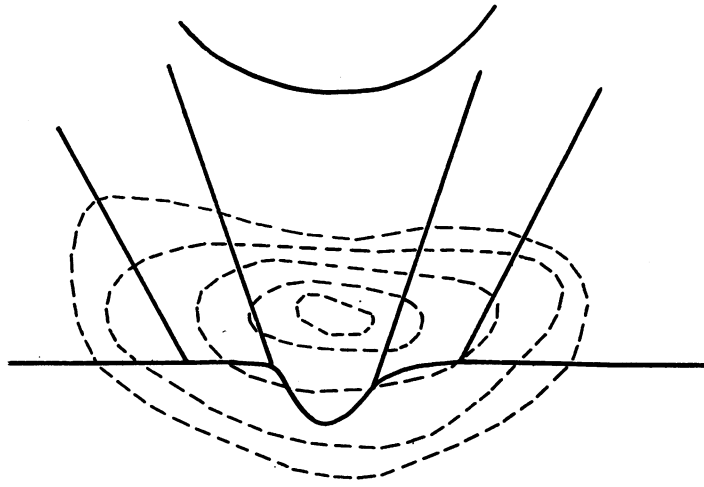

Fig. 2

Map of radioiodine concentration in the neck, showing an impalpable but over-active gland to be in a low normal position.

is responsible for most of the radiotherapeutic effect, and this is due to the emission of electrons which penetrate at most a few millimetres through tissue, so that the tissue destruction is largely confined to the actual areas in which the isotope is concentrated. This gives us two possibilities—either of irradiating a surface by producing a high concentration of radioactive material over that surface; or of irradiating a tissue mass by isotopes distributed throughout that mass. In each case we require to achieve a high local concentration of isotope, with as little of the isotope as possible circulating in the rest of the body.

The irradiation of surfaces is proving clinically valuable in several ways. Simple and effective beta radiation applicators to the skin can be obtained using radioactive phosphorus. Similar possibilities arise with internal surfaces and radioactive materials are being used within latex bags introduced into the bladder to irradiate papillary carcinoma of the bladder (Walton and Sinclair, 1952). Nor need the containing sac be an artificial one, for it is found that colloidal materials introduced into the peritoneal or pleural cavity only escape slowly through the peritoneum or pleura. If a colloidal suspension of radiogold is injected intraperitoneally, it

sediments rapidly (Fig. 3) and fairly uniformly on to the peritoneal surface, and most of it remains there or just below the surface during the whole period of its effective radioactivity—a little passing to the regional lymph glands but negligible amounts to the blood or body as a whole. In patients with rapidly recurring malignant ascites, due to deposits of peritoneal carcinoma, intraperitoneal radiogold will produce an intense local radiation largely confined to the peritoneal surface, and may abolish the formation of ascites which is the main initial limitation on health in some patients. Since the radiation only penetrates a millimetre or

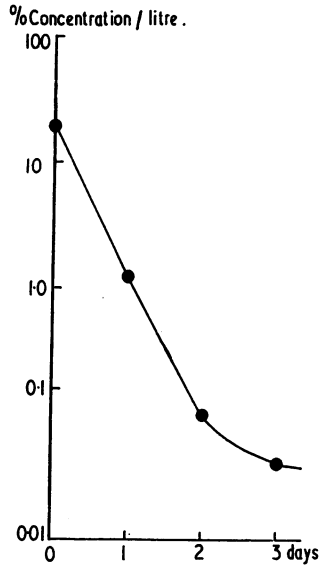

Fig. 3

Concentrations of colloidal radioactive gold in ascitic fluid on successive days after its injection, indicating rapid precipitation on to the peritoneum. Values corrected for decay.

so from the peritoneal surface, this treatment can only be palliative where substantial carcinomatous masses are present. It might, however, be curative where seedling deposits only were present, as after the operative rupture of a malignant ovarian cyst. Radiogold has a similar value when given intrapleurally for recurrent pleural effusion of malignant origin, and we have reduced the frequency of aspiration in one such case from daily to three-weekly aspiration from each pleural cavity.

Radioactive gold undergoes radioactive decay rather rapidly, and delivers most of its radiation in the first few days from the time of its injection. Even when injected subcutaneously in the region of a tumour, it therefore remains at the site of injection for long enough to be valuable therapeutically (Hahn, 1951) in much

the same way as with radium or radon implantations, but often with a better and more uniform dose distribution within the affected tissues, and such removal as occurs up the lymphatics from the affected area may in itself be helpful. Attempts are being made to treat carcinoma of the prostate by local injection through a cystotomy (Flocks and others, 1952), and bronchial carcinoma by local injection into the bronchus (Hahn and Carothers, 1951).

Now you will notice that we have so far been discussing therapeutic methods in which the isotope is placed in apposition with the tumour or affected tissue. But in some circumstances if we administer a suitable preparation of isotope, we can leave the body to concentrate it in the right positions, on account either of the physical or of the chemical properties of the preparation used.

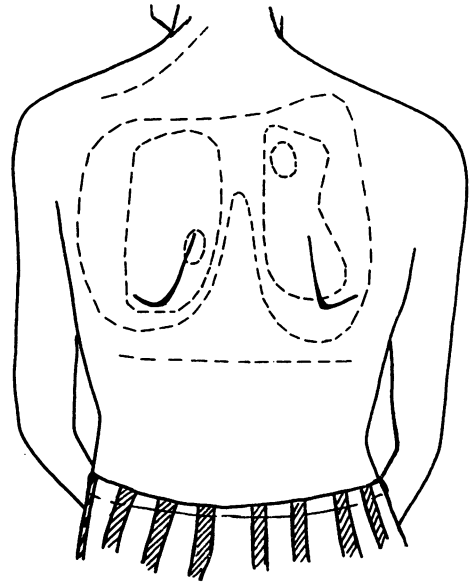

Fig. 4

Map of colloidal radiogold concentration in the chest after intravenous injection of a large particle suspension, indicating selective concentration in the lungs. Data in a case of pulmonary adenocarcinomatosis.

Concentration, based on physical properties, has more interest and promise than immediate value. If a suspension of colloidal material, say radiogold, is injected into a systemic vein, it will be carried by the circulation through the heart, but if the particle size is sufficiently large, the particles will be unable to pass through the lung capillaries and the radioactive substance will remain localised in the lungs. We have attempted to treat a patient with multiple adeno-carcinomatosis of the lungs in this way and obtained a high concentration of isotope within the lungs (Fig. 4) with no detectable escape to other parts of the body, although we did not achieve a sufficient dose to influence the tumour growth (Pochin, 1951).

Or, if colloidal gold is given intravenously in small particle size, the particles are

removed by the reticulo-endothelial system and become concentrated mainly in the liver. Fig. 5 shows the distribution of radiogold achieved in this way in a patient with a primary hepatoma where again a selective but still inadequate local concentration was reached in the liver. This technique has been used with colloidal preparations of various radioisotopes using the oxide of radioactive manganese and chromic radiophosphate as well as radiogold, in chronic leukæmias and Hodgkin's disease, but without outstanding success.

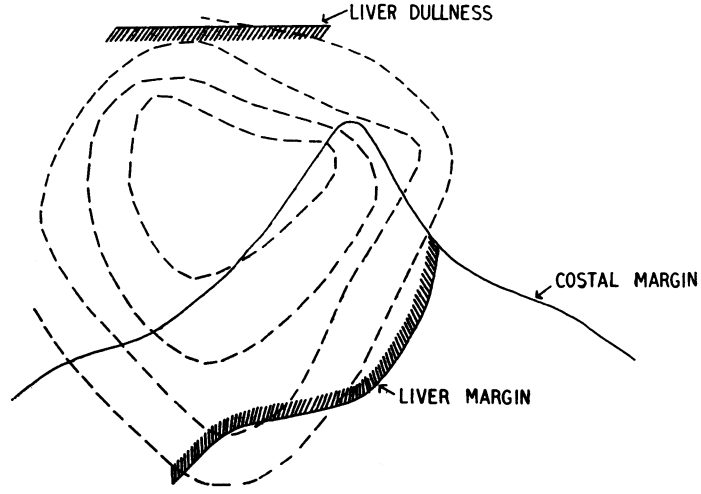

Fig. 5

Map indicating radiogold concentration in the liver in a case of primary hepatoma injected with colloidal radiogold of small particle size. Hatched margin indicates the liver edge to percussion and palpation.

At present, the most valuable methods depend upon chemical localisation of the isotope—of radioiodine for hyperthyroidism and certain thyroid carcinomata and of radiophosphorus for polycythemia.

It is well known that iodine reaches a concentration in the thyroid which is several hundred times that in the body as a whole. Since this holds equally for radioiodine, it follows that the thyroid can be given destructive irradiation of several thousand rœntgens with an amount of radioiodine that is trivial in its effects on the body as a whole. The thyroid overactivity in Graves's disease can thus be abolished very simply by a suitable dose of radioiodine—a most attractive treatment to the patient who is spared the need for operation or for prolonged supervision during the administration of thiouracil. She simply takes what appears to be a drink of cold water—for the amount of the iodide in a millicurie is less than a hundredth of a microgram and quite unnoticeable—and, if she is still thyrotoxic two months later, another drink.

This apparent simplicity is, perhaps, deceptive, and for three reasons. Firstly, these isotopes are somewhat hazardous to handle in therapeutic amounts, highly

specialised equipment is required in the control of dosage, and some care is needed in dealing with the radioactive urine which is passed for the first days after the dose. Secondly, our methods of calculating the necessary dose are not yet precise, largely owing to differing radio-sensitivity of different glands; and a rœntgen dosage which will fail to abolish the toxicity of one gland may induce myxœdema in the next. And thirdly, we do not yet know that the risks of carcinogenesis from this form of treatment are negligible. Radioiodine was first used in the United States in the treatment of Graves's disease over ten years ago, and several thousand patients have now been treated without evidence of carcinogenesis, nor was this a consequence of the earlier radiotherapeutic treatment of this condition. Since, however, such tumours might not arise until after a latency of perhaps twenty years, we shall not know for certain for another ten years whether the risk is negligible. If, then, the risk turns out to be over 1 per cent., the treatment should rarely be used unless both surgery and thiouracil therapy are attended by serious hazards to life; but if the risk of carcinogenesis is less than, say 0.1 per cent., radioiodine may well offer the treatment of choice in Graves's disease, unless by then we have achieved a less barbarous therapy than by mutilating the over-stimulated gland. Meanwhile, I think that this treatment should be used whenever both thiouracil and surgery are impossible or hazardous, and particularly in patients over 45, in whom the expectation of life is in any case comparable with the twenty years' latency of any possible carcinogenesis.

When we turn to the radioiodine treatment of thyroid carcinoma, of course, this consideration of possible carcinogenesis loses its weight, and here I think that radioiodine therapy is clinically obligatory in certain cases. We require to be able to select those tumours of which the cells or follicles concentrate iodine, since they will then concentrate radioiodine and may be destroyed by the intense local radiation that will result. The clearest initial guide in the selection of patients for this treatment appears to lie in the histological pattern of the tumour (Fitzgerald and Foote, 1949). For anaplastic thyroid carcinomata, radioiodine is unlikely to be helpful, because such tumours do not usually appear to concentrate and retain iodine, although some have been shown to do so. It is those tumours which are histologically well differentiated, with colloid-filled alveoli resembling normal thyroid tissue, which are also biochemically well differentiated and resemble normal thyroid tissue in concentrating and retaining radioiodine, although rarely as efficiently as does the normal gland. Unfortunately, this radioiodine concentration in the tumour is rarely present or demonstrable while the normal thyroid is functioning. Only after the removal or destruction of the thyroid gland does the tumour take over this function and become accessible to treatment with radio-iodine. The management of patients suspected of thyroid carcinoma would thus appear to involve :

radical surgical resection if possible and if the diagnosis is confirmed. Otherwise biopsy if practicable, with conventional radiotherapy for any suitable anaplastic tumour. For differentiated tumours, removal of all normal thyroid tissue, either surgically or by a first dose of radioiodine; then if radioiodine uptake can be

demonstrated in the remaining tumour tissue, repeated large doses of radioiodine at one- to three-month intervals. We have had thirty-five patients on such treatment and have observed obvious improvement in fourteen cases, and eleven others continue symptom-free under treatment. It is not yet four years since the start of treatment in any of these patients, so we cannot speak of a curative effect upon what is in any case often a slowly growing type of tumour. From the present results, however, radioiodine offers a treatment for differentiated thyroid carcinomata which is often at least of very obvious palliative value and may well prove to be curative even though multiple bony or pulmonary metastases have already occurred when the patient is first treated.

I would not wish to conclude this account without giving some indication of the type of hazard that the use of these methods, say of radioiodine for thyroid carcinoma, involves. To the patient, the hazard is small if changes in the blood count are closely watched. Only a rather mild radiation sickness, a brief lymphopenia, and occasional and transient swelling in the region of the tumour have occurred in our experience of about a hundred 100 mC doses. The nursing and laboratory staff, however, who may be dealing with several hundred millicuries a week, will require to observe certain rather strict precautions in their work if their radiation exposure is to be kept to the accepted low permissible figures regarded as safe for continuing exposure. We have found that a combination of quite simple methods will prevent any undue exposure—involving nothing more exacting than the methods of a bacteriologist handling pathogens, a surgeon handling radium, and some of the routine methods of barrier nursing. On this basis the patient may, if necessary, be nursed in a general ward with normal bed spacing and without restriction as to visitors, but nurses should use rubber gloves for the care of such patients, or any handling of their bedpans, in the first week from the dose, and urine may require to be kept for periods of up to eight weeks before its radioactivity is low enough to permit its rejection. The laboratory precautions require to be even more punctilious, since the dose is received in a solution of which the accidental ingestion should not on any day exceed one twenty-thousandth of a millilitre, and the day's permissible radiation would be received within one second by any part of the body within half an inch of a 100 mC dose.

The opportunities for therapy with radioiodine are unusually favourable, since the element may be highly concentrated in the tissue which requires treatment. The control of polycythemia by repeated doses of radiophosphorus (Stroebel and Hall, 1951) is due to a similar, although less great, local concentration of the phosphorus not only in the rapidly dividing marrow cells, but also in the surrounding bone. And such types of treatment are of general application. Wherever any element, or chemical compound, or formed structure can be found to enter the diseased tissue in higher concentration than in normal tissues, we have the opportunity of irradiating the diseased tissue selectively by giving the element in radioactive form, or by incorporating a radioactive isotope stably into the compound or the structure so concentrated. And it is obvious that methods of

this type may increase in number and importance in the years to come. Here is an open field for imaginative planning and detailed biochemistry, and the therapeutic applications of the radioactive isotopes offer as fertile a ground for investigation as their diagnostic uses. Twenty years ago this chapter in medical investigation had not opened. To-day I think we are still at the beginning of the chapter.

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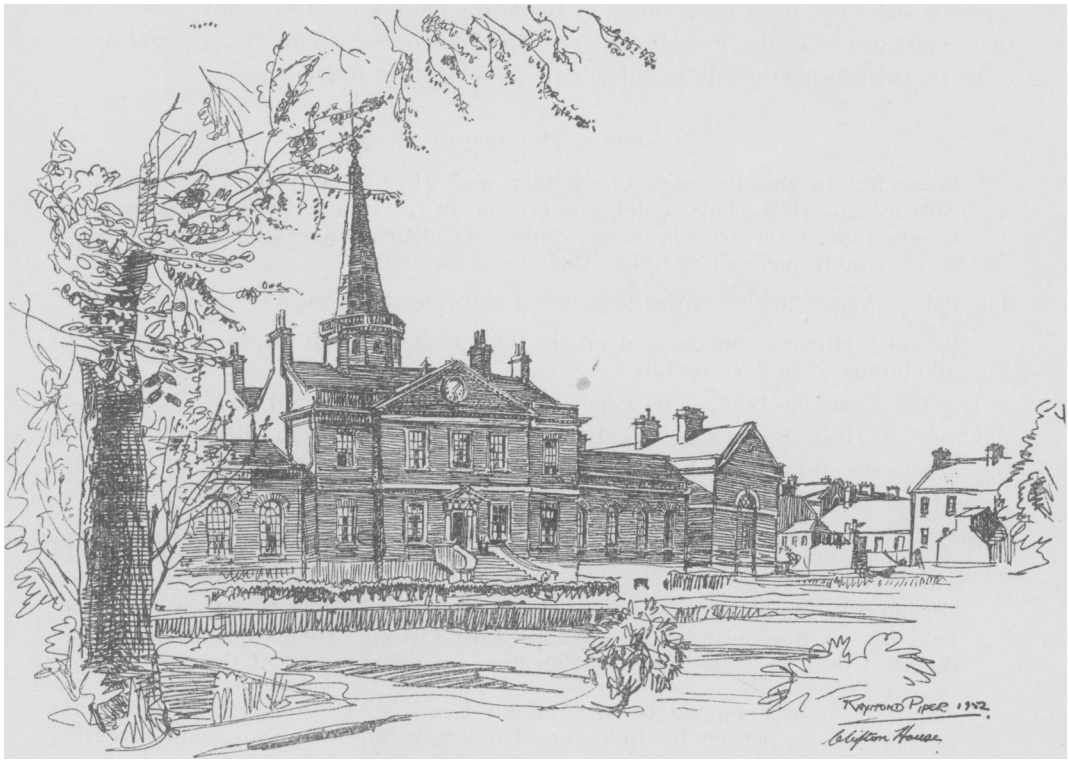
The History and Associations of the Belfast Charitable Society

By R. W. M. STRAIN, B.Sc., M.D., F.R.C.P.I.
Physician to the Society

Address given to The Ulster Medical Society, 13th November, 1952



THE Belfast Charitable Society is Belfast's oldest charitable foundation, and Clifton House is the oldest public building in the city still substantially in its original state.

Its history is interesting, because it is in essence the history of the evolution of Belfast over the last two centuries. The original intention of the founders was to build a poorhouse and hospital. Once this was accomplished, they had to undertake many additional tasks which would otherwise have remained undone, for local government as it is understood to-day was largely ineffective.

Then, during the Industrial Revolution, the population of Belfast increased very rapidly, and at the same time there was a general awakening of the public conscience to the fact that most of these people lived a wretched and precarious life. Under these two powerful stimuli other organisations appeared, both civic and philanthropic, on which devolved the many former duties of the Charitable Society, until to-day its sole responsibility, though one of its original ones, is the care of the aged and infirm.

The Original Charity Fund of Belfast.

From the moment he enters the front hall, no visitor to Clifton House can fail to remark the numerous wall panels inscribed with the names of those who, over a period of years, have contributed to funds for the needy. That above one of the two mantlepieces in the Boardroom is of special interest (Plate 1). Age and many coats of varnish have made it difficult to decipher, but it reads :—

> "George McCartney, Esqr.,
>
> Sovereign of the Borough of Belfast and High Sheriff of the County of Antrim A.D. 1680. This tablet was erected in his time as well for the general satisfaction of the friends of the donors as allso of others who hath or shall be charitably inclined to follow their good examples."

The list of donors begins with the name of a former Sovereign of the town :—

> "Edward Holmes, burgess, dyed in June 1631 and left to the poor decayed inhabitans of belfast 40 Lib."

The list closes in 1759. This panel formerly hung in the old Parish Church at the foot of High Street, and is the tangible evidence of an attempt made to regularise the funds which had collected as the result of charitable bequests made from time to time.

In Young's Town Book of Belfast the minute is quoted to which this Board owes its existence :—

> "Proposalls made to ye Soveraigne & Burgesses at a Court of Assembly held for ye Borrough of Bellfast ye 14th Octobr. 1680 to be debated and digested into By Laws Acts and Ordinances for ye good of the Corporacon.
>
> 1. That the Poores money be secured on Lands or in good hands and suffct security to be passed by Indenture from Soveraigne to Soveraigne yearly; and the Table where ye benefactors for ye poore are incerted may be fairly drawne over and the Earle of Donegall's name may be entered in Lettrs of Gould with the sume blanke in its collume till ye 200 li left by his will be paid for ye use of the said poore and allsoe ye names of all other persons with their sumes may be entered that have given that others when they see what is left and soe well secured may be induced to ffollow their good example for ye good of the decayed Inhabitants of this Corporacon.
>
> agreed on & to be don accordingly."

Until two hundred years ago this appears to have been the only organised charity in the town.

A Poorhouse and Hospital.

In the middle of the 18th century Belfast was a borough of some 8,500 inhabitants. From maps and illustrations of the time, it is possible to form some idea of the sort of place it was. High Street was the principal thoroughfare. The Farset river ran its open course down the lower part of the street, and sailing ships, their Masters living in Skipper Lane near by, could come up the river to take on or discharge cargo by the quayside. The Market House stood where Montague Burton's shop is now, and the Donegall Arms, where many of the early meetings of the founders of the Society were held, was on the opposite side of the road. These premises were reconstructed in 1786, and are actually part of John Robb's buildings to-day. The old Corporation Church at the foot of High Street, where St. George's Church is now, was small and falling into ruins. Dr. Pocock, afterwards Bishop of Ossary, passed through the place in 1752, and wrote :—

> "The town . . . consists of one long broad street and of several lanes in which the working people live. The Church seems to be an old tower or castle to which they have built so as to make it a Greek cross."

A plan (Plate 2) shows the principal streets. High Street was continued into the country as Mill Street and Barrack Street. Ann Street, then called Bridge Street, marked the south side of the town. North Street and Donegall Street, which was then called the New or Linenhall Street, both ran from Waring Street at the "Four Corners" to the Peter's Hill-Carrickfergus Road. Hercules Lane joined the top of High Street to North Street, and was not to become Royal Avenue until much more recent times. John Street connected this point with Linenhall Street.

On the corner of North Street and John Street stood the George Inn. Here, on Friday, 28th August, 1752, Margetson Saunders, the Sovereign, and some of the residents of Belfast met (Plate 3)

> "to consider of a proper way to raise a sum for building a poor House & Hospital & a new Church in or near the Town of Belfast."

There is evidently nothing new about financing an Irish hospital by means of a sweepstake, for it was

> "Resolved, that 100,000 tickets be issued, at half a guinea each, the chances thereof to depend upon the drawing of the Dublin lottery now depending."

Some of these tickets are still extant. This proved a bad means of raising money, and at a further meeting it was decided to take over another series of tickets in a State lottery in London. Accordingly, a notice appeared in the "Belfast News-Letter" of 6th July, 1753 :—

> "Belfast Charitable Scheme.
>
> Whereas a Poorhouse and Hospital are greatly wanted in the Town of Belfast for the support of vast numbers of real objects of charity in this Parish, for the employment of idle beggars that crowd to it from all parts of the North, and for the reception of infirm and diseased poor; and whereas the Church of Belfast is old and ruinous and not large enough to contain the Parishioners,

and to rebuild and enlarge the same would be an expense grevous and insupportable by the ordinary method of public cesses. Now, in order to raise a sum of money to carry these good works into execution, the following scheme hath been approved of by the principal inhabitants of said town and gentlemen of fortune in the neighbourhood who are desirous to promote so valuable an undertaking."

After this follows an outline of the new lottery scheme. In London, in the open market and in the coffee houses, the Belfast tickets which had been grafted on to the British State Lottery were not easily sold, and even in Belfast there was great difficulty in getting cash from those who had contracted to take tickets. The very characters of those managing the Scheme did not escape public criticism. A deputation was sent to London that winter to see what could be done. After about a month the deputation returned home, having made some £500 for the fund.

By annual lotteries and other means, the money collected only very slowly, but at length, on Thursday, 17th January, 1767, there was a meeting of the Members of the Belfast Charitable Scheme in the Donegall Arms, at which it was

"Unanimously Resolved

That the Sum of Sixteen hundred & fourteen pounds two Shillings and four pence half penny, which appears to be the amount of the Fund at Christmas, one thousand seven hundred & sixty six, or what other sum shall arise from the same, be applied to the building of a Poor House and Hospital, agreeable to the original Intention of the Scheme, on such Ground as Lord Donegall shall be pleased to grant for that purpose, in the Town of Belfast —And that the same shall be proceeded upon as soon as his Lordship's Pleasure shall be known.

Resolved

That it is the opinion of this Board that the Ground on the North West side of the Road leading to Carrickfergus fronting the New Street is the most convenient Place for erecting the intended Buildings, and where they will be most ornamental to the Town of Belfast.

And it is the desire of this Board, That Mr. Saurin should acquaint Lord Donegall with their Sentiments, and that they request his Lordship to have the ground for the intended Buildings set apart as soon as can be conveniently done; for it will be impossible to begin them so early as Spring, 1768 unless clay be thrown up immediately for making Bricks the ensuing Summer, and it is expected that proper Clay will be found upon the Spot."

In July of that year

"His Lordship was pleased to approve of the same, & to be desirous to concur in the proper measures to carry them into execution."

At a meeting in the New Sugar House Office it is

"Resolved that it would be very useful and proper to have a new iron chest for the use of the Society imported from Holland"

to hold the assets of the consolidated fund and all the documents that are now fast collecting. The cost is to be £8. 17s. 6d. There is one of these so-called Spanish Armada Chests preserved in the building still (Plate 4), but it is not

three-locked, as the one from Holland was reported to be, and inside the lid on the elaborate grill protecting the mechanism of the lock there is inscribed,

"*Wolffgang Abraham Otto in Nurnberg fecit.*"

This is more probably the original old chest, though it may be the new one, for with the addition of two padlocks, for which there are fasteners, it could be unlocked only with three separate keys, each in the possession of one of the specially appointed Key Carriers. One of these carriers is to be Henry Joy, and the chest is to be kept in his house.

There is a feeling that a new phase has opened. Funds and a site have been procured. Plans are under consideration. The old minute book is abandoned when only half used, and a new one is begun. Water is brought from Daniel Blow's field. Lime is purchased nearby. Mr. John Kennedy allows the lighters "Polly" and "Crab" to carry away sand and stones from his estate at Cultra free of charge. Sand is also fetched from the bank of the Lagan opposite Crummock. Bricks, as it was hoped, are being made on the spot. Stone comes from Whitehaven and Ballycastle, slates from Wales and the Highlands, timber from the Baltic.

At last (Plate 5 (a)), in 1771, on 1st August,

"being a day memorable for many glorious events to these nations,"

the foundation stone was laid by Stewart Banks, the Sovereign of the town. His portrait, in the uniform of the Volunteers, still exists (Plate 6 (a)). In the words of an inscription on copper placed within it,

This Foundation Stone
of a
Poor House and Infirmary
for the Benefit of
The Poor Sick of the Town and Parish of
Belfast
was laid
On the first day of August, A.D. MDCCLXXI
And in the 11th year of the Reign of
His Majesty George III.

The Right Honourable
Arthur, Earl of Donegall,
and the
Principal Inhabitants of Belfast,
Founded this Charity
And His Lordship granted to it,
in Perpetuity
Eight Acres of Land,
on part of which this Building
is Erected.

The laying of this stone was destined to be the beginning of more than the mere fabric of the building. There is no record of the usual collection of representative objects being placed inside the stone, but five golden guineas were put on top of it for the benefit of the workmen.

Arthur Chichester, 5th Earl and 1st Marquis of Donegall (Plate 6 (b), whose name is remembered in the designation of many parts of Belfast, made himself financially responsible for the new Church of St. Anne, which was built in 1777 on the site now occupied by the Cathedral. The bell from the old Church was hung in the tower of the new Poorhouse and Infirmary, and can be seen to-day suspended in a massive wooden frame in the entrance hall of the institution (Plate 4 (a)). The bell is dated 1731, and is decorated on the outside with a raised ornamental band. It is still of beautiful tone, and can be rung by an inside tongue.

The Society soon sought statutory powers to enable it to carry out certain of its self-appointed tasks. In the Irish Parliament in 1773 legislation was passed to amend

> "An Act for Badging such Poor as shall be found unable to support themselves by Labour, and otherwise providing for them; and for restraining such as shall be found able to support themselves by Labour and Industry, from begging."
>
> "Whereas," says the new Act, "a number of young and able bodied persons follow the several occupations of news-crying, cleaning shoes, and carrying baskets from the market, and are, in the intervals of such employment exposed to idleness and vice; and whereas such persons might more usefully be engaged in labour, and such employments might be executed by persons partially disabled, who must otherwise be taken into the house of industry; be it enacted . . . that any person following any of the said occupations in the county of the city of Dublin . . . without a licence . . . shall be deemed an idle person, and be liable to commitment as a vagabond."

There is a familiar ring about the phrase "persons partially disabled," for legislation on their employment is not new.

The Act continues:—

> "and whereas the Town of Belfast in the County of Antrim is a populous and wealthy town, and the said town and parish thereof contains as many inhabitants as several of the cities or counties of towns in the Kingdom, but, not being a county within itself, cannot have the benefit of the said law in as ample and full a manner as is found necessary; and whereas the inhabitants of the said town and parish of Belfast have by voluntary subscriptions and contribution . . . erected a poorhouse and infirmary for the reception of the . . . poor and of sick persons . . . and the said inhabitants are desirous . . . that a body corporate should be formed, and to continue for ever, for the better carrying into execution under proper regulations the charitable and humane design of maintaining the poor of the said town and parish . . . be it enacted . . . that from and after the first day of June, one thousand seven hundred and seventy-four, the right honourable Arthur Earl of Donegall. James Lewis, the Sovereign of the said town of Belfast," . . . with others . . . "be called and distinguished by the name of the President and Assistants of the Belfast Charitable Society . . . It shall and may be lawful for the said President and Assistants to make such and the like Byelaws and

Regulations . . . with respect to the poor and all idle and sturdy beggars . . . as the Corporations created by virtue of the said Act within counties at large, and counties of towns and cities are enabled to do."

Thus, from its earliest days, this Society, at all times a voluntary organisation, sought and undertook responsibilities that would have fallen to the local authorities, had Belfast then been a city or county borough, and acted, in fact, almost as the governing body of the town. An Assistant was, and still is, anyone subscribing one guinea or more annually to the Society.

When the House was first opened for inmates in 1774 (Plate 5 (b)), the accommodation was :—

7 beds for the sick
4 double beds for sturdy beggars
22 double beds for the poor
4 single beds for vagrants.

These seven beds for the sick mark the beginning of Belfast's hospitals. At a meeting in the Market House in September of that year it had been

"Resolved—That said seven Beds be fitted up immediately under the direction of the Faculty if they will be kind enough to give us their assistance."

Here are the instructions for the preparation of the first of these beds :—

"Resolved immediately to have one sick bed made in the following form : 4 posts 5 feet 10 inches high—3 : 3 wide—6-3 long—a curtain at the Back and Foot to run on Rods—corded with fir ropes—A straw Matt—A Bed of fine sacking twilled and filled with cut straw — Two single sheets — a single blanket, and a carpet for upper cover—The under Edge of the Bed side is to be 12 Inches above the floor."

These beds were in the North Eastern part of the building, but there is no record of which room or rooms were used for the purpose. There is a note that

"The Gentlemen of the Faculty of Physicians & Surgeons have generously resolved to attend the Sick Patients Gratis,"

and inside the front cover of the Minute Book started in 1774 there is this list :—

"Physicians in order of rotation :—

Dr. Seeds
Dr. Haliday
Dr. Mattear
Dr. Apsley
Dr. White
Dr. Stephenson
Dr. Moor
Dr. McDonnell
Dr. Bell
Dr. Wm. Halliday."

An Extern or out-patient department was established in 1776, which the poor could attend for advice and assistance on Tuesdays and Saturdays at 12 o'clock.

In 1786 it was

"Resolved that a letter shall be addressed to each of the Physicians in this Town, requesting that they will be pleased to convene a Meeting of the

Gentlemen of the Faculty to Determine whether it may be agreeable to them to attend the Poorhouse in Rotation or be annually elected for that purpose."

Thereafter there were annual appointments made.

The need for much greater provision for the sick, especailly for help in their own homes, was soon evident. Dr. Malcolm, in his delightful "History of the General Hospital," published in 1851, when he was 32, suggests that many of the members of the Charitable Society saw their own limitations in relieving the sick, and that it was by them as much as anyone else that the need for a dispensary was first appreciated. The list of names on the prospectus of a General Dispensary for the Sick Poor issued in 1792 would bear out this idea. The authors of the prospectus, foremost among whom is the famous Dr. James McDonnell, emphasised the value of raising a fund

"for the relief of sick poor, of all descriptions, whether strangers or natives; that they may be supplied, AT THEIR OWN HABITATIONS, with such medicines, medical attendance and necessaries of life, as may be fitted to the exigencies of their situations. It is presumed that such an institution would tend greatly to promote the interest of Society at large, and particularly of the Belfast Charitable Society, by decreasing the number of common beggars; since it is certain, that many complaints in themselves trivial, and admitting readily of cure, become confirmed by neglect, and the industrious artist, with his family, is speedily reduced to ruin."

Among the first regulations adopted by the Dispensary was one which declared,

"It is our determined purpose to co-operate with the Belfast Incorporated Charitable Society in every measure calculated to promote its welfare."

It was further resolved to invite members of the Charitable Society to attend a meeting to consider how far the two institutions should be united, and the best means of rendering their union conducive to the public good. The necessary rooms for the Dispensary were at first provided free of charge by the Charitable Society in the Poorhouse, and Malcolm records that in the early days the Surgeons were required to do the dispensing for the Physicians. At last, in 1797, under the heading "Memorabilia Annorum," he notes,

"April 27 The first Hospital in Ireland for Fever, opened, with six beds in Factory Row, Belfast."

This is the modern Berry Street. There was a further move to West Street at the opposite corner of Smithfield. In 1815, the foundation stone of a new hospital was laid in Frederick Street, formerly Brewery Lane, and the building was duly dedicated to the Sick and to the art of Medicine. This was to become the Belfast General Hospital, later the Royal Hospital, and the forerunner of the Royal Victoria Hospital. With its establishment, the Charitable Society was no longer responsible for the admission of the sick, though it has always, as far as possible, taken care of those falling ill within its walls.

If the care of the needy was uppermost in the minds of the founders, responsibility for the strolling beggars was undertaken with equal thoroughness. A public advertisement of 1775 states,

". . . whosoever shall apprehend and bring to the House any such strolling beggars will be paid 5s. 5d. each after next Saturday."

In 1776 it was resolved

"that the Standing Committee have a proper place fitted up as a black hole for confining delinquents and vagrants,"

and

"that Mr. Bray do get the window of room pointed out to him built up for that purpose immediately."

The window remains built up still.

Later it was suggested

"that a cart and ass patrole the town twice a week, attended by the Beadle and two of the ablest men in the House who shall have staves and cloaks"

to collect these beggars. A certificate signed by the 2nd Marquis of Donegall authorising the Beadle to apprehend vagrants is preserved and hangs in the Belfast Museum and Art Gallery. It is signed with the Society's seal bearing the inscription,

"He that giveth to the Poor
lendeth to the Lord."

The Beadle and his men were popularly known as the Bang-Beggars, and wore a distinguishing uniform with scarlet collars on their coats. No doubt they had other work to do with their ass and cart, for an Act of Parliament of 1800 declared that

"in case any hog, sow, boar, or pig, or other swine shall at any time . . . be found straying or wandering in any street lane or place within the said town of Belfast or precincts thereof, it shall and may be lawful to . . . cause the same to be seized, or in case the same cannot conveniently be taken alive, to be killed . . . and be taken by the Belfast Charitable Society for the use and benefit of the poor therein."

The townsfolk had once the supreme delight of seeing the Sovereign of Belfast, in person, shoot two pigs found running about the streets.

The badging of beggars seems to have continued for some years. There are badges extant for the adjoining Parish of Shankill, but none issued by the Charitable Society seems to have survived. Some of those badged had their badges and licences taken from them afterwards, and they were made a fortnightly allowance by the Society instead. For examples:—

Grace Sheals, Barrack Street, 4 young children	2/2
Catherine Gillespy, Millfield, 77 years, and one grandchild ...	1/1
Rose Proctor, Long Lane, 75, Grandchild, falling fits	1/7½

Malcolm states that in the year 1795, outdoor relief was afforded to 336 poor families by this Charity. Or the badged poor might be brought into the House instead, for instance,

John Mulligan, Mass Lane, 75 years,
old wife to shift for self.
Mary Boyd, North Street, 80 years,
single, doating.

All this activity did not escape general notice, and in the "News-Letter" of 27th July, 1804, there appeared this paragraph :—

"The public are much endebted to the Rev. Mr. Bristow and the other gentlemen of the Committee of the Belfast Charitable Society for their exertions to free them from the host of beggars who daily beseige their doors. Several of these gentlemen perambulated the streets on Saturday last, attended by the Black Cart, when a number of mendicants were seized and conveyed to the Poorhouse. The public have been told of the healing powers of metalic tractors, but we hesitate not to say that the Black Cart of Belfast is a more powerful agent for the cure of diseases than all the tractors that ever were invented. The very sight of it gave vigour to the infirm, and the lame became so fleet that their most ardent pursuers were completely outdistanced. They seemed nearly to adopt the sentiment of the poet :—

'He that begs and runs away
May hope to beg another day,
But he that's by the Black Cart ta'en
Can never hope to beg again'."

The reply given to an inquiring architect,

"that the Poorhouse is not intended for the reception of children, but of aged and infirm persons,"

shows that it was a change from the original policy when in 1776 it was resolved

"that a number of poor children . . . be taken into the Poorhouse, to be educated and supported"

and

"that the boys and girls who at present infest the streets be first taken in."

A Master and Mistress were appointed

"for the government and instruction of poor children,"

and in addition to reading, writing and arithmetic, industrial pursuits such as spinning and knitting were taught. Children of the poor outside the House could also attend. Of the masters who ruled over this school, the most remarkable was David Boyd, who, in 1806, published a pamphlet in verse entitled "The Belfast Poor-House, an Historical and Descriptive Poem." He describes the foundation of the building and recounts the day-to-day work that went on in it :—

"With hasty strides I enter the great hall,
The grand capacious rendezvous for all;
The gen'ral board, call'd always once a year,
First meet, converse, and walk together here;
Here too, on Saturdays, poor persons stand,
With cheering hope, waiting the kind command
Of the Committee who review with care
Their doleful tale, and grant their humble pray'r;
For all who wish admittance here to gain,
Bring signed petitions, and their wish obtain."

He also relates what was done whenever the funds of the Society ran low :—

"So when the Poor-house stock wears out by chance,
The worthy Treasurer pays in advance,
One pithy sermon on a Notic'd day,
Produces plenty, evr'y debt to pay!"

and there is on record one donation of £1,000 given anonymously in the Church collection following such a Charity Sermon for the benefit of the House.

After he left the Poorhouse, Boyd ran a school of his own in Long Lane, and eventually he appears in the Belfast Almanac of 1836 as "Rev. D. Boyd, School-Master." His poem may not reach great literary heights, but it is full of interesting detail about the history of the Poorhouse. A quaint sketch of the building by his colleague Mr. Gordon, the first resident engineer to the House, forms the frontispiece.

The Society in its earlier days could admit and confine lunatics in the lower rooms. Some grim details are to be found in the reports of the Orderly, an office still held weekly by each of the Committee in turn.

"Sunday, May 15th

. . . Was informed that Elizabeth Grey, who was admitted on Saturday, 7th, had got over the rafters of the room where she was confined, and ran down to the gate, but was brought back, and has since been chained, which I confirmed, finding she had been so violent.

Monday, May 16th

I did not like to come up owing to the coldness of the weather."

And from a different Orderly :—

"The woman confined in the steeple appears to be in full possession of her mental powers, and she is brought down for the present."

Another entry reads :—

"Admitted a lunatic woman who had been put ashore from a ship near Whitehouse."

Further extracts from the Orderly book show the general work of the place at the time :—

"Wednesday evening gave an order for the admittance of Catherine Wall into the House, a poor woman, a cripple. I was well informed that she slept on her barrow in the public streets for the 3 preceding nights."

And again :—

"I think the little girls are in want of a small table to eat their meat of, they taking it off the ground."

There is a half-moon Sheraton table in the front hall to this day, much shortened in the legs, and some chairs similarly treated, and it may be that these were the result of this suggestion.

"On Thursday ordered a coffin for the child of the Bellman Irwin that was killed by a cart in North Street, and on Friday a coffin for the unfortunate man that hanged himself in John Street, and on the same day I directed the admission to the hospital of William Leonard, an American Sailor, as will

o

be seen by his petition. I also directed the readmission of Mary Cunningham, who had run away from her apprenticeship, until the Committee should determine respecting her, but I understand she has eloped from this also."

If anyone wanted to leave the House even for a few hours, the permission of the Orderly had to be obtained. This was a frequent cause of trouble.

"Sunday All the poor except Widow Ross and Mary Bryson returned in proper time, the former did not return until half after five but sober and the latter not; till six o'clock & very drunk.

Monday ordered Mary Brison to be fedd on bread & water; till ordered otherwise, for her bad behavour yesterday."

and then, as if to mitigate this severity,

"Tuesday Distributed snuff and Tobacco as usual."

This distribution of snuff and tobacco by the Orderly occurred quite regularly as did the distribution of soap by the Ladies' Committee.

The Poorhouse stood at the north-west corner of Belfast. Spread out below it to the right lay the town, with a straight view down Donegall Street to the thatched cottages in Waring Street where the Commercial Buildings, now the "Northern Whig" Offices, were to be erected in 1820. Facing the Poorhouse were the cottages of Fishers' Row, which was then the main road to Carrickfergus, and had not yet attained the dignity of being called North Queen Street. There was no main road nearer the shore. From the gate of the Poorhouse, Brewery Lane, now Frederick Street, whose thatched cottages were standing until quite recently, ran down to the Lough where the men's boats lay. To the north of this were open meadows. There was no Crumlin Road or Antrim Road as those are understood to-day, and traffic out of the town in that direction passed through the Parish of Shankill. The Farset river ran through the Mill Field to its culvert, as it does still, but was, no doubt, a cleaner and more cheerful sight than the dreary and forgotten stream of to-day.

On 9th June, 1778, John Wesley was able to write in his Journal :—

"Thence we went to Belfast, the largest town in Ulster. . . . The streets are well laid out; are broad, straight, and well built. The Poorhouse stands on an eminence, fronting the main street, and having a beautiful prospect on every side, over the whole country. The old men, the old women, the male and female children are all employed according to their strength, and all their apartments are airy, sweet, and clean, equal to anything of the kind I have seen in England."

Had the great Evangelist looked from the Boardroom windows just two months earlier, he would have had more stirring events to report in his Journal, for off shore, and within full view if visibility permitted, the American Privateer "Ranger," under the command of the famous Paul Jones, was bombarding Carrickfergus Castle. The British sloop "Drake" attacked him, but he retaliated to such good effect that the British ship had eventually to strike her colours. Such was the first naval victory of the United States of America.

The Society took its full share in the general activities of the town in those days. A notice in the "Belfast News-Letter" of 24th June, 1785, reads :—

> "Mrs. Siddons having, unsolicited, generously proposed and chosen a Play for the benefit of the Charitable Institution of this Town, we are authorised to inform the Public that, in consequence thereof, on Monday next (27th) will be performed the celebrated tragedy of Macbeth.
>
> Part of Lady Macbeth—Mrs. Siddons. Tickets to be had from the Sovereign, Mr. Greg, Mr. Cunningham, and the Printers hereof."

The playhouse was then in Rosemary Lane, and there remains only an archway as a reminder of it. Mrs. Siddons visited Belfast on two further occasions, and on each she gave a charity performance for the benefit of the Society.

Nor were social events in the House itself lacking.

> "Resolved," says a minute, "that there shall be a Ball in the Poorhouse for the benefit of the House, on Wednesday next, being the 17th inst., and that the tickets be two and two pence . . . N.B. The Ball will be held in the new large Committee Room, now elegantly furnished."

On this, and many such occasions, the music was provided by the band of the Antrim Volunteer Company. These Volunteers used to drill in the Poorhouse grounds, and on occasions of review were actually billetted on the premises, for those were the days of constant fear of invasion by the French. It was within the memory of many that in 1760 a French squadron under Thurot had landed at Carrickfergus, and had captured and held the place for several days. They departed on the approach of the Volunteers, but their ships were met and defeated by the British Navy. This was only the beginning of the Institution's Military career. In 1798, the premises were requisitioned at forty-eight hours notice by the regular Army. It was only in 1802, when the Society had petitioned the Lord-Lieutenant-General asking either for the return of the premises with compensation, or their purchase by the Government, that the Committee met once more in the Poorhouse. During the 1939-45 War the premises were again requisitioned, and were occupied by the Royal Ulster Constabulary. The old Black Hole, the former dread of the vagrant, was used as an armoury, while the front lawn became a balloon site.

The history of several other organisations in the town touches that of the Charitable Society, and to record all these affairs in chronological order is quite impossible.

An interesting letter was received by the Committee in 1792 :—

> "The Memorial of the Belfast Reading Society to the Committee of the Belfast Incorporated Charitable Society humbly Sheweth—
>
> THAT your Memorialists have gone to much expense in purchasing a Collection of Books, and have formed a Society for the promotion of useful knowledge in this town and neighbourhood.
>
> That they are at present at a great loss for a proper place in which to deposit their books so as to render them of general use to the Society.
>
> They therefore request that your Committee will recommend to the

General Board of your Institution that the room known as the Ball Room shall be granted to your Memorialists for the reception and use of their Library until they can otherwise provide for themselves, and the Memorialists shall entertain a due sense of gratitude and respect."

They complied with this request

"on condition that the Reading Society pay an annual rent to this Charity of Five Guineas so long as they occupy the room."

Such is part of the early history of the Belfast Library and Society for Promoting Knowledge, founded in 1788, and better known to-day as the Linenhall Library. It is rather an anti-climax to have to record that the books and other property were never moved to the Poorhouse Ball Room, as it was considered that the premises were not sufficiently central.

In 1793, the Curate of St. Anne's, the Rev. John Clark, and Mrs. McTier, a sister of Dr. William Drennan, founded the Humane Female Society for the Relief of Lying-in Women. They applied to the Charitable Society for the use of the large centre room as a maternity ward, but the Board's Minute of 7th January, 1794, records that

"Messrs. Apsley, McTier and Sampson having reported that the House is in general full save the Ball Room which has only six beds in it, and Several of the rooms too crowded, it was unanimously

Resolved that a Respectful Negative be given to the application from the Ladies of the Humane Society."

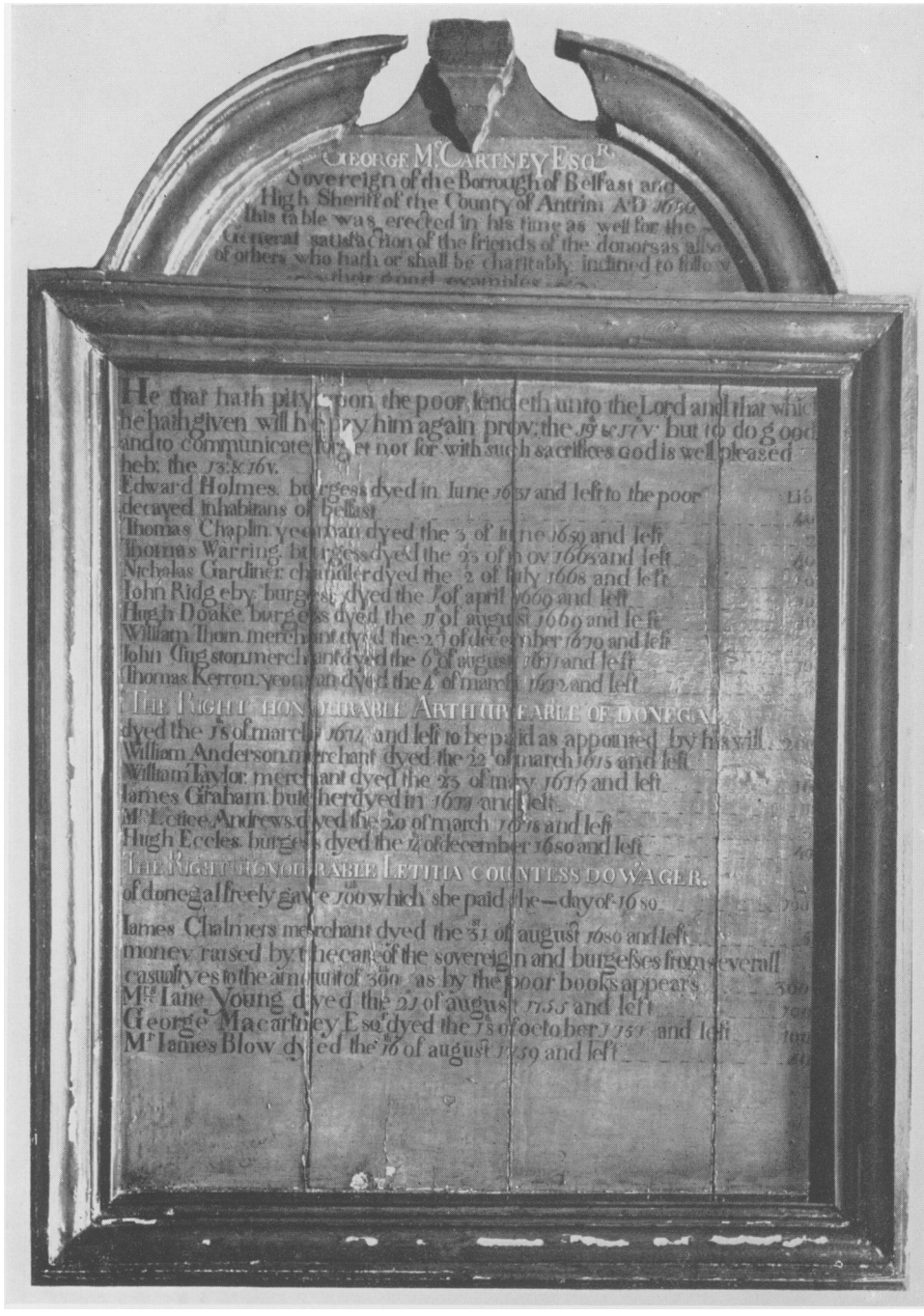
The Lying-In Hospital was first established in No. 25 Donegall Street, a house still in existence as business premises at the entrance to Exchange Court. This accommodation was very poor, and the Ladies were granted a building site, on that part of the new Antrim Road now known as Clifton Street, by the Charitable Society free of rent, provided the site was used for no other purpose. When the Medical School opened, the need for providing clinical material and instruction arose, and the Ladies, considering that this lay outside the original scope of the agreement, handed the Hospital back to the Charitable Society, who restored it to them once more at a rent of 2/6 per annum provided that the original purpose was not exceeded. It was, of course, inevitable that eventually students would attend the practice of the Hospital, and there was a good deal of unpleasantness between the Ladies and their Medical Staff, and between the Lying-In Hospital and the Society. The Society took the view that the teaching of obstetrics was a money-making business and raised the rent, stating that

"they have no wish to make a profit out of the Hospital, but will not allow others to do so."

The trouble once started between the two institutions was destined on various pretexts to last for many years. Only in 1902 does the annual report state that

"The negotiations with the Maternity Hospital bave been brought to an amicable conclusion, and the Committee are able to report that both the Society and the Hospital are satisfied with what has been arranged."

The Maternity Hospital in Townsend Street was opened in 1904, and was the predecessor of the Royal Maternity Hospital.



Old Charity Board, 1680.

PLATE 1

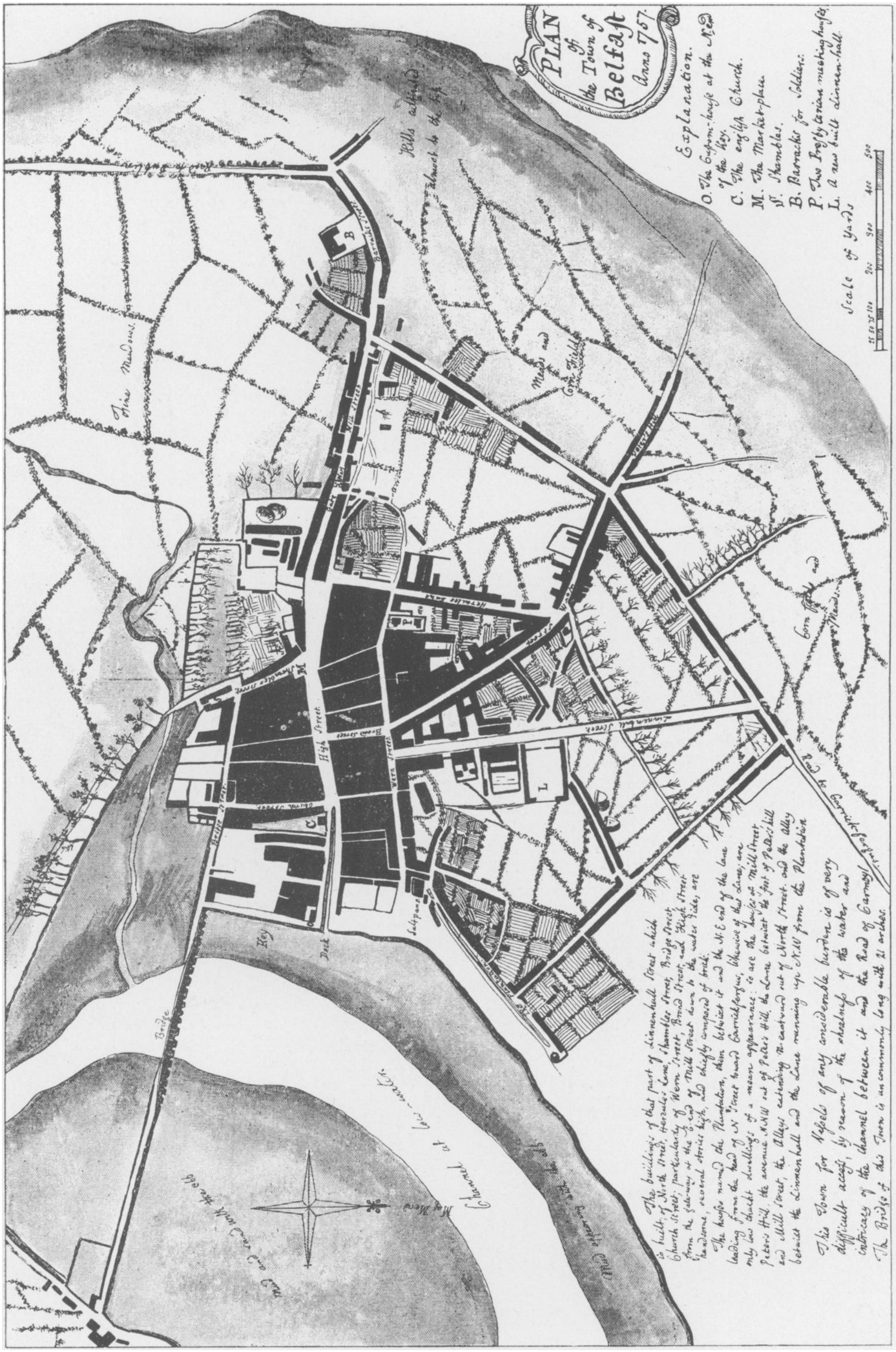
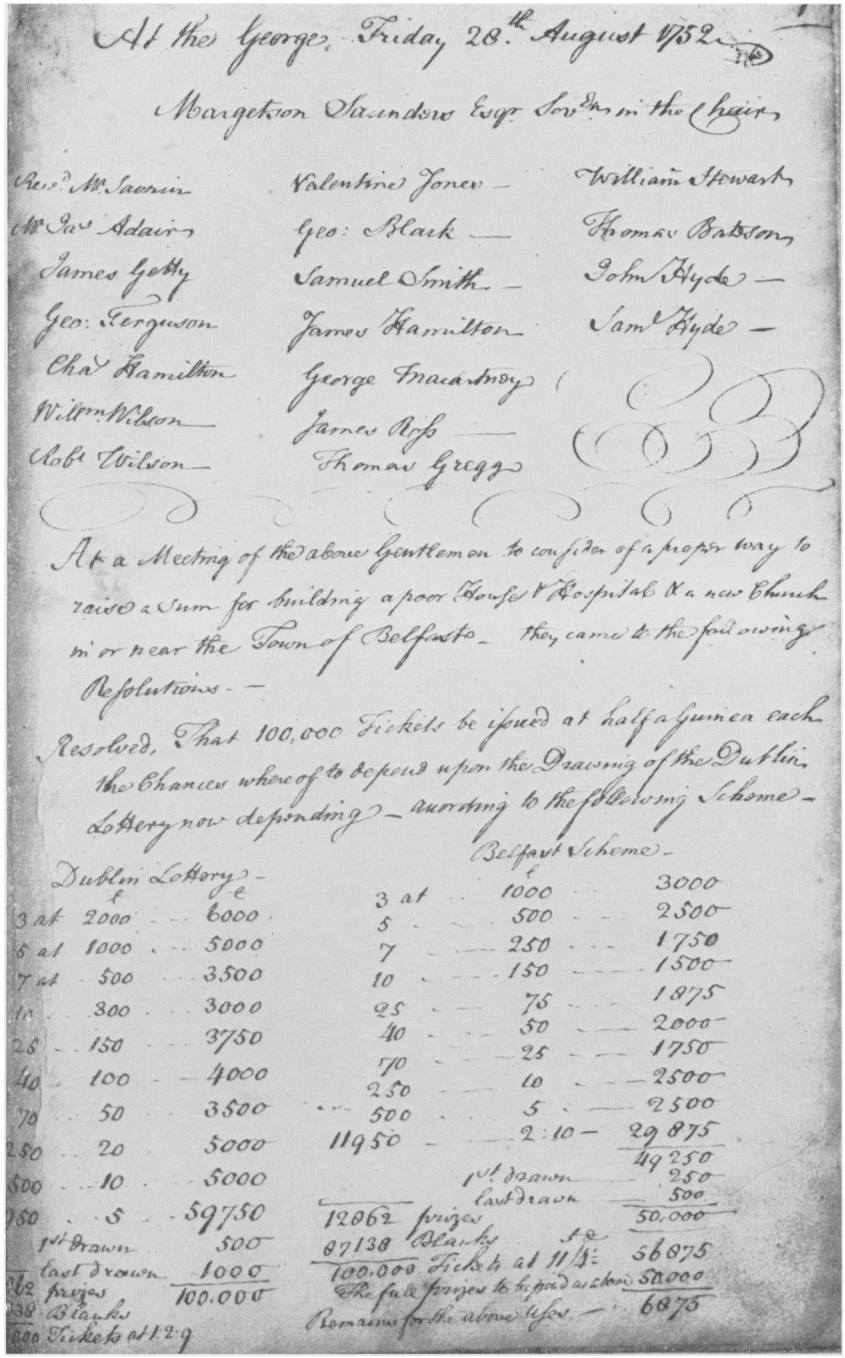

PLAN of the Town of Belfast Anno 1757
Explanation.
O. The Custom-house at the Head of the Key.
C. The english Church.
M. The Market-place
S. Shambles.
B. Barracks for Soldiers.
P. Two Presbyterian meeting-houses.
L. A new built Linnen-hall
Scale of Yards
High Street
Bridge Street
Hills adjoining almost to the Town
Meadows and Corn Fields

PLATE 2



At the George, Friday 28th August 1752

Margetson Saunderson Esqr Sovr in the Chair

Revd Mr Sawrin	Valentine Jones	William Stewart
Mr Jas Adair	Geo: Black	Thomas Batson
James Getty	Samuel Smith	John Hyde
Geo: Ferguson	James Hamilton	Sam[l] Hyde
Chas Hamilton	George Macartney	
Willm Wilson	James Ross	
Robt Wilson	Thomas Gregg	

At a Meeting of the above Gentlemen to consider of a proper way to raise a Sum for building a poor House & Hospital & a new Church in or near the Town of Belfast — they came to the following Resolutions —

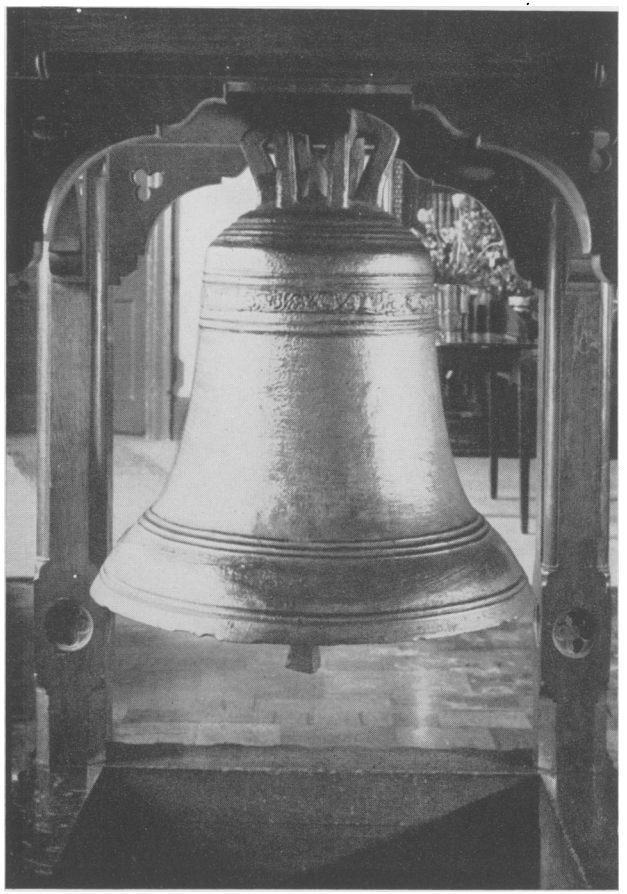
Resolved, That 100,000 Tickets be issued at half a Guinea each the Chances whereof to depend upon the Drawing of the Dublin Lottery now depending — according to the following Scheme —

Dublin Lottery	£	£
3 at	2000	6000
5 at	1000	5000
7 at	500	3500
10	300	3000
25	150	3750
40	100	4000
70	50	3500
250	20	5000
500	10	5000
980	5	59750
1st drawn		500
last drawn		1000
1962 prizes		100.000
38138 Blanks		
100000 Tickets at 12:9		

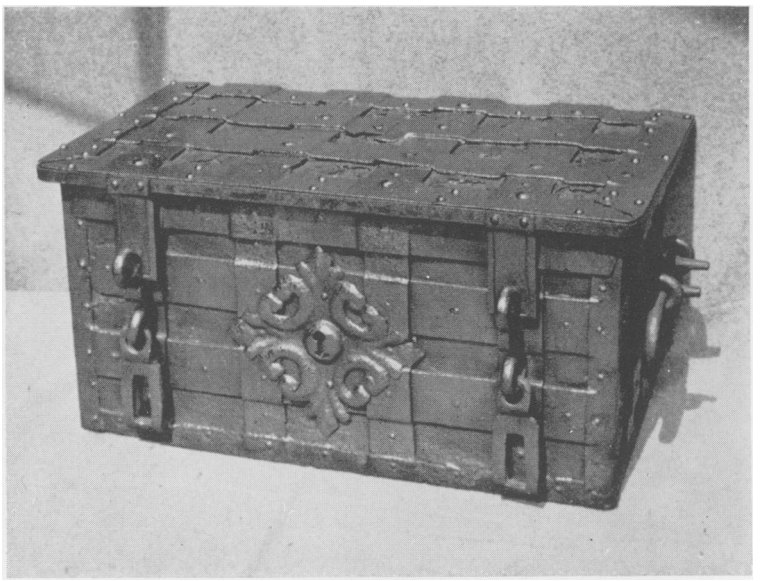
Belfast Scheme	£	£
3 at	1000	3000
5	500	2500
7	250	1750
10	150	1500
25	75	1875
40	50	2000
70	25	1750
250	10	2500
500	5	2500
11950	2:10 —	29875
		49250
1st drawn		250
last drawn		500
12062 prizes		50.000
87138 Blanks	£	56875
100.000 Tickets at 11/4		50000
The full prizes to be paid as above		
Remains for the above Uses —		6875

Minute of the Inaugural Meeting, 28th August, 1752.

PLATE 3



(*a*) Old Parish Church Bell.

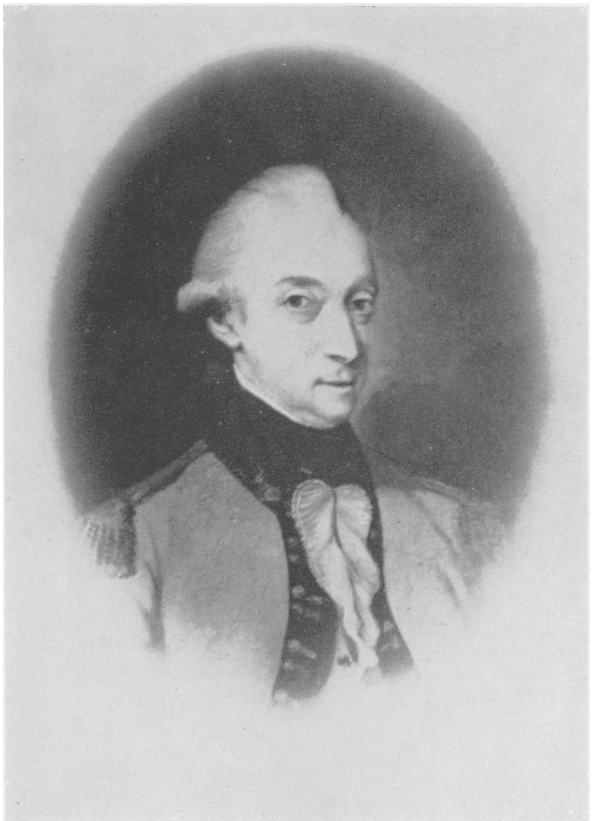


(*b*) "Spanish Armada" Chest.

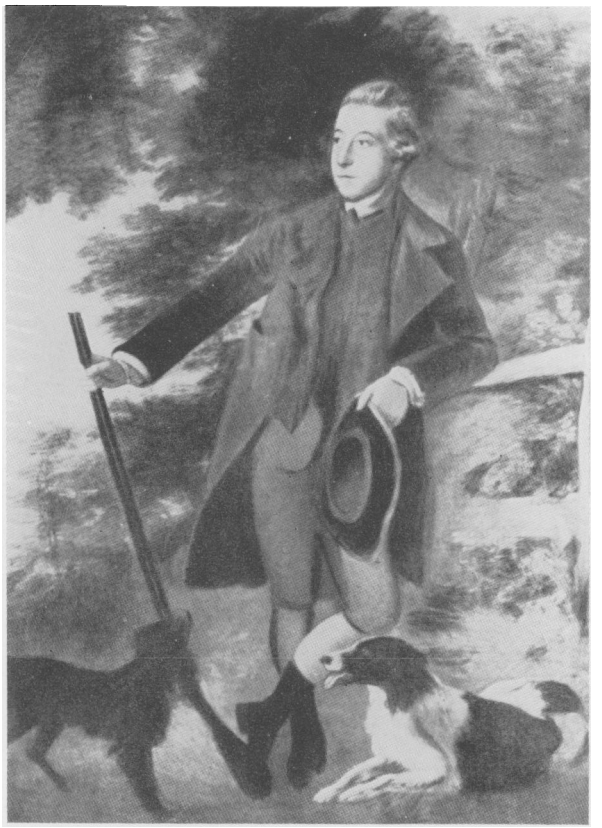
PLATE 4

(*a*) The foundation stone was laid in 1771, and (*b*) the building first opened for use in 1774.

PLATE 5



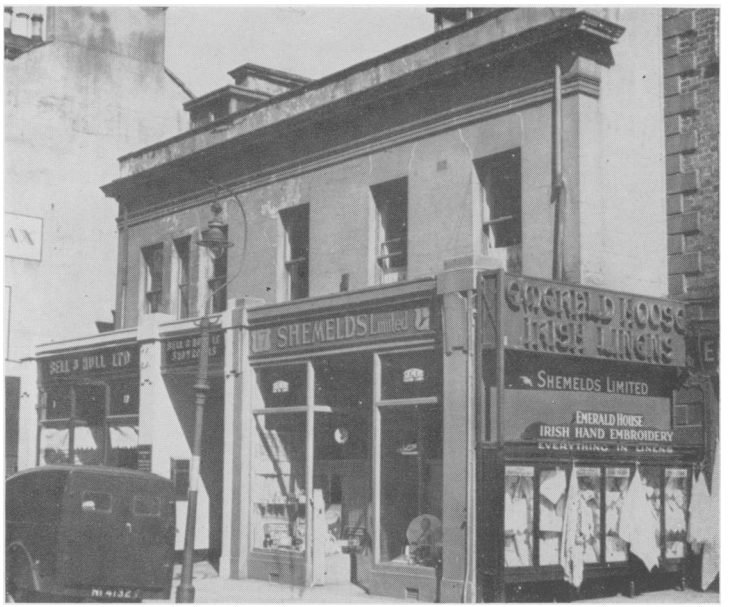
(*a*) Stewart Banks, Esq.



(*b*) Arthur Chichester, 1st Marquis of Donegal.

PLATE 6

(*a*) The Skin Hospital, Glenravel Street.



(*b*) Engineers' Hall, College Street.

PLATE 7

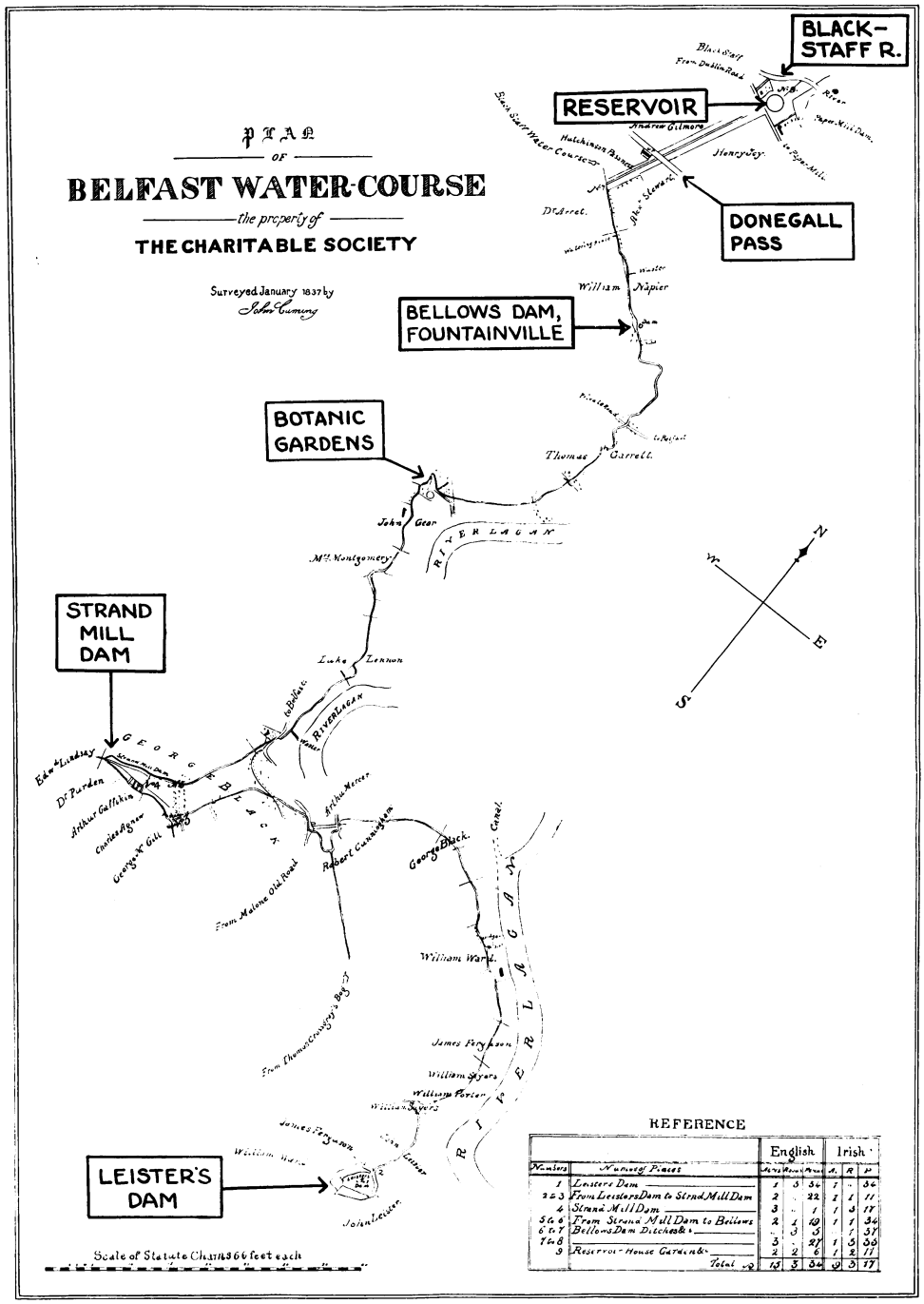
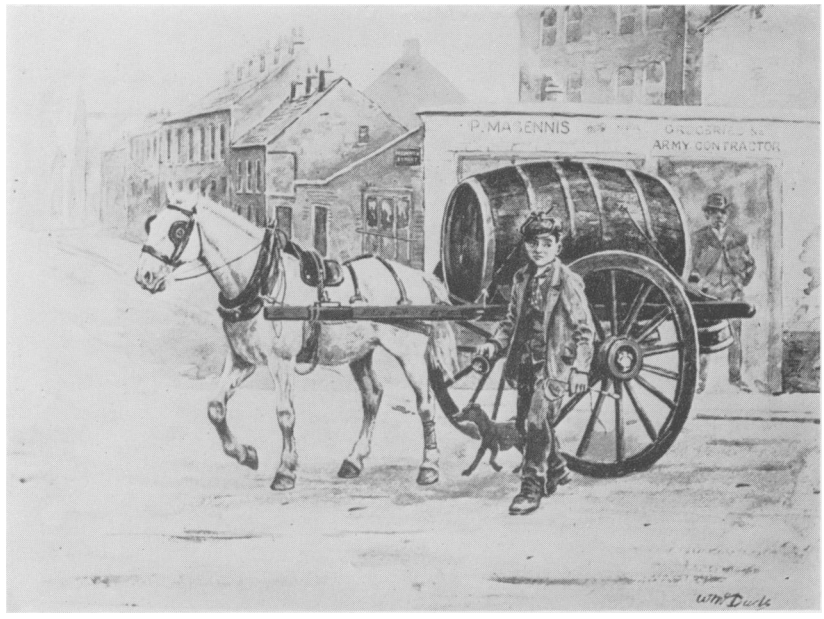
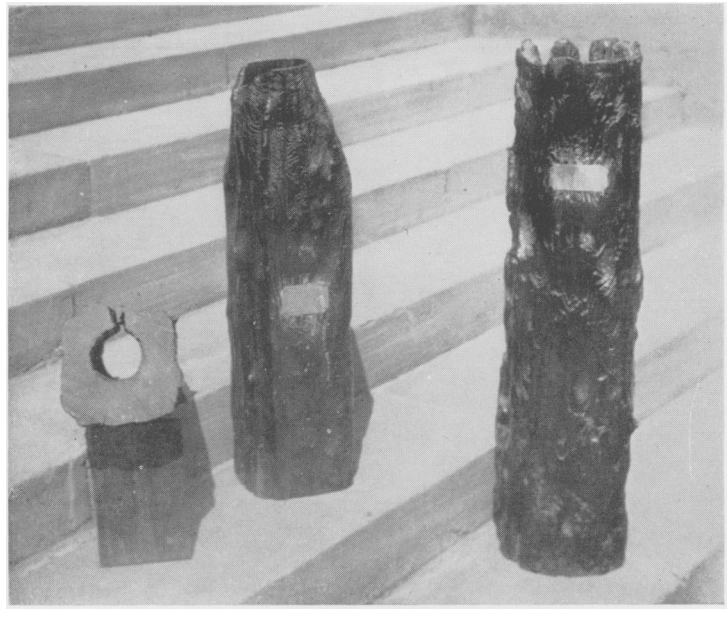

BLACK–
STAFF R.
RESERVOIR
DONEGALL
PASS
BELLOWS DAM,
FOUNTAINVILLE
BOTANIC
GARDENS
STRAND
MILL
DAM
LEISTER'S
DAM
PLAN
OF
BELFAST WATER-COURSE
the property of
THE CHARITABLE SOCIETY
Surveyed January 1837 by
John Cumming
Scale of Statute Chains 66 feet each
N
S
E
W
REFERENCE
English
Irish
Numbers
Names of Places
RIVER LAGAN
GEORGES BRANCH
CANAL

PLATE 8

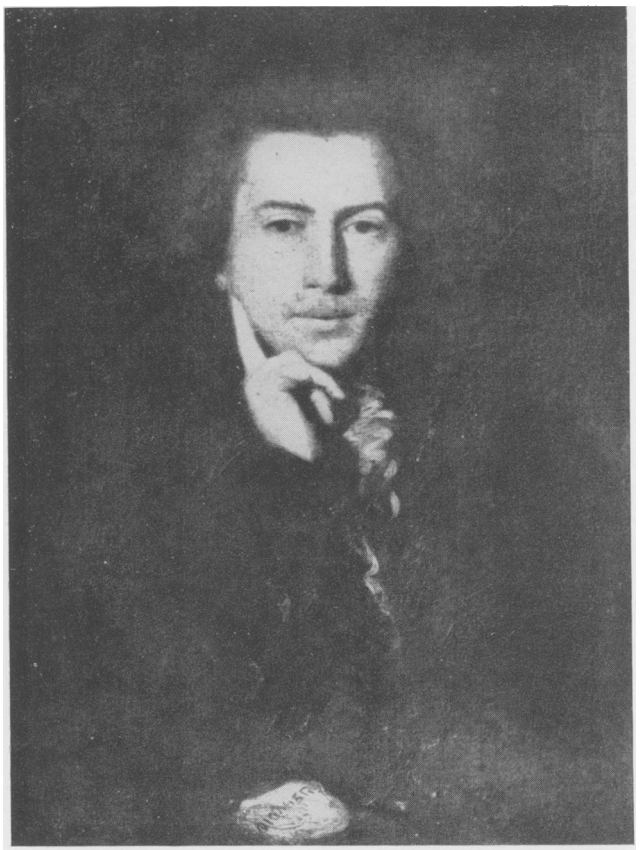


(*a*) Belfast Water Cart.



(*b*) Elm Water Pipes.

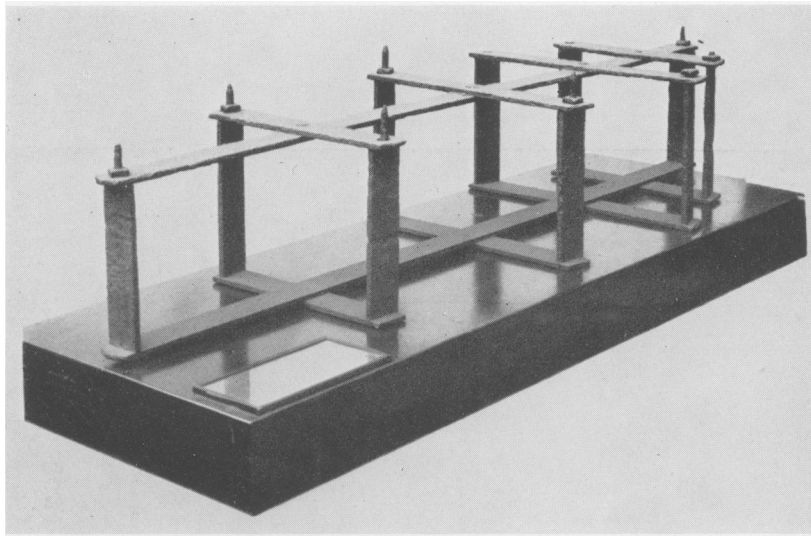
PLATE 9



(*a*) Doctor William Drennan.

(*b*) Miss Mary Ann McCracken.

PLATE 10



(*a*) Coffin Guard.

(*b*) The Cholera Ground.

PLATE 11

Edward Benn, Esq.

PLATE 12

Other institutions have been, and some still are, tenants of the Charitable Society.

One of the earliest leases of this kind was to the body now known as the Ulster Society for Promoting the Education of the Deaf and Dumb and the Blind, who, in 1835, opened their first residential school in premises in College Street on a site owned by the Charitable Society. Afterwards this building was known as the Engineers' Hall, and it is now occupied by Messrs. Bell and Hull (Plate 10).

In 1865, Dr. H. S. Purdon founded a dispensary for the treatment of diseases of the skin in Academy Street, and thanks to a bequest from Edward Benn (Plate 19) this was replaced by the Belfast Hospital for Diseases of the Skin in 1875 on ground in Glenravel Street owned by the Society (Plate 11). Glenravel was the site of the iron ore deposits in County Antrim owned by the Benn family. This Hospital was completely destroyed by enemy action in 1941, when the late Dr. Allworthy, Physician to the Hospital and a Consultant to the Charitable Society, narrowly escaped with his life, having been previously bombed out of his own house.

Next door to that site, and also on the Society's land stands the Benn Ulster Eye, Ear and Throat Hospital, built and endowed by Edward Benn in 1874. It is incidental to the story of the Charitable Society that the Benn family also founded the Samaritan Hospital.

Glenravel Street is the site of the Belfast High School, formerly the Mercantile Academy. The Rev. John Pyper opened his Academy in Eglinton Street in 1854 in a building of which the air raids of 1941 have left no trace. Before it moved to its present site the school was conducted for a time in the house on the corner of Donegall Street and North Queen Street.

At the close of the eighteenth Century there seemed to be no civic or philanthropic duty that could not be expected of the Charitable Society, though some of these extra tasks were suggested as a means of making the institution more fully self-supporting.

It was at one time proposed to the Committee that they should undertake, in part, the cleansing of the streets, but they

> "were unanimously of the opinion that it would not be eligible for the Charitable Society to establish any cart or carts for that purpose."

That such a proposal was ever seriously made, and it was made by no less a person than the Rev. William Bristow, Sovereign of the Town, shows how important was the part played by the Poorhouse in the growing community, for he hoped by this means to supplement the Society's income. Nevertheless, it did take on two peculiar tasks that were to have the most significant consequences: the training of apprentices to the cotton trade, and the supply of water to the town.

At one time the linen industry was in serious difficulties, for lack of capital prevented it from competing with the more efficient manufacture of cotton in

England. Nicholas Grimshaw suggested in a Memorial to the Society that the children in the House should be trained for this purpose, and in 1779

> "A proposal is made by R. Joy and T. McCabe to employ a large number of children in the Poorhouse in the cotton manufacture, at such rates as their respective services shall be deserving of . . .
>
> The said McCabe and Joy have, at a considerable expense in money and attention procured various machinery useful in this business, as well for carding and spinning as weaving, in the best and most expeditious manner, their intention being to introduce a particular species of this manufacture into this place after the mode and with all the advantages that are so effectually practised in England . . .
>
> The places for the above purposes are now vacant, which are the three rooms on the north-east wing of the cellar story."

In February, 1780

> "It is with great pleasure that your Committee remarks to you the probable advantages that may in a few years acrue to the community at large from having so many children instructed in the different branches of the cotton manufacture, and they are of opinion that this consideration is of much more importance than that of any profit that should arise to the House from their industry."

This was a true forecast. As the result of this training, cotton soon became of far greater importance in Ulster than linen, and eventually, so great were the profits from cotton, that the linen industry was rejuvenated with the fresh capital and machinery it had so badly needed. And those who were to make their fortunes in this renaissance did not forget the Poorhouse, as the Charters Wing of the building proves.

Thomas McCabe and Robert Joy, who made the proposal about this cotton venture in support of Nicholas Grimshaw's memorial, were two very remarkable members of the Society's Commitee.

Thomas McCabe was a watch-maker in North Street, who prospered and bought a small estate called Vicinage behind the Poorhouse, where St. Malachy's College now stands. On one occasion in 1786 in the Assembly Rooms he was asked to join in a scheme to float a slave ship company. His answer was,

> "May God wither the hand and consign the name to eternal infamy of the man who will sign that document."

And so the scheme fell through. Dr. McCabe, who was at one time Physician to the Poorhouse, was his grandson.

The Joys were the proprietors of the "Belfast News-Letter," and had a paper mill at Cromac, a fact recalled by the existence of Joy Street. Robert Joy, who owned a cotton mill, was the uncle of Mary Ann and Henry Joy McCracken. When she was over 90 years of age, Miss McCracken wrote of her uncle :—

> "He projected our 'Old Poorhouse', the first in Belfast, for a shelter for the poor . . . My uncle Robert paid his last visit to it, when unable to walk, in a sedan chair. From its erection, as long as health was spared him, it had been his constant study to promote the comfort of the inmates in every respect. The husband and wife were not separated, but had curtains round their bed; and he studied to give them variety of food, and in various ways

to promote an increase to the means of support, one of which was a shower bath, and anyone by paying one guinea a-year, might use it whenever they wished."

The Charitable Society has never taken any more surprising responsibility on its shoulders than the supply of water to Belfast. In 1678 George McCartney, that same Sovereign of the town whose name is on the old subscription list from the former Corporation Church, raised a voluntary fund to bring water into the town in wooden pipes. This supply was augmented in 1733 by the lease of other springs and rivers to William Johnston of Newforge, afterwards known as "Pipewater Johnston." By 1795 the growth of the town and the inadequacy of the supply created an opportunity which the Poorhouse seized of securing a lease of various springs from the Marquis of Donegall. The chief of these were the Bellows Spring at Fountainville, now marked by a brick archway in the north gable of Royal Terrace, and springs at Deramore "in a marshed Ground between Belfast and what is called the Strand Mill," and where the remains of an old reservoir can still be seen. To these was added Lyster's spring, near Newforge, so that there was a continuous piped system from Newforge through Deramore by way of the Botanic Gardens to Fountainville, and thence to Cromac where the water was discharged into a reservoir near where Adelaide Street enters Ormeau Avenue to-day (Plate 8). The scheme had only been in operation two years when the Water Committee reported to the General Board

"that the revenue now arising from the new supply (exclusive of the produce of the two Water Carts), even in this early stage of the business, is more than sufficient to defray the interest of the money expended and borrowed, and that they have every reason to believe it will, in the end, prove a valuable and permanent Fund for the support of the Poor" (Plate 13).

The supply was considerably increased, and more pipes, at first elm but afterwards metal, were laid down to conduct water to the streets and houses. Sections of these wooden pipes are still preserved (Plate 14). An Act of Parliament was necessary in 1800 before those being supplied with this water could be compelled to pay a water rate.

A picturesque clause reflects the Belfast of the time :—

"It shall and may be lawful for the president and assistants of the said Belfast Charitable Society . . . to make agreement . . . with all brewers, malsters, distillers, sugar-bakers, tanners, skinners, dyers, butchers, and slaughterers, inn-keepers, or any other description of persons, tradesmen, or manufacturers who have any extraordinary consumption of water for a sufficient quantity of water according to their respective consumptions."

By 1817 a further Act of Parliament was necessary. The supply of water to a rapidly growing town was becoming more and more a matter for a special authority, and therefore Spring Water Commissioners for this sole purpose were to be appointed by the Society. In view of the large amount of their money invested in the scheme, the Charity was to be paid an income, fixed within certain limits, by these Commissioners who really formed a special sub-committee. This arrangement stood until 1840, when yet another Act of Parliament set up an

independent Water Board. It is still the right of the Belfast Charitable Society to receive an annual income of £800 and free water from the Commissioners.

There were other ways in which the Society tried to make itself financially self-supporting.

At first certain conditions in the Grant, under which the surplus land was held from Lord Donegall made it impracticable to create commercial sub-leases, but an Act of Parliament eventually made it possible to make sub-lettings for a reasonable length of time, so that in this way there was established a permanent but, unfortunately, fixed income. In 1785, when the Ballast Corporation, the forerunner of the present Harbour Board, was created by Act of Parliament, it was enacted that all profits were to go to the Charitable Society. As events proved, the Ballast Board never had any working profits, but the tradition established has proved a firm sentimental bond, and the Society has on several occasions received considerable gifts from the Harbour Commissioners.

The work of the House itself in what may be called the Poorhouse phase is best summed up by a statement that appears for the first time in the annual report of 1827.

> "This Charity," it says, "is appropriated to the maintenance of aged and infirm poor, and the education of neglected or deserted children. . . . The children are apprenticed as soon as they are tolerably instructed in reading, and writing, and arithmetic."

In the Boardroom to-day there is one of the original Indentures of Apprenticeship. It reads :—

> "Harriet Martin, with her own consent and with the consent of the President and Assistants of the Belfast Charitable Society, doth put herself apprentice to Mr. Samuel Nelson, to learn the business of a servant and to sew, and with him (after the manner of an apprentice) to dwell and serve from the date hereof until the full term of seven years . . . during which term the said apprentice her said master faithfully shall serve, his secrets keep, his lawful commands everywhere gladly do. Hurt to her said master she shall not do, cause or procure to be done of others. She shall not haunt nor use taverns, ale-houses or play-houses, nor absent herself from her lawful said master's service day or night unlawfully."

The report continues :—

> "All the men's, boys', women's, and girls' woollen clothes, with all the sheets, shirts, and shifts of men, women and children, and flannels for the hospitals, are made and mended in the house. The shoes are in part made and all of them mended by paupers. A quantity of shirting is woven from yarn spun in the house by the women and girls, and the washing for such a family is sufficient to occupy a number of active hands. The Housemaid's business is done by one woman, with the assistance of a few of the girls. The slating and masonry is done by the inmates when practicable. All the jobbing and the making of a great number of coffins for the inmates, for extern poor, and for the fever hospital, amounting this year to 336 coffins, are done by house carpenters, who are paupers. The garden—which supplies abundance of vegetables, and of which a surplus was sold which exceeded the cost for seeds and manure—is laboured and weeded by the men and boys. The work of the graveyard and the saving of hay are done by some of the old men."

In that year there were 200 aged and 203 young in the House, a figure that was to rise in 1839 to 238 aged and 242 young, 480 in all.

The New Burying Ground.

Until well into the nineteenth century ships could come up into the foot of High Street, and maps of about that time show a large bay of the Lagan which, if it were there to-day, would fill Victoria Square and a large area to the south of it. There was thus tidal water on each side of the tongue of land on which the former Parish or old Corporation Church stood, the site where St. George's Church stands to-day, and although the building had been replaced by the Church of St. Anne in Donegall Street in 1777, the old burying-ground continued to be used. A clause in an Act of Parliament of 1880 introduces yet another facet of the work of the Charitable Society :—

> "Whereas the old church-yard or burying place in the town of Belfast, is situated nearly in the centre of the said town, and by means of an encrease of population therein, the same has become insufficient for the purposes intended; and whereas the water from the sea occasionally overflows the said yard, and the burying of dead bodies therein by the reason and means aforesaid, is become a public nuisance, for the remedy whereof the late Marquis of Donegall granted a piece of ground above the poor-house and infirmary of said town . . . be it enacted therefore . . . that . . . no dead bodies whatsoever shall be interred in the said old church-yard."

The Society has thus for many years had its own burying-ground. It was for generations the fashionable cemetery of Belfast. Here, in stone, are the names of those who shared in the political and professional life of the town, who created its ship-building and linen industries, its trades and crafts, and of those who, in the fulness of time, and prompted by their love of Belfast, founded or worked for its various philanthropic organisations.

Among the many worthies of the town who lie here, it is right to give pride of place to that West Indian Merchant of Winecellar Entry, Valentine Jones, 1st, who was at the inaugural meeting of the Charitable Scheme in the George Inn in 1752, and, seeing the Society through all its growing pains, "lived respected and died lamented" at the advanced age of 94, to be buried in 1805 in the shadow of the building he did so much to create. He was one of the founders of the General Dispensary, and a member of the Committee of the Reading Society. In 1799, at a Ball in the Assembly Rooms, he took part in a quadrille with his son Valentine Jones, his grandson Valentine Jones, and his great grandson Valentine Jones. Valentine Jones, 2nd, continued the family connection with the Charitable Society.

Here too are buried many of the doctors who gave their services to the Society in its early days. Dr. John Mateer, whose name appears on the original list of those attending the House, and who died in 1806 at the age of 79, lies here, and so does Robert Stephenson, Surgeon, also on the first list of doctors, and who served on the Commitee for twenty-six years. He also attended the Lying-In Hospital.

The Ulster Medical Society was formed by the union of two earlier societies. The older of these was the Belfast Medical Society which was founded in 1806, and much of whose early history can be traced here. Dr. Samuel Smith Thomson, who is buried here, was its first President. He was Consultant Physician to the General Hospital, and was, in Dr. Malcolm's words, the Father of the Medical profession in Belfast when he died in 1849. He was also President of the Anacreontic Society, afterwards the Philharmonic Society. The second President of the Medical Society was Dr. William Halliday, who lies in an unnamed family vault in the Clifton Street burying-ground. His name is the last on the list of original Physicians. One of the first names is that of Dr. Alexander Halliday, his uncle, who was the first President of the Reading Society, a position in which he was succeeded by his nephew.

The Medical Society's third President was Dr. William Drennan of Cabin Hill (Plate 15). The inscription on his headstone in the burying-ground reads :—

"Pure just benign; thus filial love would trace
The virtues hallowing this narrow place.
The Emerald Isle may grant a wider claim,
And link the Patriot with his Country's name."

For it was he who first called Ireland the Emerald Isle. He was one of the founders of the United Irishmen, and was tried for but acquitted of treason on account of his political views. He does not appear to have been a physician to the Society, but he was a member of the Committee.

It was not until 1798 that Edward Jenner published his Work on Vaccination, so it is of great interest to turn to the Minutes of the Society to find,

"Poor House, 9th March, 1782

. . . Dr. Drennan produced and read before the board a paper setting forth the utility of a mode of public innoculation being introduced into this house and supported by its countenance.

Resolved that the thanks of this corporation is due to Dr. Drennan for his very useful and public spirited proposal.

It was then

". . . Resolved unanimously that the plan of Innoculation proposed by Doctr. Drennan be adopted.

Resolved that the centre building of this House, or as much of it as the Gentlemen of the Faculty shall approve of, be set apart for that purpose."

Finally, on 9th May, 1792, when the many rules were being drawn up for the guidance of the Belfast Charitable Dispensary, No. 45 stated :—

"At a proper season, persons of all ages may be inoculated for the small pox at the Dispensary."

Dr. Drennan was one of the founders of the Academical Institution, and when it was opened in 1814 it was he who gave the address. In accordance with instructions given on his death-bed, his funeral procession stopped for a few minutes at the gate of what was then the New College.

Dr. Andrew Marshall is buried here. He was the first secretary and treasurer of the Belfast Medical Society, and afterwards its President. He began his medical

career as a Naval Surgeon, and served under Admiral Gambier in the Baltic in the operations which made Heligoland a British possession. He was afterwards in partnership in High Street with his brother-in-law, Dr. Drummond, and was Surgeon to both the Charitable Society and the General Hospital.

It is incidental to the story of the Clifton Street burying-ground that the Belfast Medical Society at one stage fell into a state of neglect, and that among those to whom it owed its survival were Dr. McDonnell and Dr. Forcade. James McDonnell is too well known to need further mention. Dr. Forcade was a retired Army Surgeon who had served all through the Peninsular campaigns with "the Duke," and, as Malcolm says, "so distinguished himself as to receive the old gentleman's particular commendation." He was the first Treasurer of the revived Society, and the founder of the Feast in commemoration of its resuscitation. Dr. Forcade was, like Andrew Marshall, Surgeon to both the Charitable Society and the General Hospital.

The best-known grave in the place is certainly that of Miss Mary Ann McCracken, who, as the headstone says, "wept by her brother's scaffold 17th July, 1798," and who died in 1866 at the age of 96. A niece of Henry and Robert Joy, it is not surprising to find her closely associated with the work of the Society, and from 1832 until 1851 she seems to have been both Chairman and Secretary of the Ladies' Committee. All the minutes are in her own hand, and there is no mention of anyone in the Chair. As her appearance suggests (Plate 16), she was a practical person who did not mince words.

> "The Ladies . . . recommend that sunblinds should be put up without delay in the children's hospitals. Some of them have very sore eyes & many are ill in measles whose eyes are consequently weak."
>
> ". . . the Ladies take the liberty of suggesting the propriety or rather the absolute necessity of establishing a regular system of visiting the apprentices, about three or four times in the year, and on such occasions to converse with master and servant apart, and when any disagreement appears to make enquiry at the nearest neighbour (particularly at such as have apprentices with whom they appear to be on good terms) as to the temper and dispositions of the discontented master and his family, in order to ascertain the real state of the case."

And later she takes up the cudgels again in a fine trenchant Minute :—

> "Poorhouse 3rd January, 1838.
>
> The Ladies have heard with infinite surprise and regret that the gentlemen are opposed to promoting industry in the House by the only efficient means that of allowing individuals to derive some little advantage from their own exertions—at the same time the Ladies are aware of the argument that may be made on the occasion viz. that it is the duty of the inmates of the House to devote all their abilities to the general good of the institution by which they are supported—yet as it is an incontrovertable fact, that the highest and best educated classes of society require some additional stimulus to exertion, besides a sense of duty and the public good, it is too much therefore to expect that those of inferior advantages should rise higher in the scale of perfection. The Ladies therefore respectfully request the gentlemen may reconsider the matter and examine it in every point of view.

For the first place they will please to recollect that every human being whatever may be their station in life ought to have some leisure time daily at their disposal which is the case with servants in all well regulated families, besides in this House at this season of the year the greatest proportion of the time which those who are engaged in active duties (particularly in attending to the children) have at their own disposal, they would be obliged to spend in darkness & consequently in idleness if not allowed to earn the means of purchasing candles for themselves as what they get from the House does not afford light for more than one hour out of the twenty four thus by permitting matters to remain as they were so much time is saved which would otherwise be lost and the coppers which are thereby earned are still for the good of the Institution being for the use of the inmates. The gentlemen will also please to observe that it would have the appearance of partiality and inconsistency to allow some to derive profit from their industry particularly those receiving salaries and deny the same indulgence to others who receive none. . . .

The Ladies would also recommend that the children should be washed at night in tepid water in the schoolroom in place of the morning in the open air."

After the Battle of Antrim, her brother Henry Joy McCracken, the United Irishman, was hanged from the Market House in High Street, and his body, after vain attempts at resuscitation had been made, was buried in the Old Churchyard at St. George's. Some years afterwards, workmen unearthed remains believed to be his from this spot, and these were later interred in the same grave as Mary Ann McCracken.

Nearby, their kinsmen the Joys are commemorated. One of the last names in this long line, many of whom served the Society, is that of Alix Bruce Joy, 3rd Officer, W.R.N.S., "Lost at sea through enemy action, August, 1941."

The only memorial in this town to William Ritchie, the ship builder, seems to be his own tombstone in Clifton Street, yet it is impossible to assess what his work has meant to the growth and prosperity of Belfast. He came from Scotland in 1791 to establish his own shipyard on a site now covered over by Corporation Square. He also undertook the construction of a graving dock for the Corporation, which he completed in 1800. This dock is still in existence and is now called the No. 1 Clarendon Graving Dock. He was a member of the Charitable Society and of the Academical Institution, and for a period was Chairman of the Committee of Management of the Belfast General Hospital. When he died in 1834, it was recorded of him that

"There was no institution in Belfast of a public nature, whether literary, scientific or charitable, which was not largely endebted to him for support."

Of the Ulster Families buried here who promoted philanthropic work in Belfast, a special place must be given to the names of Charters, Benn and Mulholland.

To John Charters, the Charitable Society is indebted for a wing to the House, and so was the old General Hospital, a fact which is still recalled by the Charters ward in the Royal Victoria Hospital, while his family name is also remembered by a Scholarship in the Royal Belfast Academical Institution of which he was a

pupil. Edward Benn is buried here. He presented two wings to the Society to complete the present quadrangle of buildings. His portrait hangs on the stairway of the House (Plate 12). It was his brother George, the historian of Belfast, who made the particularly humane Benn Bequest, which provides a special dinner for the residents each Christmas and Easter.

The Mulholland family built a wing to the old General Hospital, and their name is also perpetuated in the Mulholland Ward of the Present Royal Victoria Hospital.

One of the handsomest stones in the graveyard is that of the Journeymen Coopers of Belfast. This was erected in 1812, and carries on its reverse the names of those members who are buried in the plot.

Nor is the place without its curiosities. There is the dog on the top of the Hyndman memorial, but perhaps the quaintest of all is the headstone of a former Professor of Mathematics in the Academical Institution, which simply states, "Young! moulders here, 1829."

In the days of the body-snatchers it was not unusual for relatives to watch over a family grave for weeks after a burial. The gun and revolver used by the night watchmen are now preserved in the Boardroom, and there is a record of the form of guarantee signed by the sponsor of any person so employed. In the Belfast Museum there is a strong iron guard or cage into which a coffin could be fastened to prevent violation after burial, and which came from this graveyard. (Plate 10 (a)).

The Minutes of the Society for 31st December, 1836, mention an interesting sequel to the times of the body-snatchers :—

> "Dr. Drummond is permitted to have a single grave in the Paupers' ground for the interment of subjects granted to the Anatomical School according to the Act of Parliament."

Anatomy had been taught in the Academical Institution since 1818, but it was not until 1835 that a formal Medical School was opened, and Dr. James L. Drummond, a Physician to the Charitable Society, was elevated to the first Chair of Anatomy and Physiology, which he occupied for thirty years. He was the first President of the Faculty. He was also first President of the Belfast Natural History and Philosophical Society and President of the Literary Society.

There is a large unmarked plot in this cemetery connected with two events in social and medical history (Plate 11 (b)), for in it are buried victims of the great Cholera epidemic of 1832 and 1833, and it was afterwards used as a burying-ground for the poor in the crisis that followed the potato famine of 1845 and 1846.

"November, 1832 :—

> A very awful dispensation from the Supreme Disposer of events has taken place; and in the contemplated approach, and the actual arrival of the Epidemic Cholera in Belfast, many precautionary measures were taken generally, and in all public charitable establishments particularly, to avert, and arrest, with due submission to the will of God, the progress of the

impending evil. . . . Such has been the success of the unwearied perseverence and skill of the Physicians of Belfast, aided by the zeal, judgment and indefatigable exertions of the Board of Health, and by the liberality and co-operation of its patriotic inhabitants, depending always on the Divine blessing, that in the report of the Board of Health, November 12th, 1832, the number of deaths since the commencement of the disorder in Belfast were only 418, while the recoveries were 2409; total number of cases, 2827. This awful calamity appears now to have ceased. . . . There were only four victims to the Cholera in the Poor-House . . ."

In the summer of 1847, after the famine years, this same plot was reopened for the burial of the poor, and a certificate of freedom from infection in opening these graves was signed by many medical practitioners in the town. The annual report of that year adds :—

"Early in May, the infectious diseases had so alarmingly increased in town that, as soon as new hospital accommodation could be provided, the beds were filled, and more required. Under these circumstances, the hospital commitee applied to your Committee, to give room and beds to the surgical and other non-infectious cases, then in the surgical wards, in order that their beds might be made available for fever patients; and guaranteeing to pay all expenses. . . . Within the last fortnight these patients have again been taken back to the General Hospital. . . .

In the month of July, the influx of beggars and vagrants from the surrounding districts of Belfast, had become such a nuisance, and was considered by the Board of Health to exercise such a pernicious influence in propagating disease, that your Committee were induced, by urgent solicitation from that and other public bodies, to call a special meeting of this Society, at which it was resolved to put into activity their legal powers for suppressing street-begging, which had for many years lain dormant. . . ."

The Belfast Charitable Institution.

While the Poor Law Bill for Ireland was on its way through the House of Commons at Westminster in 1838, the President and Assistants became apprehensive that under one of its clauses their property could be taken from them and transferred to the Commissioners to be appointed under the new law. They accordingly prepared a Petition for presentation to Parliament for the introduction of an excluding clause, emphasising the special circumstances surrounding the establishment of the Society, and certain peculiar features such as leases to the Lying-In Hospital and the Institution for the Deaf and Dumb and the provision of a burying-ground in which plots were held by private individuals.

Their Petition

"Humbly Sheweth

That for the erection and support of the Poor-house . . . large sums of money were subscribed or bequeathed by various inhabitants of the town and others, under the full conviction, that their property, so subscribed or bequeathed, should remain inviolate under that management to which it had been confided, and which impression has been fully borne out by various Acts of Parliament."

The Secretary for Ireland gave an assurance that the necessary clause would be inserted, but when the time came, this was so modified as to raise doubts as to whether it would serve the purpose of the institution.

The Annual Report of 1841, however, states :—

"It having been ascertained by the opinion of Council, that the New Poor Law does not interfere with the Belfast Charitable Society, the Committee turned their attention to the reduction of the number of inmates in the House, so as to make the expenditure not greater than the income of the Charity. To accomplish this, the Committee ceased admitting any more adults or children, while, at the same time, they reluctantly discharged from the house a number of adults, whose claims upon the Charity were the least strong and who were considered proper objects for the Work House.

As soon as the inmates in the House are so far reduced in number as to leave a surplus of income over the expenditure, your Committee would recommend the admission of individuals who are natives of the town or parish, who have not been reduced to poverty by their own bad conduct or dissipation, and who do not belong to that class that are admissible into the Work House; so that, in a few years, the house will become an asylum for persons who had seen better days, and for whom the Charity was originally founded."

Although the Society had no longer to make provision for the pauper classes, the levy of a Poor Rate had an almost disastrous effect on its income, for people felt that once the State was making provision for the poor, there was no longer any need for voluntary effort. It was some years before the continuing need for the Charitable Society was realised by the public. With the coming of the Poor Law, the Poorhouse days were really over, and from that time on the House was more often referred to as the Charitable Institution. The wrought iron work over the gateway (Plate 6) is not old, but belongs to this period, and was put up as stated in a Minute of November, 1892 :—

"For many years past the Institution has been very generally known as the 'Old Poor House', and the Committee thought that if the place were called by its proper name, an objection raised by some to seek its shelter might be removed. Over each gate has been erected an ornamental design bearing the words 'Belfast Charitable Society, 1771'."

This was a period of expansion, and the dreadful overcrowding was to occur no more. This was due, not so much to any increase in the Society's income, as to a number of special gifts. In utilising these gifts to the full, the Committee of those days seems to have lost nothing of the astuteness of their predecessors, for the report of 1862 records :—

"In the report of last year it was stated that the late Lady Donegall had bequeathed an annuity to this Society of £100 annually, to commence after the payment of other objects, and to continue during the life of Lord Donegall. Under these circumstances, your Committee considered it expedient to insure the life of Lord Donegall for £500, and effected a policy for that amount."

It is pleasant to know that his Lordship survived for a further twenty-one years.

In 1868, the Charters Wing, the gift of Mr. John Charters, was opened at the rear of the original premises, and a few yards from it. This was allotted to the children, who were thenceforth segregated from the aged. Four years later, in 1872, the two Benn Wings, the gifts of Mr. Edward Benn, were built, and with additional corridors, welded the several parts into a convenient whole, very much increasing the roominess of the House. The present dining-room with its kitchens and sculleries was added in 1887.

The children did not occupy the Charters Wing long, for in 1879, a resolution was passed reserving the home for the aged and infirm exclusively. It is a curious coincidence that in this same year it was reported to the General Board,

> "Your Committee have been much gratified by the receipt of a letter from a young man, who was formerly maintained and educated in this Institution, enclosing a subscription of one guinea to the funds of the Society, and promising to contribute a similar amount annually. The letter also conveyed his grateful acknowledgment of many obligations to this Charity."

And the converse too has occurred. More than once in the history of the Society those who had been its Assistants in their days of prosperity have fallen on evil times, and have been offered and accepted the shelter of the House.

There is an interesting minute of November, 1892 :—

> "A Deputation from the Board of Management of the Royal Hospital attended and the question of the purchase of this Institution and grounds for the purpose of the Hospital was discussed.
>
> The Committee considered it would be a benefit to the town if such a sale were accomplished and agreed to recommend the Corporation to accept the sum of £35,450 for the House and grounds, and seven houses in North Queen Street, in all covering about 4 acres."

These negotiations were never carried through, for the new Royal Victoria Hospital was, in due course, built on the Grosvenor Road site.

The Building.

The House is not the oldest public building in Belfast. That distinction belongs to the Belfast Bank in Waring Street, formerly the Exchange. The Assembly Rooms, which saw the trial of Henry Joy McCracken, were on its first floor. Many of the early meetings of the Charitable Society were held here. It was built in 1769 by the first Marquis of Donegall at the "Four Corners," then one of the most important sites in Belfast, and the point from which all distances from the town were measured, as can be seen from old mile-posts. The building has been so altered both inside and out as no longer fully to deserve the consideration that would otherwise be its historical due.

Clifton House is recognised as being one of the finest examples of Georgian architecture in Belfast. The additions to the back have in no way altered the front elevation. The building is not large, but is of the most beautiful proportions, while the mellow colour of the old brickwork and its most careful pointing

are really lovely. It has been repeatedly stated that the central spire, which, the curious will be interested to know, is of Scottish stone, and cost £170. 15s. 0d., is a feature peculiar to Irish Georgian, and would be represented by a dome in the corresponding type of building in England.

It is not clear who was the architect. There were plans prepared by Mr. Myln of London and Mr. Haliday of Liverpool. A Scottish architect was also consulted for

> "Robert Thomson reported that He had advice from his friends in Glasgow that they have settled with the Person who drew the Plans of the Poor House and Infirmary for three guineas, and that he hath no further charge on that acct, but said 3 guineas & 3/8 postages."

Messrs. George Russell, Stafford Wilson and Foot appear to have submitted plans in Belfast. A Committee of five was appointed to consider these, and rejected all but three. On these three they could form no collective opinion, and each made his own report. From these a delightful probability emerges. Robert Thomson said,

> "There is yet another Plan which hath not been submitted to us as a Committee and of which therefore I shall say no more than that I would wish it laid before Mr. Cooley also, I have seen it in the hands of Mr. Robt. Joy."

William Baird, too, reported,

> "I have seen a Plan for the above purposes in the hands of Mr. Robt. Joy, which in my Judgment I would prefer."

And a third member, George Black wrote,

> ". . . some of my worthy Brethren . . . produced . . . Plans . . . And it is a pity they were not submited to public Inspection particularly the drawing of a respectable Brother who I am sorry to say declined showing it, even to the Committee as a body. . . . The front seems well calculated as a public Edifice."

Then the Committee

> "resolved that Mr. Robt. Joy be requested to take with him to Dublin the three plans now delivered in, & such other drawings as are now in his possession, and lay the same before Mr. Cooley, for his examination, with directions to choose out of those four the Plan which he shall most approve of . . ."

The Committee afterwards saw Robert Joy's plans and recommended their adoption to the General Board, a choice which was confirmed. In support of all this there is a paragraph in the poem of David Boyd, the schoolmaster :—

> "All labour'd freely in the bless'd employ,
> But the most active, Mr. Robert Joy;
> He took to Dublin with th'utmost respect,
> The various plans, the skilled architect
> Might one approve—the work of choosing past;
> His was the plan they voted best at last.
> Through the whole business still the active man;—
> Here stands the Poorhouse built on Robert's plan."

In short, as Mary Ann McCracken said at the beginning of the letter about her uncle, "He projected our 'Old Poorhouse'."

Perhaps this does not mean as much as might be thought at first sight, for long after the foundations were laid and the walls well up, the Committee were still watching every detail, and there are entries in the Minutes such as,

"Resolved that the pitch of the roof be forty degrees."

"Resolved that the stacks of Chimneys be carried up from above the roof agreeable to the model now made."

"Resolved that . . . the cupola be carried on this season agreeable to a model thereof made by Hugh Dunlap Carpenter . . ."

Family Connections With the Society.

It is remarkable how many families have served this old foundation for several generations. There were the two Valentine Joneses. There were many generations of Joys until quite recently. There have been from its earliest days and are at the present time members of the families of Brett and Dobbs. There have been several generations of Batt, Bristow, Bruce, Clarke, Pim, O'Brien, McNeill and Sinclair.

Two such family groups are specially interesting, the Donegall family and the Purdons.

The Donegall family have provided the Society with four Presidents covering a period of 165 years so far :—

Arthur Chichester, 1st Marquis - - -	1774-1799
George Augustus, 2nd Marquis - - -	1799-1844
George Hamilton, 3rd Marquis - - -	1844-1883

The 3rd Marquis was followed by three Mayors of Belfast, but he had left his Ulster estates to his daughter, Harriett, Countess of Shaftesbury, and her son, the 9th Earl of Shaftesbury, has been President since 1896.

And the Purdon family may well have established a record of medical service to one institution, for from Dr. Henry Purdon, who was Staff Surgeon to the Province of Ulster, and who attended the Poorhouse as early as 1804, the following line of Physicians to the House is descended :—

Dr. Thomas Henry Purdon - - - -	1836-1845
Dr. Charles Delacherois Purdon - - -	1845-1882
Dr. Henry Samuel Purdon - - - -	1882-1906
Dr. Richard J. Purdon - - - - -	1889-1918
Dr. Elias Bell Purdon - - - - - -	1918-1947

Clifton House.

To-day the Belfast Charitable Society provides a home for 144 aged men and women of good character who are natives of, or residents for some time in, Belfast. Under the terms of the Forster Green bequest of £10,000, a limited number of persons can be admitted from any part of the counties of Down and Antrim.

The name of the institution has been changed to Clifton House, and the residents use this address with greater freedom than the old one with its inevitable stigma.

A candidate, once admitted, has a home for life. Unless better treatment can be provided elsewhere, residents taken ill in the House are nursed on the premises, or, if transferred for treatment to another institution, are sure of their place in Clifton House when they are fit to be moved, even if chronically sick. It it occasionally necessary to transfer permanently anti-social cases of insanity.

The advanced age and corresponding frailty of those now seeking admission is a matter of some concern to the Committee, but as far as is possible with a small nursing staff, no deserving case is refused admission.

Residents have full liberty to come and go as they please within the limits of medical discretion, and are encouraged to take their holidays in the usual way if arrangements can be made for them.

The fit are accommodated in small rooms, mostly two-bedded. The less strong are in infirm wards where they can get breakfast in bed, but their other meals in the dining-room, while the most frail of all are, like the acutely ill, in the sick bay.

Each resident contributes what he or she can to their upkeep, but no one is refused admission for lack of means. Various Local Welfare Committees also make a contribution to the maintenance of people for whom they would otherwise have to make provision. Finance, however, is not so often as formerly the real problem for the applicant. These old people have in many cases outlived their own generation. Many of them have been living alone, and show signs of neglect and lack of supervision. All welcome the companionship of people of their own age in an atmosphere where the rate of living is more atuned to their physical strength.

Conclusion.

Belfast may well be proud of its oldest charity. In their lovely old Georgian building known first as the Poorhouse, then as the Charitable Instititution, and now as Clifton House, the President and Assistants of the Belfast Charitable Society have always pursued the policy that would best serve the needs of the community from time to time.

The Society has, as the Report of 1874 says,

> "an interesting and honourable history . . . . . It is a fine memorial of the men who laid the foundation of our local reputation and prosperity. Their honoured names could not have been inscribed on a worthier page of philanthropy.
>
> And it may well be desired that their benevolence, animating the successive generations of our people, may secure for this Institution a lasting prosperity, and for many a weary spirit, shaken by the storms of life, a haven of repose."

ACKNOWLEDGMENTS.

Had it not been for the generous way in which the Society put its Minutes and other material at the author's disposal, this paper could never have been written. The Belfast Museum and Art Gallery have provided the illustrations for Plates 8, 9 (a), 10 (a), 10 (b). Mr. A. H. George told the writer of the remarkable poem by David Boyd, while Mr. John Hewitt told him something of the man himself. The Linenhall Library has permitted the reproduction of one of the old maps of Belfast from its Centenary volume, and Mrs. Duffin of Mount Pleasant has allowed him to use the portrait of Doctor William Drennan. Finally, the printing of so long a paper and its illustrations has been made possible by the help of a grant from the Publications Committee of the Queen's University of Belfast. For all this assistance the author is most grateful.

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Preliminary Report on Anæsthesia and Akinesia in Intra-ocular Operations

By J. R. WHEELER, M.B, D.O.M.S., F.R.C.S.

Presidential Address to Irish Ophthalmological Society, October, 1952

WHEN a patient expresses sufficient confidence in a surgeon to allow him to perform an intra-ocular operation upon his eye, it is up to the surgeon to make this ordeal as easy and as safe as it is possible for him to do.

All our patients are admitted to hospital two days before operation, so that they may get to know the nursing staff and their surroundings. They are told what will happen to them in the operating theatre and how they will be bandaged, and every effort is made to gain their confidence. In spite of this, it is human to have a certain fear and apprehension, and so some mild sedation on the pre-operation night and again before operation is desirable. As well as removing all painful stimuli, the ideal is to have complete mental and muscular relaxation. But no mental relaxation will be complete without good muscular relaxation, which is obtained by good analgesia and akinesia. It is interesting to note that it has been stated that good voluntary muscular relaxation alone will produce mental calm. If pushed too far, however, the reverse is the case as, if breathing is affected, the patient will become distressed.

Now, as far as the eye is concerned, muscular relaxation can be produced locally by means of a facial nerve block and a retrobulbar block of the extra-ocular muscles, or it may be produced generally by means of curare or allied drugs. When using curare it is fortunate, from our point of view, that the extra-ocular muscles are the first to be affected and the last to regain tone. Therefore, only a comparatively small and safe dose need be given.

In 1939, I read a paper at the meeting of the Ophthalmological Society of the United Kingdom, pointing out the effect that curare and retrobulbar anæsthesia had in reducing intra-ocular tension, and therefore intra-vitreous pressure, by removing the abnormal tonus of the intra-ocular muscles. That is, muscular relaxation will produce what Barraquer Moner terms "a sleeping vitreous body."

Kirby's paper to the last International Ophthalmological Congress in London in 1950, on "Three Years Experience with General Akinesia in Cataract Surgery," is no doubt well known to all of you, but my interest in the subject was further stimulated by a visit to the Barraquer Clinic in Barcelona last spring.

Kirby classifies patients into three groups:—(1) The stoic; (2) The average type, who has confidence in himself and his surgeon; (3) The hypertonic or hyperkinetic type, who exhibits residual muscular spasm. I only wish I could

always diagnose successfuly that dangerous third group patient prior to operation. In this latter type of patient, fear and apprehension still leave considerable general muscular spasm and rigidity although local akinesia may be excellent. In these cases complete general anæsthesia plus curare, or local anæsthesia plus curare, is specially applicable.

In the last six months I have operated on 61 cases of senile cataract. This number of cases is far too small to enable me to offer you anything more than my impressions of various techniques, and so the heading of my paper "A preliminary report."

Of these 61 cases :—

40 had local surface cocaine anæsthesia, a facial nerve block plus a retrobulbar injection of novocaine.

9 had general anæsthesia plus Flaxedil intravenously.

6 had local surface cocaine anæsthesia plus curare intravenously.

6 had local cocaine surface anæsthesia plus curare intravenously plus facial nerve block.

It is not always easy to have a consultant anæsthetist available at the time of operation to give curare, and this is the reason why so large a percentage are done with local anæsthesia plus a retrobulbar injection. Again, when trying out new techniques, one likes to be certain that the anæsthetist knows all about this comparatively new idea of using curare with a conscious patient. In fact, it is a great advantage to have one and the same anæsthetist the whole time.

A completely unconscious and relaxed patient is, in theory at least, in the ideal state for operation. In practice there are the two difficulties of the patient who is a bad general anæsthetic risk and of the patient who develops post-operative sickness. This latter should rarely occur to-day with a first-class anæsthetist—anyhow, if one sutures the wound little harm will result. Two of my cases were slightly sick, but this was possibly due to morphia or omnipon given inadvertently with the atropine prior to operation. For a complicated extraction, a general anæsthetic seems to be the method of choice.

Local anæsthesia and a retrobulbar injection can be compared with local anæsthesia and curare—

(a) The fall in intra-ocular pressure of 5-7 mm. is comparatively constant whichever method is used.

(b) a "retrobulbar nerve block" seems to give a little more local reaction and perhaps the wound is a little slower in cicatrising, and I have had three iris prolapses in this series.

(c) curare, by giving general muscular relaxation, helps to prevent the patient holding his breath in a forced manner, and so avoids venous congestion with resulting passive uveal congestion. All wounds healed rapidly with little reaction.

(d) curare is eliminated very quickly from the system and so, by the time the patient is back in bed, its akinesia effect has probably disappeared. In the doses we used it only caused a partial paralysis of the strong orbicularis oculi muscle. I, therefore, feel that it is better to paralyse the orbicularis oculi with a facial block which will last for probably a few hours.

It is for this last reason that in my present series I am trying the effect of curare and augmenting it with a facial block.

The dosage of curare used was that suggested by Kirby—9 mgm. never being exceeded. It is usually given in three doses at one minute intervals, but we are trying to reduce this to two doses, as that seemed to us to give a more even effect. An intra-ocular operation should not start until two minutes after curarisation so that, having reached its peak, no apnœa will now occur. We have once had slight apnœa, but a little oxygen quickly controlled it. An antidote, 1.0 to 2.5 mgm. prostigmin, should, of course, always be available. Its effect is said to be instantaneous, but we have never had to use it. It is also always advisable to be able to control respiration by means of a closed circuit anæsthetic apparatus.

It would seem to me that all methods of akinesia are satisfactory for the average placid patient, but some general muscular relaxant has a tremendous advantage in those cases where fear and apprehension cause voluntary muscular spasms and rigidity.

In conclusion, I might say that in all cases an intra-capsular extraction was attempted, and in only one (a retrobulbar block) was a little vitreous lost. The results of this series of operations are very satisfactory, with one exception where a retinal detachment developed (this case has since had a scleral resection performed). For the rest, the mediæ are very clear and, provided no fundus defect exists, vision good. Later on I hope to publish actual figures.

Almoners and the Health Service

By Sir Ernest Rock Carling, ll.d., f.r.c.s., f.r.c.p., f.f.r.

Address given at the Annual General Meeting of the Northern Ireland Regional Committee of the Institute of Almoners (Abridged)

There is a sense in which an almoner is still a person who "dispenses alms." I know the word "charity" is anathema in the Welfare State—more's the pity—there is still room for charity of mind, charity of judgement, charity in counsel. They are of the essence of the almoner's work; they are the alms she dispenses.

Unfortunately the almoner was at some times and in some places betrayed into accepting a role which was entirely contrary to her principles. When the voluntary hospitals began to get into financial difficulties and patients' contributions were accepted, it was the almoner's job to see that no one paid *more* than they could afford. As the hard times became harder, some hospitals pressed the almoner to modify her tactics and extract as much as she felt she could. A faint odour of extortion followed the almoner into the National Health Service, but it was totally undeserved.

I am going to tell you a story to illustrate the qualities a good almoner must have. It concerns an assistant cook at a London hotel. He did not know it, but he had a developing cataract in both eyes. He walked along the Thames Embankment one bright sunny morning, and when he reached the hotel went down into the dark basement where every morning he was accustomed to shave. When he looked into the glass he could not see his face. He thought he was blind and he feared he would be a burden on his family. He cut his throat. We kept him in hospital for several months, and repaired his throat, cured his ruptures and operated on his cataracts. Meanwhile what had the almoner done? She persuaded the police to leave him in our hands and the manager of the hotel to keep his job open. She found his wife a job and sent the children—one to a seaside home and two to foster-parents in the country. When the day came for the man's discharge from hospital, what did he find? His job was still his, his home was preserved, his wife was proud of the way she had kept it together by her own earnings and the children were rosy with health. The family were reunited—healthy, happy and full of hope.

Now what was it the almoner possessed that enabled her to accomplish that task? Compassion tempered with wisdom, and energy directed by a personality that could impress the manager of a big hotel, even against his interests. She knew by her training how to utilise the Local Authority resources; and what is more, had established relations with them that ensured prompt attention. She

was trusted. She had a reputation that made her recommendation of the wife for a job effective. She had a way with her that persuaded the mother to let her children go—on a promise of reunion as soon as might be.

To succeed an almoner must be a woman of education; she must be intelligent; she must have her emotions firmly under control so that her sympathy itself is bracing. She must have the art of inspiring confidence, be skilful in the use of words and discreetly tactful. She must have imagination and use it—not only to explore a Utopian plan, but also to find ways of making others believe it feasible. Not everyone can expect to achieve this, but given a reasonably cultured family background to ensure an "education," and given opportunities such as a University offers for learning how to make contacts the word "impossible" is hardly in her vocabulary.

Now of course I have been painting high lights whereas there is a deal of shade, much of it dismally enduring. One-third of a family doctor's work comes from one-tenth of his patients' list. They are the feckless folk, who don't know how to manage their lives, their homes, their children and their difficulties. The almoner will often work not for the "normally" inefficient, but for the more difficult and distressful, who have the extra burden of ill-health, acute illness, accident or actual disaster. So to her general education in social work, she must add experience of hospitals, of nursing conditions, of the medical aspects of human relations and human suffering. This is the reason why, after the usual two years spent in obtaining an academic diploma or degree she must spend at least another in practical work in hospital.

Doctors have begun to realise that many of the occupants of ward beds need as much attention to their social difficulties as to their physical. In the past we really knew little and—so far as the patients could see—cared little about their domestic difficulties and hazards. To-day in every fully-staffed hospital there must be an intensively trained and highly intelligent almoner, to keep us from forgetting half the help at the disposal of our family of patients. It is her job with supreme tact to find out what hardships and heartaches are in the background of the present illness; it is her job to make sure that the discharged patient and his relations understand how the situation stands, what the doctor's instructions mean, and how help can be given through the family doctor.

The almoner is an expert on human relations as they are disturbed by illness, injury, disease, old age and senility, family troubles and emotional crises. This is her field and she ought not to have her time wasted on the executive details required to put in motion the innumerable agencies from amongst which she selects. That should be done by competently trained people, but trained in another though an associated skill.

Even that is not enough. What we have to do is to produce more almoners. It has been calculated that something like three thousand would be needed for the whole country. There are, in fact, practising and retired, about one thousand.

At the present rate of wastage, not hundreds, but merely tens can be added each year to the working total. At the moment, with the best will in the world, the Training Branch of the Institute cannot turn out more. Prospective students have had no financial assistance hitherto, such as a host of others pursuing professional trainings have enjoyed from the Ministry of Education. Nowadays no higher educational course can be run on the fees paid by the students. The Institute had come close to the verge of financial disaster when at last something has been done by the Treasury to ease the burden. In the new conditions more student entrants may be expected, but the matter is urgent. How is the present demand to be met? It is hoped that other Universities will follow the example of Edinburgh and provide in the teaching or associated hospitals for the third year of special medical training to follow their two-year social studies course.

At this moment the staff of every good hospital not already so provided should be saying "An almoner, please." When none can be made available various expedients have been suggested, none of them really satisfactory. If it be found possible to separate the social welfare work of a hospital into that which does and that which does not require the special medical knowledge of an almoner, other trained social workers might be entrusted with some of the work, definitely under the supreme direction of an almoner.

There are grave difficulties with any such expedients, but I doubt if they are insurmountable. The title "Almoner," with all it implies of strict training in hospital *after* the University diploma, should not be extended to those imperfectly qualified. Perhaps some alternative title such as "Welfare Associate" could be adopted. In any case an alliance must be established between the almoner in hospital and all the workers without. The health visitor, for example, should be at home in the almoner's office. The distinction between the almoner and the health visitor is not always appreciated. The function of the visitor is primarily educational. She must teach hygiene, sanitation, habitual cleanliness and establish lasting relations with the young families of her district.

The almoner's task is to set people firmly on their own feet. By counsel she must lead them to solve their own problems. She must not let them become dependent upon her. She must deliberately withdraw at the right moment, though ready enough to renew the relationship if the struggle becomes too hard for the weaker brethren. She is not technically a "psychiatric social worker" (their field is almost entirely outside the wards of a mental hospital), but she must be no mean psychologist—or shall we rather say—"student of human behaviour."

There is a great deal of hidden misery and suffering among the elderly and especially the lonely old people. It is not the almoner's job to seek out such people, but at least those who from time to time do reach hospital ought never to be lost sight of, and the almoner, with very inadequate resources, must try to ameliorate their lot. That she cannot do all she wishes is because there is a gap in the official organisation—between the sick and the destitute. Nobody need

be really "destitute," but many are neither fit for hospital nor fit for Part III accommodation. With all the goodwill in the world, voluntary organisations are unable to deal with the problem.

The need for more almoners is the greater because there is also a place for them in industrial health schemes and in big industrial organisations. It is a revelation to discover what a volume of work pours in on a good almoner when attached to factories where the need for any such person had been scouted by the management before her appointment. I doubt whether industry yet appreciates the value of a first-rate almoner as an agency for diminishing time lost to production through illness, invalidism, anxiety and family troubles. I doubt whether workmen appreciate how much steadier their earnings will be if they have all the help to which they are entitled in sickness and in home worries. I doubt whether local authorities realise how much their administrative and medical and sanitary services can be helped by an alliance between their health visitors, their midwives, their home nurses and home helps and the almoner. I know that at present few, if any, general practitioners have any idea how their labours could be eased and their fatigue lessened were there almoners enough to be shared amongst groups of them, working in association or on a rota system.

I want to leave on your minds the idea of the almoner as a full member of the team of doctors, sisters, nurses, radiologists, pathologists, physiotherapists and so on, into whose total care the entrant to hospital shall fall. If that is realised, her part in the teaching, not only of almoner students, but of medical students also, will be appreciated and exploited; but she will not take her proper place unless, on the highest level, she also assists with the research which, in every medical unit, is the witness of its aliveness and worth. Certainly when concerned with disease as it affects the population rather than the individual, she may be indispensable.

I have failed in my presentation of the almoner's case if I have not persuaded parents that almonry offers a career for their daughters that will be found satisfying, reasonably well paid and of great value to the community.

I hope, too, that my words may reach the ears of headmistresses who may safely and wisely advise their senior scholars not to overlook the chances of happy and useful service offered by the almoner's profession. I hope my words will not be lost on University Authorities, for I believe they can now do a service to the community by extending their Social Science Department to the production of fully fledged almoners.

I know no work open to women (and to a few men) that develops a wiser, happier or more valuable personality.

The Hæmagglutination Test in Tuberculosis

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IN establishing the diagnosis of tuberculosis, the demonstration of the infecting agent by microscopical and modern culture techniques is the method of choice. Many attempts have also been made to establish a diagnosis by such serological means as precipitation or the fixation of complement, but all these methods have proved unsatisfactory, and none are in common use.

In 1948, Middlebrook and Dubos introduced a new technique—a hæmagglutination test—to demonstrate antibodies which may be present during the course of infection. In this method washed sheep red cells were sensitised with an extract of a culture of tubercle bacilli H37. They showed that sheep red blood cells sensitised in this way were agglutinated by even small amounts of antibodies in the patient's serum. They claimed that the test was specific for tuberculosis, and suggested that it might be applied in clinical diagnosis. The sera of six cases of patients known to be suffering from tuberculosis gave positive results in a dilution of 1 : 8 or over.

Using modifications of this technique, Gerney-Rieux and Tacquet (1950) and Smith and Scott (1950) showed that 80 per cent of patients with active tuberculosis had positive hæmagglutinin titres of 1 : 8 or over. Higher figures of 92.3 per cent positive titres were published by Rothbard, Dooneif and Hite (1950). Sohier, Juillard and Trimberger (1950) with 8 positive out of 17 cases of active pulmonary tuberculosis, and Hilson and Elek (1951) with only one-third of their tuberculous patients giving positive results, found the test less useful. These workers also found that a small percentage of healthy controls gave a positive test.

In this investigation, the hæmagglutination test has been applied in a series of tuberculous patients, including tuberculous meningitis. An attempt was also made to establish the relationship, if any, between the possession of hæmagglutinating antibodies and the presence or absence of a positive Mantoux skin reaction.

TECHNIQUE.

The technique used by Smith and Scott (1950) for demonstrating hæmagglutinating antibodies was modified as follows :—

Sheep red blood cells were washed repeatedly and 0.1 ml. of the packed cells was sensitised with 6.0 ml. of a 1 : 7½ dilution of double strength deglycerinated old tuberculin (B. and W.) by incubating at 37°C in a water bath for two hours.

The patient's serum was inactivated at 65°C for three minutes and freed from heterophile antibodies by absorption with sheep red cells.

To 0.2 ml. of doubling dilutions of the patients serum, an equal volume of the sensitised cells was added, and the mixture incubated in a 37°C water bath for

three hours. On removal from the bath, the test was left overnight at room temperature, and the presence or absence of agglutination determined by observation on a microscopic slide, using the 2/3 in. objective. This method of reading differed from that of Smith and Scott, who used a macroscopic method. A reading was considered positive if 3-4 or more red blood cells were clumped together. The microscopical method was found to give a positive titre to two tubes higher in the series than the macroscopical method. Middlebrook suggested that macroscopic readings of 1 : 8 or over should be considered positive, and this was also used by Gerney-Rieux and Tacquet, and by Sohier. The microscopic method of reading in our experient is four times as sensitive as the macroscopic method, sera were therefore only considered to be positive in this investigation if the titre was 1 : 32 or over. Sera, which gave titres of 1 : 8 and 1 : 16 are included, but are considered negative.

Hæmagglutination Reaction in Active Non-Meningeal Tuberculosis.

The sera of 46 cases of active non-meningeal tuberculosis were examined. Of these, 21 patients gave positive reactions from a titre of 1 : 32 to 1 : 512, and 25 were negative, i.e., showed a titre less than 1 : 32, although 10 of these had titres of 1 : 8 or 1 : 16 (Table 1).

Hæmagglutination Reaction in Healthy Nurses.

A group of 91 healthy nurses, whose Mantoux reactions were not known, were tested for hæmagglutinating antibodies, and eleven of these contained antibodies ranging from 1 : 32 to 1 : 128. Of the 80 who gave negative results, 34 had titres of 1 : 8 or 1 : 16. It was observed that the titres found in this group were generally lower than those in the tuberculous series. A routine Mantoux skin test was subsequently carried out on this group, and 51 were found to be positive. Ten of those who gave positive hæmagglutination titres between 1 : 32 and 1 : 128 were in the skin test positive group. However, one of the 40 nurses who were found to be Mantoux negative had shown a positive hæmagglutination in a titre above 1 : 32 (Table 1).

TABLE 1.

	Number of Sera Positive to Maximum Titre of							
	Under 1 : 8	1 : 8	1 : 16	1 : 32	1 : 64	1 : 128	1 : 256	1 : 152
46 non-meningeal tuberculous patients ...	15	6	4	3	8	8	1	1
51 healthy Mantoux-positive nurses ...	14	14	13	7	2	1	-	-
40 healthy Mantoux-negative nurses ...	32	4	3	1	-	-	-	-

From these results it would appear that a positive Mantoux skin test is more often associated with a positive hæmagglutination reaction than is a negative Mantoux. However, the sera of Mantoux negative individuals may occasionally show hæmagglutinating antibodies.

The 91 healthy nurses in this series had Mantoux skin tests applied several days prior to sampling their sera for the hæmagglutination test, and it was suggested that the tuberculin used might have stimulated the production of hæmagglutinating antibodies. This possibility was pointed out by Smith and Scott (1950), who showed that one out of 23 Mantoux negative and 12 out of 58 Mantoux positive healthy individuals possessed positive hæmagglutination reactions before Mantoux testing, but that these figures had risen to 5 and 27 respectively after Mantoux testing. It was therefore decided to investigate (1) whether hæmagglutinating antibodies appeared before or after the Mantoux skin test became positive; and (2) if continued intradermal injections of tuberculin might stimulate production of hæmagglutinating antibodies.

The 40 healthy nurses in the above group who were Mantoux negative, were Mantoux skin tested every three months, samples of blood being tested one week before and after the actual skin test. These nurses were followed up for one year, and throughout the investigation continued their duties in the wards of a large general hospital.

The results showed that the titre of each nurse's serum remained fairly constant with only minor variations throughout the period of this experiment. One nurse gave a consistently low positive titre and remained Mantoux negative throughout. This nurse showed no evidence of pulmonary lesions on chest X-ray, and her blood sedimentation rate never exceeded 7 mm. (Westergren). Seven other nurses, who showed titres ranging from 1 : 8 to 1 : 16 also remained Mantoux negative throughout the investigation, and clinical investigation revealed no abnormality. Only four nurses changed from a Mantoux negative to a Mantoux positive state. These four showed no hæmagglutinating antibodies even after Mantoux conversion.

Hæmagglutination Test in Tuberculous Meningitis.

An attempt was made to adopt the hæmagglutination test to the diagnosis of tuberculous meningitis. The cerebro-spinal fluids of 40 cases of tuberculous meningitis, which were proved positive by cultural methods were examined. The only difference in technique was the acceptance of hæmagglutination in cerebro-spinal fluid dilution of 1 : 1 as a positive result. As controls, 10 cerebro-spinal fluids from non-tuberculous patients were used.

In 4 cases of tuberculous meningitis out of 40, hæmagglutinating antibodies could be demonstrated in very low titre, i.e., from 1 : 1 to 1 : 8. The 10 control fluids were entirely negative.

Discussion.

There is no evidence to show that the Mantoux test and the hæmagglutination reaction run parri passu. On the contrary, one out of 40 nurses with persistently negative Mantoux skin reactions gave constantly, a positive hæmagglutination titre to 1 : 32, while 7 others constantly showed titres ranging from 1 : 8 to 1 : 16. In the serum of the one nurse who was persistently Mantoux negative and who showed positive hæmagglutination the titres never rose above 1 : 32, unlike active tuberculous cases, which generally show a much higher titre. Middlebrook and Dubos (1948) found two nurses with a negative Mantoux who possessed hæmagglutinating antibodies in their blood, while Sohier et al. (1950) found seven healthy adults with a negative Mantoux and a positive hæmagglutination reaction. Hilson and Elek (1951) also reported 1 out of 16 healthy Mantoux negative individuals with a positive hæmagglutination test. Again four nurses were found who changed from the Mantoux negative to the Mantoux positive state and yet remained persistently hæmagglutination negative.

Smith and Scott (1950) and Hilson and Elek (1951) suggested that carbohydrate impurities in the old tuberculin used in the repeated Mantoux skin testing may stimulate antibody production. The results obtained during this investigation do not uphold this view. Although the nurses in this series had been Mantoux skin tested on an average five times during the course of this work, the level of circulating antibodies in their sera was not appreciably affected. The repeated intradermal injections of tuberculin did not appear to stimulate the production of hæmagglutinins, nor did it produce any anamnestic response in the level of hæmagglutinins already present.

In general, it appears that a Mantoux positive state is more often associated with the presence of hæmagglutinating antibodies than is a Mantoux negative state. Beyond this, there does not seem to be any correlation between the Mantoux state of the individual and the possession of hæmagglutinating antibodies, and there does not seem to be a rise in the titre of hæmagglutinating antibodies on acquiring a positive skin Mantoux.

Although Middlebrook and Dubos consider that the hæmagglutination reaction indicates the presence of a specific antibody to the infecting agent in the course of the disease, it does not necessarily indicate the degree of clinical activity in the individual patient, since 54 per cent of non-meningeal tuberculous cases in this series were active and yet showed no hæmagglutinins.

The results of a few observations suggest that the presence of hæmagglutinating antibodies to the tubercle bacilli in the cerebro-spinal fluid, even in very low titre, may sometimes indicate active tuberculosis of the meninges. The number of tuberculous and non-tuberculous cerebro-spinal fluids in this series is small, but it is felt that the results may be significant. It is not suggested that the hæmagglutination test be used as a routine method in the diagnosis of tuber-

culous meningitis, as the low percentage of positive results is against such an application; but it should be considered if all other tests in ordinary use prove inconclusive.

Conclusions.

1. The hæmagglutination test is not dependable in the diagnosis of tuberculosis as 54 per cent of active tuberculous patients gave a negative result, while 12 per cent of healthy individuals gave a positive hæmagglutination.

2. A Mantoux positive skin reaction is more often associated with a positive hæmagglutination reaction than is a negative Mantoux.

3. Repeated Mantoux skin testing has no effect on the level of circulating antibodies, nor does it stimulate their production.

4. Ten per cent of cerebro-spinal fluids from patients with tuberculous meningitis possessed hæmagglutinins. The application of this method in the diagnosis of tuberculous meningitis is discussed.

I wish to express my sincere thanks to Dr. N. C. Graham and Dr. E. O. Bartley for their help and encouragement during the preparation of this paper, to Dr. L. V. Reilly for supplying the C.S.F. specimens, and to all the nurses in the Royal Victoria Hospital, without whose help this paper could not have been produced.

My thanks are also due to Mr. F. Burns and his technical staff for their invaluable services.

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Cardiac Murmurs in the Newborn

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That cardiac murmurs are of frequent occurrence during childhood is evident from the statement of Holt and McIntosh (1940) that 50 per cent. of all children have a functional murmur at some time. Several workers have investigated the incidence of cardiac murmurs in the neonatal period. Their results have varied considerably. Seham (1924) found 34 per cent. of newborn infants to have murmurs. Siemsen (1938), in a series totalling 105, found an incidence of 25 per cent. Lyon, Ruah and Stirling (1940) examined the hearts once or at most twice, and found, in the largest series yet reported (7,673 infants), that only 1.9 per cent. of the infants had murmurs. Taylor (1953) reported an incidence of 4.8 per cent. in a series of 1,133 infants.

The present investigation was undertaken to determine the incidence of these murmurs in a small series of babies in which frequent examination was carried out.

Method of Study.

This study is based on a series of fifty newborn infants, born in Southmead Hospital, Bristol, during 1950. Males and females were equally represented. Only three were premature. Delivery was spontaneous and normal in all but four cases, three being delivered by cæsarian section and one by forceps. Six infants had asphyxia neonatorum; all recovered rapidly. Of the fifty infants, forty-eight were considered to be normal in all respects. None showed cardiac enlargement, severe jaundice or clinical anæmia. Of the two infants considered to be abnormal, one had birth fractures, and the other was a feeding problem, subsequently recognised as a case of fibrocystic disease of the pancreas.

The infants were selected at random. Each infant was examined within twenty-four hours of birth. Thereafter, it was hoped to examine each infant once every day throughout its stay in hospital, but this was only possible for thirty-two of the infants, and one, two or three examinations were omitted for seven infants, ten infants, and one infant respectively. The average length of stay in the nursery was twelve days, and the total number of examinations made was 585. Each infant was examined whilst lying on its back thirty minutes to two hours after the 9 a.m. feed. A diaphragm chestpiece was used, and this was found to facilitate a quiet examination, as it could be used successfully with a minimum of undressing and interference with the infant.

Observations.

Of the fifty infants examined nineteen exhibited a systolic murmur at some time during the period of observation. The murmur was localized to the cardiac apex

in twelve cases, to the cardiac base in three cases, and was generalised in four cases. All the murmurs were soft and blowing in character. There was, however, a slight but definite variation in the loudness of individual murmurs. Heart sounds were normal in all cases, and there was no thrill in any case. Three of the murmurs were first heard on the first day of life, two on each of the second and third days, one on each of the fourth, sixth and seventh days, and two on each of the eighth and ninth days. The remaining five murmurs were first heard subsequent to the ninth day of life. Individual murmurs varied in the number of occasions on which they were heard. In nine cases the murmur was heard once only, whilst in five cases it was heard six times or more. The remaining five murmurs were each heard between two and five times.

Follow-up.

Fourteen of those infants in whom murmurs had been found were re-examined when they were three to eight months old. Eight were found to have their murmurs unchanged. All those infants with persisting murmurs were in apparent good health and presented no evidence of anæmia or cyanosis. The infant with fibrocystic disease of the pancreas, who had a murmur during the neonatal period, was amongst those examined at eight months of age. At this time there was no murmur. This child died shortly afterwards and at necropsy there was no evidence of congenital heart disease.

Discussion.

Apart from the matter of incidence, the results of this study are in agreement with the findings of other observers. Smith (1951) thought that the widely varying figures reported probably depended on what the individual examiner accepted as a murmur. From a study of previous work on the subject, the incidence in any group would also appear to depend on the frequency or otherwise of examination. For example, Siemsen found 12 per cent. of babies to have murmurs when one examination was made, 15 per cent. when there were two examinations, and 37 per cent. when there were three examinations. As many of the murmurs in the present series were transient, and were often only heard once, it would seem that the true incidence of these murmurs can only be appreciated when examination is carried out frequently. The occurrence of a murmur could not be related to maturity, sex, asphyxia, anæmia or jaundice. Smith considered that these murmurs disappear within a few weeks or months of birth. The limited follow-up findings in the present investigation do not support this, as eight babies were still found to have unchanged murmurs three to to eight months after birth.

The origin of these neonatal murmurs is obscure. Some of the murmurs which disappear early may be due to changes coincident with adaptation from fœtal to post-natal life. Taussig (1947) believed this type of murmur to be associated with blood flow through the ductus arteriosus. On the other hand, the murmurs which are first heard several days after birth may be associated with the normal post-natal rise in blood pressure.

In view of the preponderance of apical murmurs, it is considered unlikely that a substantial number of these murmurs represent congenital defects. Taylor thought that the soft transient systolic murmur was the one least likely to be associated with congenital heart disease. In the absence of any congenital abnormality sufficient to produce such a murmur, it must be supposed that these murmurs are produced, in some little understood way, during the normal passage of blood through the heart and its associated great vessels.

If such a murmur is recognised in early infancy, a good prognosis seems justified, with the provision that the child should be kept under periodic observation, in order to attempt to arrive at an ultimate assessment. If the eventual conclusion is that there is no major congenital anomaly, and that the murmur is in all probability innocent, reassurance should be complete, and further periodic examination of the heart becomes unnecessary.

Summary.

Fifty newborn babies have been examined and nineteen (38 per cent.) have been found to have systolic murmurs.

A limited follow-up has been carried out, and has shown that some of the infants still have their murmurs several months after birth. The innocent nature of the murmurs is stressed, and a good prognosis seems justified.

I wish to thank Dr. Beryl Corner for providing facilities for the follow-up, and Dr. V. K. St. G. Breakey and Professor F. M. B. Allen for helpful advice and criticism in the preparation of this paper. This study was carried out during the tenure of a "Cow and Gate" fellowship in the Department of Child Health, University of Bristol.

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REVIEWS

CHEMICAL INDUCTION OF CANCER. By George Wolf, B.Sc., D.Phil. (Pp. xiii + 250. 17s. 6d.). London: Cassell. 1952.

SCIENTIFIC knowledge is increasing so rapidly that it is impossible for any one person to be the master of more than a small portion of his own subject, and yet it is desirable that he should have some knowledge of advances in other fields. This knowledge can only be obtained by the reading of authoritative critical reviews, but these must be written in such a way that they are understandable to the non-specialist. This book is an excellent example of this type of review. It deals with a branch of medicine of which few have more than rudimentary knowledge, namely, research into the causes of cancer.

The history of the chemical induction of cancer is unfolded lucidly, and in parts is as exciting as a detective novel. There is an excellent balance between the presentation of facts and speculation. At first glance, the non expert will be dismayed at the numerous chemical formulæ presented, but a complete understanding of these is not essential.

As a layman in this field of research, I found the book fascinating, and recommend it to any reader with basic scientific training. G. M. B.

AIDS TO MEDICAL DIAGNOSIS. By G. E. F. Sutton. Seventh edition. (Pp. viii + 346; illustrations 45. 7s. 6d.). London: Ballière, Tindall & Cox. 1953.

STUDENTS revising for the final M.B. examination will find this little book useful. Its scope is necessarily restricted by its size and there is much of diagnostic importance in the natural history of disease we should have preferred to see included at the expense of the extensive discussion of physical signs and anatomical diagnosis.

The student requires more guidance in the tactical handling of special investigations than is offered here. It seems odd to devote three pages to auricular flutter and seven lines to gastric and duodenal ulceration. J. S. L.

ANY QUESTIONS (second series). Selected from *British Medical Journal*. (Pp. xii + 195. 7s. 6d.). London: British Medical Association. 1952.

THIS book in entertaining and instructive.

It is a selection of questions and answers from the *British Medical Journal's* feature "Any Questions." Dr. Clegg's experts have firm opinions on all manner of ailments, ranging from millgirl's ankle to infertility, and deliver them with pleasant finality in an agreeable English prose.

There is information here for all engaged in clinical practice and it would be hard to spend 7s. 6d. better. J. S. L.

BEDSIDE DIAGNOSIS. By Charles Seward, M.D., F.R.C.P.(Edin.). Second edition. (Pp. xvi + 380. 17s. 6d.). London: Livingstone. 1952.

IN this handbook on bedside diagnosis the author bases his text on the concept of disease as a disturbance of function which may or may not be accompanied by structural changes. Here is discussed the common presenting symptoms of disease, both mental and physical, their possible causes, and the associated clinical signs and investigations which might help to establish the cause.

Sound diagnosis is the keynote of the book, and it clearly demonstrates that the physician must view the patient as a whole and not isolate him into separate compartments, as is the tendency in these days of increasing specialisation.

This is an excellent book, not only for the student, who will find in it an excellent foundation on which to build future knowledge, but for the experienced practitioner, who will find much to learn from its text. W. J.

REVIEWS

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Emphasis is rightly placed on diagnosis, and cancers of all parts of the body are described on a regional or organ basis. The development and spread of the disease, the symptoms and signs produced, its treatment and prognosis are clearly set out under sub-headings. In short and well-written sentences the authors make clear and unequivocal statements. Treatment is now highly specialised, but the practitioner will need the brief descriptions given if he is to attempt to answer the questions of patients and friends.

No book can provide an easy way to the diagnosis of any form of cancer. The signs and symptoms are clearly, but somewhat briefly, set out and add little or nothing to what is found scattered throughout any of the larger standard text-books on general medicine or surgery. The information is authoritative and in general a good balance is preserved between common and rare lesions. The page and a quarter devoted to argentaffinoma is perhaps generous, and few would agree that these spread as readily as the authors suggest. The book is well printed for easy reading and reference and is of convenient size. Many of the clinical illustrations are excellent, but a few are of operation specimens and they are too small, lack detail and are of little value.

We believe that the perusal of this book by practitioners will increase the frequency of early diagnosis in cancer.

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PROFESSOR ALAN MONCRIEFF remarks in his introduction that all have their own ideas on the way in which the child shall be fed, managed, clothed, protected and educated. Acknowledging such differences of viewpoint almost all concerned with child health will welcome this well balanced and beautifully produced text-book. Designed to cover the syllabus of the National Nursery Examination Board, and now enlarged to cover the needs of the student taking a Supplementary Certificate in Infant Care, the book cannot fail also to interest all who have children in their care. The greater part of it will be of value to mothers of young families and the family doctor can recommend it for its common sense attitude on the care of the normal child.

Mrs. Meering discusses the physical and mental growth of the child and his management with a wide understanding and with appreciation of individual variations, and she manages to provide guidance without laying down rigid rules. She advises on food both in general and by providing details, and even recipes which will be useful to the inexperienced housewife. Clothing and hygiene are discussed and there is a section on general anatomy and physiology which seems adequate for the nurse. Home nursing, invalid cookery and notes on ailments and accidents are brief, but convey much pertinent information the nurse and mother will be glad to have.

The widespread study of this book would increase the health and happiness of young children in hospitals and more especially in their own homes.

SNAKES ALIVE: THE JOURNAL OF THE BELFAST MEDICAL SCHOOL, Vol. 1, Nos. 1 and 2. Belfast: Belfast Medical Students' Association.

THE Belfast Medical Students' Association are to be congratulated on their courage in publishing this new journal and on the contents of the two numbers which have already appeared. The articles are a happy mixture of serious items such as clinical memoranda and book reviews, items of humorous prose and verse, clever line drawings and news of work and sport in the medical school. They show that there is talent in the Medical Faculty which other faculties should envy. We hope that before long some of the writers will be contributing to the more staid pages of this journal. We are sure our readers will join with us in wishing this venture success and a long life.

A METHOD OF ANATOMY. By J. C. Boileau Grant, M.C., Ch.B., F.R.C.S.(Edin.). Fifth edition. (Pp. xxiv + 870; figs. 862. 54s.). London: Baillière, Tindall & Cox. 1952.

THE text of this new edition of the descriptive and deductive "Method of Anatomy" has been revised, but not increased in total amount. The main plan remains unaltered, but many new illustrations have been inserted and a number of old ones improved. The clarity of text and diagram remains unimpaired, and the emphasis on the correlation of structure and function is everywhere apparent. This is a book designed to make anatomy rational, interesting and of direct application to clinical problems, and as such, can be recommended as a constant companion in the dissecting-room, museum or study. The post-graduate reader will readily appreciate the striking way in which the author brings out underlying principles, and how obvious he can make the relationship of structure with function. The constant reference to the surface relations of deeper structures is also worth noting, as this keeps the clinical approach to anatomy before the student throughout his course. No attempt has been made to cover the anatomy of the brain, which, in view of the success of the author's method for other parts of the body, can only be regretted. It is to be hoped that the opportunity of the present period of change will lead to a new and greater awareness by students of the merits of this useful book. W. R. M. M.

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PROFESSOR ALAN MONCRIEFF remarks in his introduction that all have their own ideas on the way in which the child shall be fed, managed, clothed, protected and educated. Acknowledging such differences of viewpoint almost all concerned with child health will welcome this well balanced and beautifully produced text-book. Designed to cover the syllabus of the National Nursery Examination Board, and now enlarged to cover the needs of the student taking a Supplementary Certificate in Infant Care, the book cannot fail also to interest all who have children in their care. The greater part of it will be of value to mothers of young families and the family doctor can recommend it for its common sense attitude on the care of the normal child.

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The widespread study of this book would increase the health and happiness of young children in hospitals and more especially in their own homes.

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Articles are all of approximately the same length. Subjects such as the use and abuse of penicillin in general practice, the chemotherapy of pulmonary tuberculosis and the treatment of coronary thrombosis are at a phase when a more extended discussion might have been welcome. Sir Cecil Wakeley has assembled a team well fitted to represent British medical and surgical practice. It is a good omen of the soundness of British general practice that a year book covering such a wide field of interest is bought by practitioners year after year.

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The author has on the whole succeeded remarkably well in presenting her information briefly and clearly. The difficulty appears to be the failure of the examining bodies of the nursing profession to limit the amount of detailed and theoretical information they expect from their candidates. After all, therapy is still prescribed by medical practitioners; though even they might be glad of an opportunity to refresh their memory on the dose of some of the preparations listed. We suppose such books are necessary, but we feel, as we feel about the theoretical knowledge now required of the ever increasing army of medical auxiliaries, that "knowledge grows, but wisdom lingers."

A TEXT-BOOK OF GYNÆCOLOGICAL SURGERY. By Victor Bonney, M.S., M.D., B.Sc.(Lond.), F.R.C.S.(Eng.). Sixth edition. (Pp. xii + 958; figs. 611. 60s.) London: Cassell. 1952.

THIS book has held a unique position among British gynæcologists since it was first published forty years ago. The present edition presents the recent advances in operative gynæcology in an attractive manner. The various steps of all operations are clearly illustrated, and indeed make each operation look simple.

The discussion of alternative lines of operative treatment is a valuable addition to the operative technique. In dealing with Wertheim's operation, it was surprising to find that a block dissection was not illustrated, and removal of the regional lymph glands was advised after the hysterectomy. The reasons for this are given, but, with modern anæsthesia, are perhaps not so cogent as they were some years ago.

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AIDS TO TUBERCULOSIS NURSING. By L. E. Houghton, M.A., M.D., and T. Holme Sellors, D.M., M.Ch., F.R.C.S. Fourth edition. (Pp. xii + 308; illustrations 63. 6s.). London : Baillière, Tindall & Cox. 1953.

THE appearance of a Fourth Edition of this work, which was first published in 1945, is an indication of its well deserved popularity. There are excellent introductory chapters on the more general aspects of tuberculosis and the morbid anatomy is lucidly explained. There follows an account of symptoms and complications of pulmonary tuberculosis, together with notes of common associated diseases.

The main part of the book is devoted to the treatment of pulmonary tuberculosis. There are two chapters on sanatorium treatment, followed by detailed accounts of the various collapse and surgical measures. The value of this section is increased by well chosen illustrations and there is an appendix, illustrating the common radiological abnormalities, the interpretation of which is simplified by key diaphragms.

The chapter on differential diagnosis may not be regarded as entirely within the scope of a nursing manual, but there are useful chapters on the common forms of extra-pulmonary tuberculosis. The final chapter on prevention contains much useful material, but the authors appear to have had difficulty in deciding whether or not it is practicable or desirable to prevent infection in the community. There are useful appendices on sputum examination and on special apparatus used in collapse therapy.

This book is to be recommended to all nurses whose work includes tuberculosis or other chest diseases. B. R. C.

TEXT-BOOK OF PUBLIC HEALTH. By W. M. Frazer, O.B.E., M.D., Ch.B., M.Sc., D.P.H. Thirteenth edition. (Pp. xi + 663; figs. 76. 42s.). Edinburgh : E. & S. Livingstone. 1953.

THE thirteenth edition of the Text-book of Public Health by Dr. W. M. Frazer (until recently Medical Officer of Health, Liverpool), formerly by Hope and Stallybrass, now published four years after the previous edition, has given Dr. Frazer the opportunity to incorporate something of his experience of the practical working of schemes for which the Public Health Departments of Local Health Authorities became responsible in the immediate post-war years under the National Health Services Act, 1946, and National Assistance Act, 1948. This has necessitated, not merely the revision of many chapters, but their entire rewriting. In addition, much recent legislation in such fields of environmental health as supervision of milk supplies has meant that this section of the book has also had to be rewritten.

In these days of specialisation and emphasis on specific aspects of preventive medicine it is refreshing to find a text-book which, in addition to giving due place to recent developments in public health, has not omitted to bring up to date the fundamenal aspects of sound public health policy which tend to be forgotten.

There are minor defects in the text, e.g., on Page 264 the reference to the legal standard of composition for cream should read Page 278 and not Page 277, and some of a more substantive nature, e.g., on Page 251 : "Milk may not be stored in any room or kitchen, etc.," should read : "Milk may not be stored in any room used as a kitchen, etc." This section of the book, which contains very important legal provisions for protecting milk against contamination or infection, is misleading in parts due to curtailment of statement in the very difficult task of summarising legal requirements. One would like to see this improved in the next edition, with careful attention to correct terminology, e.g., middle of Page 250, the Amending Provisions referred to are Regulations, not Orders.

These, however, are minor blemishes in a text-book which has secured for itself an established place amongst the standard text-books used by students for the Certificate and Diploma in Public Health, and as such can be confidently recommended. W. G. S.

AIDS TO TUBERCULOSIS NURSING. By L. E. Houghton, M.A., M.D., and T. Holme Sellors, D.M., M.Ch., F.R.C.S. Fourth edition. (Pp. xii + 308; illustrations 63. 6s.). London : Baillière, Tindall & Cox. 1953.

THE appearance of a Fourth Edition of this work, which was first published in 1945, is an indication of its well deserved popularity. There are excellent introductory chapters on the more general aspects of tuberculosis and the morbid anatomy is lucidly explained. There follows an account of symptoms and complications of pulmonary tuberculosis, together with notes of common associated diseases.

The main part of the book is devoted to the treatment of pulmonary tuberculosis. There are two chapters on sanatorium treatment, followed by detailed accounts of the various collapse and surgical measures. The value of this section is increased by well chosen illustrations and there is an appendix, illustrating the common radiological abnormalities, the interpretation of which is simplified by key diaphragms.

The chapter on differential diagnosis may not be regarded as entirely within the scope of a nursing manual, but there are useful chapters on the common forms of extra-pulmonary tuberculosis. The final chapter on prevention contains much useful material, but the authors appear to have had difficulty in deciding whether or not it is practicable or desirable to prevent infection in the community. There are useful appendices on sputum examination and on special apparatus used in collapse therapy.

This book is to be recommended to all nurses whose work includes tuberculosis or other chest diseases. B. R. C.

TEXT-BOOK OF PUBLIC HEALTH. By W. M. Frazer, O.B.E., M.D., Ch.B., M.Sc., D.P.H. Thirteenth edition. (Pp. xi + 663; figs. 76. 42s.). Edinburgh : E. & S. Livingstone. 1953.

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Dr. Pearce begins his book with a brief historical survey of the subject, showing that "the grave increase in Juvenile Delinquency" has been a source of anxiety since the beginning of the nineteenth century. He ends his study by remarking that the real question is not so much one of deciding *what* the right preventive steps are, but *why* they are not taken.

Throughout the book, he stresses the fact that delinquency is only the presenting symptom—it is not in itself a disease—and that each juvenile delinquent must be studied as an individual. While no simple explanations can be accepted as adequate, the causes for the development of the delinquent character are divided into nine broad categories, which may each have many sub-divisions. The clinical descriptions of these categories are given in not too technical language, and the many illustrative cases quoted are excellent, and serve to emphasise the individuality of each problem.

The section on the Law and the Delinquent, and those on Treatment (including punishment) and Prevention are well-balanced, and show that the re-education of the young delinquent can be much more efficiently achieved through constructive methods than by mere repression and retribution.

Dr. Pearce's book is comprehensive, and though possibly too technical for the ordinary layman, will prove very valuable to those whose work brings them into contact with this vast problem.

M. E. L.

CLINICAL NEUROLOGY. By Frank A. Elliott, Brodie Hughes and J. W. Aldren Turner; edited by Frank A. Elliott. (Pp. xxii + 751; plates 8. 42s.). London : Cassell. 1952.

This book which has just been published is intended primarily for the use of post-graduate students. Too advanced for under-graduates and possibly not containing, as the authors assert, the wealth of detail required by the professed neurologist, I think most neurologists will want to read it and the book should have a wide appeal to the general physician. Although not profuse, such illustrations as there are seem to be well chosen and the subject matter is set out in two sections, both the medical and surgical aspects of neurology receiving equal attention. In the first section, which comprises some 200 pages, there are nine chapters devoted to the applied anatomy and physiology of disorders of the nervous system. In the second section the clinical aspects of these disorders are dealt with systematically. There is a well balanced and neat description of modern views on motor functioning, a difficult feat to achieve, and a welcome addition (usually missing in most text-books of this kind), is the chapter on mental disorder in organic disease. More space indeed might have been devoted to this important subject. Such ancilliary aspects of clinical neurology as electroencephalography, neuro-radiology, perimetry, receive adequate attention and one of the best chapters in the second section deals with injuries and disease of the peripheral nerves. Bibliographies are given at the end of each chapter and although short, include the best and most representative papers on the subjects discussed.

R. S. A.

DISEASES OF THE EYE. A Text-book for Students and Practitioners. By Eugene Wolff, M.B., B.S.(Lond.), F.R.C.S.(Eng.). Fourth edition. (Pp. x + 224; figs. 150; plates 5. 30s.). London : Cassell. 1953.

The difficulty of writing a text-book in a speciality for students and practitioners is to establish what is the essential minimum to be intelligible. Mr. Wolff has succeeded admirably, and, furthermore, the material is set out in a manner which attracts the interest of the reader. Students seem to regard "the eye" as a small separate entity without realising the tremendous link-up with other branches of medicine, yet they have only to glance, for example, at the opening of Chapter VIII and they cannot fail to be impressed by the fact that retinal hæmorrhages occur in a great number of widely scattered medical diseases.

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This present edition of the Aids to Public Health reflects this increase in maturity of medical thought, but at the same time Dr. Roberts has not forgotten that the improved habits and outlook of the people, the better social and economic conditions, the improvement in health and the changing emphasis on the causes of ill-health all have their basis in the "sanitary idea" of the early Victorians. He demonstrates clearly that the primary need in health must always be environmental—air, ventilation, water-supply, housing, etc., while the secondary need, secondary because it must follow and not precede an appropriate environment, is personal nurture, a nurture which begins nine months before birth and is continued until the end of life.

Dr. Roberts, a Medical Officer of Health of a large industrial city, brings to his authorship the practical experience of the worker in the field of social and preventive medicine, a factor which must recommend this book, not only to the medical undergraduate, but also to the established medical practitioner. The clear arrangement of the text and the plain, straightforward style of this book cannot fail to satisfy the most critical of its readers. J. S.

THE ESSENTIALS OF MEDICAL DIAGNOSIS. By Rt. Hon. Lord Horder, G.C.V.O., M.D., F.R.C.P.(Lond.), and A. E. Gow, M.D., F.R.C.P.(Lond.); revised with the assistance of R. Bodley Scott, M.A., D.M.(Oxon.), F.R.C.P.(Lond.). Second edition. (Pp. xvii + 462; plates 23. 22s. 6d.). London: Cassell. 1952.

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In a work covering such an extensive field, generalisations are inevitable, but here they are often so wide as to be misleading. Another unsatisfactory feature of this book is the very brief summary of the so-called typical clinical picture of a disease. These descriptions tend to encourage "spot diagnosis," instead of a proper deductive approach.

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THE publication of the seventh edition of this well-known book is a further tribute to its usefulness and to the appreciation it has received since it first appeared in print in 1940. The plan of making a selective presentation of neurological subjects especially for students and practitioners has been followed as has the method of presenting first general principles of neurological diagnosis and then chapters on space-occupying lesions in the skull, vascular disorders, epilepsy, acute infections, syphilis, disseminated sclerosis and other common conditions such as peripheral nerve lesions and trauma of the nervous system. The attention given to details of treatment is still inadequate for a book of this kind. The care of the paraplegic patient, for example, is dealt with in little more than one page and receives less attention than the description of the heredofamilial ataxias and syringomyelia. The section dealing with the psychoneuroses is also too formal or abstract to be of much value to practitioners. Other criticisms one might make are that in the chapter on cerebral tumour too little is said about early diagnosis and no mention is made of the difficulty and importance of distinguishing such cases from presenile dementia in the elderly. R. S. A.

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The terms of reference of the book are frankly morphological, although the author has not hesitated to introduce physiological and clinical data where these illuminate the morphology. The book also deals specifically with man, the author pointing out that experimental data from lower animals are particlarly misleading when applied uncritically to man in this field.

After a short historical introduction there are chapters on terminology, development, general histology, cortical and subcortical representations. There follows a detailed account of the parasympathetic component, a general account of the sympathetic component, and then regional accounts of the sympathetic in the head and neck, thorax, abdomen and pelvis. There are over 800 references, and a very full index.

The illustrations are excellent, including many photographs of actual dissections and clear, accurately drawn coloured plates, all of which are original. Professor Mitchell has aimed at being deliberately provocative on some points because, as he says, "a few pebbles cast into placid pools of complacency readily display the doubts and difficulties lurking in the depths and their revelation is the first step towards their solution." Thus he refutes the prevalent idea that the autonomic nervous system is a purely efferent mechanism and he criticises the current attempts to subdivide the autonomic into adrenergic and cholinergic components. He regards the olfactory as well as the taste fibres as autonomic and even suggests that it may be well to regard proprioceptive nerves as belonging to the system also. On the vexed question of the dorsal root vaso-dilators he believes the evidence favours the existence of efferent fibres in the dorsal spinal

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CARDIAC THERAPY. By Harold J. Stewart, M.D. (Pp. x + 622; figs. 68. 75s.). London: Cassell. 1953.

THE opening chapter of this book by a well-known cardiologist gives a general account of the therapy of congestive cardiac failure. This is followed by chapters on the use of mercurial diuretics, digitalis, and anticoagulants. Subsequent chapters are devoted to consideration of the ætiology, pathology, clinical features, treatment, and prognosis of the various pathological conditions, common and uncommon, which affect the heart. The range of subjects covered is wide—a complete chapter is devoted to glosso-pharyngeal neuralgia associated with cardiac arrest. Each chapter is followed by a bibliography, in which British work is not entirely neglected. The reviewer was surprised to find no mention of the work of the Manchester School in the chapter on Heart Disease in Pregnancy.

When debatable subjects are dealt with, e.g., anticoagulant therapy, the author does not hesitate to express his own views.

The information on therapy is up to date, and includes an account of the surgery of mitral stenosis and pulmonary stenosis. Although a detailed account is given of the application of therapeutic measures, old and recent, emphasis is rightly placed on the management of the patient. There are many remarks indicating that the author has observed the patient as well as the disease. Thus in the chapter on myocardial infarction he states: "Patients may use the episode to reassess their life's accomplishments and future hopes, and, by freeing themselves of useless activities, enter upon one of the most productive and satisfying periods of their careers."

This is not a book for the undergraduate; it can, however, be thoroughly recommended to all physicians interested in cardio-vascular disease. F. P.

CLINICAL APPROACH TO FEVERS. By C. J. McSweeney, M.D., F.R.C.P.I., D.P.H., Medical Superintendent of the House of Recovery and Fever Hospital, Cork Street, Dublin. (Pp. vi + 146. 10s. 6d.). London: Churchill. 1953.

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