NOVEMBER, 1959

THE ULSTER MEDICAL JOURNAL

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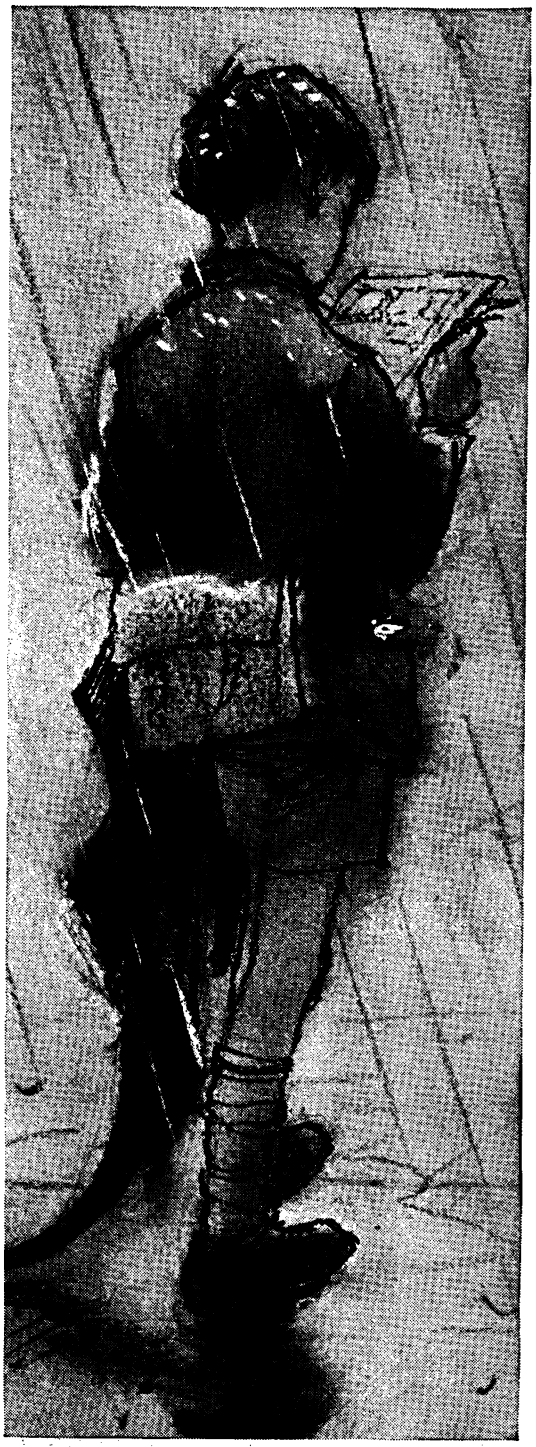

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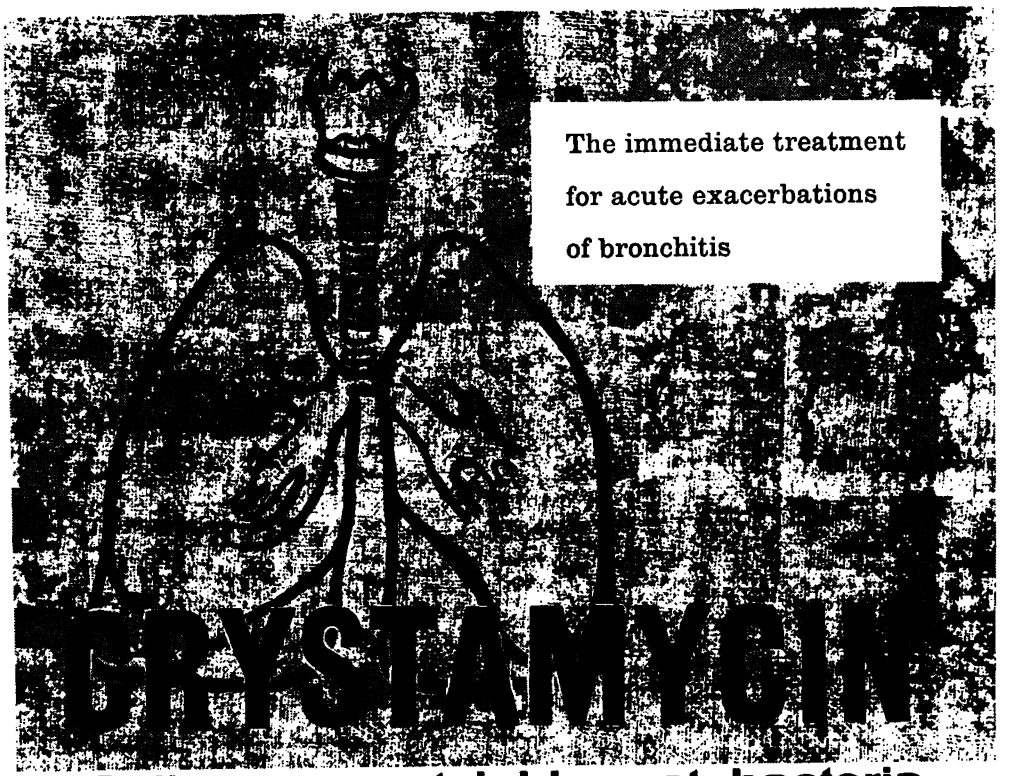

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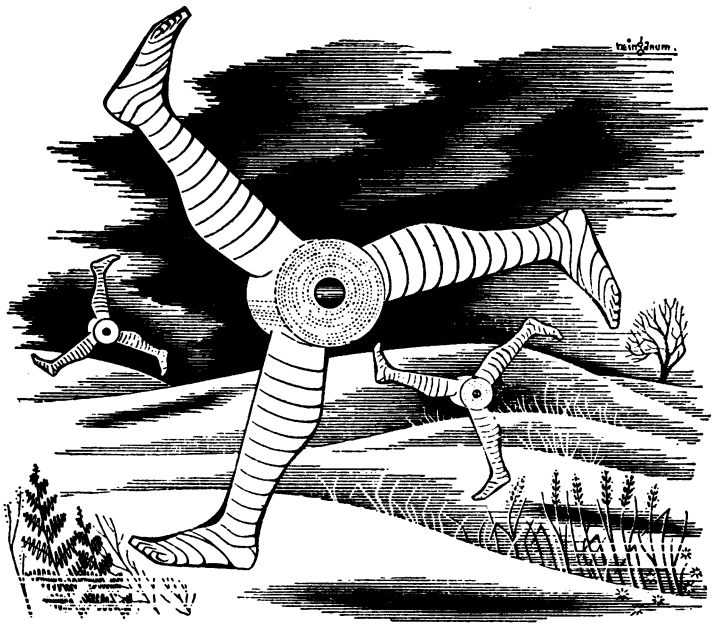

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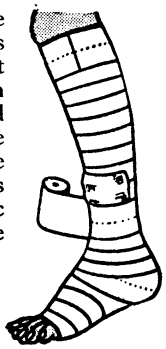

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The Ulster Medical Journal

VOL. XXVIII

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1959

CONTENTS

No. 1: May, 1959

No. 2: November, 1959

CONTENTS

Fellows and Members of the Ulster Medical Society receive the Journal free.
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THE ULSTER MEDICAL JOURNAL

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2. Manuscripts should be typewritten with double spacing and with wide margins. They should be fully corrected, and contributors will be responsible for the payment of any sum charged for alteration in printer's proof in excess of ten shillings per sheet (16 pages).

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ULSTER MEDICAL JOURNAL

PUBLISHED ON BEHALF OF THE ULSTER MEDICAL SOCIETY

Vol. XXVIII 1st NOVEMBER, 1959 No. 2

THE POOR RELATION

By J. C. SMYTH, L.R.C.S., L.D.S.

PRESIDENTIAL ADDRESS
to the Ulster Medical Society, 22nd October, 1959

THERE is ample evidence that from the very earliest times teeth were subject to disease and injury, and since teeth are the most indestructible organs of the body, these often supply the only remaining evidence of prehistoric life, and carry us back the furthest in time.

In the National Museum at Ottawa there are skeletal remains of an herbivorous dinosaur, estimated to be a hundred million years old, which show evidence of dental caries. And in Europe remains of early pleistocene cave-bears show signs of both dental decay and periodontitis, that is, disease of the supporting structures of the teeth. The forerunners of early man have similar signs of dental troubles. For example: the java remains found in 1894 by Eugen Dubois consist of a jaw with two molars and a premolar, as well as other bones of the skull. These are judged to belong to the Pleistocene Age, some five hundred thousand years ago. The teeth here are ape-like, large with five or six cusps and the roots of the molars spread out. The Heidelberg skull is similar, but of a more distinctly human type; in both these the teeth are much worn down—the result of attrition.

Coming to comparatively recent times, the Old Man of La Chappelle, who lived only some thirty thousand years ago, must have had severe dental trouble; he had lost practically all his molars, and it is thought that this may have been due to excessive attrition, leading to pulp exposure and consequent infection, and so resulting in periodontitis. In England, a Neanderthal skull found near Tilbury has all the lower molars missing as a result of disease, and we know that extinct Tasmanian people, and early Australian aborigines, were subject to both dental caries and periodontitis. More exact knowledge is, however, gained from Egyptian skulls, where the custom of embalming and burying the dead has provided a wonderful store house, and it would appear from examination of

quantities of these remains that caries and periodontitis were common at all times. Alveolar and perialveolar abscesses, the result of chronic suppurative periodontitis, were the most usual causes of the loss of teeth.

In all early man attrition was a prominent feature which can be readily understood when we consider the rough character of the food he ate, and its frequent contamination with grit and sand. A remarkable example of this is the Pecos Indians, who had an isolated existence in a valley of the Pecos River in New Mexico. The tribe was founded about A.D. 1100 and remained undisturbed for many hundreds of years. These people had an excellent muscular development, their food consisting of raw fruits and vegetables, and corn ground in soft stone mortars, from which a fine stony grit was detached. When the skeletons of these Indians were examined, attrition to a marked degree was found in 97 per cent. of the skulls, caries in about 48 per cent., and loss of one or more teeth in 47 per cent. The caries was mainly occlusal, the result of wear. It may be said that there has probably never been a period in which man did not suffer from dental disease, to a greater or less extent.

It is only natural that man suffering from any pain or sickness would seek to alleviate the pain and cure the ailment. Those ills which resulted from an obvious cause, such as a blow or a fall, were easy to understand, but many other painful conditions or illnesses, for which there was no obvious cause, presented him with a problem, and these early peoples, not understanding the reason, attributed the disease to outside influences, such as storms, earthquakes, floods, etc. These forces came to be associated with gods or demons possessing human emotions, as hate, fear or love. They were often malevolent and worked their spite on human beings, consequently the obviously proper thing to do was to placate them in some way, and persuade them, if possible, to act benevolently and to disarm their hostility. Some members of a community would have more skill than others in this direction, hence the rise of the Medicine Man almost always associated with the current religion of the people. Since, as I have said, dental illness dates from earliest times, it was not dissociated from any other form of ill, either in the mind of the sufferer or of the physician, and until comparatively recently medicine and dentistry walked hand in hand. It is curious how this idea of magic has persisted in varying and disguised forms to the present day. We are all familiar with the wearing of amulets and charms, and in earlier days teeth were often chosen, as they were supposed to give protection to the wearer, or to ward off the evil eye, and in certain circumstances, if the teeth were those of an animal, to convey to the wearer the physical properties of that animal, such as strength, courage or guile. Later they became popular as religious relics.

Saint Appolonia was a lady of advanced age, who lived in Alexandria in the year A.D. 249. She became a Christian and, in consequence, was imprisoned and tortured, her teeth being broken off and the roots extracted. During her torture she prayed for all suffering from toothache, and asked the Lord that any such person invoking Him in her name should be relieved. Later she was publicly put to death. She was adopted as the Patron Saint of Dentistry, the story gradually changing, and she became a young and beautiful maiden, the daughter

of a senator, and as such she was usually depicted in pictures and in shrines erected in her honour. Her teeth were treasured as holy relics, but it is said that when King Henry VIII ordered the collection of these (with other relics) they then numbered well over a thousand.

Saint Appolonia's teeth were not the only ones regarded with veneration; one tooth in particular is reverenced to this day, the Holy Tooth of Buddha, brought to Ceylon in A.D. 311, after being treasured in India for over eight hundred years. Those Europeans, who claim to have seen it, say that it is a bicuspid, and much larger than a normal tooth.

The progress of the evolution of medicine and dentistry has varied much in different centres of civilization. Sometimes it has risen, sometimes it has fallen back again, and sometimes it has been almost lost. Consequently it is not easy to trace it in a general manner, but rather in reference to different areas. Its progress varied from place to place, depending on the relative development of the locality, but it all occurred within the boundaries of the ancient world, India, and China.

About 2350 B.C. the Semitic Empire was established with Babylon as its capital and the chief city of that whole area. In Babylon, in 2100 B.C., reigned Hammurabi, who had the laws of the country engraved on a stone pillar, "The Code of Hammurabi." It contained, amongst other commands, established fees for physicians, and provided suitable punishment for unskilful or unsuccessful treatment. This must be a severe blow to the National Health Services Board, who imagined they had thought of it first.

Hammurabi also writes that, "if anyone knock out the tooth of an equal, his tooth shall be knocked out," which corresponds very much with the Hebrew law of "An eye for an eye, and a tooth for a tooth." In the same country inscribed on cuneiform tablets, compiled by the priests, are various prescriptions, and amongst them one for the cure of toothache; it gives directions for calling down the wrath of a particular god, on the worm, driving it out of the tooth, and it is remarkable how the worm theory persisted even to the seventeenth century. In Babylonian legends the worm was the enemy of the sun, and it may be that what was originally an evil spirit subsequently became identified as a physical entity.

On the other side of the civilized world was the land of Egypt. The Egyptians, unlike the Babylonians, were not a warlike people, and turned their attention largely to the arts of peace. They discovered how to make a kind of paper from a reed called papyrus, and to write on it. Many of these writings have been recovered from the tombs. The most important, from our point of view, was the Ebers Papyrus, discovered in 1875. It is now in the University of Leipzig, and it contains the oldest and best preserved writings on medical and dental subjects. There is no special chapter on dental disease, but remedies for tooth affection are found scattered amongst other prescriptions, showing that dentistry was regarded as part and parcel of medicine, and that the Egyptians suffered much from dental diseases.

The examination of thousands of mummies would seem to establish that the Egyptians made no attempt in any way at filling teeth, or replacing lost teeth; nor, indeed, do they seem ever to have extracted painful teeth. They believed that illness was the result of Divine displeasure and, consequently, prayers, magic, and incantations were much to the fore, in addition to therapeutic remedies. Much later in Egyptian history Herodotus, in 500 B.C. when he visited the country, states that it was full of physicians, one treating of the head, another of the eye, another of the teeth, and another of the internal organs, so it would appear that there was a form of specialization then, though all combined under the one general heading.

Medicine in India was founded on principles laid down in the Vedas, ancient Sanskrit writings of the Hindus. This system of medicine, improved and enlarged, has remained in operation until very recently, and is still practised by many. Not very long ago, in Benares University, a Chair of Ayurvedic Medicine was established. One of the ancient laws then enacted, and still current, requires that the teeth be cleaned as a daily ritual. Any of you who have been to that country will be familiar with both the sight and sound of this being carried out. Very often a twig of the Neem tree is used, first chewed till it has a fibrous end; it has a slightly astringent taste, and makes a very creditable toothbrush, which I have tested for myself. The more modern and rather objectionable habit of chewing betel nut is also said to benefit the teeth, as the nut is astringent and stimulates a flow of saliva, and the lime with which it is made up is of course alkaline.

Turning to another ancient people, medicine and hygiene were bound up with the religious laws amongst the Jews. Teeth are frequently mentioned in the Bible, numerous references will I hope occur to all of you, and even more specifically in the Thalmuds of Jerusalem and Babylon. Oral health was held to be important, and to have a special significance. We read in one record, where it states that if a man married a woman on condition that she was free from physical faults, and afterwards it transpired that she had a bad breath, the marriage was not valid. Various remedies are prescribed for the relief of dental pain, honey, spices, garlic and vinegar. This last was good for bad teeth, but bad for good teeth.

Medicine in Ancient Greece was in the hands of the priests; then, in the fifth century B.C. came Hippocrates with his more rational approach to disease, its cause and treatment. In his works there are frequent references to dental physiology and embryology. He knew that the development of the teeth began before birth, and that at their eruption a child may have convulsions. He speaks of drawing teeth with pincers, and treating fractures of the jaw by binding together proximal teeth with gold wire or linen thread.

In the Medical School of Alexandria it was noted that death could follow the extraction of a number of teeth, and it would seem that treatment of the mouth was regarded as a normal part of medicine.

Good teeth were esteemed by the Romans, as a sign of health and vigour. A Roman wag ridicules a Patrician dandy, who picks his toothless mouth with a

tooth-pick, to give the impression that he is not too far stricken in years. And certain wealthy families often employed special slaves to clean their mouths with small sticks of mastic wood, and evergreen common along the shores of the Mediterranean. So, it would appear that oral hygienists are not so new. Nor were false teeth uncommon amongst the well-to-do, to quote from one writer: "She lays down her false teeth at night, as she does her silken robe." And Horace writes (Ode 5, Book 5): "You would have laughed to see those two old witches run towards the Town, losing in the flight, Canidia her false teeth, and Sagana her false hair."

It is probable that medicine was introduced to Rome by the Greeks, where in the first century there flourished one Aurelius Cornelius Celsus. He wrote much, and in one book, "De Medicina," which is preserved, he deals at considerable length with dental diseases, and gives a definite plan of treatment for ulcers of the mouth; he believed that oral disease could have a systemic background. He regarded toothache as amongst the worst of tortures and prescribed a mixture of castoreum, cinnamon, mandrake and poppy, to induce sleep in the sufferer. This, of course, he did not consider a cure, but only a sedative, and further states that the patient should abstain entirely from wine, and use the teeth sparingly in mastication.

Pliny the Elder was not so scientific, and his writings were based not on his own observation but on ideas derived from various other sources; he says that some believe that toothache can be prevented by eating a mouse twice a month. He states that a man has thirty-two teeth, and women less, following the idea originated by Hippocrates, and that the best dentifrices were the ashes of the head of the wolf, or the hare, or mice, or better still, the feet of a goat. It was currently held that caries was caused by small worms which ate into the body of the tooth, and this idea persisted, as I have said, until the seventeenth century. There can be no doubt that the Romans suffered much from dental disease. Many remedies were prescribed by physicians, and at the same time craftsmen made bridges, crowns and dentures. But as the people grew more corrupt and indolent, the Empire and its technical progress fell before the barbarian hordes from the North.

Christianity was the predominant force at the time of the destruction of the Roman Empire, but its immediate temporal application did not seem to work out. The meek did not inherit the earth, and the new faith did not lighten the burden of the heavy laden. So in time the idea penetrated that the promised peace was not for here, but the hereafter, and, swinging to the opposite side of the pendulum, all emphasis was put upon the soul, and undue attention to the body became a sin of the flesh, jeopardising one's entrance to Heaven. The hermit, who never took a bath and lived in a cave, became the most respected of citizens and this attitude persisted for nearly a thousand years, during which dentistry almost became a lost art. Why, under the circumstances, should one bother as to whether one's teeth decayed or not, when there were much more important matters of the soul and its care to contend with? The Church also frowned on any ideas outside its strictly limited philosophy.

After the birth of Mohammed, his followers set out to conquer and spread their religion by force, and at the height of their religious zeal sought to destroy all evidence of culture, and civilization in subjugated countries. But realising the folly of this course, certain Caliphs had the medical literature of Greece, India, and Persia translated into Islamic languages. One in particular, El Hakim II of Cordova, is said to have had a library of six hundred thousand books; he sent envoys all over the known world to act as copyists, and it is due to this that much has been preserved, though the Arabians themselves added little new to what was already known.

Dentistry, at the end of the Dark Ages, was practised both by the scientific and the ignorant, for one writer speaks of impudent and audacious barbers, who frequently did great harm by their practices. Even as early as this, there was conflict between the physicians, and the surgeons and barber-surgeons, whom the former looked down upon. At this time, oral ailments were largely treated by doctors of medicine, and the surgeons and barber-surgeons dealt with the surgical part of dentistry, while in addition there were itinerant tooth drawers, who plied their trade in the fairs and market places, all contributing something to the advancement of dental knowledge.

The Renaissance may be said to have come first in Italy with the skill and work of the almost legendary Leonardo da Vinci, who led a life of unparalleled variety, and yet, who touched nothing that he did not adorn, including the arts and medicine. Towards the end of Leonardo's life was born Andreas Vesalius, a famous Belgian anatomist, who attempted to point out the errors of Galen, but his task was not easy, as the medical profession at that time was steeped in ignorance and superstition. In Paris they called him a madman, and persecuted him; fortunately, the University of Padua in Italy was more enlightened, and asked him to occupy the Chair of Anatomy.

Padua was, at that time, a part of the Venetian Republic, where the Papal Authority was powerless to interfere in affairs of the school, and anatomical dissections in Padua were therefore possible, unhampered by fears of the Inquisition. There Vesalius published his famous work, correcting many of Galen's errors, and Hippocrates' statement of the difference in number between the teeth of men and women, pointing out that no one is prohibited from counting his own teeth. It is said that his attention was particularly directed to the eruption of the third molar, as at the time of writing he suffered intensely from an impacted wisdom tooth. As well as counting the teeth, he also counted the ribs, and exploded the myth that man had suffered any physical loss in the Garden of Eden. He accepted a position as physician at the Court of Spain, but here dissection was prohibited under pain of death. Performing an autopsy on a nobleman, who had just died, he was accused by onlookers of murder, and his life was only spared on the intervention of the King, but he had to leave and go on a pilgrimage to Palestine as a penance.

The present position of dentistry in Italy is that no one is permitted to practise who has not obtained a Diploma in Medicine.

In France, Ambroise Pare, about 1525, commenced in a humble way, as an apprentice to a barber-surgeon. Subsequently becoming a Doctor of Surgery, he rose to the position of Chief Surgeon to the Court in the reigns of Charles IX and of Henry IV. Although a Protestant, his life was spared at the Massacre of Saint Bartholomew in 1572, through the intervention of Charles IX. He believed also that decayed teeth had worms in them, and advised extraction, or treatment with vitriol and caustics.

In France in 1678 there was born Pierre Fouchard, who may be called the father of modern dentistry. He entered the Navy as a student surgeon, later turning to dentistry, and in 1723 published his famous book, "The Surgeon Dentist," or "Treatise on the Teeth." He definitely disposed of the worm theory, and was probably the first to use the term "Dental Caries."

In 1614 and 1699, laws were enacted, placing the dentist on the same level as the oculist, and the bone setter, but, following the Revolution of 1792, an edict was promulgated, abolishing all restrictions on professions and trades. This, however, was soon found not to be a very good idea, and after much agitation, restrictive laws were passed, which became effective in 1892, when definite regulations for examinations were set forth, with conditions of practice for medicine, dentistry, and midwifery.

Time does not permit of more than a passing reference to dentistry in other countries.

When the "Mayflower" sailed for America, with the Pilgrim Fathers, we know that numbered amongst the company were several physicians, an apothecary, and three barber-surgeons, but there is little authentic dental history available, for quite a time after their landing. However, in 1749, the following advertisement appeared in the "Independent Advertiser," Boston: "Sieur Roquet of Paris announced that he cures effectually the most stinking breaths by drawing out and eradicating all decayed teeth and stumps, and burning the gums to the jaw bone, without the least pain or confinement, and putting in their stead an entire set of right African ivory teeth, set in rose-coloured enamel, so nicely fitted to the jaws, that people of the first fashion may eat, drink, swear, talk scandal, quarrel and show their teeth, without the least indecency, inconvenience or hesitation whatever. He deals only for ready money with the Quality and Members of Parliament, but will give reasonable credit to tradesmen and gentlemen of the Inns of Court."

Following this, there is little note of dentistry, till we hear of John Barker of Boston. Paul Revere, famous for his ride, was a pupil of his. Barker himself was a dentist of George Washington's, though indeed that great man had in all seven dentists, in spite of which he had much dental trouble, and eventually lost all his teeth. Considerable correspondence is preserved regarding his various dentures. He was one of the first people to have dentures equipped with springs. George Greenwood, another of George Washington's dentists, might be regarded as the father of American dentistry.

The University of Maryland was given authority in 1805 to license dentists and oculists, by examination, and a Dr. Hayden gave lectures in dental surgery

to medical and dental students. He was also in part responsible for founding the Baltimore College of Dental Surgery in 1840. This College granted a Doctorate in Dental Surgery under State Charter, and this has been the pattern of dental education in America ever since. Unlike Great Britain, it was entirely separate in control and government from medicine. In another way also it differs, for the primary and qualifying degree is a doctorate, which left it little scope for further qualifications. In time, recognizing this drawback, supplementary courses of study have been instituted, with certificates granted by various bodies.

Dentistry progressed very rapidly in America, partly due at least to tooth consciousness on the part of the population, and their willingness to spend freely to have their mouths kept in order. A colleague, recently returned, tells me that a family he knew paid $10,000 over a period of five years, to have their daughter's teeth regulated.

There is little information regarding dentistry in Russia, prior to the revolution. Many of the dentists then practising in Moscow and Leningrad had qualified in France, Germany or America, but the present position is interesting.

In 1935 a new category called stomatologist was introduced to take the place of dentists, and became part of the general medical establishment. Under this system all students take first a common two-year course in the basic sciences, then branch into whatever speciality they intend to pursue, such as general medicine, pædiatrics, or stomatology, and when completed each has the general classification of doctor. It is interesting to note that in their specialization years the stomatologists take courses in general medicine, surgery, and obstetrics, and attend clinics in all other branches.

This means that in time all dentists will disappear and be replaced by stomatologists. The present ratio is 24,000 stomatologists to 12,000 dentists. Four years ago the proportions were in reverse. Last year 1,600 students graduated as stomatologists, and they hope to increase this number to 2,200 per annum, in five years' time. It is remarkable that whereas in this country dentistry seems to be, as in America, gradually disassociating itself from medicine, in Russia it has become a completely integrated speciality.

For this information I am indebted to Mr. Whitlock, who has just returned from a visit there, under the auspices of the World Health Organisation. In the institute in Moscow where he was he tells me that work started at 9 a.m. and continued without interruption or break until 5 p.m. or 5.30 p.m., so he soon learned to take a good breakfast. Think of the consternation that would reign in the Royal Victoria Hospital if the morning coffee break, let alone the lunch interval, were abolished.

In Great Britain a Company or Guild of Barbers was formed in 1309, and references are found concerning the admission of tooth-drawers. Even at a very early stage it was evident that some departed from accepted standards, for in 1416 we find certain trustworthy and discreet barber-surgeons complaining of unruly members who, inexperienced in the act, take sick persons under their care, and then go off with their goods.

Official recognition was obtained in 1461 when a company of barber-surgeons was first incorporated by Edward IV, divided into two classes—those who practised barbery or bloodletting and those who practised tooth-drawing. This company was dissolved in 1745, and the extraction of teeth, regarded by surgeons as dangerous, handed over to the ignorant and unqualified. There is a story that Queen Elizabeth I, grievously troubled and unable to sleep or to obtain any relief from an aching tooth, eventually called in her physicians, who urged that it must be extracted, to which procedure she was very much averse. However, the Bishop of London, who was present, encouraged her, saying that it was not so bad, and as an evidence he had one of his own teeth removed, in her presence, which gave the Queen the necessary fortitude to have hers extracted. It is said that James VI, of Scotland, and first of England, engaged in the practise of extracting teeth, much as a recreation. An entry, which is referred to in the town records of Edinburgh, reads:

> "Item paid to ane fellow, because the King pulleth his tooth—18 shillings."
>
> "Item to Kinnard the Barber for two teith drawn furth of his head, by the King—18 shillings."

Fortunately the precedent set by the King, of the operator paying the patient, has not been generally followed.

It may be added that the present Duke of Edinburgh became an Honorary Member of the British Dental Association a couple of years ago.

The first book in English entirely devoted to dentistry was written by Charles Allen, and published in 1685; the second and third editions of that work were published in Dublin in 1687.

Dentistry in Great Britain did not progress as on the Continent, and up to the eighteenth century was largely in the hands of the unqualified, but when the middle of the century was reached dentistry was beginning to be recognised as a profession, whose practice required a special knowledge and skill. John Hunter, Surgeon to St. George's Hospital, published in 1771 his natural history of the teeth. He refuted the theory that teeth grew continuously, and lifted dentistry to a more scientific plane.

About this time dentures were made of bone or ivory, carved and let down to fit the contours of the gums, the front teeth, attached, being human teeth, if obtainable, but the demand far exceeded the supply, and the resurrectionists, having disposed of the bodies of their victims to the anatomists for dissection, sold the teeth to the dentists. During the Peninsular War the Continent was the great source of supply for dentists, certain gentlemen following the armies for no other purpose than to extract teeth from those that were killed, or wounded so badly as to be unable to resist.

At home the destitute often sold their teeth directly to dentists. Indeed, Miss Hawkins states in her memoirs that Emma Hart, afterwards Lady Hamilton, in a state of destitution, was on her way to sell her fine set of teeth when she met an old fellow-servant, who launched her on a more lucrative, if less honourable, method of improving her finances. (Are teeth more important than virtue?)

Teeth were extracted by forceps, or more often by a rather brutal but very effective instrument known as a key. As time moved on, the more reputable practitioners were filled with a desire to remedy the state of affairs then existing, and in 1841 George White, a Member of the Royal College of Surgeons, issued an appeal to Parliament to nominate a board from the dental members of the College, to examine the fitness of those proposing to practise dentistry, to grant a diploma or licence, and to prohibit unlicensed practice. Nothing, however, came of this, which, as Sir Wilfred Fish remarks, was a great pity, since that was exactly what did happen, only it took nearly twenty years to get the diploma, and eighty years to get prohibition of unqualified practice. But further stimulus came for the publication of lectures on dental physiology and surgery in 1841 by Sir John Tomes.

In 1857 the College of Dentists and the Odontological Society were formed, and between them a controversy arose, the Society advocating that dentistry be retained as a branch of medicine, and the College of Dentists wishing it to be an independent profession. This delayed matters, but eventually the Society, though the smaller, triumphed, and in 1859 a Charter was granted to the College of Surgeons empowering them to institute examinations and give certificates of fitness to practise dentistry.

It was hoped by some who had been instrumental in obtaining this Charter that dentistry would become a specialized branch of medicine, and holders of the Diploma placed on the Medical Register. However, this did not materialize. It remained a faculty, and is indeed still the senior faculty, but holders of the Diploma were not on the Medical Register. It is a curious fact that the very Act into which this Charter was inserted was that establishing the General Medical Council, which had control of the Medical Register and of the standards of medical education, and, consequently, also of dental education.

Now at the time of the Act there were no specialized branches of medicine, and no provision for any such specialized representation on the Council (nor is there any yet, so far as I know). Members of the Council were drawn from medical authorities, and from the Medical Faculties of the Universities. There was no provision for any dental member, and indeed there was none until 1898, when Sir Charles Tomes was appointed by the Privy Council to advise on dental matters.

Thus there was the rather anomalous situation of the General Medical Council, which would not admit dental licentiates or graduates to the Medical Register, yet retained control of dental education and the dental curriculum. It was not surprising that the same pattern was observed by the other colleges and universities. Where dental schools were established these were placed under the direction of the Dean of the Medical Faculty. (And perhaps we have been fortunate in this respect in Belfast.)

As I have said, this Charter did not provide for any registration, and a very unsatisfactory state of affairs continued, but subsequent to the union of the two dental societies the Dental Act of 1878 was passed and a Register opened. which again was placed in the hands of the General Medical Council.

Under the same Act the Dental Board was set up to advise on the purely dental side of dental education, but they still had to work indirectly through the General Medical Council, which retained control of the dental curriculum, and so it was until 1956, when the newly established General Dental Council took over, which is now responsible for the Dental Register and dental education. We are left again with a rather odd situation, that, whereas the surgeons, physicians, ophthalmologists and gynæcologists all have colleges of their own, and are under the General Medical Council, the dentists are under their own General Dental Council, but have no college.

The Charter of 1859 did not provide for registration or prevent any unqualified from practising, and in 1878 the Dentists' Act referred to previously was passed, which provided for registration of the Licentiate Dental Surgeon and prohibited the use of the terms "Surgeon Dentist" or "Dental Surgeon," by other than those who were on the Medical or Dental Registers.

This Act was unfortunately full of loopholes, and only prevented the use of specific descriptions, and a plate bearing the words "Dental Surgery" did not look very different to the words "Dental Surgeon" to the unobservant general public. The number of unqualified practitioners grew, and many acquired a high degree of professional skill and ethical conduct. It was found the position could not be altered by any enforcement of the 1878 Act, so in 1921 another Dental Act was passed, permitting any who for five years could show that dentistry had been their main source of livelihood, to be placed upon the Register, which was finally closed, and from thence forward practice was prohibited, save for those whose names were on the Medical or Dental Register, or who gained admittance thereto, by passing the prescribed examinations.

During the formative years dental schools were springing up all over the country, the Edinburgh Dental School in 1850, the Glasgow Dental School, associated with the University of Glasgow in 1879, the Incorporated Dental Hospital in Dublin in 1879, and the Dental School in 1884. It is remarkable that a dental school connected with Guy's Hospital was not established until 1889, though Mr. Joseph Fox was appointed dental surgeon to the hospital in 1799, a hundred years previously. Numerous other schools were established all over the country, and in the memory of many of us our own dental school was established in Belfast, in 1920, and degrees and diplomas issued by Queen's University.

In the years immediately following the establishment of the Dental School at Queen's there have been many advances and changes in the practice of dentistry, both at home and abroad. When I first came to Belfast much of the current oral surgery was undertaken by surgeons or surgeons in conjunction with dentists, many of whom, I am glad to say, are still with us, Sir Samuel Irwin, Mr. Loughridge, Mr. Frazer, Mr. Malcolm and others, to all of whom I would like to pay tribute.

But the establishment of the Facio-Maxillary Unit, towards the end of the First World War, at East Grinstead, has, I am glad to say, led to the training of many dentists in this particular branch, so that now dentists specially trained and qualified to deal with almost every surgical condition affecting the mouth

and associated parts are to be found in every district of the country, and they, in their turn, have enlisted and established a close liaison with dentists skilled in prosthetics, who make the necessary splints and dentures to replace lost tissues.

About the same time orthodontics, as a distinctive branch of dentistry, began to emerge. For a long time it had been known that movement of teeth through the bone to new positions could be affected by gradual pressure, but such attempts as had been made were only to the front teeth, and for cosmetic reasons.

At the beginning of this century an American dental surgeon, Edward Angle, stressed the fact that the dental unit consisted of thirty-two teeth functioning as a whole, and that, in considering any irregularities, the whole unit must be taken into account. He devised mechanisms, whereby all teeth could be moved, and upheld the view that every tooth could be brought into alignment, and that extractions to provide extra space were unnecessary.

Much study and research was stimulated in an ever-growing number of dentists interested in this particular field, and the present position is that Angle's views are in the main outdated, and it has been established (although Professor Nord of Denmark maintains that a large proportion are due to thumb-sucking and kindred activities on the part of young children), that irregularities and malocclusion are basically developmental in origin, and there are times when a quart will not fit into a pint pot.

Thirty years ago the only practising orthodontist in Northern Ireland was Mr. H. T. A. McKeag, and we have been exceptionally fortunate to have had such a person for, as opportunity presented, he and his successor, Mr. Philip Adams, have been instrumental in building up an Orthodontic Department in Queen's and the Royal Victoria Hospital, second to none in the United Kingdom, and orthodontic treatment through them and those they have trained is available to the whole province.

In the field of anæsthetics perhaps the inter-relationship of dentistry and medicine is best demonstrated. Through the ages man had sought for some means of alleviating pain, and pain in the teeth has been described by an early writer as the worst of tortures. In this search many methods have been used to prevent or minimise pain, the ancients were familiar with narcotic drugs, opium, Indian hemp, hemlock and the root of the mandrake, which was steeped in wine and the patient drank until stupor overcame him, but, unfortunately, when used within the limits of safety, pain was always present, and, when pushed to complete unconsciousness, the risk of death was very great. Ether itself was probably discovered in the thirteenth century, and a travelling apothecary, Velerious Cordus, in 1515-1544, described the method of preparing ether, while Joseph Priestley in 1733-1804 isolated amongst other gases nitrous oxide, and used it in the treatment of certain diseases. But in spite of the long knowledge of the existence of ether and method of preparation, it was not until 1842 that a physician, Crawford Long, attending an ether party, conceived the idea that sufficient administration of the vapour might be given to perform an operation without pain. He did indeed undertake several successfully, but let the idea drop and pressed it no further. On the contrary, a young dentist, Horace Wells,

deriving his inspiration from the same source, together with another dentist, William Morton, demonstrated conclusively that there now existed a method whereby pain could be obviated during the extraction of teeth and, of course, in other operations. A Dr. John Snow of London is stated to be the first physician to make a speciality of the administration of anæsthetics, and it is remarkable that for some considerable time a large section of the medical profession was opposed to the use of inhaled anæsthetics.

It was another dentist, Thomas W. Evans of Paris, who introduced nitrous oxide to Europe; he encountered much opposition from English anæsthetists, led by Richardson, but eventually had the satisfaction of seeing it in general use.

It is not my intention to enlarge on the developments in general anæsthetics, save to say that many of the improvements, combinations of gases and techniques for administration were developed by dentists and in dental hospitals. As, for example, in 1896, a dentist in Hildeesheim called Thieshing observed that while spraying the gums of patients with ethylchloride to produce local anæsthesia several of them became unconscious. He experimented with its use as a general anæsthetic, and it became popular with a number of dentists, and was subsequently used in major surgery.

During this latter period advances were made in the production of local anæsthesia by injection. Cocaine or Stovaine were used, and although the addition of adrenaline as a limited factor was helpful, it was still unsatisfactory and dangerous, and it was not until 1905, when Professor Baun introduced novocaine, that a reliable substitute was found.

An Army surgeon, Harvey S. Cooke, is credited with first having the idea of using anæsthetic solutions in cartridge form. This idea he gained from observing rifle cartridges; he made his own brass syringe and his own cartridges from glass tubing, with India rubber from pencils as stoppers. Today the number of cartridges used by dentists annually would reach from here to Moscow and back again, if placed end to end.

Following suggestions put forward in 1901 by William Hunter that infection at the apex of a tooth might be responsible for many diseases, the idea was eagerly seized upon by the medical profession, as a solution to problems which had hitherto baffled them, and there arose a degree of co-operation between doctor and dentist, which deprived vast numbers of people of their teeth without much improvement to their physical condition. So much from so many, with so few good results. More light has largely exploded this theory. At the same time, the introduction of X-rays raised a considerable amount of diagnosis from conjecture to certainty.

What, then, is the present position of dentistry? And what is its relationship to medicine in this country?

The advent of the National Health Services and the entrance of the State as a large-scale employer, had a profound affect upon both medicine and dentistry. The original terms of the Act were vigorously opposed by both professions, and there are many today who still think it was too arbitrary, too abrupt, and ill judged in some of its applications.

Before the Act dentistry was not popular, either from the point of view of the numbers entering the profession or from that of the general public. The amount of dental attention needed by a community is very different from the amount it is prepared to pay for, but it was soon evident that the lure of something for nothing, even dentistry, was irresistible, and the comparatively small profession was swamped by an avalanche of demands for treatment.

In spite of this, apart from the years immediately after the War, when there were a great number of ex-Service students, the various schools were not filled, and the number of dentists to meet the requirements of the public remained inadequate. That position has completely changed, as far as the schools are concerned, for they are now full. Indeed, as Professor Biggart stated in a recent letter, he has twice as many applications as he can take, and the same is true of most other schools. The shortage now is accommodation, and it is an astonishing fact that, over ten years after the introduction of the Act, there is as yet no new dental school in the United Kingdom, although some have been enlarged, and we here in Belfast hope to have a new Dental Hospital—sometime.

About the time of the introduction of the Act, the Teviot Committee was set up to consider dental affairs, and very recently the McNair Committee, which was to deal especially with dental recruitment. If you will forgive me, I would like to quote a few of the figures which no doubt influenced their findings:—

At the end of 1938 the total number on the Dental Register was 14,722.

In 1948, ten years later, the number was 14,909.

In 1958, ten years later, again, the number was 15,922.

The number added to the Register in 1958 was 672, which included 207 of foreign and Commonwealth origin. The number of names removed from the Register in that year was 1,019, so that in 1958 there was a loss of approximately 450. This loss can be partly explained by two facts, Firstly, that when the Register was opened in 1921 almost 8,000 new names were added, most of whom were in their twenties. Many of these have gone through death or retirement, but there are still 2,000 of the 1,921 entrants remaining, and it must be expected that they too will cease to practise within the next few years. Secondly, 1958 was the first year in which full benefit of superannuation under the National Health Services Act could be obtained.

To meet these losses and to build up the profession to the required numbers the Teviot Committee recommended an annual intake of 800 and the McNair Committee 900 plus, but the total capacity intake of the schools at the present moment is only 640. Through the legacy which has come down to us almost all application for staff, money or buildings are made through bodies largely dominated or controlled by doctors, and since there is only a limited amount of money available, some members of these bodies may have felt that what money there was could be more advantageously spent on medicine. This is an understandable view, but one which did not greatly assist in producing more dentists, and it is impossible to do this, unless we have more training centres and existing ones are enlarged.

This, however, is not so simple as one might imagine, as it has been shown that an efficient and economic training centre to turn out say 35/40 qualified students each year, as well as the material buildings and equipment, requires a population centre of 4/500,000, and also a very considerable and experienced teaching staff, and teachers too need training.

It is here, perhaps, that the dental profession feels a little disappointed. Incidentally, our own new hospital, which was originally planned for 50,000 square feet, with an output of 35, is now to be 31,000 square feet, with an output of 25.

The present position is that we have too many patients chasing too few dentists, a state of affairs which I do not think is in the best interests of any profession.

What, then, is the present relationship of the medical profession to dentistry? I give it respectfully and regretfully, as my personal opinion, that the medical profession is not greatly interested in dentistry, and the reason is partly of our own making. The advances in clinical procedure, operative skill, and local anæsthesia, and the perfection of replacement, have been in a large sense our own undoing. Dr. A. has passed the time of life when caries is prevalent; many of his teeth are satisfactorily filled, and those beyond filling removed. He functions quite well. Dr. B. always had good teeth, and very little trouble. Dr. C. had his removed years ago, and excellent dentures substituted. They look well, and he can eat anything, his only trouble being—raspberry jam. They do not consider that dental caries is much more than a distressing local condition, which can be adequately treated. They might consider the position more practically, if they remember that the control of dental caries would take at least one shilling, if not one and sixpence off the income tax.

Is there a cure for dental caries, and, if not, how can the medical profession co-operate?

There is no specific cure that we know of, but we do know of several limiting factors. The high incidence of caries has always followed certain habits of diet, rich food, raw sugar, increased carbohydrate. As I mentioned earlier, the incidence amongst the Eskimoes is only 2 to 3 per cent., and they are largely flesh-eating. Caries fell in this country with restriction of sugar during the War. It can be reduced, as shown by an experiment carried out amongst children in orphanages in Glasgow. If we limit the number of times during the day in which food is taken to three, and cut out all sweets and sugar drinks, etc., between meals, the incidence will fall. If caries in children and adolescence is systematically treated at an early age, and if all water supplies were to contain one to two parts per million of fluorine (Belfast water contains fluorine 0.1 parts per million, calcium 4.0), and if children had more milk and fruit and less sweets, cakes and iced lollies, caries would, I believe, be greatly reduced.

The descendants of the "Bounty" mutineers were practically caries free when rediscovered; but the addition of raw sugar and refined white flour to their diet soon reduced subsequent members of that community to the general level found in most countries.

There is also a school of thought which holds that, if we lived on foods grown where the ground is fertilized by natural manures and compost, and animals fed on such foods, we would suffer less illness, have better hair, better skins, better teeth and more children. I am assured, however, by all to whom I have spoken that a radical change in diet is out of the question—and indeed the result of a recent experiment carried out in Norway would go to prove this.

But, nevertheless, I believe that the medical profession, and particularly the general practitioner, has still the greatest influence on mothers, relative to the children's health and well-being, and if he were to convince young mothers of the advantages accruing to their children from properly regulated diet and early and continuous dental attention there would be much improvement in succeeding generations.

But most doctors and dentists prefer to float serenely on a sea of self-satisfied complacency, and this, ladies and gentlemen, is where we came in. Dental affections are probably the oldest and certainly the most widespread ailments to which the human race is subject.

REVIEW

DISEASES OF THE NOSE, THROAT AND EAR. By I. Simson Hall, M.B., Ch.B., F.R.C.P.E., F.R.C.S.E. Seventh Edition. (Pp. xii+467; figs. 85; plates 8. 21s.) London and Edinburgh: E. & S. Livingstone, 1959.

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THE CONQUEST OF PAIN

By **W. M. BROWN, M.D., F.F.A.R.C.S., D.P.H.**

OPENING ADDRESS OF THE WINTER SESSION
Royal Victoria Hospital, 8th October, 1958

BEFORE beginning my address I have to record with regret the deaths during the past year of two members of the Hospital Staff. Mr. James Andrew Craig died last December in his 87th year. Mr. Craig was the senior member of the Honorary Consultant Staff, having been appointed to the visiting staff of the Royal Victoria Hospital before it was moved to the present site in 1903. He gave many years of devoted service to the Royal until his retirement in 1937. During the war years he returned from retirement to his former post at the Hospital to release his junior colleagues for war service.

In 1913 he was appointed Lecturer in Ophthalmology and Otology at Queen's University and his special clinical skill and teaching ability were recognised by the University in 1951 when he was awarded the honorary degree of M.D.

His quick wit and incisive speech were not always appreciated by the more garrulous of his patients, but he will be best remembered by the skill of his surgery and the kindliness of his nature.

Mr. William Marshall Swan was one of the leading dentists in Belfast, where he had practised for more than fifty years. He was appointed Honorary Dental Surgeon to this Hospital on the 8th January, 1920. This appointment, with that of Dr. J. S. O'Neill, made up the original staff of the Dental Department. The following October Mr. Swan was appointed Lecturer and Examiner in Dental Surgery to the Queen's University. This was one of six appointments made to start the Dental School at the University. The Dental School owes much to the pioneer efforts of Mr. Swan in these early days of its existence.

Three members of the staff are due to retire this year.

Dr. Hugh Edwin Hall has been associated with the Royal since 1921. During most of this time he has worked away unobtrusively at his own unmentionable speciality in a place set slightly apart from the main hospital.

In the Royal Navy during two world wars he has travelled the length and breadth of the globe from the Arctic wastes of the North Pole to the burning deserts of the Equator.

A raconteur of no mean repute, his many stories are strongly flavoured with material gained from his life's work.

An authority on old Belfast and its ancient monuments, he contrasts this interest with a superb skill in making modern furniture in his own home workshop.

Mr. Hugh Theodore Alexander McKeag was one of the original band of six appointed to start the Dental School at Queen's University in 1920, but it was

four years later that he was appointed to the Royal Victoria Hospital as a "special dental surgeon for the treatment of irregularities of children's teeth." He was appointed Reader in Orthodontics in 1952 and his high reputation in this field has now been recognised by his appointment this year as President of the European Orthodontic Society.

Dr. James Coulter Smyth joined the Hospital Dental Staff in 1937. He was absent most of the war years serving his country with the R.A.F. As President-elect of the Ulster Medical Society he will have plenty to occupy him during his first year of freedom from the daily round and the common toil.

We wish these three many happy years of retirement.

During this year the staff has been transfused by two young bloods—Dr. John Andrew Weaver and Mr. Derek Stanley Gordon. Both are graduates of this school. Dr. Weaver has chosen the rapidly expanding field of metabolic diseases for his life's work while Mr. Gordon hopes to carve a name for himself in the surgery of the central nervous system. We welcome them both to the staff and wish them many years of happiness and useful work in the Royal.

It is now my privilege and pleasure to extend on behalf of the Consultant Staff of this Hospital a warm welcome to the students, and especially to those of you who are attending the Hospital for the first time.

So far the education and training in your chosen profession has been formal and academic and, although given within the hallowed walls of the Queen's University, the lectures in the basic sciences must have been reminiscent of classes in the schools which you have so recently left. But now, in hospital, you will encounter an entirely different method of instruction—the clinical method, where art competes with science, and experience teaches much by trial and error. The disease described in the text book is often so different from the patient with that disease that the 'book' student is at a loss when he meets it in clinical practice. First then, I would say, learn your disease from the patient and build on the clinical picture from the text books.

This new world of experience now about to be opened to you is an experience which is unequalled in any other profession or walk of life. During the next few years when you walk the wards and out-patient departments, not only will your knowledge of medicine be increased by your study of disease but you will also reap a rich harvest of knowledge of the behaviour of your fellow-man in sickness and in health. In sickness, you will see the patients as they really are, without the mask of social intercourse, and it is in adversity that the best, or the worst, in a patient's character reveals itself. This first-hand study of humanity will increase your mental stature, broaden your vision and develop your personality so that, in the few short years you spend in the Hospital, you will change from callow youths to mature men. To see the beginning of a new life, or to study the patient's attitude of mind as he approaches the end of his journey, often after the allotted span, but, sometimes, in the bloom of youth, cannot but add years to your mental stature and maturity. Contact with suffering and mental anguish develops that element of seriousness which is in us all, and it will, I hope, intensify

in you the humanity and compassion without which you cannot become good practitioners. You will do a lot of growing up when you realise that the responsibility of the patient's life is in your hands; and, at a time when almost one death in four results from malignant disease, it may be difficult for you to reach a decision to prolong a life at whatever the cost in human suffering. On the other hand, no matter how desperately ill a patient appears to be, you must never give up hope. I say this with the deepest personal conviction. I, myself, was once carried on a stretcher towards a mortuary.

With the tremendous technical and scientific advances of this century an enormous increase of factual knowledge now crowds our curriculum, and scant official time is left for the humanities. The good doctor will give the patient not only all the benefits of modern therapy but will administer them with kindness and understanding. The patient's appreciation of your worth will depend as much on how you approach them as human beings as on your scientific achievements. Take the patient into your confidence; tell him in simple language what you think is wrong with him and what treatment you consider necessary. I have seen many patients who have had their abdomens opened and diverse operations performed therein. They had no idea what was done to them, or why.

Your teachers will, of course, guide your footsteps as you tread the paths of experience in the Hospital, but do not follow their lead too slavishly. Have an independent and enquiring mind. Remember that it was the blind following of the authority of Aristotle and Galen that held back scientific progress for nearly 1,300 years until the observation and experiment of the Renaissance finally threw off the dead hand of scholasticism.

In more modern times there have been many eminent, but mistaken, men of science who, as moulders of public opinion, have retarded human progress. Lister's old teacher, Sir John Erichsen, said: "We have carried the art of surgery to the highest degree of perfection of which, as an art, it is susceptible." This was just before Lister's teaching made abdominal surgery possible. Lord Moynihan expressed much the same opinion, just before the development of chest and cardiac surgery.

Today there is no region of the human body and no organ free from surgical intervention. Even the heart (until recent years considered inviolate) is now routinely stopped and opened and its chambers explored and defects repaired. But who would dare to say, even now, that surgery has reached its acme of perfection?

Today, when science is making such rapid strides, there is an unfortunate tendency for students to be taught more and more by men whose perspective is largely institutional. This can mean that instruction in those aspects of medicine which will be so important to the greater number of you in general practice in the future—(the relation of doctor to doctor, and doctor to patient)—may be neglected. Osler's advice to the doctor on how to preserve good relations with his colleagues was characteristic. He said: "Never believe what a patient may tell you to the detriment of another physician, even though you may fear it is true." Faulty relations between doctor and patient often result from thoughtlessness.

What is commonplace and routine to the doctor may be unique and personal to the patient. Avoid, for example, discussing the unpleasant details of the case which has just been operated on in front of the patient who is next in turn for the theatre. Try always to put yourself mentally in the patient's place and then give him the kindness and consideration which you would wish yourself. To be a patient is often a valuable and chastening experience.

Finally, as time passes, and your contact with sickness increases, you will be surprised, one day, to realise how much your help and encouragement mean to patients. Words of advice (often lightly given by you) may carry much weight with them. You will then appreciate that the maturing process has been going on apace and that you have passed at least the preliminary examination in the school of experience. But, bear your success with humility, remembering that each of us, however old, has still much to learn.

When you begin your work in hospital one of your first visits will be to the operating theatre. Though you may not yet have actually witnessed an operation you may have passed, in common with the many thousands of visitors to the hospital, within a few feet of the spot where a patient was being operated upon. From behind the theatre doors comes little sound beyond the murmur of voices. The patient is asleep and completely oblivious to his surroundings, because today, even for the most trivial operation, anæsthesia is taken for granted. Indeed, most of us were probably born with the smell of anæsthetic in our nostrils.

A little over one hundred years ago the picture was very different. The theatre was then situated as far away from the wards as possible so that the patients' screams should not be heard in the wards. The theatres were grimed with the filth of decades. The operating table was never washed and around its base sawdust was sprinkled. The coats the surgeons wore were their ordinary street coats which, when they became a little too shabby for use in the fashionable drawing-rooms, were either given away or used to operate in. They became stiff with dried pus and blood and it was the hall-mark of eminence if the coat could stand by itself. The patients were few in number, more because of the fear of the exquisite pain that was in store for them than of possible accidents or fatal errors on the part of the surgeon. The only operations performed were of an urgent nature. A limb was sacrificed in an attempt to save a life; an artery was tied to prevent an aneurysm bursting; a tumour of jaw was removed to prevent it choking the patient. To perform an operation which was not life-saving was regarded as tempting providence. An operation on the abdomen was unheard of and the agonies of intestinal obstruction and of peritonitis went unrelieved till death put an end to them. Most of the patients preferred to die rather than endure the torture of the surgical theatre.

In order that the duration of the excruciating pain of surgery be reduced to a minimum, the surgeons became excellent craftsmen, working at great speed and with superb technical skill. All the operations and operating techniques were governed by the one factor—speed. "The quicker the surgeon, the greater the surgeon" was the order of the day. Sir William Ferguson used to warn his

audience not to wink or they would miss the operation entirely. A current joke concerned the surgeon who, with one sweep of the knife, cut off the limb of the patient, three fingers off the assistant and the coat-tail off a spectator. Robert Liston was famous for his dexterity. It was said of him that when he amputated "the gleam of the knife was followed so instantaneously by the sound of sawing as to make the two actions appear almost simultaneous" and an amputation through the thigh took less than half a minute.

It is obvious that these surgeons must have possessed not only superb technical skill but also resolute and merciless minds to withstand the strain of operating upon struggling, screaming, and terrified patients. However, for many surgeons the operating day brought anxiety and dread. The famous William Cheselden could not sleep for nights before performing an operation, so disturbed was he with the thought of the pain and danger to which he was subjecting his patient.

Sir James Young Simpson, after seeing the terrible agony of a poor Highland woman during amputation of the breast, went to Parliament House to seek work as a writer's clerk. It was not unusual for the surgeon to order two bottles of whiskey before an operation, one for the patient and one for himself. This was the time when surgeons were straining to do many more operations, operations of greater magnitude and of greater complexity. Their technical skill had reached a high pitch of perfection but they were prevented from widening the scope of surgery by one thing—pain. Few patients could withstand the terrible torture of the operation for more than three or four minutes. Pain stood inexorably in the pathway of progress. The story of man's struggle to conquer pain is a fascinating one, and this, if you bear with me, will be the subject of my address.

Evidence of surgery and anæsthesia in prehistoric times has to be guesswork. Primitive man must have eased his bruises and sprains by bathing them in the cool streams or exposing them to the sun's rays. Prehistoric man regarded the pain of disease as the work of demons. Physical injury by wild beasts he could see and understand, but when pain appeared without apparent cause it was incomprehensible and he ascribed it to a supernatural power.

As you all know trephined skulls have been found in many parts of the world dating back to neolithic times. These trephinings may have been done for headache; to let out an evil demon, then thought to be the cause of delirium; to cure fits or simply as a tribal rite, the discs of bone being preserved as amulets. As these operations must have been done with flints it is hoped that the patients were unconscious from the disease or injury at the time. We can find nothing to suggest that there was any knowledge of pain-relieving drugs, and medical practice in this connection was limited to magical rites carried out by the witch doctor.

Even in the civilizations of ancient Egypt there is no evidence to show that drugs were available for the relief of pain and in carvings illustrating surgical operations the patient is always conscious and obviously suffering pain.

As soon as neolithic man began to grow crops he must very soon afterwards have stumbled on the process of fermentation. Certainly Noah, almost five thousand years ago, was in possession of an alcoholic beverage strong enough

to produce complete unconsciousness; and excessive drinking, with the production of unconsciousness, has been going on throughout the ages. There is, however, no mention in the Bible of it being used to mitigate the pains of surgery, but there is evidence of its use as a mental sedative and perhaps also as an analgesic when it was given to persons condemned to die—"Give strong drink unto him that is ready to perish." It is impossible to conceive, isn't it, that all this drinking of alcohol throughout the centuries with the production of unconsciousness and analgesia was not, on occasion, put to good use; at least for the fixing of fractured limbs and other injuries?

Alcohol, mandragora, and opium are the three main pain-relieving drugs of antiquity, and these were used until the time of Elizabeth I's reign. The use of mandragora ceased about the middle of the sixteenth century. Ambrose Paré, writing at this time, says: "Doctors used it formerly when they wanted to burn or cut a member." Shakespeare, of course, knew all about mandragora. Cleopatra says: "Give me to drink mandragora . . . that I might sleep out this great gap of time." While mandragora is considered by some to be a mythical plant and its supposed properties to be mainly due to the anthropomorphism of its potato-like root, opium, although known to the ancients, has survived to the present day as a prince among pain-killers in spite of fierce competition from the manufacturing chemists with their modern synthetic products.

The sleeping sponge, introduced in the ninth century, was the chief anæsthetic of the Middle Ages. It was a sea sponge soaked in the juices of all the then known soporific drugs, and included opium, mulberry, hyoscyamus, hemlock, mandragora, lettuce and wood ivy. The sponge, when required, was placed in hot water and the fumes inhaled by the patient.

Throughout the Middle Ages, and even earlier, individual attempts were made to mitigate pain, but the use of such drugs as were available was not general. One obvious reason for this was that the extracts of the plants used varied greatly in strength. There was no standardization of drugs and a certain measured dose would either be of no avail or cause such profound stupor that the patient's life was despaired of. Many accidents obviously occurred and voices were raised in criticism of the surgeons. Severe penalties were meted out to those responsible when a tragedy followed the use of these mixtures of drugs and it is not surprising that more and more the surgeons avoided these concoctions until, at the end of the eighteenth century, only two drugs, alcohol and opium, were in common use.

Ether had already been discovered in 1540 by Paracelsus, the migrating physician and chemist. He gave it to his chickens and found that they fell asleep and later awakened without harm. In 1730 the German chemist, Frobinus, rediscovered and publicised sweet oil of vitriol, calling it, for the first time, ether. From now on it was a common sight on chemists' shelves and was commonly used to treat asthma and consumptives. It was used in "pleurisy, pneumonia, and hacking cough, to draw from the lungs pus and mucus."

You are, no doubt, wondering why the anæsthetic properties of ether remained undiscovered for three hundred years. It has been suggested that one reason was the lack of humanity on the part of so-called civilised man during the Renaissance

period in spite of the many cultural, artistic, and scientific advances at this time. You all know that this was a time of great brutality, of the slave trade, of child labour, of public executions and of barbarous treatment of the insane. Men went to the gallows for stealing a sheep. Even in play the sports were brutal—bull-baiting, bear-baiting, and cock-fighting. The infliction of pain, not its relief, was, it seems, one of the chief delights of the age.

Another factor which tended to retard any search for relief of pain was the current religious belief that pain was a punishment sent by God for wrong-doing. This attitude towards pain persists in some European countries, even to the present day. In spite of this attitude on the part of the Church towards pain there were those irreligious enough to want their pain assuaged. In 1591 a Scottish lady, Euphamie Macalyne, asked her midwife to give her something to relieve her pains at the birth of her two sons. When this news reached King James VI, a great searcher after witchcraft, he had her burnt alive on Castle Hill.

As the confidence in the drug mixtures of the Middle Ages waned, recourse was had to more ancient methods of producing analgesia. As early as 1543 Ambrose Paré suggested compression of the nerves and blood vessels of a limb to prevent the pain of amputation.

It is well known that Baron Larry, the brilliant surgeon in Napoleon's army, was impressed by the lack of suffering when he amputated the legs of the half-frozen soldiers in the Russian campaign in 1807.

The present-day joke about the anæsthetist knocking out his patient was a very serious affair in former times. This was the method used in order to facilitate the minor operation so essential for the smooth running of the Imperial Court of China. It is the method still used in Abyssinia for the same operation, the patient being rendered unconscious by a sudden blow on the point of the jaw. The Assyrians produced unconsciousness during the operation of circumcision by compressing the neck. The Javanese still produce unconsciousness by pressure on the carotid arteries. In fact, the word carotid is derived from the Greek word, to stupefy.

Another method of producing unconsciousness during painful procedures was by bleeding. Venesection had been a tool of the physicians for thousands of years and surgeons have used it in the treatment of inflammation, and to produce unconsciousness and relaxation. Patients were bled repeatedly; to prepare them for operation, during operation, and afterwards in a misguided attempt to aid their recovery. It is incredible the extent to which venesection was carried out and it was not unusual for six pints of blood to be removed at one time. Having survived such enormous blood loss, the patient frequently succumbed to infection of the vein where it had been opened.

One of the many uses of blood-letting was to so weaken the patient that dislocations could be more easily reduced. If the patient fainted with the loss of blood he was doubly lucky in that he would be oblivious to the traumatic procedure which then usually accompanied the reduction of the dislocation.

The utter desperation of man's plight before effective anæsthetics were available is indicated by his acceptance of these methods. Nothing else was available until

well into the nineteenth century and the very inefficiency of these ancient methods must have been partly responsible for the enthusiastic acceptance of hypnotism.

The person who had the greatest success with hypnotism was James Esdaile, who, though he had never actually seen mesmerism performed, began to practise it himself while he was in charge of a native hospital in India. In his first year he had a record of over one hundred successful cases; these included amputations of the arm and breast, removal of tumours, hydrocele and tooth extractions. Ten months after the publication of Esdaile's cases the discovery of ether anæsthesia was announced to the world. Mesmerism in surgery became a lost cause when the more reliable and more efficient chemical anæsthesia became accepted. Mesmerism had at least focused attention on the possibility of painless surgery and so helped to pave the way for the acceptance of ether and chloroform. After one hundred and twenty years hypnotism is now coming into its own again, not only as a therapeutic agent but also as an anæsthetic and the benevolent State will now pay a hypnotist a fee for his peculiar type of non-toxic anæsthesia.

You will remember that the organised advancement of science began in the latter part of the eighteenth and early nineteenth centuries and gathered full momentum after the middle of the nineteenth century following the publication of Darwin's "Origin of Species" in 1859. Chemistry, physics, and biology were then finally freed from theological dogma and were studied objectively. So that whilst Mesmer was holding the world in his spell, Priestly, by the new methods of precise experimental study, was discovering and testing new gases. In 1775 he had not only discovered oxygen but had inhaled it and published his views on the beneficial effects of breathing it and other airs. This was the beginning of a new therapeutic fashion which received its greatest impetus by the establishment of the Pneumatic Institute at Bristol. Thousands flocked to the Institute for treatment. However, it seems impossible that success could have been based on any scientific foundation as the only gas inhaled which could possibly have been of any benefit, oxygen, was dilated with twenty to forty times its bulk with common air before inhalation.

In his search for newer and more powerful remedies for chest complaints, Humphrey Davy, who was appointed Superintendent of the Institute at the age of 19 years, tested nitrous oxide which had been discovered by Priestly in 1772. This gas had been described by the authoritative Samuel Latham Mitchell as the principle of contagion, capable of destroying plant and animal life in the minutest amounts and the cause of cancer, scurvy, and leprosy. To Davy's surprise the inhalation gave him nothing but pleasure, and it is alleged that he repeated his pleasurable experiment so often that he came a nitrous oxide addict, probably the first.

Davy's researches with nitrous oxide finally led him to the conclusion (based on the relief of pain from an erupting wisdom tooth) that—"As nitrous oxide in its extensive operations appears capable of destroying physical pain, it may probably be used with advantage during surgical operations in which no great effusion of blood takes place." This statement, published in his Researches, is a

definite suggestion how pain may be relieved, but it was only put forward as one of many uses for nitrous oxide. It was unstressed and although Davy had two years previously been serving his apprenticeship to the surgeon Borlase and must have been aware of the pain of operations, he obviously did not realise the import of his own words.

It may seem incredible to us who take for granted the fact that surgery and relief of pain go hand in hand, that no one took any notice of Davy's suggestion; for his Researches were widely read. But we have already seen that the eighteenth century attitude to suffering was callous in the extreme.

Isolated individuals, however, more plentifully supplied with the milk of human kindness than the common run, still sought a means to relieve life's burden of pain. The person who, above all, was actuated in his desire to conquer pain, by pity for his fellow-men, was Henry Hill Hickman. He was born in 1800 and from an early age he was appalled at the sight of povery and illness and soon decided to become a doctor. An insight into the kindly nature of Hickman's character is given by the notice he had on his village surgery door—"At home every Tuesday from 10 o'clock until 4 for the purpose of giving advice gratis to the poor and labouring classes." This kindly individual described in a letter to his friend, T. A. Knight, seven experiments in which Hickman produced unconsciousness in animals by depriving them of air and administering carbon dioxide. This unconsciousness he called 'suspended animation,' and while the animals were in this state he found he could operate on them without causing pain.

Hickman asked his friend Knight to bring his discovery to the attention of the Royal Society so that his claim to have produced insensibility to pain could be investigated and to explore the possibility of using this method in surgical operations in the human subject. It is not known if Hickman's letter was ever brought before the Royal Society, but certainly no action was taken. It is interesting that the President of the Royal Society at this time was Sir Humphrey Davy, whose book, published the year Hickman was born, suggested that nitrous oxide might be used to relieve the pain of operations. After waiting three years for a reply from the Royal Society, Hickman went to Paris, the then recognised centre of scientific research, and presented a petition to King Charles X. The petition was in due course passed to the Royal Academy for consideration and a committee of five was appointed. Like so many other committees even today, no report can be traced in the archives of the academy. Disappointed, Hickman returned to England, where he died two years later at the early age of 30. He, alone among his contemporaries, had a clear conception of relief of the pain of surgery by the inhalation of a gas. His choice of gas was unfortunate. It was also unfortunate that partial asphyxia was part of his technique. But he was ahead of his time, for his contemporaries were unable to grasp the significance of what he urged, namely, the principle of anæsthesia for the surgical patient.

One of the results of Davy's experiments with nitrous oxide was that in his 'Researches' he left a description of the exhilarating effects of nitrous oxide. This apparent stimulating effect of the gas was remembered by those who read Davy's book, and soon nitrous oxide was being inhaled by many people, not for the

purpose of scientific investigation, but to produce a delightful drunkenness for purely social reasons. The laughing gas party became popular and a social evening was not a success without one. Needless to say, medical students were very enthusiastic about this new form of amusement and it soon became a popular form of relaxation after studies. This pastime spread with great rapidity in America and was even capitalised by the travelling showman. In 1818 the Journal of Science and the Arts stated that "when the vapour of ether mixed with common air is inhaled, it produces effects very similar to those occasioned by nitrous oxide." Thus the laughing gas parties became the ether frolics.

The local practitioner in the southern town of Jefferson, Georgia, was Crawford Williamson Long. During these frolics Long frequently noticed his friends when intoxicated received blows without wincing that should have caused pain, and this, he states, led him to believe that ether might be of use in surgical operations. Among Dr. Long's patients was a certain James Venables, who had two small tumours on the back of his neck. He had made many appointments to have these removed because they were unsightly, but each time he refused at the last minute, fearing the pain of the operation. Now Venables, although a young lad, was very fond of the ether frolics and had often been to a party at the doctor's house. Therefore, when Long suggested to him that the tumours could possibly be removed under the influence of ether, inhaled in exactly the same way as had been done at the ether frolics, Venables at last agreed to have one tumour removed. The operation was performed in the presence of four witnesses on the 30th March, 1842, Long administering the ether on a towel and then removing the tumour. It was a complete success; Venables lay quiet throughout and had to be shown the tumour to be convinced that it had been removed. This was the first recorded painless surgical operation performed on a patient by the inhalation of ether.

Now, you know as well as I, that a discoverer must be able to recognise his discovery and at least try to tell others about it. But Long seems to have been completely unaware of the significance of his achievement. He made no move to publish his discovery. In his account book occurs the simple entry, "James Venables, 1842, ether and excising tumour, $2.00. Only years later, during the bitter ether controversy, did Long put forward his claim for priority.

It has been stated that the ignorance and prejudice of the populace of this small town in the wilds of the cotton planting area were against him. Rumour spread that the doctor had a strange medicine with which he could put people to sleep and then carve them to pieces without their knowledge. He was told he would be lynched if anything happened to a patient under ether. His practice dwindled and he was eventually forced to give up the use of ether. In all, he had performed six operations in four years.

Whatever excuses there were for Long's inability to publicise his discovery, the fact remains that his action played no part in bringing the benefits of anæsthesia to mankind. He accomplished anæsthesia where Hickman failed. Hickman had the conception of anæsthesia; Long could not recognise its significance when he saw it.

On the 10th December, 1844, the following advertisement appeared in the local papers of Hartford, Connecticut: —

> "A Grand Exhibition of the effects produced by inhaling Nitrous Oxide, Exhilarating or Laughing Gas! will be given at Union Hall this Evening, December 10th, 1844. Twelve Young Men have volunteered to inhale the Gas, to commence the entertainment. Eight Strong Men are engaged to occupy the front seats to protect those under the influence of the Gas from injuring themselves or others. This course is adopted that no apprehension of danger may be entertained. Probably no one will attempt to fight."

The notice also stated that the gas would be administered only to gentlemen of the first respectability and that none but ladies would be admitted.

The lecturer on this occasion was a former medical student, Gardner Quincy Colton, who was unable to take a degree because of financial difficulties. He had, however, learned about nitrous oxide and turned his knowledge to good effect when he put on his own act as Professor Colton. He travelled about the country giving scientific lectures which ended with a practical demonstration of laughing gas. Hundreds had attended his lectures and witnessed the effects of the gas, but this particular exhibition was important because of the presence there of Horace Wells, a dentist, with his wife. Sitting beside Wells was a man called Samuel Cooley, a drug clerk. Both Wells and Cooley, together with a dozen other members of the audience, accepted Professor Colton's invitation to come up on the stage and try the effects of laughing gas. Wells inhaled the gas, and, according to his wife, "made a spectacle of himself" on the stage. While under the influence of the gas Cooley ran against a settee and severely bruised his shins. Wells noticed that Cooley did not seem to mind knocking his shins, and when he resumed his seat Wells asked him if his legs were sore. Cooley was surprised at the question, having had neither the pain nor the memory of barking his shins, but he automatically looked at his legs and found they were cut and bleeding. It was at this moment that the idea of anæsthesia was born in Wells' mind. Of all the crowd at the exhibition only Horace Wells saw any significance in Cooley not crying out when he hurt his legs. As Pasteur said, "In the field of observation chance favours only the mind that is prepared."

The sensitive Horace Wells had for a long time been upset at the pain he had to inflict upon his patients while performing extractions of teeth. As soon as he saw Cooley injured, but without pain, the significance of the event was borne in on him. He lost no time in putting theory into practice. Immediately the exhibition was over he persuaded Colton to take part in an experiment the next morning in Wells' office. Colton was to supply and administer the gas to Wells while another dentist, John Mankey Riggs, was to remove a wisdom tooth. The experiment took place on the 11th December, 1844. Also present were Colton's brother, who helped with the exhibition, Cooley of the battered shins, and several other gentlemen. The spectators, we are told, insisted that the surgery door be left open for a quick exit in case Wells became raving mad from the effects of too great a dose of the gas. Wells sat in his own chair and put the tube from the

rubber bag containing the gas in his mouth. Riggs waited expectantly, doubting the wisdom of this venture into unknown territory. Where was the limit which must not be crossed lest it prove the dividing line between life and death? Colton signalled to Riggs when he had given a little more gas than was usual at the exhibition and Riggs quickly removed the wisdom tooth. Wells did not move or cry out. Riggs, accustomed to the screams and struggles of his patients, stood amazed with the tooth in the forceps. Presently Wells recovered from the gas and is reputed to have exclaimed, "A new era in tooth pulling; I felt it no more than the prick of a pin."

His single experiment having succeeded, Wells immediately set about repeating it. He had to build his own apparatus and manufacture his own gas, but by the middle of January, with Riggs' assistance, Wells had administered nitrous oxide to no less than fifteen patients for the extraction of teeth and all but one or two of these with complete success. Before long all Hartford knew that Wells pulled teeth painlessly—Horace Wells had discovered anæsthesia. Furthermore, unlike Crawford Long, he was aware of the discovery he had made and was anxious that everyone should benefit from it as soon as possible. In order to publicise his great achievement he hurried off to Boston, the centre of medical life in the Eastern States. Here he looked up two acquaintances, William T. G. Morton, a dentist and former pupil, and Professor Charles Thomas Jackson, an eminent, if eccentric chemist and geologist, and told them of his discovery. Jackson was sceptical and scoffed at the idea but Morton was more credulous and helped to get Wells an introduction to the Massachusetts General Hospital.

Arrangements were made with Dr. Warren, the Senior Surgeon of the hospital, for Wells to speak to his class of students at the close of his lecture on surgery and then to administer gas for a case of amputation. At the last minute the patient decided against operation—it was a common decision in those days—usually the only difference being that the patient died with two legs instead of one. Instead, a volunteer from the audience who needed a tooth extracted agreed to help Wells demonstrate the gas by being the patient. It was January, 1845. Wells made a few brief remarks about nitrous oxide to the students and then proceeded to administer the gas to the patient. Wells had to act both as anæsthetist and operator and, unfortunately, just as the tooth was being removed, the patient gave a sharp cry. Now, nothing appeals to a body of medical students so much as a demonstration that goes wrong and apparently medical students were always like this. The jeers, whistles, cat-calls and shouts of "Humbug" which followed drove Wells from the theatre. The fact that the patient afterwards admitted that he felt no pain only added colour to the currently-held belief that Wells was a fraud and that he was in collusion with his patient.

Wells left Boston and returned to Hartford a disappointed and disillusioned man. He still believed in his discovery and he continued to anæsthetise patients at his surgery. His one opportunity to demonstrate the fact of anæsthesia had failed. If his demonstration had been successful he would have been hailed as the discoverer of anæsthesia just as Morton was for the very reason that he demonstrated the fact of anæsthesia. But luck was against him. The volunteer medical

student may have been a tough type of individual known to be difficult to anæsthetise with such a weak agent as nitrous oxide, but Wells made no excuses for himself or his failure. All he said was simply, "I took the bag away too soon."

Shortly after his failure at Boston Wells' health broke down and he gave up his dental practice. Three years later he became an addict while experimenting with chloroform. His mind became unbalanced and he committed suicide under rather sad and sordid circumstances. He was 33. Twelve days before he died a letter written to him in Paris stated that the Paris Medical Society had elected him an honorary member and had voted to him "all the honor of having successfully discovered and successfully applied the use of vapours or gases whereby surgical operations could be performed without pain, and to the last day of time must suffering humanity bless his name." Wells did not live to receive this letter.

William Thomas Green Morton, who had been Horace Wells' pupil and later partner in a dental practice in Boston, had been present at Wells' failure to demonstrate anæsthesia in the Massachusetts General Hospital. This demonstration seems to have proved to Morton that nitrous oxide was an impracticable agent to use. Already Morton, at Professor Jackson's suggestion, was using liquid ether applied locally to deaden the pain of preparing a cavity for filling and the ether frolics made it plain to all that the inhalation of ether could cause unconsciousness. Morton's obvious choice was ether.

Two events spurred Morton at this time. The first was that he had discovered a new and improved method of making dentures. But this method, contrary to the current practice, involved removing all roots and broken teeth before fitting the denture. Morton had advertised his new venture on 'a money back if not satisfied' basis and the crowds began to roll up. But, when they found that all the old broken teeth had to be removed first, they went away again. I may add that cocaine for local anæsthesia was not in use until 1879. The second event was his meeting with a Miss Elizabeth Williams, who proudly boasted that Wells had painlessly extracted one of her teeth while she was under the influence of laughing gas. The grateful patient, as everyone knows, is the best advertisement a doctor or dentist can have. Morton was, if nothing else, a business man. These two events made him realise the financial advantages of painless tooth extractions.

He started experimenting with ether about the middle of 1846. He began by anæsthetising his household pets and was most successful with his dog. As the experiments progressed and Morton believed he was on the right track, he became more and more secretive in case someone should steal his invention. He sent across town for his supplies of ether to a wholesale firm, and bought it under assumed names lest he arouse the curiosity of his own druggist. There came a time, however, when he had to experiment on a human subject. He inhaled the ether himself, but had not the courage to lose consciousness. He sent his two assistants down to the dockside to offer $5 to anyone who would allow himself to be the subject of an experiment, but they were unsuccessful. He tried to administer ether to his assistants in August, 1846, but both became excited and violent and could not be brought under the control of the ether. The reason for this was subsequently discovered. Morton had used for this experiment the ether

obtained from the wholesalers and which was later found to be impure, almost one-quarter of it being alcohol.

Morton now found himself in a quandary. He knew something was wrong but was afraid to consult the only person who could help him, Professor Thomas Jackson, lest he should claim the credit for the discovery Morton now felt to be a certainty. This eminent man had claimed to be the discoverer of the telegraph on the slender grounds that he had met Samuel Morse on a transatlantic voyage. So, instead of explaining his difficulty, Morton merely asked Jackson for the loan of a rubber bag, saying he wanted it to pretend to a patient that she was being anæsthetised—in fact, as a prop in an attempt at mesmerism. Jackson evidently warned Morton against such trickery and said he would be called a greater humbug than Wells with his laughing gas. Instead Jackson recommended the use of sulphuric ether. This suggestion put Morton in a panic. Had Jackson found out that he was experimenting with ether? In desperation he pretended to Jackson he had not heard of ether; but before leaving, Morton had gleaned the information that the ether must be pure. On his way home Morton bought some pure ether and that same evening tried to anæsthetise himself. This time he was successful, and when he looked at his watch he found he had been unconscious seven or eight minutes. Later that evening a man called Eben H. Frost came to Morton's surgery to have a painful tooth extracted. When Morton suggested that he had a preparation which would relieve the pain of the extraction Frost was more than delighted. Morton soaked his pocket handkerchief with ether and gave it to Frost to hold to his nose. In less than a minute the patient's hand had dropped and Morton, by the aid of an oil lamp, held by his colleague, Hayden, quickly extracted the tooth. Frost uttered no sound and showed no sign of pain. When he awoke Morton asked him to sign the following certificate:—

> "This is to certify that I applied to Doctor Morton at 9 o'clock this evening, suffering under the most violent toothache; that Doctor Morton took out his pocket handkerchief, saturated it with a preparation of his, from which I breathed for about half a minute, and then was lost in sleep. In an instant I awoke, and saw my tooth lying on the floor. I did not experience the slightest pain whatever. I remained twenty minutes in his office afterward, and felt no unpleasant effects from the operation."

There is no doubt Morton was a practical person. Next day there appeared in the Boston "Daily Journal" the following note:—

> "Last evening, as we were informed by a gentleman who witnessed the operation, an ulcerated tooth was extracted from the mouth of an individual, without giving the slightest pain. He was put into a kind of sleep, by inhaling a preparation, the effects of which lasted for about three-quarters of a minute, just long enough to extract the tooth."

The same day that this notice appeared Morton called on a commissioner of patents and made enquiries about the possibility of patenting etherisation. Even Morton must have considered this rather precipitate action when the next patient,

a boy, whom he tried to anæsthetise, was so sick that his friends threatened to sue Morton for poisoning him.

Nothing daunted, Morton immediately called on Dr. John Collins Warren, Senior Surgeon to the Massachusetts General Hospital, and asked for permission to demonstrate a new agent he had discovered which would prevent pain during surgical operations.

In the meantime, because of his many failures to anæsthetise the patients who came to his surgery, Morton decided that a new type of inhaler was necessary. He got from Jackson an apparatus which consisted of a conical glass tube having two openings and in which was placed a sponge saturated with ether. This was the type of inhaler used to administer ether for asthma and other chest complaints. Morton had greater success with this apparatus, but he was far from satisfied with it when, on Wednesday, 14th October, 1846, he received the following note from C. F. Haywood, House Surgeon to the General Hospital: —

> "Dear Sir, I write at the request of Dr. J. C. Warren to invite you to be present on Friday morning at 10 o'clock, at the hospital, to administer to a patient who is then to be operated upon the preparation which you have invented to diminish the sensibility to pain."

This meant that Morton had only one clear day before the demonstration. Remembering the reception Wells got in the same theatre less than two years previously and his own indifferent success, to date, with this apparatus, he decided he needed an entirely new apparatus. At 10 a.m. on Friday, 16th October, the time of the demonstration, Morton was still at the instrument makers, having been there most of the night. Meanwhile, at 10 a.m. in the theatre of the Massachusetts General Hospital the patient, Gilbert Abbott, a young man with a congenital tumour on the left side of the neck, was brought in and strapped to the table. After waiting 10-15 minutes Dr. Warren decided to begin the operation, saying, "As Dr. Morton has not arrived I presume he is otherwise engaged." Just then Morton burst into the theatre, having collected Eben Frost on the way as a witness to the success of the preparation in case the demonstration was a failure.

With a disapproving look, Dr. Warren indicated to Morton that the patient was ready for him. Morton rapidly filled his new inhaler with ether which he had disguised with perfume and colouring matter and which he referred to as Letheon. He then put the tube from the glass globe into the man's mouth and asked him to breathe gently. After 5 minutes, during which the murmur of voices and the scraping of feet died into silence, Morton removed his inhaler and motioned Dr. Warren to begin. Dr. Warren cut into the tumour, unconsciously steeling himself for the screams of anguish, but to his great surprise, no sound came from Abbott's lips. There was no struggling, nor any other sign of pain. The contempt and incredulity of the audience gave way to astonishment and eager interest. During the final stages of the operation the patient began to mutter in his sleep, but it was evident to all that an extraordinary thing had happened. Dr. Warren, convinced the patient had felt no pain, turned to the

audience and, using the same word that had been hurled at Wells in 1844, uttered his famous remark, "Gentlemen, this is no humbug." The whole world of surgery was transformed by an operation that lasted only a few minutes. The splendid dream of conquering pain had become a reality.

The use of ether spread rapidly throughout Europe. Professor Jacob Bigelow, who witnessed Morton's triumph, wrote on the 28th November to his friend, Dr. Francis Booth, of Gower Street, London, giving an account of the discovery. Before passing on the incredible news to Liston, Booth had ether tested in his own house when on the 19th December a dentist painlessly extracted a molar tooth from a Miss Lonsdale. This was the first ether anæsthetic in Europe. But anæsthesia was assured a prominent place in the world when two days later Liston amputated the leg of a butler named Fredrick Churchill at University College Hospital. William Squire, a chemist in Oxford Street, was the anæsthetist. When this successful operation was completed the rough-mannered Liston's comment was, "This Yankee dodge beats mermerism hollow."

As with almost every discovery of note, there was opposition which stemmed mostly from jealousy, envy, religious scruples, ignorance, and deep-rooted prejudice. There was jealousy and envy on the part of the dentists of Boston, who entered into systematic and organised opposition. Preachers poured out impassioned sermons to demonstrate that relieving pain interfered with Divine justice and that nothing could be more heretical than circumventing the consequences of original sin.

Children born under the influence of chloroform were refused baptism, but the Churches' opposition to the relief of pain in childbirth was forcefully and effectively dealt with by that indomitable Scot, James Young Simpson. A lesser man would have been crushed by the intensity of the opposition, but as it was, no man could have been found better suited than Simpson to champion the cause of painless childbirth. Even so, Simpson's agility with Biblical quotations had less to do with the final acceptance of anæsthesia in childbirth than the fact that Queen Victoria consented to use chloroform at the birth of her eighth child, Prince Leopold, in April, 1853. Thereafter chloroform *a la reine* was respectable and the Churches' opposition was stilled by Royal example.

Great names revered for their wisdom and intelligence were associated with remarks which were neither great nor wise. Majendie, the French physiologist, stated that it was "a trivial matter to suffer and a discovery whose object was to prevent pain was of slight interest only." A hospital in Philadelphia resisted the use of ether for over a year. Nine years after the discovery of anæsthesia the Medical Director-General in the Crimea issued a memorandum condemning the too frequent use of chloroform because it was considered that the cries of the patient undergoing an operation were an indication to the surgeon of the absence of syncope and that pain had a stimulant effect which assisted recovery.

However, the surgeons of the Massachusetts General Hospital stood by Morton, particularly after he had disclosed (under pressure) that his preparation, Letheon, was, in fact, ether.

The chief opposition Morton had to face was not to the idea of anæsthesia but to his claim to be the sole discoverer. This Morton brought on himself—his secrecy with regard to the nature of his Letheon annoyed the surgeons of the Massachusetts General Hospital and his application for a patent which would have given him a quarter of all the charges for performing operations in the U.S.A. antagonised all his colleagues.

Morton was a little man with a little mind whom petty motives had led to a great discovery and he exploited it to the full. He would not admit his indebtedness to his old friend and teacher, Wells. To Jackson, for his suggestion that the ether must be pure, he gave grudging admission of help. As Morton's friend, Dr. Henry Bigelow said of him: "He was not a man of much cultivation or science." But when Jackson wrote to the French Academy of Sciences and other European societies and claimed that he was the sole discoverer and that "a dentist of this city" was simply his agent, there began a bitterness and hatred between these two men which has seldom been equalled in any other field of science. The whole ether controversy arose from the battle between Morton and Jackson —a fight characterised by dishonesty, bad taste, and double dealing. It was carried to the United States Congress, Morton asking for a $100,000 reward. No other discovery has been characterised by such meanness and such spite.

Morton was only 27 years old when he demonstrated ether anæsthesia. He spent the next seventeen years of his life explaining and defending his claim to the discovery. He wrecked himself financially and impoverished his family in an effort to exploit his patent and to collect a reward from Congress. When finally, in 1862, Congress rejected his claim, mainly because of the rival claims of Jackson, Wells, and belatedly Crawford Long, Morton retired to his farm, broken in health and financially ruined. Here he lived in squalid poverty for six years until 1868, when a new pamphlet of Jackson's on 'his discovery' caused Morton to have a fatal stroke. He was 48. Jackson, who was so brilliant and so proud of his intellect, spent the last seven years of his life in an asylum.

The history of medicine is only a minute part of the history of the human race and the discovery of anæsthesia a tiny fraction of the evolution and progress of medicine. Nevertheless, in the reduction of the sum-total of human misery the boon of anæsthesia must stand pre-eminent. The one happy, grateful look which answers the news that all is over can have no value placed upon it—alone it is worth a lifetime of exertion. History often gives the award to a single individual, although many may contribute to a discovery. In the discovery of anæsthesia history has singled out Morton for special praise. Of him it can at least be said, he translated the dreams and theories of others into practical realities. He was not a man with many lovable qualities, but whatever the force which drove him on, either base mercenary motives or high ideals, there is no doubt that by his untiring efforts, his courage and tenacity of purpose, he has left mankind a priceless gift—"the greatest single gift ever made to suffering humanity."

THE STORY OF THE ULSTER HOSPITAL

THE SCOTT-HERON LECTURE OF THE ROYAL VICTORIA HOSPITAL, BELFAST

29th October, 1959

By **ROBERT MARSHALL, M.D., F.R.C.P.**

Honorary Consulting Physician, The Royal Victoria Hospital and The Ulster Hospital for Children and Women, Belfast

MR. CHAIRMAN, LADIES, AND GENTLEMEN,

It is to me a source of very great pride and pleasure to be chosen by the Staff of The Royal Victoria Hospital to give the Scott-Heron Lecture, and, Sir, your kind words do much to allay the acute apprehension which afflicts me at this moment.

Francis Hugh Scott, whose bounty has led to the establishment of this lecture, was born in 1865, the son of Robert Scott and Caroline Louise Heron. He was a student of this Hospital, where he won the Malcolm Exhibition, and I am told that he was always particularly proud that he won the Students' Medal at the Ulster Hospital, thus forming a link between himself as our benefactor and the subject of the 1959 lecture. He practised for fifty years in Saintfield, and died in 1946 at the ripe age of 81 years. He was a man of great erudition, with a passion for books. I am old enough to remember that my own teachers held him in great esteem. His bequest was made for the purposes of medical education, and I submit that it comes within his generous provision to look back at the origin and to study the progress of the little hospital which he loved so well.

It has been said, probably by Mr. W. M. Thackeray, that "If you want to make a thing really dull, say all there is to be said about it." This is one danger which I may evade this evening, because so much of the early history of the Ulster Hospital is already lost. It was, probably, the first children's hospital to be opened in Belfast, and the story which I shall now try to tell you is one of struggle and achievement, marred by tragedy and frustration. So much has happened in the eighty-seven years which have elapsed that I can spare but little time to remind you of the civic and sociological background against which the Hospital had its origin. Belfast then had a population of about 220,000 people (almost exactly half of our present population), and was in many respects a thriving and prosperous town. The Belfast General Hospital, now The Royal Victoria Hospital, had been founded in 1792, and at the time I speak of had approximately 176 beds for adults. There were children among the inmates of the workhouse and infirmary on the Lisburn Road, but there is little information about the provision which was made for them there. In January, 1871, there were 2,743 persons in that institution, of whom 448 were presumably children,

because they were housed in the school building. In 1872 the Board of Guardians advertised for a healthy, intelligent woman to be a nurse for them, at an annual salary of £10. 8s. resident. The standard of nutrition and care cannot have been high, for the weekly cost of a healthy adult inmate was 1s. 6¼d., of the sick in the infirmary 2s. 9d., and in the hospital 3s. The Belfast Charitable Institution, now known as Clifton House, had also a number of destitute children living there, and in 1872 there were fifty-one such residents. Dr. R. W. M. Strain tells me that hospital accommodation was available for them when they were ill, but they were, for the most part, healthy children who were being taught useful trades. The Charitable Institution stopped taking children altogether in 1879. Even in London the position was far from good. The Foundling Hospital had been opened as early as 1740, but the mortality rate for many years was as high as 75 per cent., and even in the latter half of the eighteenth century, of 15,000 children admitted in four years, 10,000 had died. The Great Ormond Street Hospital for Children was opened with ten beds in 1852, and the Sick Children's Hospital in Edinburgh in 1860. Dublin can claim priority, for its Institution for Sick Children, now the National Children's Hospital, dates from 1821. It was not until 1881 that the Liverpool Society for the Prevention of Cruelty to Children was formed, to be followed by the London Society in 1884. The idea had originated in America, where an early prosecution for cruelty to a child had to be brought under the Animals' Act, on the grounds that a child is an animal with a soul. The Belfast Branch of the N.S.P.C.C. was not founded until 1891, although the Belfast Society for the Prevention of Cruelty to Animals had flourished long before any hospital for children had been thought of here.

It has become a cheap and nasty habit to sneer at the Victorian era, but perhaps future historians, with a better sense of perspective, will appreciate that the latter half of Queen Victoria's reign was the dawn of an age when people began really to care for the welfare of children other than their own. It would make a tempting subject for research to try to trace the causes of this new and splendid phase of civilisation, and we shall see, as our tale unfolds, the contrast between the Foundling Hospital in London in the eighteenth century and our tiny hospital at 12 Chichester Street in the nineteenth. Our research worker would probably find that the causes were partly economical and political, but surely they were in part due to the advance in medical knowledge and even more, I believe, to a spiritual awakening to a sense of communal responsibility.

The birth of our hospital is in itself a mystery, and one which may never be completely unravelled. This is because the minutes of the Committee of Management for the first twenty-three years of its existence are missing, that is, from 1872 to 1895, and the Medical Staff Minutes are missing until 1883. Every now and then we read in the papers that some individual has made history. Sometimes we forget that we ourselves are continuously making history, if not by individual achievement, at least by the sum of our communal behaviour. Unfortunately, we forget how important it is to record our actions, and still more, how important it is to make these records sufficiently ample and to preserve them once they are made. In the task which I have undertaken for this

lecture I have, fortunately, had access to all except two of the Annual Reports, from the first one dated 1873-1874 until the current one, which records the year 1958. It was only from a search of the available newspapers of the period, the "Belfast News-Letter" and the "Northern Whig," that I was able to ascertain the following facts. It was in October, 1872, that the Ulster Hospital for Children was first thought of, but nothing seems to have been done for some months, and during this time two entirely separate groups of charitable persons were each intent on creating a hospital for children. I searched in vain in the newspaper files for 1871-1873 for any appeal for funds, or for letters to the editor suggesting the formation of such a hospital. The "Northern Whig" of 10th May, 1873, reported a meeting of gentlemen, held on 9th May, to institute a children's hospital in Belfast. This was to become the Belfast Hospital for Sick Children. There is quite a long account of the meeting in the "Whig," but no mention of it in the "News-Letter," which is surprising, because the Mayor of Belfast, Alderman James Alexander Henderson, proprietor of the "News-Letter," was the Chairman of the meeting. He then said: "There is no such institution (as a children's hospital) in Belfast." On the 24th May the "Whig" published a leader supporting the Belfast Hospital for Sick Children, and made no mention of any other hospital. It is definitely recorded that the Belfast Hospital for Sick Children was opened at 25 King Street on 2nd June, 1873. When I read this I felt convinced that this, and not the "Ulster," must have been the first hospital, but the "Whig" of 1st August, 1873, reports a meeting to form the Ladies' Committee of the Ulster Hospital for Children, and states that: "The ladies having inspected the premises (at 12 Chichester Street) were unanimous, not only of the usefulness of the proposed charity, but the suitableness of the premises for the object in view." Dr. John Martin, who was present, stated that: "Already 101 new patients had attended the out-patient department. There had been 44 in the first week, with a large increase in each succeeding week, as the ladies could see by the case-book open before them." So that it is probable that the Ulster Hospital won the race, but by a very short head. The newspapers do not mention the actual opening of either hospital, which is surprising, because they could give space to the activities of other hospitals, and of such occasions as the seaside excursion of Knock Methodist Sunday School, and the doings at Ballygrainey Presbyterian Church Annual Social Meeting. Indeed, on 5th June, 1873, the "Whig" devoted three closely-printed columns to verbatim reports of the speeches at the Belfast Society for the Prevention of Cruelty to Animals. On 22nd July a brief note in the "News-Letter" announced that His Excellency the Earl Spencer, Lord-Lieutenant of Ireland, had graciously expressed his intention of becoming Patron of the Ulster Hospital, but, in spite of this distinguished patronage, it is clear that King Street got off to a better start financially than Chichester Street, because they got £1,155 in the first year, of which they spent £642, whereas the Ulster Hospital collected only £343, and spent £379. It is quite clear that the Ulster Hospital at this early stage approached the Sick Children's Hospital in the hope of amalgamating the two charities, but without success, because King Street had formed the impression that Chichester Street

proposed to treat women as well as children, and they said "they would as soon take cases of cancer as cases of women." Later in the year the Ulster again made approaches, because they were anxious that the public should not have their interests divided on a charity of so much importance. It is recorded in the "News-Letter" of 9th September, 1873, that all the King Street terms would be agreed to except (a) that which involved the rejection of one person of the Ulster medical staff, (b) the rejection of co-operation with dispensary doctors, which was part of the Ulster Hospital plan, and (c) the objection to the holding of out-patient sessions in evening hours to suit the convenience of working people. I regret that the Ulster Committee thought it necessary to add that "the strong language of the Secretary of King Street Hospital seems to be by no means warranted."

CHICHESTER STREET 1873

Now we must go to 12 Chichester Street to look at a house which had just opened its doors as the Ulster Hospital for Children. Just as James McDonnell, himself a doctor, was the prime mover in the foundation of what is now the Royal Victoria Hospital, so it was a medical practitioner, Doctor John Martin, who deserves the name of founder of the Ulster Hospital. He was the son of Doctor James Martin, of Newtownards, and was born in 1839. He studied in Glasgow, but became a L.R.C.S.I. in 1858 when 19 years of age. Shortly afterwards he was appointed medical officer of the Fivemiletown Dispensary, and it was not until 1868 that he completed his qualification by becoming

L.K.Q.C.P.I. He moved to Belfast, where he practised at Clarence Place, at the western end of May Street, and was a Dispensary Medical Officer for sixteen years. He was not ashamed to beg for his charity, because some of the early annual reports show that he must have gone almost from door to door of the shops and warehouses in that area of the city, and, for example, in 1880 he personally collected £48 from sixty separate subscribers. He gave up his active work as a medical attendant of the hospital in 1876 for reasons of ill health, and he resigned from the Committee in 1881, because he disapproved of the opening of a gynæcological and maternity unit. He died of pneumonia in 1884, aged 45 years. His obituary notice in the medical press stated that: "He enjoyed an extensive practice, and was recognised in the profession as a gentleman of more than average abilities."

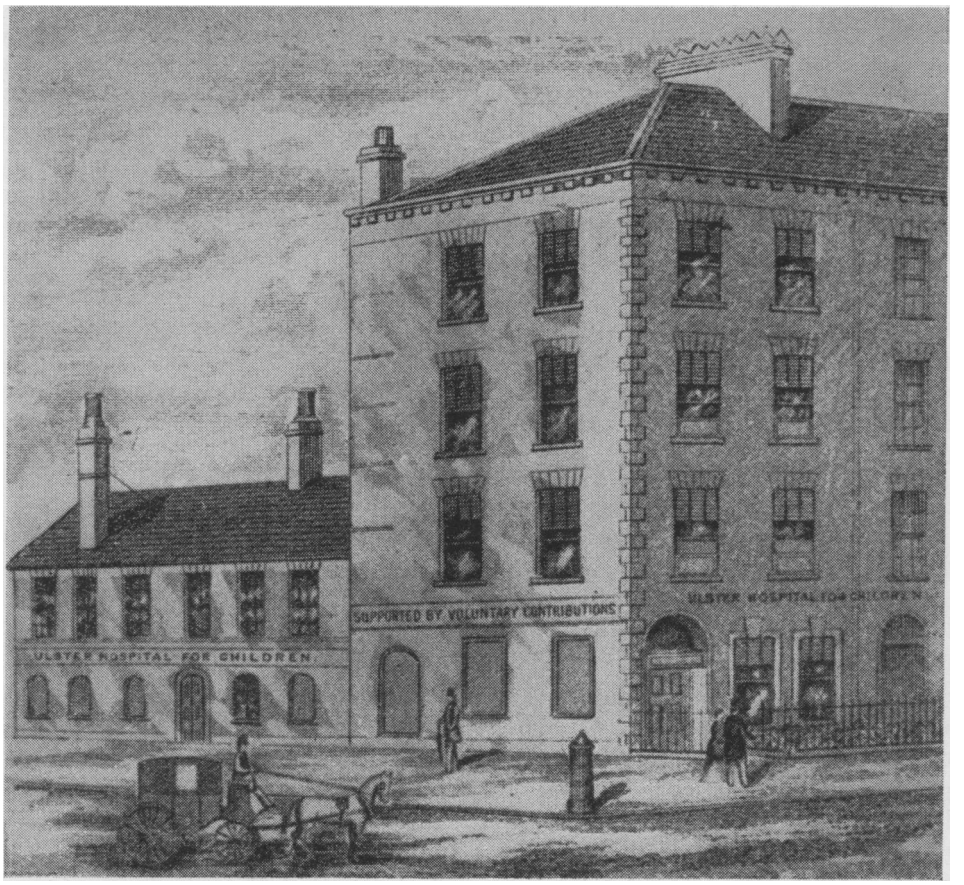
It was a tiny hospital to start with, fourteen cots, and it was considered that "No operating-room was necessary, because the General Hospital in Frederick Street could meet all demands." The first annual meeting was held on 2nd September, 1874, and the first report presented. The Duke of Abercorn, then Lord-Lieutenant of Ireland, had become our patron, in succession to Earl Spencer. No fewer than thirty-five rules of the hospital were printed, the first of which stated that "The word of God shall be free throughout the hospital." This was not altered for twenty-eight years, when, in 1902, against the will of some clergymen, it was replaced by the more usual rule to the effect that "clergymen of all denominations are to have free access at all suitable times."

Seven of the thirty-five rules referred to the Matron, and one imposed on her that "she was not allowed to leave the hospital, without the permission of the Management Committee, save on Sunday from a quarter to seven p.m. until 9 o'clock p.m., and on Wednesday, from 7 p.m. until 9 p.m." Another interesting rule was that all nurses must be able to read and write. In addition to the 6,700 visits of children to hospital, 367 children were visited at their own homes during the first year, and it was noted that "The visiting and treating of patients in their own homes cannot be too much encouraged, both as a saving to the hospital, and as encouraging home frugality." (This last needed but little encouragement, as most people's lives were frugal enough in those days.) These visits were not domiciliary consultations, as we know them now, but apparently there was an attempt to correlate the work of the hospital doctors with that of the general practitioners in the neighbourhood.

What sort of conditions did they treat, and with what results? For some years it was the practice to print classified lists of the diseases treated in hospitals. The principal difference between those early days and the present time is that when there was a vastly greater incidence of tuberculosis, particularly in its effects on bones and joints. There are recurrent references to deaths from burns; a problem which still confronts us. The sulphonamides and the anti-biotics had not been discovered, but the death rates were surprisingly low. Occasionally the Annual Medical Report almost apologizes for a death-rate rising to 5 per cent. by noting that some patients were moribund on admission. Here I may claim

that it has always been our tradition that no seriously ill child must ever be turned away.

In 1876 the Hospital left its cramped premises in Chichester Street for more commodious ones in Fisherwick Place (exactly where the Ritz Cinema now stands), and there was space for twenty-two cots. How absurd it was that the



FISHERWICK PLACE 1876

two children's hospitals in Ulster were only four hundred yards apart, in Fisherwick Place and King Street. We read in the Fourth Annual Report that "two ladies raised the sum necessary for furnishing of the large ward in a style as suitable and elegant as to elicit marked encomiums from the vice-regal party." The Lord-Lieutenant of Ireland, the Duke of Marlborough, was then our patron.

Of even greater importance was the fact that Dr. Robert Esler, the visiting physician, was joined by Dr. William Whitla. Robert Esler was the author of the Book of Belfast for the Meeting in 1884 of the British Medical Association.

He served the "Ulster" for thirteen years before migrating to London. This was William Whitla's first honorary appointment on a hospital staff, for he had not long completed his tour of duty as a houseman in Frederick Street, and one can imagine the tornado of energy and enthusiasm that swept into Fisherwick Place. It is recorded that "He and Dr. Esler uniformly visited the intern patients at least once every day," thus establishing a worthy tradition. Furthermore, he was the first of a long line of physicians and surgeons who served their apprenticeship in the "Ulster" before being appointed to the "Royal" or to the Union Infirmary, now the Belfast City Hospital. Whitla, Lindsay, Calwell, McQuitty, McKisack, Houston, Turkington, Stewart, Hall, McCann; T. K. Wheeler, Sinclair, Mitchell, Stevenson, S. T. Irwin, McConnell, Purce, Calvert, Sinclair Irwin, Hunter, Withers, Wilson; Fielden, Geddes; Beath, Montgomery, Porter; C. G. Lowry, Greer, Macafee, H. C. Lowry, McClure; how proud I am to be able to add my own name to this list. All became members of the Royal Victoria Hospital Staff, and Holmes, McFadden, and Vincent went to the Belfast City Hospital.

As I have told you, until 1883 almost my only source of information has been the printed Annual Reports. In some of these space is wasted by verbatim reports of votes of thanks, and many interesting data are omitted. Occasionally one gets a glimpse of things to come, as in this pathetic story, which seems to show that even then the Ulster Hospital deplored the separation of mother and child.

1877-78 REPORT, PAGE 7

"The young mother of an only child had lost her husband by death. The support of mother and child was earned in a mill. Bereaved of her husband, she seemed to have multiplied her affection, many times, for her child. Suddenly, like a robber seizing his victim by the throat, that terrible scourge of children—the croup—attacked the child. She heard how successfully the scourge had been grappled with and baffled by the physicians of our hospital, and thither the frenzied mother, almost in despair, hurried with her dying child. She brought it to our care, but from it she would not be carried. We received the child as a patient, and the mother as a guest. For days it hovered between life and death. By the Divine blessing on the skill of the physicians and the care of the nurses the little one was pulled through; and at the end of ten days the mother, whose shadow never ceased to flit behind the curtains of the little sick one's cot, bore away joyfully her child, full of gratitude to God and to those who, under Him, had been instrumental in saving its life." Truly a Dickensian description.

In 1878 approaches were again made to the Belfast Hospital for Sick Children with a view to amalgamation, but without success. Three years later, in 1881, the Hospital, hitherto exclusively for children, embarked on a new adventure. It was decided to devote ten beds to the diagnosis and treatment of diseases of women, and to appoint a midwife for domiciliary midwifery. Dr. Esler and Dr. B. Spedding were to take charge of gynæcology, and to collaborate with four dispensary doctors, Torrens, Clements, Wadsworth, and Coates, for midwifery. Dr. S. B. Coates was the father of Dr. Foster Coates, our late colleague in

The Royal Victoria Hospital. Dr. John Martin and his wife retired from the Board because of this innovation. Professor Dill, who held the Chair of Midwifery in Queen's College, joined the Staff in a consulting, but most active capacity. Robert Foster Dill was the great-uncle of Field-Marshal Sir John Dill and great-grandfather of Miss Anna H. Martin, who was for several years our excellent physiotherapist. The teaching of students in midwifery, diseases of women and diseases of children was undertaken with great enthusiasm. Midwifery was taught in collaboration with the four dispensary doctors, each of whom took two students under his personal tuition, again a forerunner of the modern methods of collaboration with general practitioners. A detailed Prospectus was published, giving the names of the Staff and hours of attendance. As well as morning sessions evening out-patient sessions were held for the convenience of workers.

In 1884 it was decided to award a gold medal and a silver medal for competition by students. Professor Dill personally gave the first medals. Mr. J. L. Livingstone won the gold and Mr. G. S. Thompson the silver medal—the first such awards in the history of the Hospital. Mr. Francis Scott won his medal in 1891. These medals continued to be awarded at least until 1900, and the number of students increased gradually to twenty-eight—a large proportion of those in the Medical School. The Hospital was recognised as a teaching one by the Royal University of Ireland. Operative gynæcology was increasing, and in 1887 the Staff recommended that additional nurses should be employed when ovariotomies were undertaken, and in 1889, seventy years ago, the Staff recommended that the nurses' bedroom, adjoining the Women's Department, should be used when operations were necessary, and that the nurses should sleep in the Board Room, ordinarily used as Matron's sitting-room, or that the Board Room be used as a ward for operation cases. The latter alternative was adopted. Dr. St. Clair Boyd was our principal gynæcologist in those days. He served from 1889 until 1908.

It seems odd that when Dr. T. K. Wheeler retired in 1887 his place as a surgeon was taken by Dr. William Calwell, and similarly, in 1890, Dr. Thomas Sinclair was replaced by Dr. H. L. McKisack, and Dr. W. B. McQuitty came on to the Staff as a surgeon. (Calwell, McKisack, and McQuitty became physicians of eminence.) It is stranger still to imagine Dr. Thomas Houston as a gynæcologist, a specialty in which we also find Mr. Howard Stevenson. The Staff showed an amazing versatility, and a willingness to serve in any capacity where need existed. It is impossible to estimate the value of the varied experience thus gained, and I am sure it contributed to their later successes. In 1900, however, Dr. Mitchell proposed that, in future, candidates who were appointed as surgeons should not "switch" to be physicians, and vice versa.

In 1891 the great move was made to Mountpottinger, and Roundhill House, a pleasant villa in Templemore Avenue, was furnished (Fig. 3). As this new site was so far from the doctors' residences, it was decided to invite two local men to join the Staff, so Dr. R. W. Leslie, as surgeon, and Dr. J. D. Williamson, as physician, were appointed. Dr. Leslie became a physician and rendered faithful service for thirty-five years and Dr. Williamson for thirty-seven years.

In this year, 1891, Dr. Cecil Shaw established the Ophthalmic and E.N.T. Departments, which have been such an admirable feature of the "Ulster" ever since. In this connection I would like especially to recall the services of Dr. Isaac Davidson. Three years later Dr. A. B. Mitchell was appointed on the surgical side. This marked an epoch, for "A. B." played a tremendous part. The skill in orthopædic surgery which he developed laid the foundations of this important specialty, in which he has been followed by a succession of brilliant pupils, and

ROUNDHILL HOUSE 1891

which, incidentally, was to stand him in good stead in his war-time rôle of Surgeon to the U.V.F. Hospital.

One curious consequence of the move to Mountpottinger was that some of the doctors there signed a "round robin," protesting against the hospital being placed in their midst. I suppose they were afraid that it would lessen their not very lucrative earnings. One of their number soon afterwards was a candidate for an appointment on the Staff. He was not elected.

In 1894 the Honorary Staff offered to subscribe £10 if the Committee would grant an equal sum for the purchase of medical equipment. This was agreed, and for £10, one-half of the total sum made available, they purchased a Leitz microscope (costing £4), two dressing waggons, and a urinalysis stand.

In 1895 a chloroformist was appointed, but it was not until 1898 that Dr. Victor Fielden was appointed with the title of Honorary Anæsthetist.

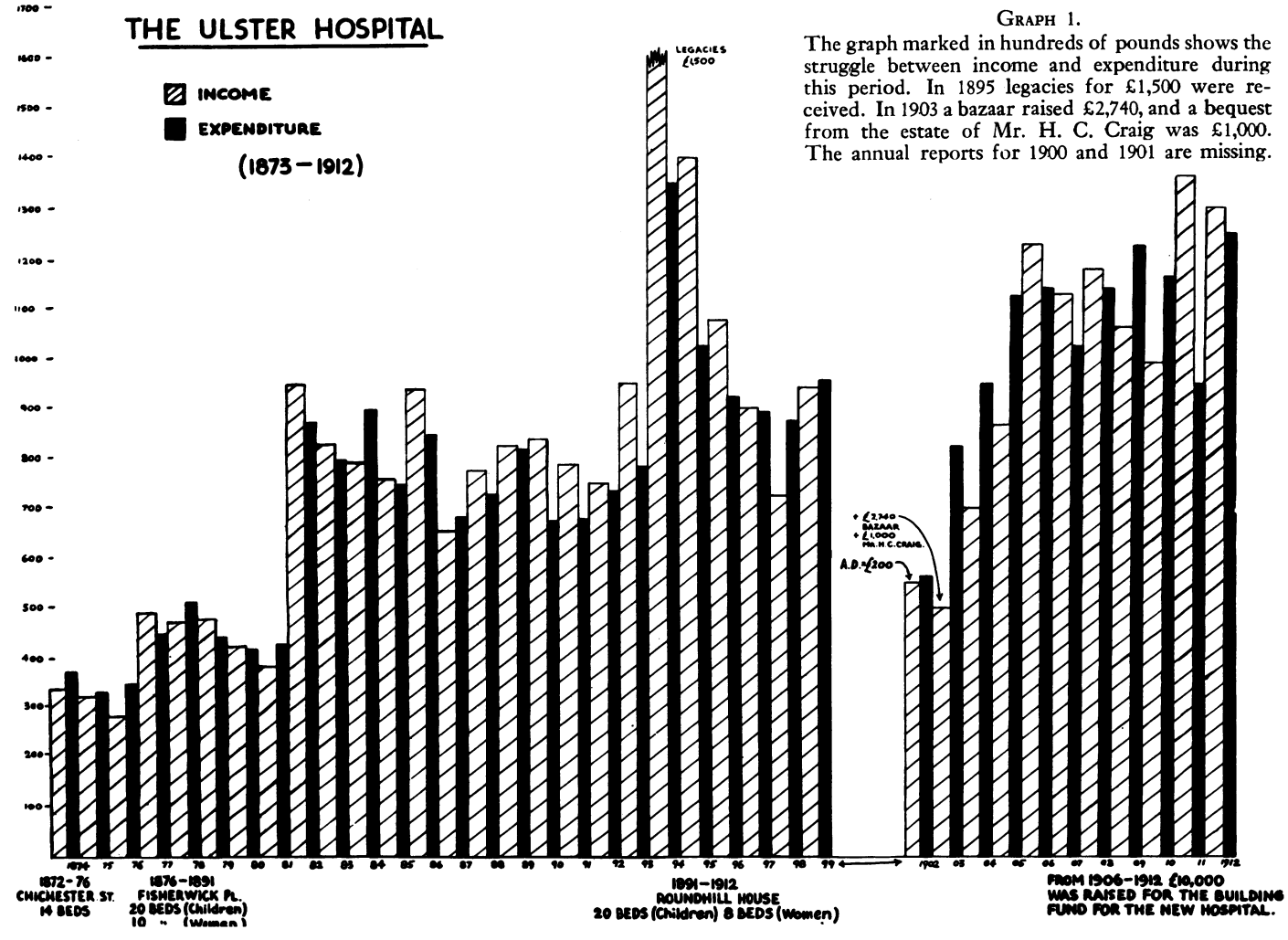
In 1900 the practice of giving medicines to out-patients was stopped, and soon afterwards a scale of charges was agreed with a group of chemists—medicines and lotions were priced at 1d. per oz. and ointments at 2d. per oz.

The new century (1901) opened auspiciously, because on 18th January a new Matron was elected out of thirteen applicants. She was Miss E. S. Tate, whose name will not soon be forgotten. For many years she was not only Lady Superintendent of Nurses, but the sole administrator, and on occasion midwife and doctor. (It was not until 1914 that a house surgeon was appointed.) Her salary slowly rose from £50 to £150 before she retired in 1927. It was truly said of her that "she enhanced the reputation of the Hospital" and that "she won the love of all with whom she came in contact." The salaries paid to nurses in those days were ludicrous, especially when one considered the hours they worked and their comfortless quarters. In the earlier years probationers had to pay £15 for their training. This was not altered until 1904, and then owing to a dearth of applicants. Even in 1912, when "the new hospital" was built, the Lady Superintendent was to get £75 per annum, Sisters £28-30, Staff Nurses £24-28, and the District Midwife £35. Imagine doing about two hundred domiciliary confinements and all the necessary visits for this pittance! In 1898 it was reported that there had been no midwifery deaths for three years.

In March, 1903, the Honorary Staff produced some important rules, among which were that members were to be appointed for five years and eligible for re-election. (In R.V.H. the term was four years, a rule dating back to the foundation of the Hospital), but it was not until 1908 that it was decided that all candidates for medical posts in the Ulster Hospital must be M.D., or M.R.C.P., or F.R.C.P., all surgeons M.Ch., or F.R.C.S.; gynæcologists could have either senior medical or surgical qualifications *or* the degree of M.A.O.

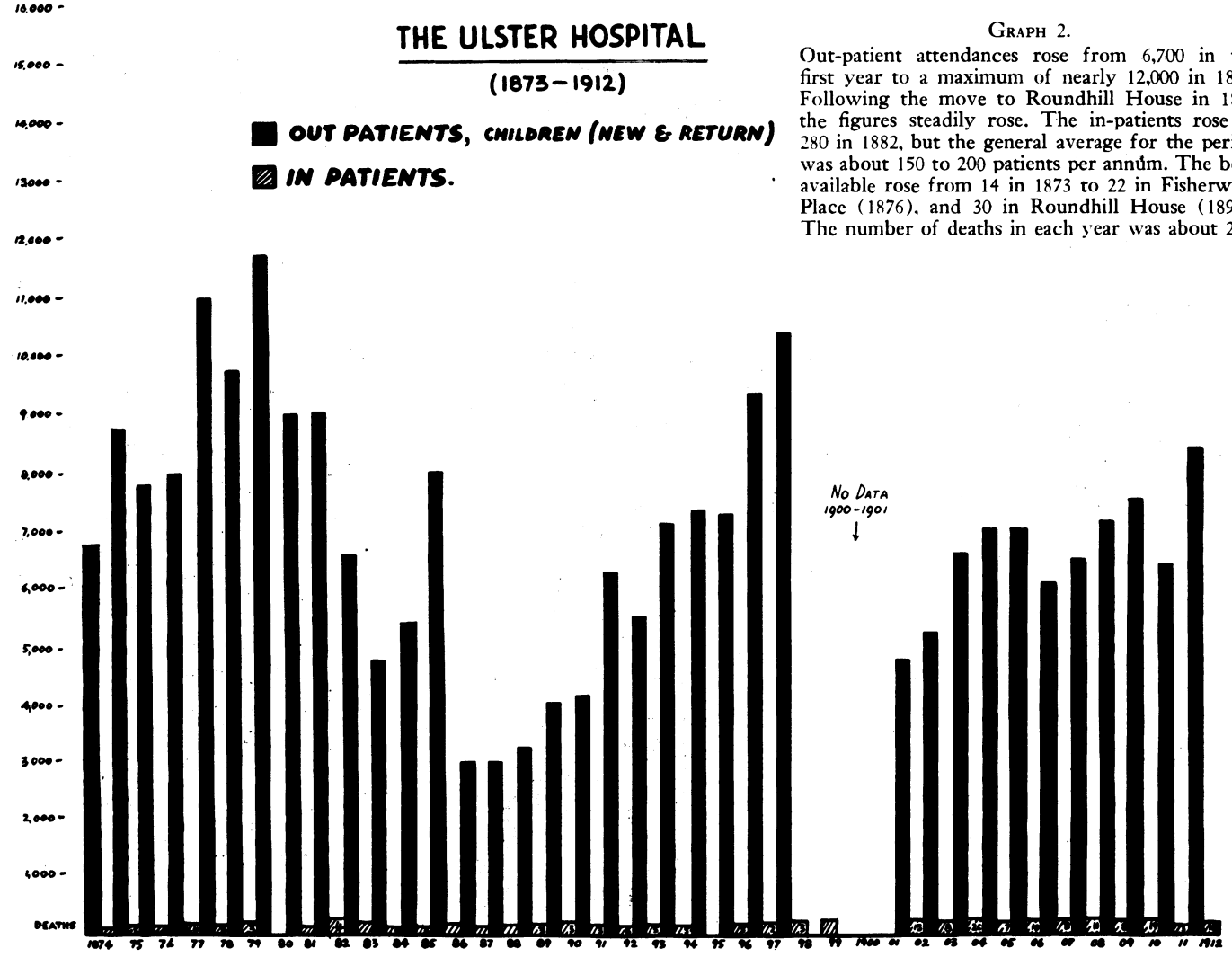
From the turn of the century it became increasingly imperative that a new building must replace Roundhill House, and a building fund was opened. The debt of £2,000 on the current account had first to be cleared, and this was done in the customary manner by organizing a bazaar, which was opend by the Lord-Lieutenant, Lord Dudley, and raised £2,740. It was decided that the new Ulster Hospital must have forty-four beds for children and six for women. The nursing staff, including eight probationers and two student midwives, was to number sixteen, with, possibly, four more for future developments. The medical staff sent in a complete list of the equipment they required—at an estimated cost of £137. 10s. 0d.

Throughout these first forty years of our history, from 1872 until 1912, the Management Committee had kept up a weary and continuous fight to obtain sufficient money to maintain the Hospital. It was a long apprenticeship in economy, and the graphs 1 and 2 show how closely income and expenditure ran neck and neck and the numbers of in- and out-patients. When things became too bad a special effort—usually a bazaar or sale of work—restored the balance.



GRAPH 1.

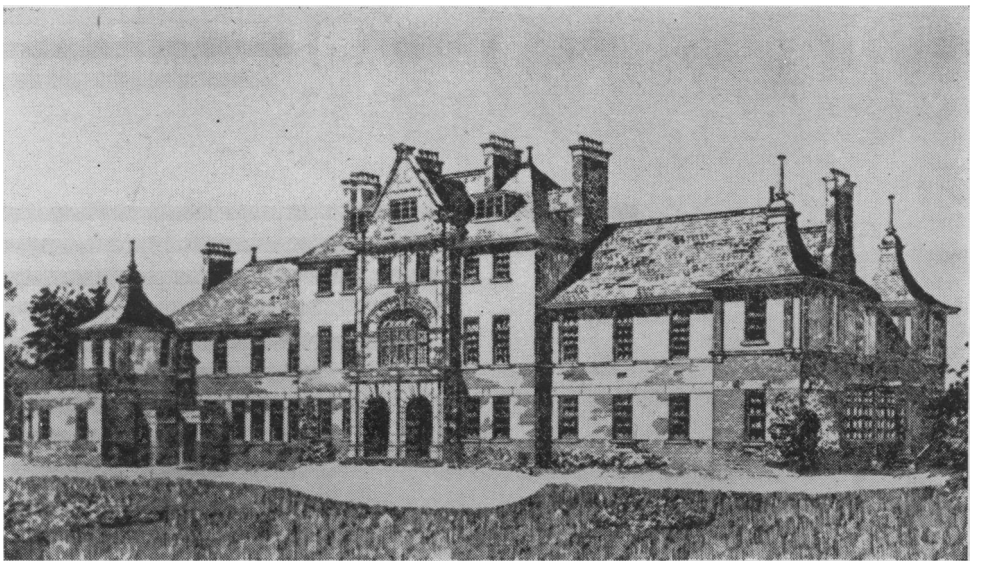
The graph marked in hundreds of pounds shows the struggle between income and expenditure during this period. In 1895 legacies for £1,500 were received. In 1903 a bazaar raised £2,740, and a bequest from the estate of Mr. H. C. Craig was £1,000. The annual reports for 1900 and 1901 are missing.



GRAPH 2.

Out-patient attendances rose from 6,700 in the first year to a maximum of nearly 12,000 in 1879. Following the move to Roundhill House in 1891 the figures steadily rose. The in-patients rose to 280 in 1882, but the general average for the period was about 150 to 200 patients per annum. The beds available rose from 14 in 1873 to 22 in Fisherwick Place (1876), and 30 in Roundhill House (1891). The number of deaths in each year was about 2%.

Building operations were begun by Messrs. Thornbury to the plans of Messrs. Tulloch & Fitzsimons, the architects, when £10,000 had been lodged in the bank —thus complying with Mr. Gustavus Wolff's conditional gift of £1,000. The Jaffe family also gave £1,000, and Mrs. McMordie raised £2,000 at her fête. A temporary hospital had been built, St. John's Vicarage had been lent, and between April, 1911, and May, 1912, the Hospital was completed, ready to be formally opened by the Countess of Shaftesbury on 23rd May. How pleased I am to tell you that the little girl who presented the bouquet to the Countess is here this evening to recall the memory of that tremulous and exciting moment



TEMPLEMORE AVENUE 1912

And while the walls of the new building are drying, the new tiles are shining, and the new counterpanes are still unruffled, let us pause for a moment to pay tribute to those who had done so much to make all this possible; not only the doctors, and I have named but a few of them, who gave their time and also their money, with no thought of future remembrance; not only the nurses, underpaid and often underfed, whose selfless devotion passeth understanding, but also the bygone benefactors, the Craigs, the Jaffes, the Sinclairs, the Mitchells, and the Boas family and so many others; and no less warmly those less well endowed, whose small gifts were a greater sacrifice; and those who organised jumble sales and little concerts, as well as great bazaars, and those dear ladies who tramped weary miles through suburban avenues collecting florins and shillings from door to door. Looking back, one is impressed by the struggle to obtain money for this small, but splendid charity, and here may I mention that between 1913 and 1947 the "Ulster" derived £23,685 from the street collections

on Alexandra Day. From 1931 until 1947 the allocation from the Students' Day collections was over £2,000. Similarly, an increasing amount was raised by the collections of the workpeople in the various factories. There were the special efforts for special purposes, like the X-ray Fund and the various rebuilding funds. You may think it rather pitiable that the proper care of the sick in hospital should be dependent on such exiguous sources, but one aspect of the matter must not be forgotten, that is, the very proper human desire to help other people, and, as well, the comradeship created by work for so good a cause. Neither should we forget those almost anonymous people, the wardsmaids and cooks and porters who have served our Hospital so faithfully.

There is another group which must be mentioned. Especially in the early days, ministers of religion have helped the Hospital, not only by making encouraging speeches at annual meetings, but in many other ways. In the eighties the Reverend John Clarendon was Honorary Secretary, and was succeeded by the Reverend F. Graham. Canon Joseph Stewart not only served on the Committee, but bequeathed a considerable part of his estate to the Hospital. The Reverend John MacDermott, and, more recently, the Reverend C. M. Young, were among many staunch clerical supporters. It came as rather a shock to find that in 1903, when funds were low, and a circular letter was sent to all Protestant clergymen in the city, asking them to appeal for our charity from their pulpits, only three replied at all, and two of these were definitely in the negative.

But on the list of benefactors now being compiled for exhibition in our new building the names of many Churches, and their Guide and Scout Troops and Brigades, will be found. If I had to single out *one* name for special mention at this stage it would, of course, be Ernest A. Boas. He became Honorary Secretary on 6th September, 1904, and in this capacity, and later as Chairman, he gave his heart to the Hospital until he died in January, 1925. It was mainly due to his untiring energy and enthusiasm that "the Wee Hospital" was built. Those who designed his memorial tablet on its staircase were justified in using the words inscribed to Christopher Wren in St. Paul's Cathedral: "Si Monumentum Requiris, Circumspice."

Thus ended the first forty years of our history, and here we may tabulate this and the subsequent periods until the present day.

1873–1912	Chichester Street Fisherwick Place Roundhill House	*The Period of Penury and Hope.*
1912–1941	"The Wee Hospital" in Templemore Avenue	*The Period of Achievement.*
1941–1958	"A Hospital in Lodgings" Saintfield Haypark and the Ruins	*The Period of Tragedy, Frustration— and Renewed Hope.*

In 1912, therefore, the Ulster Hospital seemed to be well set for success. The Committee was a good one, with Mr. John Stevenson as Chairman, Mr. R. A. Mitchell as Honorary Treasurer, and Mr. Boas as Honorary Secretary, and the medical team was a strong one. The veteran physicians, R. W. Leslie and J. D. Williamson, had the ill-fated Fred Smyth as honorary assistant physician, and on the surgical side there were A. B. Mitchell, Howard Stevenson, and S. T. Irwin, with Marion Andrews and C. G. Lowry as gynæcologists, and Thomas Houston as pathologist. H. H. B. Cunningham (founder and first C.O. of Queen's University O.T.C.) as ophthalmic surgeon, and Victor Fielden as anæsthetist, completed the team.

The Board Minutes tell us that Messrs. Thornbury's estimate for building the Hospital was £8,007, that is, about £160 per bed. Today's price per bed is about £5,000. The cost of the first year's working of the Hospital was £1,600. Miss Tate's salary was raised by £10 a year. In 1912 the G.P.O. offered a telephone service for £6 per five hundred outgoing calls—last year's telephone bill was £437. Another short note in the minutes reported that practically the whole of the inner walls of the Hospital were distemperd for £6.

We also read that in 1913 a masseuse was appointed, and a room fitted as a gymnasium—the first in any Belfast hospital. Nineteen hundred and thirteen was notable, too, because Mr. T. S. S. Holmes joined the Staff as gynæcologist.

In 1914 came the war. Some members of Staff and almost all the clinical assistants went off an active service, and for the first time a House Surgeon was appointed in the person of Dr. Elizabeth Robb. She stayed for six months, and then "asked permission to take up more lucrative employment," and I, for one, don't blame her, for 8s. a week, even with board and lodging, can scarcely be described as lucrative. Soon the long lists of casualties appeared. Among those killed was Mr. Boas' only son. His kinswoman, Miss S. R. Praeger, created a terra-cotta plaque to adorn the balcony which was erected in his memory.

Some years later, when we decided to revive the custom of awarding a gold medal for competition by students, we obtained Miss Praeger's permission to reproduce the children's figures. It is, I think, the most beautiful medal I have ever seen. The first winner was Miss Ethel Bamford, and the photograph here shown is of the medal won in 1923 by a student called Ian Fraser.

The words inscribed on the upper part of the plaque are:

"THEY SHALL RETURN AGAIN WITH REJOICING
BEARING THEIR SHEAVES WITH THEM."

They are derived from Psalm 126.

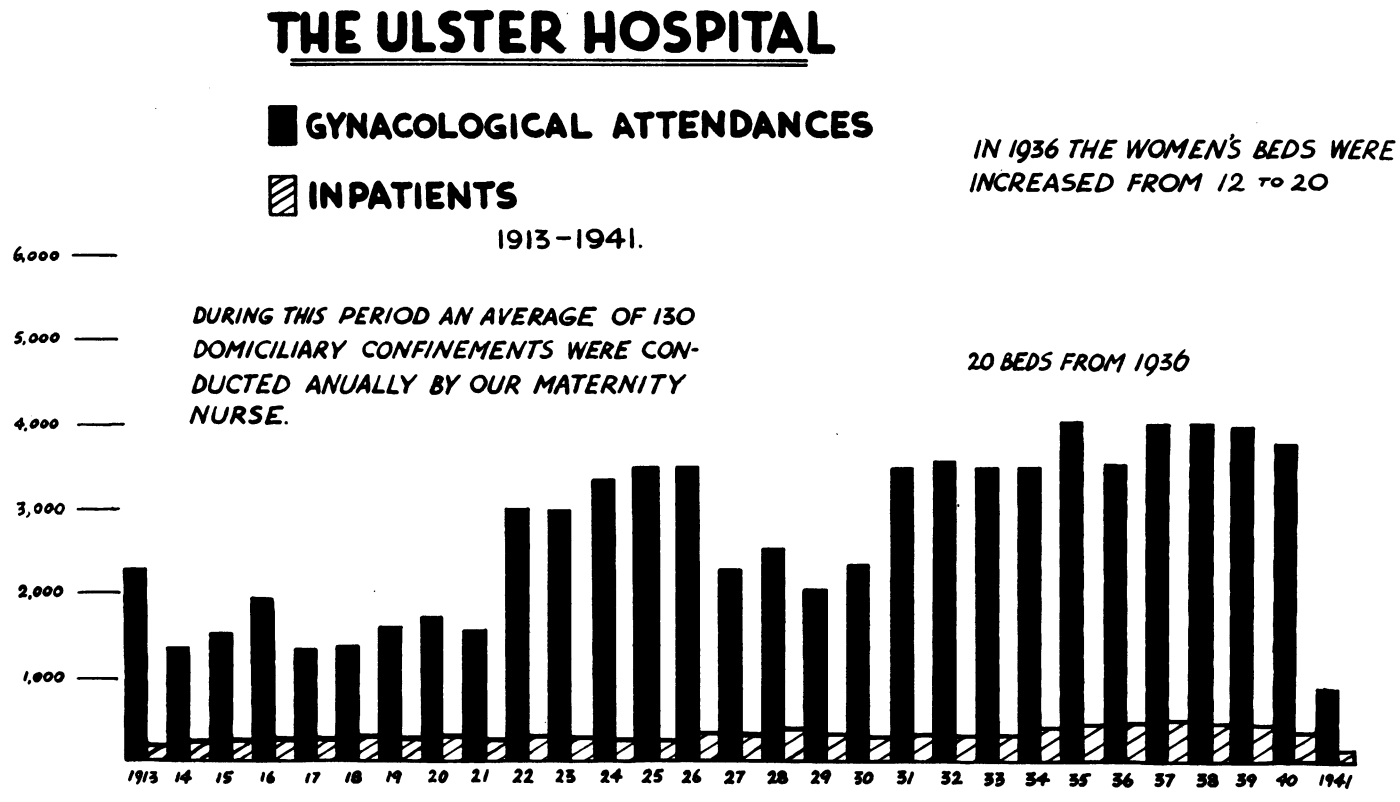
THE MEMORIAL TO 2ND-LIEUT. ERNEST GEORGE BOAS

THE STUDENTS' MEDAL

It was in February, 1919, that the Staff informed the Committee that if only the Hospital had an X-ray apparatus its equipment would be second to none, so it was decided to purchase this at an estimated cost of £620, and some months later Dr. R. M. Beath became our Honorary Radiologist. A special X-ray fund raised £3,650. Within the next year or so there were some further changes. Mr. Hardy Greer succeeded Mr. C. G. Lowry, who had become Professor of Midwifery. Dr. Stafford Geddes became our anæsthetist, and the surgical staff was further strengthened by the appointment of Mr. R. J. McConnell and Mr. G. R. B. Purce. When Dr. F. C. Smyth was tragically killed in a motor accident Dr. S. I. Turkington and I became assistant physicians. "Turkey," as we always called him, served until we were both appointed to the Royal in 1924, but I was reluctant to leave, and stayed on the Acting Staff until 1952. Since I have mentioned myself, may I add that I have never belonged to any community of people where I found such perfect harmony. The "Ulster" was, and is still in spite of its vicissitudes, "a happy ship." At our Staff meetings there was discussion, but never dissension, there was argument, but always agreement.

The post-war years were peaceful and progressive. Finance was the ever-present problem. The two largest benefactions were £10,000 from the estate of Mr. Henry Musgrave in 1922, and £5,000 from that of Mr. John C. White in 1929. When we asked for an electrocardiograph in 1924 the cost rather frightened the Committee, but Mr. J. E. Warnock collected £300, mainly from his legal friends, in a very few days. In 1925 Dr. Beath and Dr. Turkington retired, and were replaced by Dr. Montgomery and Dr. Simms. Mr. McFadden enrolled as an assistant surgeon. In 1930 the physicians became dissatisfied with the Hospital diets—for nurses as well as patients—fearing that they were less than adequate, and made detailed recommendation to the Committee, who were again alarmed, and estimated that the additional cost would be £360 per annum. Their own sub-committee soon agreed, however, and the improvements were made. I believe that our patients were well nourished and well cared for, and we had a long training in economy. It was in 1930 that Cecil Calvert joined us, at first as a general surgeon, and, until his untimely death, as our neuro-surgeon. In 1931 a dental consultant was appointed in the person of Mr. R. G. C. Acheson.

At or about this time two reforms affecting nurses were instituted. In 1931 we decided that all probationer nurses must be medically examined and X-rayed *before* entrance, instead of after a lapse of some months, and in 1937 a Nurses' Superannuation Scheme was evolved. Salaries were slowly rising, but were still absurdly low. In 1925 Mr. Holmes retired and Mr. C. H. G. Macafee was appointed. Mr. Macafee became the third Professor of Midwifery to have close association with our Hospital. The Staff was justly indignant when, in 1932, a member of the Board suggested that, because of financial difficulties, the Gynæcological Department should be closed. Nothing more was heard of this idea when it was shown that, as well as some thousands of out-patients, 284 new patients had been admitted in one year to twelve beds, being 23 new patients occupying each bed in the course of the year (graph 3).

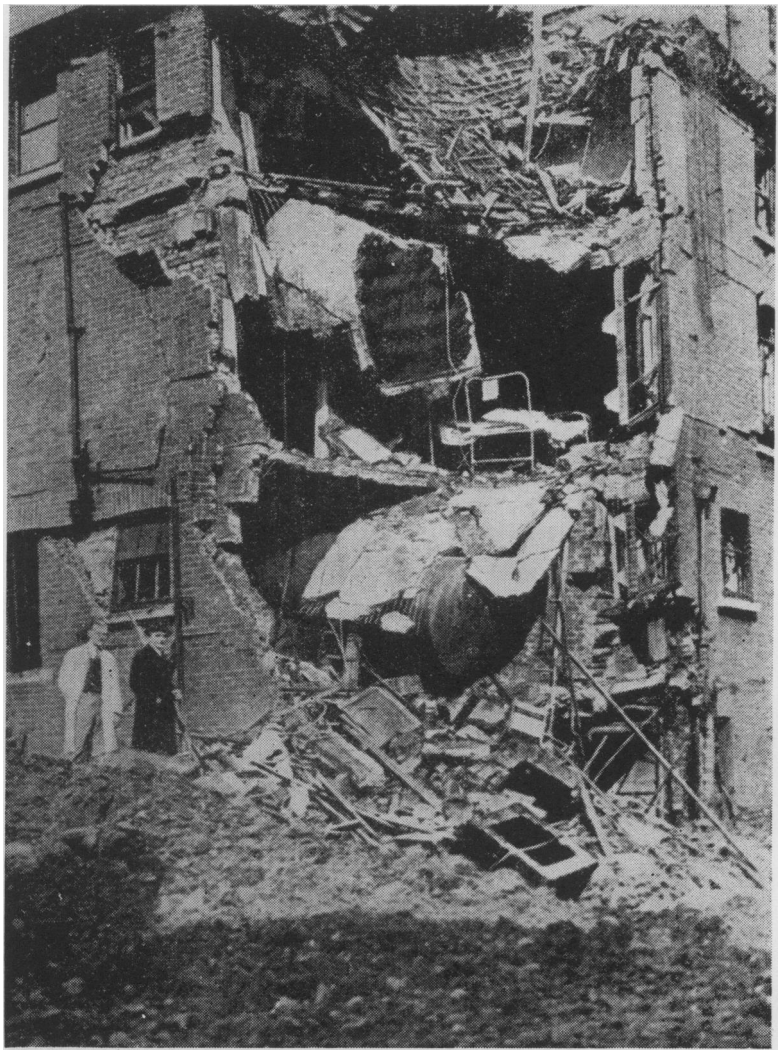


GRAPH 3.

Gynæcological out-patients rose from 2,000 or less to about 4,000 during this period, and in-patients rose from 150 to 400.

Unlike the sundial, I cannot be content to count only the happy hours, but one brief glimpse of sunshine must be recorded, if only to show you what a privilege it was in those days to be elected to the Ulster Staff. I shall read you an excerpt from the Staff minutes of February, 1936: "At the conclusion of the official business, So and So returned thanks for appointment, and to mark the occasion presented a bottle of whiskey to the Staff. The Chairman suitably acknowledged the gift, and, the cork having been withdrawn, So and So's health was drunk." I shall give no clue to identity except to say that So and So was not Dr. Hilton Stewart, who had already reinforced us in 1928. Whether this stimulant renewed our energies or not, I do know that for some time afterwards the Staff minutes are full of references to plans for extension, and on 23rd March, 1937, the Duchess of Abercorn opened the new wing, to be allotted mainly to gynæcology. But these wards, and the theatre which had been designed with such loving care by Mr. Hardy Greer, with the assistance of a professional architect, had a short life. By 1938 we were already involved in tentative air-raid precautions, and when September, 1939, came, one did not require to be a Cassandra to predict that sooner or later Belfast would be bombed, and that because Templemore Avenue lies in the midst of the "munitions area" it would almost certainly be hit. Not only at the Ulster Hospital, but also at the Royal Victoria, the Committee and Staff instinctively placed air-raid precautions in the hands of Dr. F. P. Montgomery. Here he quickly showed that amazing flair for organisation which ultimately led him, on 10th February, 1955, to Buckingham Palace, to receive the knighthood which gave much pleasure to his friends.

During the first raid on 7th-8th April, 1941, the Hospital was sprayed with incendiary bombs, quickly dealt with by gallant hands. The second attack was on 15th-16th April, when a large bomb was dropped immediately outside the wall of the new wing, completely destroying it. One of our house surgeons, Dr. R. G. Brennan, had lain down for a few moments on a bed in an empty side ward, and, being a tidy lad, had taken off his shoes and put them under the bed. When the crash came his bed was poised perilously at the edge of the precipice, and his shoes, together with the stethoscope which he had had in his pocket, were found next morning at the bottom of the bomb crater. He himself sustained only a small scratch on his forehead, a truly miraculous escape from death. The Hospital, thus mutilated, maintained its function as a casualty clearing station, and members of the honorary staff continued in turn to sleep in the draughty premises at night. On 4th-5th May the Germans returned, and this time dropped an oil bomb on the roof, setting fire to the Hospital and virtually destroying it. Mr. R. J. McConnell, Mr. Ian McClure, Dr. Hilton Stewart, and Miss Isabel Dixon, our radiologist, were on duty on that occasion. Mr. McConnell produced what may best be described as a prose poem with occasional verses, recounting the events of that memorable night, and reflecting in every line the undaunted courage of the little band of doctors, nurses, students, and others who survived the ordeal. It was a source of great gratification to all of us that Mr. McConnell, Miss Aiken,



Photograph "Belfast Telegraph"

16TH APRIL 1941

and Miss Dixon received official commendation from His Majesty for their gallantry, and, as well as these, the Committee and Medical Staff very warmly commended Dr. Hilton Stewart, Mr. Ian McClure, and indeed all those who had been on duty during this, the most dreadful of the air-raids.

You will remember that after every heavy raid on any city in the United Kingdom a member of the Royal Family would visit that city, bearing a message of sympathy and renewing hope and courage. Our Royal visitor in May, 1941,

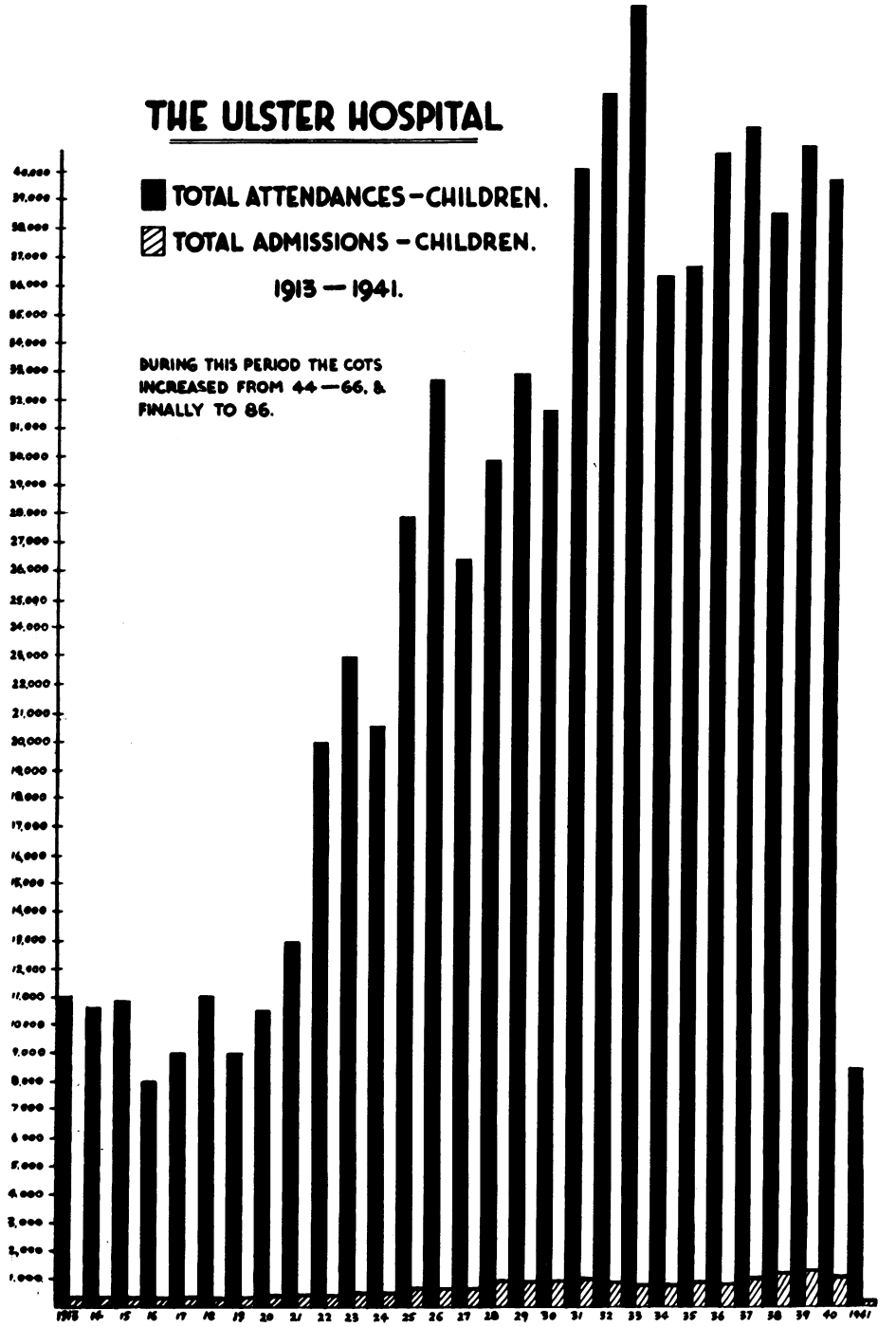
Photograph "Belfast Telegraph"

5TH MAY 1941

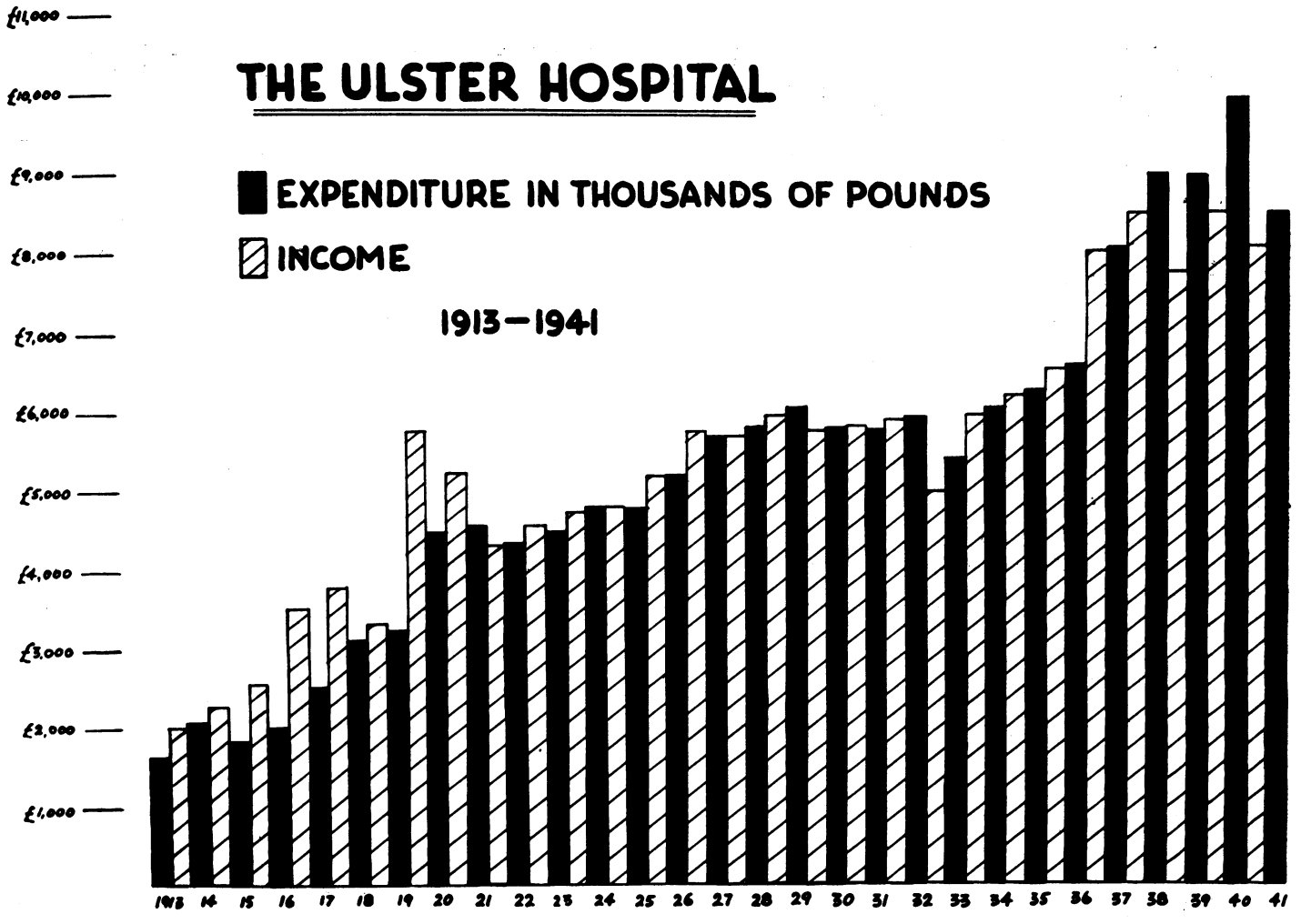
was Her Royal Highness the Duchess of Gloucester, whose friendly interest in the Hospital has never waned since then, and who will, we hope, formally open our new home. You can readily imagine how near we were to despair. These thirty years had marked real achievement, and our Hospital had become in number of beds not only the third largest voluntary hospital in Ulster, but had gained a high place in the affection and respect of the public. The graphs will

show the numbers of patients dealt with, and the relatively small cost to the community (graphs 4 and 5). I would draw your attention to one noteworthy fact; the very large number of children seen as new or old out-patients in proportion to our small number of beds. This is because at that time only the breadwinners were entitled to "medical benefits," although the British Medical Association had for several years urged the extension of such benefits to women and children. This meant that more children were brought directly to hospital by their parents, and were treated there for many maladies, surgical as well as medical, instead of being referred back to their family doctors for treatment after a diagnosis had been established. When the air-raids came we were fortunate in that we had already our children at Saintfield House, and I shall never forget the spontaneous and generous words of the Reverend Canon Blackwood-Price, the owner, when, hearing of our need, he at once said: "I think perhaps my house would suit you." We were fortunate, too, in having the splendid co-operation of Dr. McKelvey, of Saintfield, in the care of the children. In September, 1941, we obtained the use of Haypark, which had been a residential school for mentally defective children, and eighteen years later we are still there. In November, 1944, Saintfield was restored to its owner, and in-patients were concentrated at Haypark. This was indeed the phase of frustration. We made a mistake in buying a site at Belmont, only to discover afterwards that no building of more than two storeys could be erected there, because of the proximity of Sydenham Airport. This site in due course became the property of the Hospitals Authority, who very wisely sold it. In 1943 it was proposed by the Medical Staff, and agreed by the Board of Management, that future development should aim at the establishment of a general hospital for men as well as women and children, with a maternity ward, within the radius of Belfast Corporation transport, and with accommodation for private patients. Under difficult conditions the work of the Hospital was gradually resumed, and here I may speak in words of the highest praise for the manner in which the Matron, Sisters and nurses, and my colleagues upheld their standards in such circumstances, and how our younger colleagues have maintained the best traditions of the Hospital throughout this long and trying phase in our history. In all this they have had the support of a sympathetic Committee of Management and a devoted and competent administration in the persons of Miss Kelly and her clerical staff.

The 5th of July, 1948, arrived, with all its consequences. The Health Services Act came into operation. Approximately £100,000 had been raised for rebuilding the Hospital, but with rising costs it was only too obvious that this sum would be quite insufficient for our purpose. The building fund remained in custody of the Committee of Management, but we placed it at the disposal of the Hospitals Authority—perhaps in the hope of expediting the new building. It was not until 1950 that the Authority decided that the new Ulster Hospital should be designed for three hundred beds, with possible extension to five hundred. The Medical Staff, on the other hand, urged that it should be designed for five hundred, with administrative and ancillary services for such a number, and that first priority



GRAPH 4.—The graph shows how out-patient attendances rose from 11,000 to a maximum of 50,000, while in-patients rose from 300 to 1,200.



GRAPH 5.—Income was still sorely taxed to meet expenditure, which rose in 1941 to a maximum of £10,000.

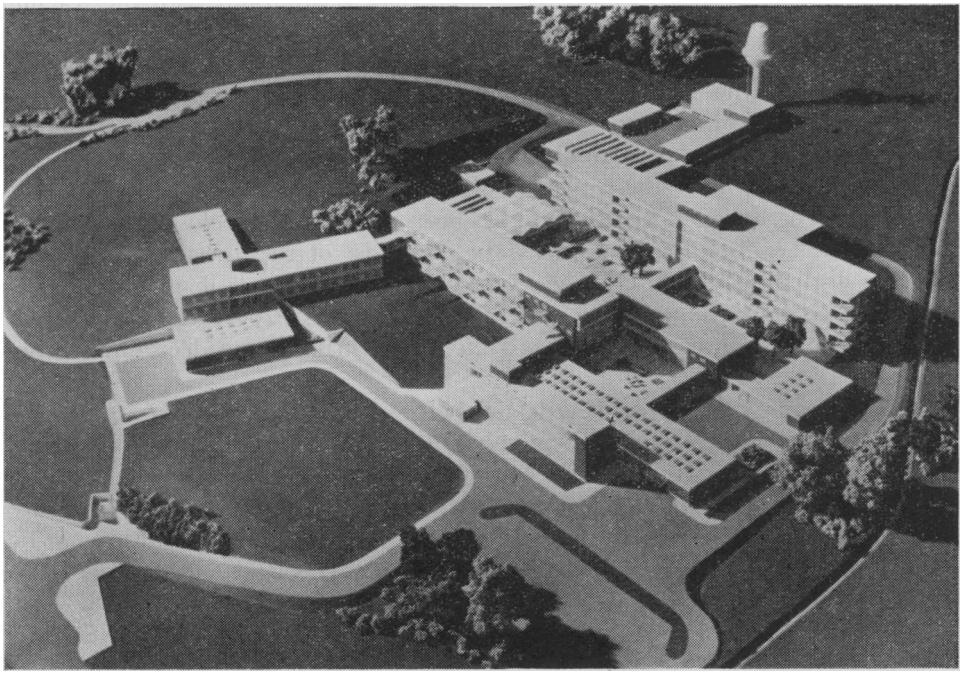
should be given to one hundred beds for children and a gynæcological and midwifery block, the general medical and surgical beds to be added later. In 1956 the site work actually began at Dundonald, and progress has been slow. Rumours, some of them ill-founded, disquieted us: we were told that we might no longer be a teaching hospital, after all these years. This degrading was never discussed by the Senate of the University, but a more real danger was that we might not be recognised as a training-school for nurses. This similar degradation has happily been averted.

The long delay has in itself been disheartening. Eighteen years are a long time. Haypark has been at best a makeshift—in Lady MacDermott's words, "a hospital in lodgings." We are indeed "cabin'd—cribb'd—confin'd." The graphs 6, 7, and 8 will show you the immediate effect on the work of the Hospital and its resilience.

We are now in the period of renewed hope. The wonderful new hospital at Dundonald is slowly but surely taking shape before our eyes. The architect is Mr. Frederick Gibberd, of London, and the builders Messrs. Stewart & Partner, of Belfast. The hospital promises to be not only of functional excellence but of distinctive beauty. Perusal of the Staff Minutes for the past few years shows how much time and thought have been given to the plans of the new building, in order to collaborate as closely as possible with the architect, and to incorporate all the things we felt to be most desirable. We hope to have a hospital which is not only up to date—to-day's date—but planned with forethought for the future. No one can accurately guess what future needs will be, but let us make our guesses intelligent. Let us avoid rigidity. Our minds—and our ward units—must be adaptable. We look forward not only to wards which, like that of Fisherwick Place, will "elicit marked encomiums" from vice-regal visitors, but we wish for theatres that can be cool as easily as hot, for clean air as well as really sterile instruments, for sensible provision of such simple things as wash-basins and elbow-taps, adequate electric plugs, for floors that are really silent, for windows that are easily cleaned, for reasonable access from wards to theatres and laboratories. We hope to have wards for adolescent patients, those who are too old for a children's ward of both sexes, and too young to be suitably included in wards for adults.

No record of the Ulster Hospital, however inadequate, would be worthy of the name if I were to forget to mention how we all rejoiced when in January, 1952, Her Majesty conferred a Membership of the Order of the British Empire on Sister Mills. Sister's surprise was only equalled by our delight. It is also a pleasure to record that five years later, in 1957, Her Majesty bestowed the accolade on our doyen, S. T. Irwin. Nineteen hundred and fifty-two was also notable because it marked the arrival on the Staff of the first of the "pure" pædiatricians, in the persons of Dr. Joan Logan and Dr. Drew Gailey. Now they have been joined by a specialist in pædiatric surgery, Mr. Brian Smyth.

As we look back over the years we see how the hospital has grown from a tiny unit of fourteen cots, with an annual expenditure of some £370, to a hospital



MODEL OF "THE HOSPITAL OF OUR DREAMS"

now of about one hundred beds, costing almost £100,000 a year, and about to become a hospital of five hundred beds, and what the cost will be, your guess is as good as mine.

When Sir Winston Churchill visited the Royal College of Physicians he observed that he who would know the future should study the past. This is true, but one wonders where in the past, as John Martin knew it, could he have found any clue to the future of his little hospital in Chichester Street. Coming nearer to our own time, we wish that our own colleagues, now no longer with us, could have lived to see the hospital now rising like a phœnix from its consuming flames. How Ernest Boas, and "Barney" Purce, and "Bobby" McConnell, and a host of others, would have rejoiced if they could have lived to see it. None would have been more delighted than Maynard Sinclair, successively our Honorary Secretary, Chairman, President, and Honorary Governor, whose brilliant career culminated in his tragic death on board the ill-fated "Princess Victoria."

It is little wonder that we grow impatient, like the Israelites of old, to see our Promised Land—though they were even longer in the wilderness. They carried with them their Ark of the Covenant—we have no such tangible treasure, but we carry with us something equally precious, the Ulster Hospital tradition, not easily defined, but very real to us.

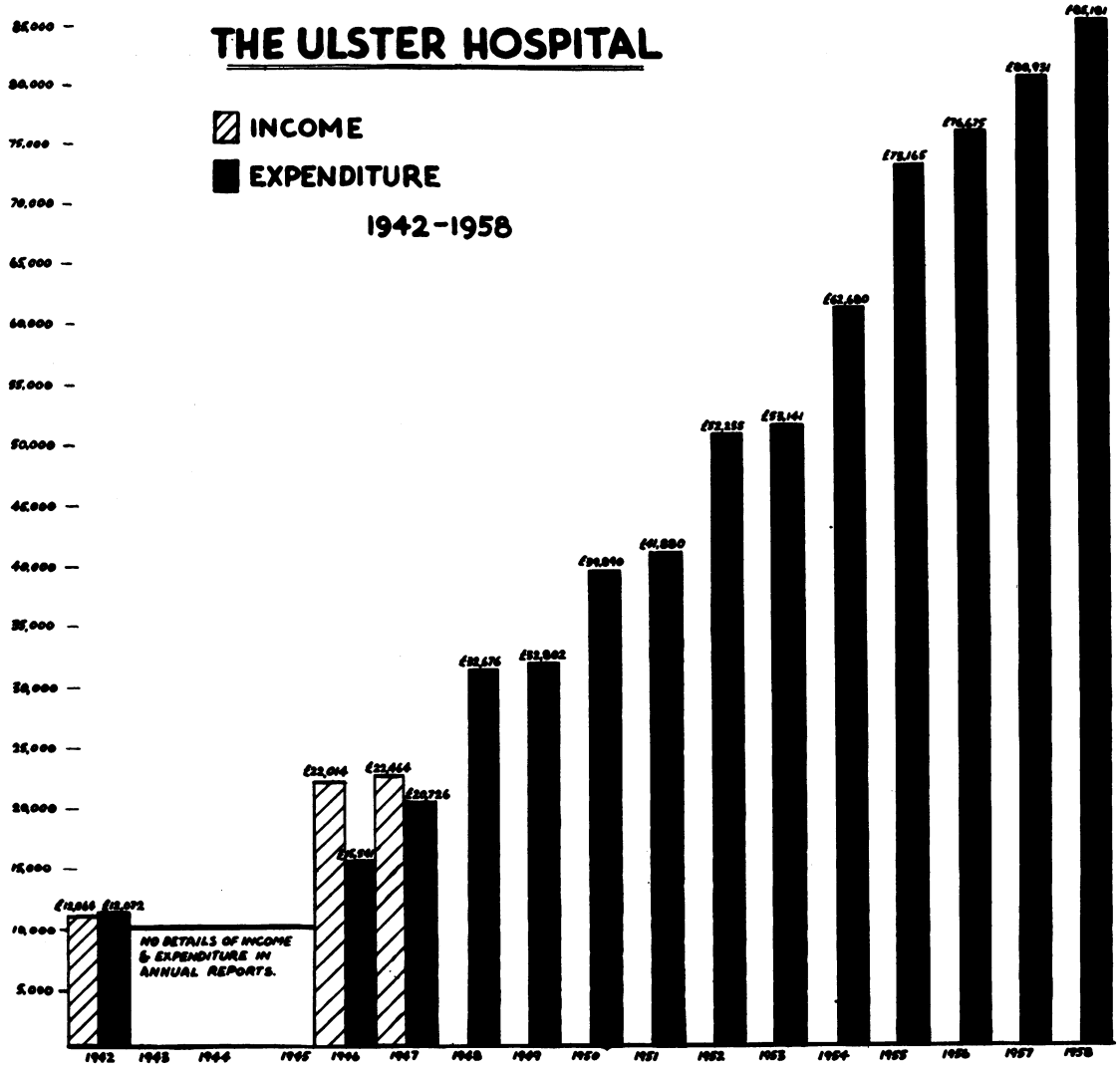
In this retrospect we see that the pioneers in Chichester Street were right in their desire to collaborate with the dispensary doctors, in their wish to bring

domiciliary midwifery and pædiatrics into closer relationship with the teaching hospital, in their early recognition of the desirability of admitting the mother as well as the sick child to hospital. We have seen the changing character of the hospital service, the relative fall in out-patient attendances consequent on the extension of medical benefits to mothers and children, and the closer relationship with the public health departments and the specialists in tuberculosis. We have seen the recognition of the existence of the venereal diseases and the need for their treatment, and at long last there has been brought about closer collaboration between the two children's hospitals. In the midst of these changes we do feel that the distinctive character of the Ulster Hospital has been maintained. In the words of Viscount Montgomery, "Change is inevitable. Progress is not inevitable. Progress depends on courage to face facts and to make sound decisions on those facts."

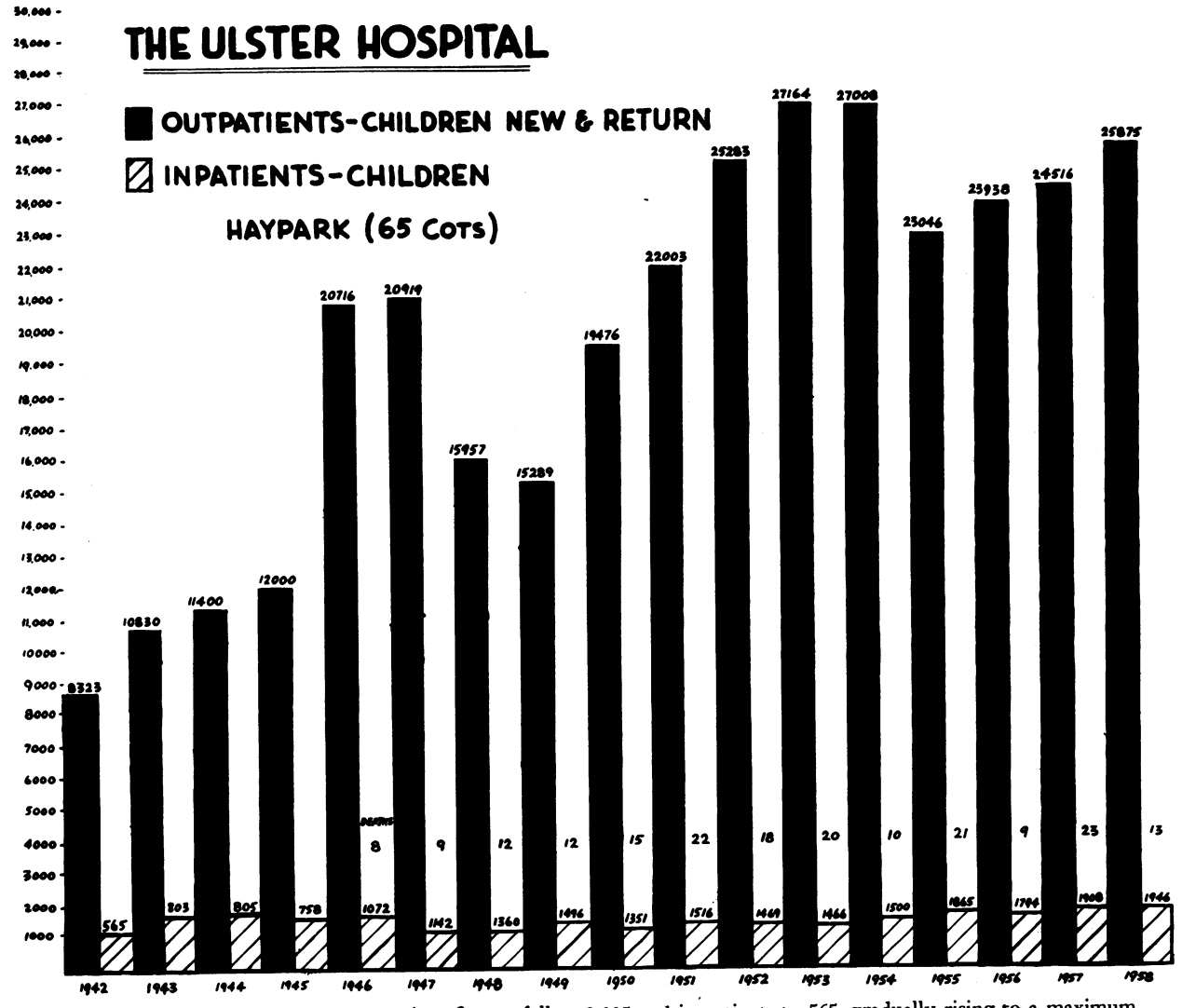
I have spoken at too great length, but before I close I would like to take you back for a moment to the 2nd September, 1874, to the first Annual Meeting of the Ulster Hospital. Mr. William Johnston, M.P., spoke these words:

"I have only to say in conclusion, that the hours we spend in the Hospital or in the home, in ministering to the sick children, will be the roses and lilies of our lives, and will be pleasant to look back on in after days, and will perhaps be the best-spent hours of our lives."

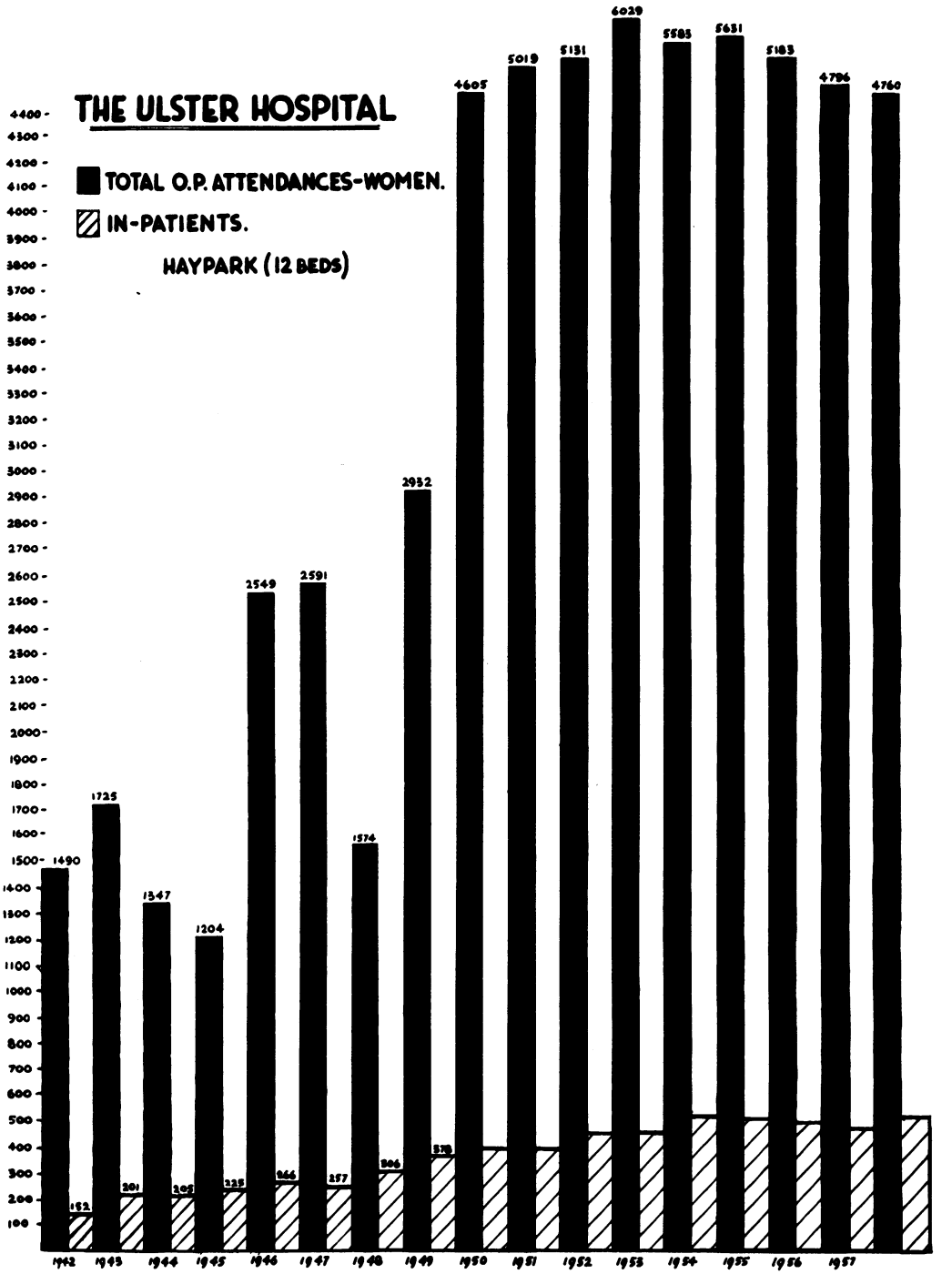
I desire most gratefully to acknowledge the help I have received from Miss R. N. Kelly; Mr. Hugh Edgar (of Messrs. Lizars Ltd.); Mr. Harold Bryans (of the Municipal Art Gallery); Dr. Reynolds Morton (slides and photography); "Belfast News-Letter" (for access to files); "Belfast Telegraph" (air-raid photographs); Miss S. I. Bullick and Miss M. Paisley (typewriting), and Mr. Victor Bell (lanternist).



GRAPH 6.—In the two years following the air-raids the hospital finances were difficult to assess, and no accurate records are available, but the income in the last "voluntary hospital" year was £22,464 and the expenditure £20,726. The graph shows how the expenditure has risen to more than £85,000.



GRAPH 7.—After the air-raids out-patient figures fell to 8,325 and in-patients to 565, gradually rising to a maximum of 27,000 out-patients and 1,946 in-patients. The average death rate throughout this period was approximately 1.4%.



GRAPH 8.—Following the air-raids out-patients fell below 1,500 and in-patients to 152. These figures have gradually risen to a maximum of 6,000 and 504 respectively.

CARBIMAZOLE (NEO-MERCAZOLE) IN THYROTOXICOSIS—A REVIEW OF SIXTY PATIENTS

By M. W. J. BOYD, M.D., M.R.C.P.E.

Late Senior Registrar Tutor, Department of Medicine, Royal Victoria Hospital
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CARBIMAZOLE (2 Carbethoxy-thio-1-methyl glyoxaline) was first introduced by Lawson, Rimington, and Searle (1951). Early reports by Lawson and Barry (1951), Macgregor and Miller (1953), Doniach (1953) and Poate (1953) stressed the freedom from toxicity and potency of carbimazole as an anti-thyroid drug. Though potent, thiourea derivatives had proved to have a significant toxic risk. For this reason, most recent workers have concentrated on a comparison of carbimazole with thiourea drugs in regard to studies of toxicity. McGavack, *et al.* (1956), in describing their experiences in forty-one cases with special reference to speed of control of symptoms, remark on the sparsity of reports of clinical experience with carbimazole.

The purpose of the present paper is to record observations made in a group of thyrotoxic patients concerning short- and long-term effects and drug toxicity. An assessment of the place of carbimazole in treatment and factors which may influence the response of thyrotoxic patients to the compound are recorded.

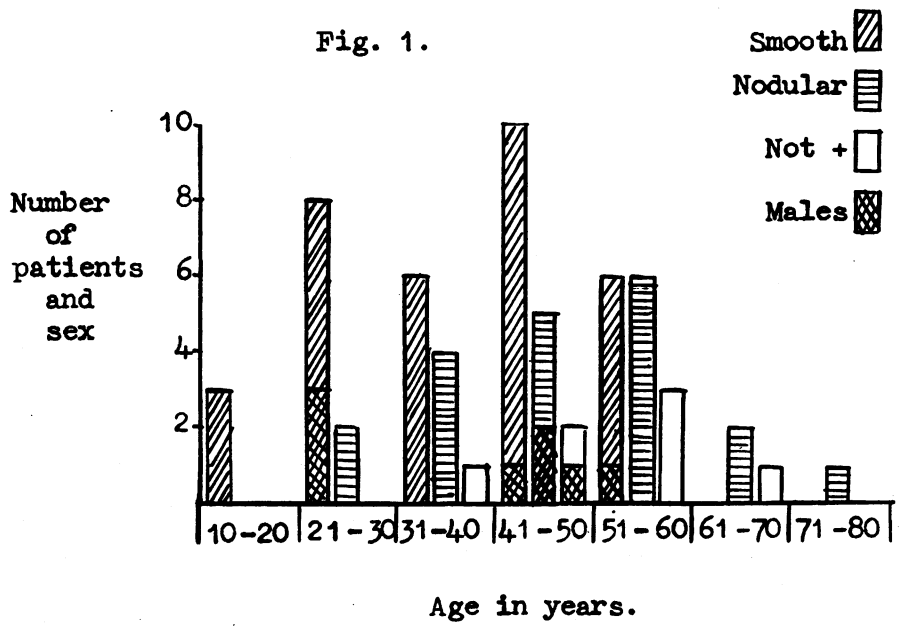

Fig. 1—Distribution according to sex and age in 60 thyrotoxic patients.

Methods and Plan of Study.

Sixty non-selected patients were studied, comprising 52 female and 8 male patients, of age ranging from 17-74 years. The distribution according to age, sex, and gland type is shown in Fig. 1. Symptoms were present for from 12 days to 3 years (average 11 months) at the time of first attendance. The average duration of symptoms before attendance for smooth toxic goitre was 7 months and for nodular goitre 10 months. Sixty-six per cent. of patients attended within 6 months and 82 per cent. within a year.

Fig. 2.

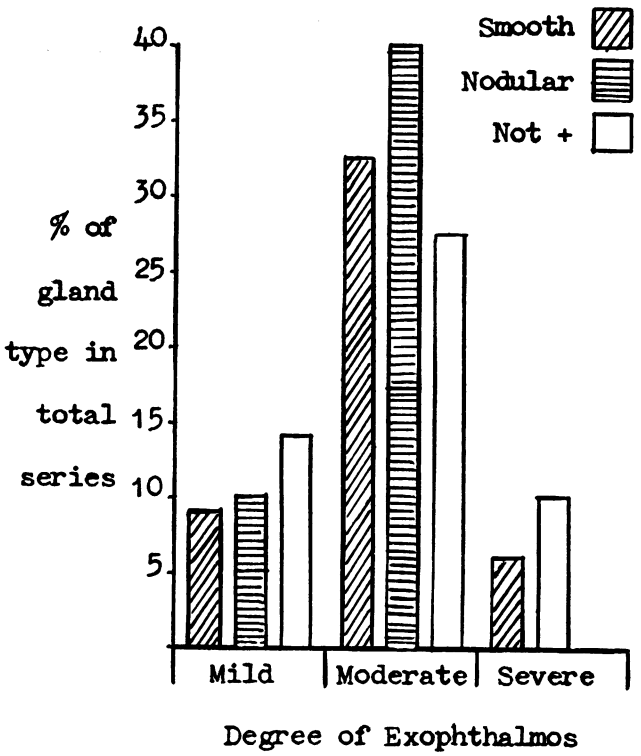

Fig. 2—Incidence of degrees of exophthalmos as a percentage of gland type.

The type and degree of thyroid enlargement were assessed clinically on each visit. A smooth goitre was noted in 33 patients, nodular gland in 20, and in 7 patients no clinical enlargement was demonstrable (Not +).

Eye changes were judged clinically in 3 grades, the least marked being a thyrotoxic stare with lid lag and the most severe indicating marked exophthalmos with or without ophthalmoplegia. Moderate grades fell between these two

extremes. The incidence of eye changes related to the gland type is shown in Fig. 2. There were eye signs in 50 per cent. of the 60 patients.

The diagnosis of thyrotoxicosis was made clinically with confirmation in 34 patients by I_{131} uptake and by basal metabolic rate estimation in 3 cases. Serum cholesterol was assessed at the first attendance in 15 patients. In 3 the result was 200 mg./100 ml. or more and in the remainder averaged 167 mg./100 ml.

All patients were started on carbimazole 30 mgs. to 45 mgs. daily in three doses. L-thyroxine-sodium 0.1-0.3 mg. was given concurrently with the dosage of carbimazole to reduce the risk of goitrogenesis (Astwood, *et el.*, 1943; Purves, 1943; Fraser, *et al.*, 1954) and to avoid aggravation of eye signs (Fraser and Wilkinson, 1953).

Throughout the investigation, the patients were examined at intervals of 1-3 months, the attendances being at approximately the same time on each occasion in relation to meal times. As far as possible, each was weighed in the same attire on each attendance. Routine differential and total white cell counts were undertaken on each visit. The decision as to when each patient was euthyroid was assessed clinically.

All patients treated medically had at least 12 months' treatment and varied on average between 14-16 months. Carbimazole was gradually withdrawn, the dose in most patients being reduced to 5 mgs. daily, followed by 5 mgs. on alternate days, without added thyroxine in the last few months of treatment. Supervision has been continued up to 30 months after stopping carbimazole.

Fig. 3.

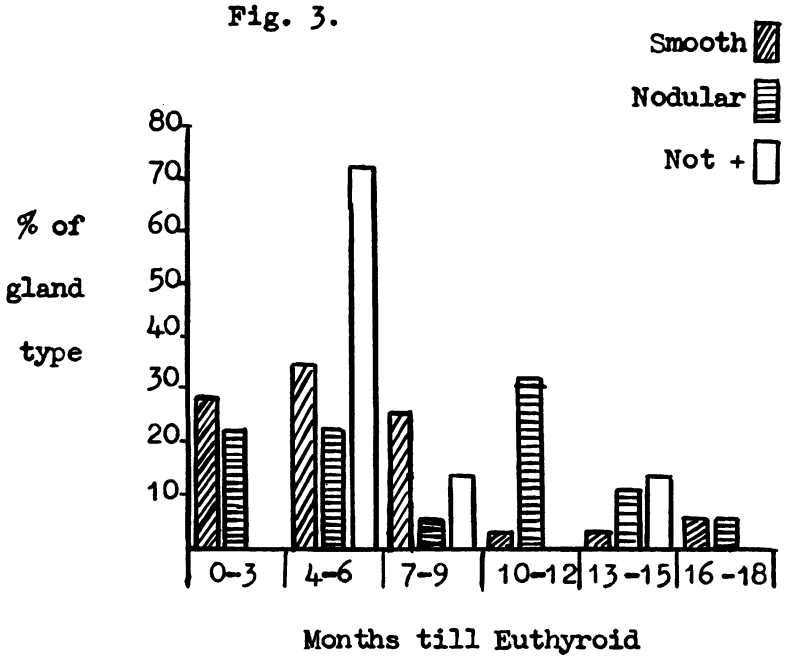

Fig. 3—Time required in gland types for establishment of a euthyroid state.

Results.

1. The Anti-Thyroid Effect.

Most patients on carbimazole 15 mgs. three times daily with l-thyroxine sodium 0.1 mg. twice daily reported an improvement in symptoms in 2-4 weeks. The establishment of a clinically assessed euthyroid state took much longer. For smooth goitres, 2-17 months (average 6 months) was required, for nodular goitre 3-17 months (average 8 months), and where the gland was not palpable 4-14 months (average 7 months) was necessary. Resistant cases are excluded from the above assessments.

Sixty-two per cent. of the patients with smooth goitres were euthyroid in 6 months as compared with 43 per cent. with nodular glands. Fig. 3 shows the time taken for a euthyroid state in relation to the gland type and the outcome of carbimazole treatment in the total series is shown in Table 1.

TABLE 1.

Analysis of Carbimazole Treatment in 60 Thyrotoxic Patients.

Outcome of Carbimazole Treatment	Gland Type				% of Total
	Smooth	Nodular	Not +	Total	
Elective Surgery	6	3	–	9	15
Elective I_{131}	2	1	–	3	5
Toxic Response	2	–	–	2	3
Resistance to the drug	–	2	–	2	3
Still on treatment	2	2	–	4	7
Definitive Carbimazole—					
Remissions	16	4	5	25	42
Relapses	5	8	2	15	25
Total	33	20	7	60	100

Of the 60 patients, carbimazole was used as a preliminary to an elective operation in 9 cases (15 per cent.)—6 smooth and 3 nodular—and as a preparatory treatment to radioactive iodine in 3 cases (5 per cent.)—2 smooth and 1 nodular. One patient was treated by sub-total thyroidectomy on account of granulopenia while another required treatment with radioactive iodine for agranulocytic angina. Of the remaining 46 cases, 2 showed resistance to the drug. One of these has received 45 months' treatment and is still toxic, requiring high dosage, while the other has had 39 months' adequate treatment with incomplete control. Four patients are still on treatment, 19 months, 22 months, 23 months, and 34 months at the time of reporting. They are reasonably well controlled while on the drug.

The remaining 40 patients (67 per cent.) proved amenable to treatment with carbimazole. Twenty-five (62.5 per cent.) of these have had remissions following cessation of treatment for from 5-30 months (Table 2). Fifteen cases (37.5 per cent.) have relapsed. The time following treatment at which relapse occurred

TABLE 2.

ANALYSIS OF REMISSIONS AND RELAPSES IN 40 PATIENTS FOLLOWING CARBIMAZOLE THERAPY.

MONTHS AFTER CESSATION OF CARBIMAZOLE	SMOOTH CASES = 21		NODULAR CASES = 12		NOT + CASES = 7		TOTAL
	Rem.	Rel.	Rem.	Rel.	Rem.	Rel.	
0-6	2	2	1	6	1	–	12
7-12	5	1	2	–	1	1	10
13-18	5	–	1	1	–	1	8
19-24	2	2	–	1	1	–	6
25-30	2	–	–	–	2	–	4
0-30	16	5	4	8	5	2	40
% of gland type fully treated -	76	24	33	67	71	29	

Total remissions in 40 selected cases = 25 (62.5%).
Total remissions in 60 unselected cases = 25 (42.0%).
Rem. = Remissions. Rel. = Relapses. Not + = Thyroid not enlarged.

is shown in Table 2. Of the 21 patients with smooth goitres treated on carbimazole, there has been a remission for from 5-30 months in 16 (76 per cent.). The corresponding figure for nodular goitre was 33 per cent. Patients without thyroid enlargement numbered 7. Of these, 5 (71 per cent.) have remained euthyroid on stopping the drug. The rate of remission of the total 60 unselected patients has been 42 per cent.

Of the relapsing cases, 53 per cent. of all failures have occurred in the first 6 months and 67 per cent. within a year. Seventy-five per cent. of the relapses affecting nodular glands were detected within 6 months.

2. Effect on the Eye Signs.

Of the 60 patients, eye signs were observed in 31. They occurred with about equal frequency and severity in the gland types (Fig. 2). A thyrotoxic stare was present in 6, while there was moderate exophthalmos in 21 and severe eye changes in 4. The eyes were normal in the 29 remaining cases. Table 3 shows the effects of treatment on the eye signs. In 36 patients (60 per cent.) the eyes were unchanged, in 19 (31.5 per cent.) there was improvement, and in 5 (8.5 per cent.) the exophthalmos was aggravated. All these last cases constituted relapses or cases unsuited to medical treatment alone.

Of the 4 patients with severe exophthalmos, 2 had ophthalmoplegia. Both showed some improvement in the eye signs on carbimazole. In one of the remaining cases the exophthalmos remained unchanged in spite of clinical remission of the disease process. In the other the eye signs became worse because treatment was carried out irregularly. This patient was elderly, had a small nodular gland, and was treated electively by radioactive iodine.

TABLE 3.

Analysis of Change of Eye Signs in 60 Thyrotoxic Patients on Carbimazole.

Treatment Category on Carbimazole	Eye signs in sixty cases: Unchanged Sm.	Nod.	Not +	Total %	Improved Sm.	Nod.	Not +	Total %	Worse Sm.	Nod.	Not +	Total %
Remissions	12	2	4	18 (72%)	4	2	1	7 (28%)	–	–	–	–
Relapses	2	4	1	7 (47%)	3	3	–	6 (40%)	–	1	1	2 (13%)
Elective Surgery	4	2	–	6 (67%)	2	–	–	2 (22%)	–	1	–	1 (11%)
Elective I_{131}	2	–	–	2 (67%)	–	–	–	–	–	1	–	1 (33%)
Remaining Cases	3	–	–	3 (37.5%)	–	4	–	4 (50%)	1	–	–	1 (12.5%)
Total Cases	23	8	5	36 (60%)	9	9	1	19 (31.5%)	1	3	1	5 (8.5%)

Sm. = Smooth. Nod. = Nodular. Not + = Thyroid not enlarged.

TABLE 4.

Analysis of Change in Gland Size in 60 Thyrotoxic Patients on Carbimazole.

Treatment Category on Carbimazole	Gland size in sixty cases: Unchanged Sm.	Nod.	Not +	Total %	Decreased Sm.	Nod.	Not +	Total %	Increased Sm.	Nod.	Not +	Total %
Remissions	5	2	5	12 (48%)	11	2	–	13 (52%)	–	–	–	–
Relapses	3	6	1	10 (67%)	2	2	–	4 (27%)	–	–	1	1 (6%)
Elective Surgery	1	3	–	4 (44%)	–	–	–	–	5	–	–	5 (56%)
Elective I_{131}	1	1	–	2 (67%)	–	–	–	–	1	–	–	1 (33%)
Remaining Cases	4	2	–	6 (75%)	–	2	–	2 (25%)	–	–	–	–
Total	14	14	6	34 (57%)	13	6	–	19 (32%)	6	–	1	7 (11%)

Sm. = Smooth. Nod. = Nodular. Not + = Thyroid not enlarged.

3. Effect on Gland Size and Consistency at Operation.

The outcome of carbimazole therapy on gland size was noted in all 60 patients (Table 4). The gland was unchanged in 34 (67 per cent.), decreased in size in 19 (32 per cent.) and increased in 7 (11 per cent.) A decrease in gland size was more common in remitting cases—52 per cent. as compared with 27 per cent. in relapses. No case in which the gland increased in size showed a remission.

Surgery was decided on in 5 patients because of the size of the gland on first interview or because of its rapid enlargement in the early stages of carbimazole treatment. All had smooth glands and varied in age from 20-53 years. In 4 others, surgical treatment was considered necessary at the first attendance on account of other factors such as nodularity, age, and mechanical effects. Toxicity was adequately controlled in all 9 patients pre-operatively.

Four patients were treated by sub-total thyroidectomy on account of relapse after adequate duration of treatment. One operation was necessitated by granulopenia complicating carbimazole treatment.

In all, 14 sub-total thyroidectomies were required. Lugol's iodine 5 minims three times daily was given in the 10-14 days before operation concurrently with carbimazole. In all patients the gland was enlarged and vascular. In no instance was it considered friable and no difficulty from bleeding at operation was encountered.

4. Effect on Body Weight.

Weight gain was a constant feature in all cases, though there was great variation in the amount, which varied from 3 lb. to 42 lb. and expressed as a percentage

Fig. 4.

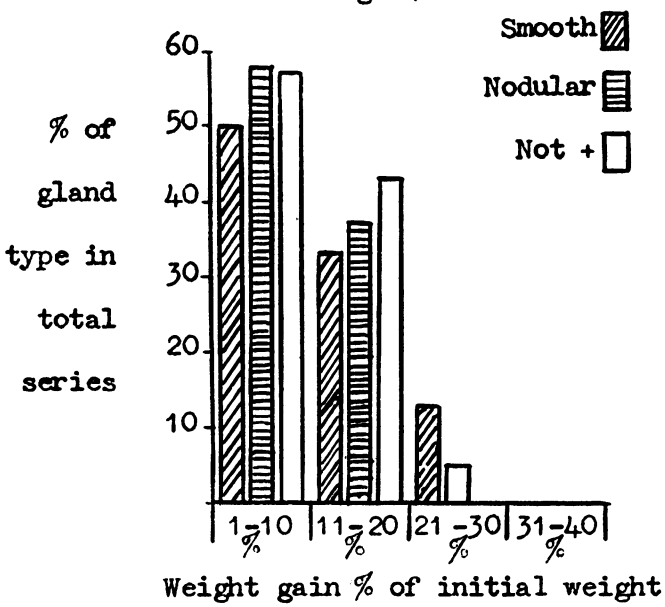

Fig. 4—Percentage weight gain according to gland type.

of the patient's weight on the first attendance was 2 to 33. The average weight gain in cases which remitted was 12.6 lb. (9 per cent.) and in relapsed cases 15.4 lb. (12 per cent.). Fig. 4 shows the weight gain per cent. related to the gland types. This shows no significant difference in the average weight gains in cases with smooth, nodular or "not enlarged" glands. For the cases going to operation the average weight gain was 9 per cent.

Considering the two resistant cases, both with nodular glands, one had a weight gain of only 3.5 per cent. in 36 months while the other gained by 18 per cent. over 29 months.

5. Effect on Associated Pregnancy.

Three patients in the series were pregnant. The first became pregnant during the early stages of carbimazole treatment, and treatment was continued throughout the pregnancy without incident. Four months after completing a 16-months'

TABLE 5.

TOXIC AND ASYMPTOMATIC LEUCOPENIC REACTIONS IN 60 THYROTOXIC PATIENTS ON CARBIMAZOLE.

CASE No.	SEX AND AGE YEARS	AT ONSET: Daily Dosage mgms.	AT ONSET: Stage of Treatment	CLINICAL FEATURES	DIAGNOSIS AND PERCENTAGE INCIDENCE
46	F. 58	45	22 days	Agranulocytic Angina. W.C.C. 3,600 N. 22%	Blood Dyscrasia 1.5%
5	F. 74	45	60 days	Allergic Stomatitis. Contact Dermatitis.	Allergic Reactions 4.5%
28	M. 43	45	10 days	Allergic Erythema.	
35	F. 33	45	14 days	Erythematous rash. W.C.C. 3,200 N. 49%	
1	F. 54	5	12 months	No symptoms. W.C.C. 3,100 N. 42%	Asymptomatic Leucopenia 10.5%
4	F. 53	15	5 months	No symptoms. W.C.C. 1,000 N. 65%	
7	F. 54	45	5 months	No symptoms. W.C.C. 2,800 N. 48%	
9	F. 61	45	3 months	No symptoms. W.C.C. 3,900 N. 47%	
13	F. 38	45	1 month	No symptoms. W.C.C. 3,600 N. 63%	
27	F. 17	45	2 months	No symptoms. W.C.C. 2,700 N. 48%	
30	F. 59	30	5 months	No symptoms. W.C.C. 3,100 N. 58%	

No patient had a history of previous allergy.

Treatment was continued with carbimazole in all except patients Nos. 46 and 35.

course of treatment pregnancy occurred again. She appeared to have undergone remission, no further carbimazole was given and there was no relapse during or immediately following the pregnancy. However, 19 months later she showed slight recurrence of thyrotoxicosis and was treated by sub-total thyroidectomy.

The second patient was pregnant in the last 6 months of carbimazole therapy. Mother and child did satisfactorily and the patient is now euthyroid 15 months following a course of carbimazole lasting 19 months.

The third patient became pregnant 3 months after starting treatment. By the third month of pregnancy control was unsatisfactory, the thyroid enlarged rapidly and she had definite exophthalmos. She was treated by sub-total thyroidectomy and is now euthyroid 17 months later. No eye changes are evident.

6. Toxic Effects.

One patient with agranulocytic angina, 3 with allergic responses, and 7 with asymptomatic leucopenia were observed (Table 5), viz.:—

One female patient of 58 years (Case 46), with a slight smooth goitre, developed a sore throat on the twenty-second day of treatment. The white cell count fell to 3,600 per c.mm. with neutrophil polymorphs 22 per cent. Carbimazole was promptly omitted with subsidence of symptoms. She was successfully treated by radioactive iodine and is now euthyroid some 3 years later.

One patient (Case 5) complained of a sore tongue and mouth after 2 months' treatment with carbimazole. The lesion was allergic in type and readily subsided with local application of neomycin and hydrocortisone solution. There was no associated blood dyscrasia.

After 7 months of treatment the same patient developed a contact dermatitis to carbimazole tablets affecting the left index finger and thumb. This settled spontaneously when she used a spoon for removing the tablets from the jar.

A 43-year-old male patient (Case 28) developed an itchy red rash with "prurigo nodules" ten days after starting treatment. The rash, mainly on the trunk and upper limbs, continued for a month and cleared without interruption of carbimazole therapy. There was a recurrence of the rash six months later. This responded satisfactorily to an anti-histamine drug.

A further patient (Case 35), a 33-year-old woman, also developed a generalised erythematous rash with a leucopenia of 3,200 per c.mm., neutrophil polymorphs 49 per cent. two weeks after starting carbimazole. The drug was withdrawn, and she was satisfactorily treated surgically.

Seven patients were noted on routine white cell counts to have leucopenia. There were no associated symptoms and carbimazole treatment was continued with no ill effects. The figures for white cell counts are shown in Table 5.

Grouping Case 35 as an allergic response, serious blood dyscrasia arose in 1.5 per cent. of cases and simple allergic reaction in 4.5 per cent. Asymptomatic leucopenia was simply a chance routine finding, the blood count returning to a low normal value 1-2 weeks later. The incidence was 10.5 per cent.

TABLE 6.

SUMMARY OF PAIRS OF FACTORS PLOTTED ON SCATTER DIAGRAMS.

NUMBER OF SUBJECTS	x	y
60	Age in years	Duration of symptoms in months
33	Age in years	I_{131} "T" factor
30	Weight gain with treatment as % of initial weight in lbs.	I_{131} "T" factor
50	Weight gain with treatment as % of initial weight in lbs.	Initial weight in lbs.
50	Actual weight gain in lbs. with treatment	Initial weight in lbs.
27	Actual weight gain in lbs. with treatment	Duration till euthyroid in months
50	Weight gain with treatment as % of initial weight	Duration till euthyroid in months
11	Weight gain with treatment	Stage of relapse in months
34	Weight gain with treatment as % of ideal weight	Total carbimazole till euthyroid in gms.
15	Total duration of treatment in months	Stage of relapse in months

No apparent relationship demonstrated.

DISCUSSION.

The potency of a new anti-thyroid substance may be tested by its blocking effect on the uptake of I_{131} by the normal human thyroid (Stanley and Astwood, 1947) or by a similar effect on the thyrotoxic gland (Stanley and Astwood, 1948). Macgregor and Miller (1953), while demonstrating a more potent effect from carbimazole as compared with methimazole in doses as small as 0.5 mgm., using the former technique, stress the caution necessary in transferring the results of potency trials of this type into the clinical field. Doniach (1953) remarked on the fact that such tests do not take into account the cumulative properties of the drug, the individual response to dosage, and the amount of hormone stored in the gland. The same remarks apply to tests of inhibition *in vitro* of the enzymic oxidative iodination of protein (Fraser, *et al.*, 1954). Only by clinical trial can the place of an anti-thyroid substance in treatment and its toxic risk be estimated.

1. Anti-Thyroid Effect.

The decision as to when a euthyroid state has been achieved is a difficult one in most patients. In the present series 6-8 months were necessary for maximum improvement as judged by return to normal of the pulse rate, sweating, tremor, and other signs. In reports from the literature, control is claimed to have been achieved much earlier. McGavack, *et al.* (1956), in 38 patients treated on 30-60 mgm. of carbimazole daily obtained control of thyrotoxic features in 21-84 days (average 35 days), while Kirkeby and Romcke (1955) found toxic symptoms

to cease in 3-12 weeks and Bartel (1953) in an average of 8 weeks. There is no doubting that very considerable improvement was noted in the initial 2 months in all patients treated. No comparable studies of carbimazole combined with thyroxine are available, but in the series of 32 patients treated on methyl thiouracil with thyroxine, Fraser and Wilkinson (1953), a euthyroid response was achieved in 6-8 weeks. Using carbimazole alone, Doniach (1953), in 90 patients with clinical and B.M.R. control, found a return to a euthyroid state in 2-8 weeks in 72 subjects while 18 cases responded slowly, requiring 3-6 months. She considered these slow responses due to such factors as insufficient dosage and associated psychological stress, and noted a high proportion of elderly patients with small nodular glands among the resistant subjects. She further postulated in some instances of resistance that such patients might detoxicate or excrete the drug rapidly and so require a higher dosage.

None of these factors appears to be operative in the present series and the slow development of euthyroidism can be accounted for only by different criteria of assessment for in all cases the patient had to satisfy the most meticulous criteria of normality before being judged euthyroid, special attention being paid to absence of tremor and sweating, coupled with the return of normal energy, a normal resting pulse rate and maximum weight gain.

In regard to the resistant cases in the present study, one was a man of 43 years who required 36 months of treatment before toxicity was controlled, the other a 39-year-old woman who became euthyroid only after 29 months. Both had moderately enlarged nodular glands, and had carbimazole 45 mgm., and at times 60 mgm., with 1 thyroxine 0.1 mgm. twice daily with only partial control. Hernberg and Lamberg (1957) record 4 cases out of 81 in whom not even a primary response occurred on "thyrostatic drugs." The reason for these resistant cases is not clear.

2. Effect on Eye Signs and Gland Size.

Eye signs were not noted so frequently in this series as in that of Doniach (30 in 60 cases as compared with 63 in 90 cases). Only 3 patients had aggravation of eye signs as compared with 5 in the present series. Goitrogenesis in the present study had an incidence of 11 per cent. as compared with 6 per cent. in that of Doniach. Neither the effect on the eye signs nor the goitre appear to particularly commend the routine addition of thyroxine to treatment. It must be noted, however, that Doniach's was a very closely controlled group of patients. In routine out-patient management, the intervals between attendances for adjustment of dosage may be longer and marked aggravation of eye signs and gland size might arise from overdosage. In support of this, Fraser, *et al.* (1954), in 113 patients treated on methimazole and carbimazole with added thyroxine found no aggravation of eye signs nor any instance of goitrogenesis.

3. The Incidence of Remission.

In this series the rate of 62.5 per cent. for remissions of from 5-30 months for all gland types treated definitively with carbimazole compares very well with any results so far reported for other thyrostatic drugs. Hernberg and Lamberg

report a 25 per cent. remission rate following mixed anti-thyroid treatment in 85 patients, 60 of which had nodular glands. Of the smooth gland patients, their remission rate of 73.8 per cent. is very similar to that of the present group (76 per cent.). Other studies on results obtained with long-term treatment with propyl thiouracil are those of McCullagh and Cassidy (1953), who reported a remission rate of 66.7 per cent. in 60 patients with smooth goitre 4 years after stopping the treatment, and of Iversen (1951, 1955), who reported a 79.6 per cent. remission rate in a series of 144 patients treated on methyl thiouracil. Similarly, Aspenstrom (1953), using propyl thiouracil, observed remission in 75 per cent. of subjects with smooth goitre and 65 per cent. of those with nodular glands.

4. Toxic Reactions.

Several papers deal with the low incidence of toxic complications of carbimazole as compared with other thyrostatic drugs. Doniach (1953) reported absence of toxicity in 150 patients. Bartel (1953), in a series of 52 cases, described 2 patients with skin rashes and 1 with agranulocytic angina; an incidence of 6 per cent. total or 2.0 per cent. of serious reaction. The agranulocytic patient had a white cell count of 2,000 per c.mm. with no polymorphonuclear cells. Fraser, *et al.* (1954), in 57 patients on carbimazole had one instance of agranulocytosis in a patient who had previously suffered from skin and joint symptoms with methimazole. The reaction to carbimazole arose 5 weeks after changing to this drug. The white cell count fell to 2,000, polymorphs 3 per cent., and returned to normal in 10 days. Harrison (1954) and Shaw (1955) each recorded a case of agranulocytosis on carbimazole with recovery. Greene and Morgan (1956), in a series of 181 patients, found 4 with harmless rashes in whom treatment could be continued. Two patients developed purpura, 1 pretibial myxœdema, and 1 pure red cell anæmia, all necessitating treatment by sub-total thyroidectomy. This represented an incidence of serious side effects in 0.6 per cent. By summation of the 435 cases reported at that time, they noted the occurrence of rashes in 1.6 per cent., agranulocytosis in 0.7 per cent., and pancytopenia and pure red cell anæmia in 0.1 per cent. each. The total toxic reaction of 3.4 per cent. compares favourably with that for methyl thiouracil quoted by Greene and Morgan (1956) as 5.8 per cent. Burrell, *et al.* (1956), reported on 1,046 cases regarding toxicity. The incidence of major toxic reactions (marrow aplasia, fever, lymphadenopathy and arthralgia) was 0.5 per cent. and minor reactions (rashes, nausea, headache, etc.) in 1.5 per cent. The first fatal case of marrow aplasia arising with carbimazole treatment was described by Richardson, *et al.* (1954). Further fatal cases have been published by Burrell (1956) and Tait (1957).

In the present series, one case of agranulocytic angina was encountered, representing an incidence of 1.5 per cent. In view of the small number of patients studied, this figure is probably an exaggeration of the true risk. The same applies to the development of minor allergic complications, the occurrence of generalised rashes in this series in 4.5 per cent. being rather higher in incidence than elsewhere reported. I have so far not found any previous account of contact dermatitis to the carbimazole tablet such as arose in one case in this series.

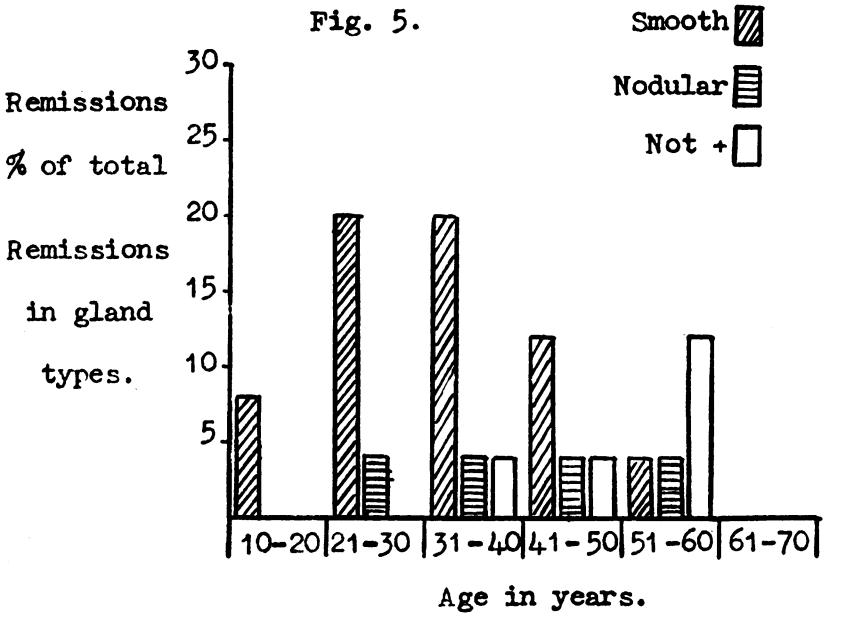

Fig. 5—Remissions in gland types grouped according to age.

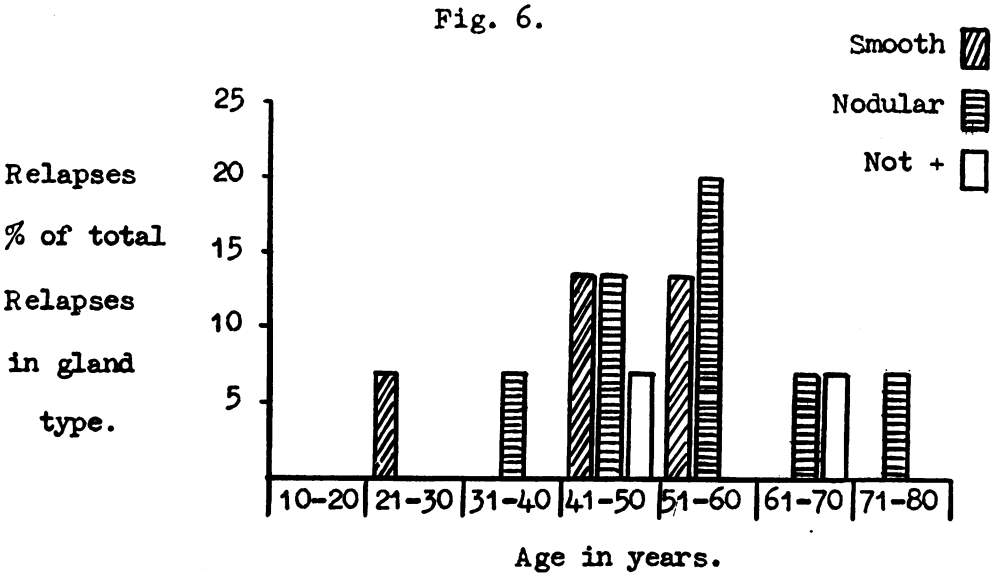

Fig. 6—Relapses in gland types grouped according to age.

5. Factors influencing Response to Treatment.

All investigators agree that carbimazole is an effective anti-thyroid agent with a definite, but slight toxic risk. Except for the rare resistant cases cited above, all patients with thyrotoxic glands will be controlled by the drug whether the eventual treatment is by thyroidectomy, radioactive iodine or the patient be continued on definitive drug treatment.

In the last group of patients, certain factors undoubtedly influence the therapeutic response. Among the most important are age and gland type. Remissions and relapses expressed as a percentage of the gland types in relationship to age groups are shown in Figs. 5 and 6 respectively. Fifty-one per cent. of the remissions up to the age of 40 years involve smooth glands, and the total remissions of all types before the age of 40 constitute 60 per cent. By the age of 50 years, 80 per cent. of remissions have occurred so that the chances of obtaining permanent control on stopping carbimazole beyond this age group are small. Remissions among nodular glands form a small constant fraction of the total remissions from the age of 30 years onwards. The cases in which there was no glandular enlargement are relatively few. They appear, however, to give a peak of incidence in the 50-60 age group and 5 out of the 7 cases have had remissions of 6, 8, 20, 28, and 29 months respectively. The incidence of remission in even this small group of patients is high and the impression is that they behave more like smooth glands in their good response and long remission on carbimazole.

In order to explore further any factors which might possibly relate themselves numerically, scatter diagrams were drawn against the factors shown in Fig. 6. It was clear from these diagrams that there was no obvious relationship. Goodwin, *et al.* (1954), in a statistical analysis of the long-term treatment of thyrotoxicosis with thiouracil compounds were unable to find a significant relationship between age, length of illness, length of treatment before the drug was withdrawn and the length of remission obtained in 94 patients. They concluded that other factors such as intercurrent infection and social maladjustment as suggested by Douglas and Kennie (1952) might be more important in determining a patient's response on withdrawing thiouracil treatment. It seems likely that this is so. The complex endocrine and other ætiological factors and the influence of the psychological aspect and "make up" of the sufferer undoubtedly play their part. It is, therefore, not surprising that no statistical connections can be found.

The present study supports the observation that young patients with primary thyrotoxicosis are most likely to have a satisfactory remission on carbimazole. Diminution of exophthalmos and gland size or absence of aggravation of these features are more common in remitting cases. Weight gain indicates immediate improvement but is of no prognostic importance regarding duration or permanency of remission. It cannot be related quantitatively to the initial weight taken as an index of weight loss, the duration of treatment till euthyroid, nor to the total amount of carbimazole given till symptoms are controlled. Weight gain is further unrelated to the I_{131} T factor, using it as indicative of the severity of the hyperthyroidism. There is no evident relationship between the amount of weight gained and the stage of relapse for any gland type.

Summary.

A series of 60 thyrotoxic patients was studied, of which 40 were treated on carbimazole and thyroxine. Two patients proved resistant. Six to eight months were required to render the patients euthyroid. Remissions of 5-30 months occurred in 62.5 per cent. of cases and 76 per cent. of the smooth glands remitted. The majority of relapses arose within a year.

The effect of treatment on the eye signs, gland size and consistency, body weight and associated pregnancy are recorded. Toxic complications arose in 4 patients, including 1 with agranulocytic angina with recovery. The occurrence of contact dermatitis to the tablet is described.

Factors related to the anti-thyroid effect are discussed. No relationship could be found in regard to age, duration of symptoms, I_{131} T factor, initial weight of patient, percentage or actual weight gain, duration of treatment or total quantity of carbimazole till euthyroid, total length of treatment given and the stage of relapse.

The following facts emerge:—

1. Carbimazole is a potent anti-thyroid drug with a very low toxic risk.
2. Age and gland type are the most important factors in selection of cases for treatment, young subjects with smooth glands giving most remissions.
3. In the few cases available for study, those without clinical thyroid enlargement appear to respond as well as smooth cases in spite of their later age of presentation.
4. Weight gain occurs in all cases and is variable.
5. Remission is unlikely in cases where the eye changes are aggravated or the gland enlarges in spite of added thyroxine.
6. Certain resistant cases occur. They constituted 3 per cent. of the series. The reason for the resistance is obscure.

Acknowledgments.

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REVIEWS

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FLAX-DUST BYSSINOSIS AND CHRONIC NON-TUBERCULOUS CHEST DISEASE IN BELFAST

By **J. S. LOGAN, M.D., M.R.C.P.**

Physician to Out-patients, Royal Victoria Hospital, Belfast

Sapientia prima stultitia caruisse

It is an appropriate time to review chronic non-tuberculous chest disease (C.N.T.C.D.). This is now one of the most important medical diseases. It is extremely common. The disability is often gross. The mortality is heavy. It can now be observed without the confusion of co-existing phthisis and without its course being cut short by broncho-pneumonia. The old background of poverty and malnutrition has almost vanished. The industrial background is better understood. Above all, the old concept of "chronic bronchitis" is yielding to a healthy willingness to admit ignorance of the causation of some of these syndromes. It is assumed throughout this discussion that primary chronic bacterial bronchitis does not exist or is very rare. It is important too that bronchiectasis, which was so long considered of numerical importance, is now seen to make a very small contribution to the numbers of C.N.T.C.D. On the other hand, it is easy to recognise a group of C.N.T.C.D., of special interest to Ulster physicians, due to prolonged inhalation of flax dust. This condition has clinical features hardly to be distinguished from cotton-dust byssinosis and is best called flax byssinosis.

Classification. Clinical Study of C.N.T.C.D.

Most cases of C.N.T.C.D. may be classified as emphysematous or non-emphysematous. The great majority fall into the emphysematous group. In this emphysematous group the three common kinds are asthma, "idiopathic emphysema," and specific industrial dust diseases. Uncommon varieties include the emphysematous syndromes of icthyosis and fibrocystic disease, and eosinophilic bronchopathy. Of the recognised emphysematous dust diseases in this city most are due to flax byssinosis, though hemp byssinosis occurs. The rest are found in those exposed to grain, meal and flour dust, rarely feather dust, and possibly also in coal dischargers at the coal quay. Of the comparatively few non-emphysematous C.N.T.C.D. sarcoidosis is the commonest. Silicosis is rare. Asbestosis is uncommon but may be commoner than silicosis. How much tobacco-smoking contributes to bronchial disease is unknown but it probably has genuine if minor importance.

Emphysema. Definitions.

The diagnosis of emphysema requires a complaint of shortness of breath on exertion, bad air entry into the lungs on auscultation, and appearances on chest screening of hyperinflation of the lungs and impaired respiratory movements, especially expiration. With experience a confident diagnosis of emphysema may

be made at chest screening and this is the crucial examination. Clinical impressions of emphysema cannot stand if they are not supported by chest screening findings. A reservation must be made in that in flax byssinosis the degree of hyperinflation is usually less than one would expect clinically and is not so remarkable as it would be in a case of idiopathic emphysema with equal breathlessness. The same may be said of the impaired expiration. The chest plate is of no value in emphysema except to exclude phthisis, cancer, sarcoidosis, silicosis, and other opacifying diseases.

Idiopathic Emphysema.

Idiopathic emphysema is a very common and disabling syndrome of unknown ætiology. The breathlessness is exertional. It is a disease almost exclusively of men. Most but not all of the men are employed in industry as tradesmen or labourers. However, no specific dust or fume risk can be identified. The onset is usually in the forties and it runs a slow steadily progressive course over some fifteen or twenty years to total disablement and eventual death. Death nowadays is usually due to pulmonary failure with anoxia and carbon dioxide retention. A large minority in their late stage show evidence of tricuspid regurgitation or congestive heart failure. Curious œdema of the face and hands may be seen in the absence of ordinary congestive failure or before its onset. Clubbing of the fingers never occurs in pure idiopathic emphysema. The characteristic sputum is small in quantity and mucoid. The disease is not responsive to prednisone or other steroid drugs. Secondary purulent bacterial infection of the bronchial tree may frequently occur in the later stages but is not invariable. On screening hyperinflation and radiolucency of the chest are striking. The diagnosis is made on these features and by excluding other causes of C.N.T.C.D.

Asthma.

Asthma is over-diagnosed and strict criteria must be applied. It is a hereditary tendency to paroxysms of breathlessness at rest, associated with wheezy respiration, an irritant cough and scanty mucoid sputum. The onset is often in childhood. At least in the earlier years remissions are common. Hay fever (which is the same process in the nose as asthma in the bronchial tree) is commonly associated in the patient or in the family. Infantile and flexural eczema are occasional associations. Finger clubbing does not occur. There is a strong tendency to the establishment of emphysema which is eventually, but not at first, irreversible. A remission of the asthma, but hardly of the secondarily established emphysema, may be induced with prednisone. It has to be recognised that in asthmatic families the onset may sometimes be late in life. Further, the course may often become continuous after being initially intermittent. Sometimes genuine asthma occurs where no hereditary tendency can be traced but this is not the usual case.

HISTORY OF FLAX BYSSINOSIS.

> But we must needs own that some Arts intail no small mischiefs upon the respective Artisans, and that the same means which keep up Life, and maintain their Families, are oftentimes the Cause of grievous Distempers, which hurry them out of the World.
>
> —*Rammazini's Preface.*

Flax byssinosis might occur in any flax store or works where workers are exposed for years to heavy concentrations of flax dust in the air. Flax has been worked at least since the days of the ancient Egyptians, so that the possibility of disease has existed for thousands of years. It certainly occurred before the days of mechanical spinning because Rammazini (1705) described it in his treatise of the Diseases of Tradesmen. He says: "Those who hatchel the Flax and Hemp to prepare it for being Spun and Wove afford frequent Instances of the Unwholesomeness of their Trade; for there flies out of this Matter a foul mischievous Powder, that entring the Lungs by the Mouth and Throat, causes continual Coughs, and gradually makes way for an Asthma. These Work-people complain that they suffer more in Hatcheling of Flax than in Hemp; and that, perhaps, because the Powder or Dust of the former is subtiler, and so making a smarter Irruption into the Organs of Respiration, provokes 'em more sensibly to throw off the clog that galls them."

With the introduction of mechanical spinning of flax in Leeds by 1791, and perhaps especially with that of mechanical hackling in Leeds in 1805, the risk became immeasurably greater. Leeds was the birthplace and for long the home of mechanical spinning of flax (Marshall, 1858). Because of this Thackrah (1832) had exceptional opportunities for observing flax dust disease of the lungs. In his famous book he describes the clinical features much as we can observe them now in Belfast. He does not, however, describe the Monday exacerbation. He says he believes flax mills more destructive than cotton. He does not seem to have had much experience of cotton spinning but quotes the experience of others. He draws attention to the special risk to hacklers. Greenhow (1861) described the Monday exacerbation of symptoms in flax workers. This is still a main distinguishing feature.

Mechanical spinning of flax in Ulster began as early as the first decade of the nineteenth century, for from 1805 the Linen Board was paying bounties to encourage the erection of flax-spinning machinery (Horner, 1920). However, mechanical spinning did not replace the spinning wheel till after 1825, when wet spinning was invented. Thereafter spinning was centralised in spinning mills and the stage was set for an increase in flax dust disease of the lungs in Ulster.

It is difficult to document the history of flax byssinosis from 1828 onwards. No doubt everyone in the industry was aware that flax dust, or pousse as it is called, could cause lung disease. On the other hand, relatively little was written about it and it seems to have deterred few from engaging in the linen manufacture. This was partly because they could earn a living at little else, and partly because they accepted the dust risk as inevitable. Then and now psychological rejection of the idea of dust danger probably was important. Those concerned about the workers attributed as much importance to changing environmental temperatures and to wettings as to dust. Moreover, dust disease was only one of many risks, and there were many in those days more immediately dangerous and obviously unpleasant. Byssinosis, even if recognised, would not terrify the people as would phthisis, pneumonia, the epidemic fevers, and the dangers of childbirth. In any

case, continued improvement did take place in mill hygiene even if it was not enough to eliminate the disease.

The earliest Belfast paper I have traced is that of Malcolm (1856). Malcolm asserts that the inhalation of flax dust is injurious to the lungs. He visited 2,078 workers in their homes and also examined the General Hospital admissions and dispensary district returns. He adduced evidence of a preponderance of chest disease among the disorders of hacklers and preparers. He says, "Pulmonary disease, generally bronchitis, is par excellence the hacklers' malady."

Henry M'Cormac (who was Professor of Medicine in the Royal Belfast Academical Institution) does not mention byssinosis in his Methodus Medendi (1842), but in his work on Consumption (1855) he mentions bronchial irritation in flax dressers. An early observer like McCormac might have seen or heard of cotton byssinosis, for there had been a substantial cotton industry in Belfast from 1777. In 1810 there were 150,000 cotton spindles working in and around Belfast (Horner, 1920). However, no record of that time is known to me concerning cotton byssinosis and the cotton industry died out as the linen expanded. Later, in the nineteenth century, C. D. Purdon (1873, 1875, 1876, 1877) was familiar with flax byssinosis and in burning language described the dreadful syndromes it was then producing. Purdon's works are available in the Belfast City Library, and striking quotations may be found in the paper of Dr. J. A. Smiley (1955). Dr. Hamilton, of Cookstown, described a chest disease in scutchers (quoted by Purdon, C. D., 1877), and the report of Osborn (1894) contains several interesting contributions from general practitioners in the Province.

References by Belfast writers in the early twentieth century are scanty. Lindsay (1906) does not mention flax dust disease. Whitla (1908) describes it briefly in a single paragraph. Calwell (1910) does not mention it. McKisack (1912) mentions flax dressers' bronchitis by name only. Wilson (1915) does not mention it. *The Ulster Medical Journal* has never published a paper on it. In England, on the other hand, Legge (1934) recognised that the flax dust syndrome closely resembled the cotton dust disease. A revival of local interest came with the work and observations of Smiley (1951, 1955), who may be said to have rediscovered flax dust disease in Belfast and first to have described hemp byssinosis in the city. Thompson (1952) concluded that "no serious illness which could be attributed to employment in this trade has been found among the workers during this series of investigations." However, she says chronic complaints were not considered.

It cannot be doubted that Rammazini, Thackrah, Greenhow, and Purdon had described the disease accurately. Nothing significant has been added since to their clinical descriptions. It is difficult to explain why physicians generally failed to recognise such a serious public health problem. It was, of course, confused with phthisis (Purdon, H. S., 1903) before the days of radiology. One must remember that thought was arrested for generations by the concept of chronic bronchitis. Another handicap was the loose diagnosis of asthma. Many physicians and family doctors had never been in a flax mill and had no knowledge of conditions there.

Many did not grasp that a severe dust disease of the lungs existed which did not produce opacities in the lung fields on X-ray study. The disease lacked a distinctive name. The occupational history was not taken. The resultant ignorance of flax byssinosis (in which the writer shared) was such that in Northern Ireland up to 1958 no claim for disablement benefit for byssinosis had been made since the Industrial Injuries Act came into operation in 1948. In that year only one claim was made. This while the number of cases in the Province must run to hundreds, and deaths are not infrequent. Indeed flax byssinosis is not a prescribed disease under the Industrial Injuries Act, though cotton byssinosis inexplicably is.

Clinical Features of Flax Byssinosis.

> The Shops or Work-houses of Trades-men are the only Schools in which we can find any satisfactory Knowledge of these Matters.
>
> —*Rammazini's Preface.*

The disease is commonest in those engaged in preparing flax for spinning. Generally the earlier the process the more dust. Hackling is very dusty and so is the carding of tow. It occurs only rarely, if at all, in spinners when the flax is wet. It can occur in those handling the spun yarn after it is dried and in linen weavers. It has not been determined at what point in the manufacture of linen cloth the risk ceases. The disease has not certainly been described here in workers in scutch mills probably because the scutching season is short. It is known, however, that a dust irritation occurs in scutchers in Northern Ireland; and in England during the late war a comparatively acute syndrome was observed in scutchers (Goodall and Hardwick, 1951). It is not certain that this can be classified as flax byssinosis because the preliminary exposure had not lasted for many years.

After a variable number of years of exposure the worker begins to experience chest symptoms on a Monday. These consist of breathlessness, tightness in the chest, and a cough. Sputum, if any, is scanty and mucoid, and remains so always. The symptoms are worse as the day goes on. In the beginning the symptoms are not present on other days of the week, but as time goes on they come on Tuesday too, and then Wednesday, and so on till in the end they are present on all working days. Any day they are present they are worse as the day goes on. At the week-end there is relief, great in the beginning, but rather less as the years go by. Monday is always the worst day. Sometimes the nose runs almost like hay fever, but this is not invariable. The cough becomes very racking and distressing. Breathlessness and wheezing increase. The exercise tolerance diminishes greatly. Appetite and general condition and sleep are poor. Eventually the worker is disabled. If he leaves the mill and does not return there is some improvement, and this improvement may continue up to eighteen months or so. However, restoration to normality does not occur.

On examination: There is cyanosis of some degree. There is never clubbing of the fingers. Air entry is bad on auscultation, but not so bad as in idiopathic emphysema. Rhonchi are usually heard and they are perhaps more in number and finer than in idiopathic emphysema. Sputum is scanty and mucoid. General condition is poor. Chest screening shows emphysema, but there is not the extreme

radiolucency and impairment of respiratory movement that one sees in idiopathic emphysema. The impression is of proportionately more disease in the bronchial tree than in the lung substance. The X-ray shows no abnormal shadowing or opacification whatever.

The later course may be one of a non-progressive, stable, moderate disability. On the other hand, asthma-like crises may occur and there may be repeated hospital admissions and finally death. Pulmonary hypertension occurs in the advanced disease.

Case Reports.

Case 1.—H. H.; age 51; male. He went to the mill to be a hackler after leaving school. He was a hackler for many years and later worked in a tow store, hand-shaking and mixing tows. Total employment in the mill was nineteen years. He left at age 33. He began complaining of his chest at 19 and had regular chest trouble from 24. He was worse on a Monday. He felt well out in the air over the week-end. Afternoons were worse than forenoons. He improved somewhat after leaving the mill at the age of 33, but has remained partly disabled by shortness of breath on exertion. He presents clinically the features of emphysema. X-ray of chest shows no parenchymatous lung disease. His hospital records show various diagnoses—"chronic bronchitis and emphysema," "asthma," and "bronchiectasis." There is no evidence of these and he clearly has advanced flax byssinosis, a typical hackler's syndrome. He says that Courtrai and Livonian flaxes were the worst. He will not admit that Ulster flax does the same harm.

Case 2.—T. McA.; age 55; male. He was employed in flax spinning mills from leaving school till 1958, except for three years during the war away from the industry. He was a tow teaser. He broke open the bales of tow, shook it out and put it on the feed sheet of the machine that broke it up. This was a very dusty job. His prime complaint is of shortness of breath on exertion. He has not been able to work since he left the mill on this account in 1958. He long had had shortness of breath, but first attended the doctor in 1956. Monday was a bad day. Afternoons were worse than forenoons. He was improved at the week-end. On examination: There is emphysema. X-ray chest shows no parenchymatous lung disease. The diagnosis is clearly flax byssinosis.

Case 3.—F. J.; age 57; male. At 13 he went to work in a linen bleaching works and he remained at bleaching till 1946. He then laboured for a little while in a railway workshop. Then he went to a spinning mill, where for two years he was in the engineers' shop. Then he went to the tow store and he was there five years till he had to stop work in December, 1957, because of his chest. He had been a charge hand in the store but had to get out because of the pousse. His breathlessness was great and he had a cough and wheeze. Sputum was scanty and mucoid. Monday was the worst day of the week for his chest and he got worse each day as the day went on. On examination: There were many fine rhonchi in the lungs. Air entry seemed poor. Chest screening did not show much emphysema. There was some ventricular hypertrophy which was probably mainly in the right ventricle. There was no hypertension, valvular disease, or ischæmic pain. E.C.G. showed right bundle branch block and right ventricular hypertrophy. He had three hospital admissions in 1958 and died during the third of a suffocative asthma-like attack. Hospital diagnoses were "asthma," "chronic bronchitis," and "asthmatic bronchitis." It is hard to say why this course was so rapid and so fatal. He had pulmonary hypertension which Case 2, who also worked in a tow store, had not. His breathlessness had begun ten years before

death and he had had only five years' exposure to pousse in the tow store. Possibly some inhalational damage had occurred in the bleach works. Possibly being first exposed to the pousse at a late age was unusually harmful.

Case 4.—R. McC.; age 50; male. He went to a flax spinning mill at 14 and from 15 to 48 he was employed in the bundling shop. His job was to bundle yarn. This yarn, having come wet from the spinning room, had been reeled, dried, and cooled before reaching him. After about eighteen years in the bundling shop he began to notice shortness of breath and cough on a Monday. As time went by he felt it on Tuesday too, and then on every working day. On any day he had it it was worse in the afternoon and evening. At first he got relief at the week-ends. Later the relief was less. In the end his exercise tolerance was greatly diminished. He lost in general condition. His sleep was poor. He could not continue his work. He was specially alarmed when, in 1956, he had a frightful exacerbation after a fortnight's holiday. After he left the mill he got some relief, and his exercise tolerance improved slowly over about two years, but substantial disability remained. It is my impression that this man improved more after leaving the mill than Cases 1 and 2. On examination, he was emphysematous. X-ray chest showed no parenchymatous lung disease. This case illustrates byssinosis in a worker at a stage when spinning is completed and in a man who was engaged only in a hand-work process with no mechanisation.

Case 5.—S. F.; age 57; female. At 12 she went to a flax spinning mill. She piled bobbins and was a doffer and backminder in the first year. At 13 she began to learn weaving. At 16 she went to the ropeworks to braid. Much if not all the material in the ropeworks was hemp. After her marriage she was very intermittent in her work because of her family duties, but she returned on and off to weaving till 1939. She worked during the war at shell-making and drilling and returned to weaving at the end of the war. She has remained at linen weaving since. In her earlier days she had to suck the shuttle to get the thread through. She has had a wheezy chest since her forties, with irritant cough and scanty sputum. On examination: There are many rhonchal sounds, but no gross emphysema. The impression is of bronchial disease without too much change in the lung parenchyma. She says her chest was worst when she was at weaving and it was worst at the end of the week when the machines were being cleaned. There was no Monday exacerbation. At the week-ends she was clear. She never had asthma or hay fever. A brother who worked in the shipyard has a bad chest, though another who also worked in the yard in the open has not. A sister is a braider in the ropeworks and has a worse chest than the patient. This sister was in a very poussy job in the finishing room. The patient is now weaving cushion covers from dyed fibro and cotton, which process gives off a "black pousse."

This patient has byssinosis, but the history brings out some important points. Women stop work for a time when they marry, or later when they are pregnant or caring for a small child. Depending on financial necessity, their liking for working out of the house, and the needs of their young family and ill relatives, their attendance at work is intermittent till the children grow up. This lessens the exposure and makes for a less severe and less characteristic syndrome. This patient was exposed to hemp as well as flax in a proportion I cannot determine. She did not have a Monday exacerbation, but rather at the end of the working week when the machines were being cleaned. The involvement of other family members because of a similar employment is common. The most important point is that she was a weaver. If this case is accepted as byssinosis, and I think it must, it follows that at all stages up to and including the weaving there is enough flax dust to cause the disease, *given suitable conditions of dryness and agitation to*

disseminate it. Schilling (1956) remarks on the relatively low concentration of cotton dust which produces a high prevalence of pulmonary disease. The same may be true of flax dust, and proportionately more so, if Thackrah is right in saying that flax is more destructive than cotton.

Case 6.—Alph. McC.; male; age 57; flax rougher. He went to work in the mill at 13. He began in the machine room "at the back of the machine breaking ends." He worked variously in the early stages of getting the flax ready for spinning. He was a tow boy. He did tippling up and screwing the hackling machine. Eventually his main work was a flax rougher. This includes a kind of hand hackling (similar probably to what Rammazini's patients did). The job was always very dusty. "It does not get you till you get to a certain age." "Every year as you go on you feel it." He had the Monday exacerbation badly. He eventually was very bad every evening. Often he could hardly walk home. He had the usual relief when out. He never had asthma or hay fever. He first had symptoms in his twenties. He worked hemp in his teens for a few months, but would not continue because it caught his chest on first going in. He left work at 55 because of the industry's contraction. The diagnosis is byssinosis in a flax rougher.

There are some interesting social points. His father "followed the flax" and "died of his chest." Most of the males of the family "followed the flax." He would not let his son do so and always advised young men not to join because of the dust. Nevertheless, he himself liked the job. The company and conversation were agreeable, the comradeship was close, and the management left them alone. The group were accustomed to take rum to ease their chests (cf. Purdon, 1873; D'Evelyn quoted by Osborn, 1894) and this added to the cheerfulness. "You want to see them on a Monday and on a Friday night rushing to the pub to get a drink to ease their chests." Similar moderate alchoholism is common among coal dischargers who think it necessary to wash the dust away.

Case 7.—C. B.; age 53; female. She went to the mill at 14. After being a doffer for a year she became a drawer and worked till she was 29. She was then out till she was 41, when she returned to drawing. She was wheezy for many years but was not too bad when at home. When she returned to work at 41 her chest got bad again. She dreaded Monday because of the exacerbation. When it came 6 o'clock in the evening she had no breath and often could hardly get home. Cough and spit were not prominent. She left the mill at the age of 48 and since then has not been too bad, though her chest is still troublesome. Last year she had an asthma-like attack. On examination: Her chest is silent and there are a few rhonchi. Screening shows no hyperinflation, but expiration is restricted. This is a case of byssinosis in a drawer with much residual disability. There is a family history of alleged asthma.

Case 8.—J. N.; age 55; male. He spent twenty years in a flax-spinning mill, where he began work at 13. He worked in various jobs in the hackling and preparing rooms. His chest was troublesome in the usual way and he had the Monday exacerbation. After twenty years he left and went to work in a moulding shop, making boxes for the moulders. He left this job in 1957 and all work a few months afterwards. He was admitted twice to hospital in 1959. One admission had been to a mental hospital for anoxic delirium. He has gross emphysema with anoxia and carbon dioxide retention. He has had tricuspid regurgitation and congestive heart failure. E.C.G. shows right ventricular hypertrophy and X-ray shows the enlarged heart and pulmonary artery engorgement. This man's flax byssinosis may have been complicated by further inhalational lung damage in the moulding shop.

The following two cases are known to me only from their comrades' account of them and their hospital notes. Both died in their fifties of flax byssinosis with right ventricular failure.

Case 9.—F. G.; male; died at age of 54. He began work at 12 and was employed all his working life in and about the hackling department. Case 1 worked beside him for twenty-eight years. He was a machine boy and man (put flax up to the hackler). He baled out tow (collected the fibre that falls out of the hackling machine). He pieced out (making flax up into bunches for the machine man) and he worked in the tow store. He was a cutter and this seems to have been dusty to a point that almost passes belief. He cut both flax and hemp. He had the usual chest complaint and the usual Monday exacerbation. He came off work in 1949 at the age of 47 and never recovered. He had two hospital admissions in 1956 and died during the second. The severe course and the early disability and death seem possibly to have been due to the cutting. His hospital diagnoses were "asthma" and "bronchitis." It is clear that he had severe flax byssinosis. His X-ray chest showed considerable right ventricular and pulmonary artery enlargement. He terminally had venous congestion.

Case 10.—Alex. McC.; male; died at 53. He was a flax rougher all his working life. He was an associate of Case 6. He was well known to have the chest complaint usual among his group, and he had it unusually badly. "Some are more gripped than others." He had the usual Monday exacerbation. He had one hospital admission in 1956 and improved at the time. He died soon afterwards. It is clear from his hospital notes that he had emphysema with gross right ventricular embarrassment. X-ray chest showed enlargement of the right ventricle and pulmonary artery. E.C.G. showed extreme right ventricular preponderance. There is no reasonable doubt but that he died of flax byssinosis with consequent right ventricular failure.

COMMENT.

> When you come to a sick Person, says Hippocrates, it behoves you to ask what Uneasiness he is under, what was the Cause of it, how many Days he has been ill, how his Belly stands, and what Food he eats: To which I'd presume to add one Interrogation more; namely what Trade he is of.
>
> —*Rammazini's Preface.*

The history of the condition and the clinical observations make it certain that flax dust causes a lung disease with severe disability, much misery, some mortality, and considerable economic loss. It is still quite a common disease in Belfast. In its grosser forms it is easily recognised provided one knows of the condition, takes an adequate occupational history, identifies the Monday exacerbation, and does not expect to see characteristic signs on a chest X-ray plate. There are no diagnostic appearances to be expected on X-ray. The true incidence is unknown. It should always be suspected in a woman with emphysematous C.N.T.C.D. who is not asthmatic, and her occupational history should be taken. The Monday exacerbation is not mill fever. I have not heard of mill fever in these patients, though Purdon speaks of it (1873, 1876), and Thompson (1952) discusses it.

So soon as the condition is recognised the patient should be advised to leave his employment and he should never again be exposed to any textile or other industrial dust. It is stated, however, that the new man-made fibres do not

produce any dust disease and, if this proves to be true, these people might be able to use their skill in the working of fibro and other fibres. Flax byssinosis is not a prescribed disease according to the regulations made under the Industrial Injuries Act. Under the present arrangements, therefore, neither disablement nor death benefit is payable. It is open to these workers, of course, to make a claim against their employers on common law grounds, and Case 4 did so successfully. It is important that when certification is necessary the disease should be certified correctly as flax byssinosis.

It is impossible to say why workers vary in susceptibility. It is probably a question of variation in the individual risk and the dose of dust received. Contrast the dose in Case 9 (cutting) and Case 5 (weaving). The character of the dust may vary too. What a yarn bundler (Case 4) received is not identical with the dust breathed in by a hackler (Case 1). No doubt some have a pre-existing asthmatic tendency. Thackrah thought young people could stand the dust better than older people. In Case 3 the risk began at 52, and the course was severe and fatal. Case 5 had been exposed to heavy dust and had had other industrial employment. The onset of pulmonary hypertension and right ventricular failure seem to herald death. Three of the ten cases reported have died of pulmonary heart disease secondary to byssinosis.

When new entrants are being examined for employment in flax spinning and weaving, those with asthma, or with hay fever, or with a blocked nasal airway should be excluded.

Prevention by dust extraction and ventilation in the mills is of vast importance, but I am not qualified to discuss it. With continuing improvement in such prevention and with the contraction of the linen industry it is likely that the incidence of the disease will diminish. It is probable, however, it will not disappear entirely, the pousse being so "subtil."

The concept of chronic bronchitis as a disease due to primary bacterial infection never had any validity and should be abandoned. It has been a great hindrance to diagnosis. It covered the whole group of C.N.T.C.D. and, as this group is gradually broken up by better identification, the residuum of so-called chronic bronchitis should disappear.

Whatever the status of bronchiectasis twenty years ago, it is now uncommon. It should not be called in to explain C.N.T.C.D., the nature of which is not clear. Such diagnoses are speculative and block diagnostic thinking. Lipiodol bronchograms can cause an asphyxial crisis in emphysematous people and should be avoided.

Idiopathic emphysema is almost certainly due in the main to industrial dust or fumes, or combinations of dust and fumes, or combinations of these external causes with an inborn asthmatic tendency. No progress can be made with these diseases by workers in hospitals. What is needed is a doctor to investigate the individual risk at the place of work. These risks are sometimes very individual. One man, for instance, by a set of unusual circumstances, was exposed to a combination of coal and grain dust for many years. The history is often suggestive, but can never be entirely relied on.

While air pollution makes worse the symptoms of people with emphysematous C.N.T.C.D. it is not likely that it has anything to do with initiating the disease. Investigative effort is best directed to determining the individual industrial risk.

Finally, it must be remembered that this paper is based on observations made only in the hospital. Understanding could best be advanced by work in the mills and factories. I wish to emphasise that great improvements in mill hygiene have been made over the years by the industry and by the efforts of industrial doctors and those concerned with factory inspection. It is among those doctors who work outside the industry that the disease has been unknown.

Summary.

Flax byssinosis is an important industrial disease of workers in flax and linen. Ten cases are described. The diagnosis may be made by taking the occupational history; noting the Monday exacerbation; and recognising the disabling emphysematous lung disease. This is as much bronchial as parenchymatous, and is progressive at least so long as exposure to flax dust continues. Pulmonary hypertension may result. Although long known to those closely concerned with the industry, the disease has failed to obtain general recognition even in Belfast. Better certification is required. Flax byssinosis is not, but should be made, a prescribed disease under the Industrial Injuries Act.

Idiopathic emphysema occurs almost exclusively in men; and among men predominantly in labourers and tradesmen. In this condition investigation of the individual dust risk at the site of work is advocated. Chronic bronchitis is thought to be an invalid concept.

I am much indebted to Dr. J. A. Smiley for information and for guidance in the literature. I have had much help from Miss Webster of the University Medical Library. I am indebted also to Dr. E. James; and to my colleagues of the Royal Victoria Hospital staff for permission to use their notes.

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REVIEWS

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REVIEWS

SURGICAL TECHNIQUE. By Stephen Power, M.S., F.R.C.S. Second Edition. (Pp. x+411; figs. 198. 40s.) London: William Heinemann Medical Books Ltd., 1959.

THIS book has been written with the difficulties of the young surgical registrar in mind. It has attracted enough interest already to warrant a second edition. Priced at 40s., this book can reasonably be owned rather than borrowed.

Under the present system of surgical training, the prospective surgeon finds himself all too often left to his own resources. Larger operative surgical manuals supply details of operations but assume a knowledge of surgical technique. Stephen Power's book of surgical technique is therefore complementary to the larger surgical manuals as it supplies an answer to the more immediate ward and theatre problems which confront the hospital registrar.

Information is supplied on ward techniques, theatre management, operative techniques, surgical materials, and surgical instruments, and the comments and illustrations are completely clear.

One can recommend this book highly, as it fulfils in every way its aim of assisting the surgical apprentice who does not have an attentive senior constantly giving instruction.

W. T. C.

AN INTRODUCTION TO MEDICAL GENETICS. By J. A. Fraser Roberts, M.A., M.D., D.Sc., F.R.C.P. Second Edition. (Pp. xii+263; figs. 107. 35s.) London: Oxford University Press, 1959.

THE reviewer has always considered that for medical readers the first edition of this book, published in 1940, was by far the best introduction to genetics. Here is the long-awaited second edition. Though the book has been largely rewritten and many new examples, especially those relating to the blood group systems and the abnormal hæmoglobins, have been added, the approach is basically the same. Genetic principles are only briefly described, but are clearly illustrated and derived from examples of human inheritance. A most valuable chapter is now included on genetic prognosis, but the author refrains from an attempt to list human inherited abnormalities. Readers will hope that the companion handbook, promised by the author as an attempt to cover this most difficult subject, will soon appear since the literature still remains scattered and somewhat uncritical. This is not a book for hurried reference or casual reading, and the somewhat inadequate index is perhaps no real disadvantage. Every medical man reading it will have his horizon broadened and his mental processes stimulated. J. E. M.

THE MECHANICS OF BLADDER CONTROL

By S. A. VINCENT, M.B., F.R.C.S.
Belfast City Hospital and Ulster Hospital for Children and Women, Belfast

In the normal adult the urinary bladder is so well under the control of the cerebral cortex that the act of micturition does not require any great mental effort. The much more prolonged act of holding urine could almost be stated to be automatic. This apparent simplicity is misleading. We know that many factors, efferent and afferent, local and distant, come into play in normal bladder control. It is not achieved until many months after birth and in some people it is never achieved at all or only after an unhappy childhood and adolescence. As well as this, due to disease or injury, many people lose the ability to pass or to hold their urine normally.

At the Belfast City Hospital, the Ulster Hospital for Children and Women, and in the Anatomy Department of Queen's University an investigation has been in progress since 1954 in an attempt to learn more about the various factors that might come into play in normal and abnormal bladder control. Although the problem has been attacked simultaneously from the clinical and the experimental aspect, this discussion confines itself to some of the preliminary results of the experimental work. This has been concerned partly with observing the mechanical effects of certain manipulations on unfixed post-mortem bladders, and partly with the results of attempts to copy these manipulations on living subjects both normal and with incontinence of urine.

Mechanical Studies on Post-Mortem Bladders.

Up to the present 350 of these bladders have been examined. The bladder is removed during routine autopsy. In the male the bladder is removed in such a way as to include the prostate and a varying amount of the urethra distal to it. In the female all the urethra is included in the specimen with a varying amount of the anterior vaginal wall. By the very great kindness of pathologists at the Royal Victoria Hospital and the Belfast City Hospital, the author has been permitted to remove a number himself and in these cases the usual procedure has been to remove the bladder along with all the pelvic floor muscles. During these procedures the tremendous mobility of the middle and posterior parts of this region became apparent as did the relative fixity of the anterior or pubic element.

In each case the bladder is dissected clear of extraneous tissues, the fundus is opened and the bladder outlet is inspected from above. Water is then poured into the bladder to note the appearance of the outlet as the water escapes. A circular perspex window 3″ in diameter is then firmly sutured into the fundus to produce a watertight joint. The window contains an opening which allows water to be poured rapidly into the bladder from a reservoir which can be raised or lowered as required. Another opening transmits a tube which can be attached to a manometer. A small electric bulb faces into the bladder from the inner surface

of the window. This bulb can be overloaded for short periods for the purpose of photography.

The bladder with its perspex window is then clamped firmly into a special machine in the form of an upright stand. Above the bladder is a movable arm which can hold a camera or cine camera. Below the bladder and in the region of its neck is a clamp containing sharp needles pointing inwards so that when the clamp is tightened the needles transfix the outer coats of the bladder neck, and, when it is somewhat loosened again after this manipulation, the neck is supported without being squeezed, and can be raised or lowered as required by a fine adjustment which attaches the clamp to the upright stand. During this raising and lowering it is possible to see and photograph and cine-photograph the bladder outlet under measured internal volumes and pressures of water, and at the same time to observe the effects of these manipulations on the water-holding ability of the bladder.

Observations on Unfixed Post-Mortem Bladders.

(1) When water is poured into the bladder from the fundus it leaks from the urethra immediately. Out of 350 bladders only ten failed to allow water to escape in this way. Eight were from elderly patients with enlarged prostates and had marked increased trabeculation or diverticula formation. Two were from young adults who had died from pyelonephritis due to obstruction at the bladder neck. These had gross hydroureter as well as diverticula formation, and were the only bladders in the series that allowed any reflux into the ureters when the bladder was filled.

(2) *Any* manipulation at the outside of the bladder neck below the outlet tends to obstruct it and to allow the bladder to fill. Thus, touching it lightly with the finger or any flexible instrument may be enough and raising it is extremely efficient.

(3) Lifting the neck of the empty bladder closes the outlet and lowering it causes it to open again. Pulling it to an artificially low level causes it to gape widely.

(4) When the bladder with its perspex window is placed in the machine it is possible to see this opening and closing under varying pressures. On lifting the bladder neck with the needles and clamp the flow stops as soon as the outlet is seen to close and, when this occurs, the pressure in the bladder can be raised enough to burst the bladder wall before any leakage occurs at the outlet.

(5) The actual amount of lift required before this closure and stoppage of flow occurs varies a great deal and seems to depend on the original diameter of the outlet, but in each case there is a sharp "end-point" of about half a centimeter between a good flow with the outlet still very slightly open and complete cessation of the flow with the outlet closed.

(6) Lateral X-rays using radio-opaque fluid in the bladder instead of water show that when the neck is raised alone the contrast medium remains entirely in the bladder. When the neck is squeezed alone the medium comes down as far as the point of squeezing.

All these effects are passive ones produced by simple bunching or stretching of the tissues of the bladder neck. They are the results that would be expected from any vessel of that particular shape and consistency when treated in such a way and in fact can be imitated to some extent, using rubber balloons instead bladders. What is remarkable is the extreme ease with which lifting the bladder neck stops the flow compared with squeezing the neck alone. This was considered sufficiently striking to warrant an attempt at imitating the movement and the raised position in the living subject.

Clinical Experiments.

The first attempt at producing this lifting movement on the living subject was on a young woman during the course of an operation for bed-wetting and diurnal urge incontinence associated with a wide bladder neck anomaly. A specially designed periscope of about 2″ diameter was sutured into the fundus of the bladder. This allowed a view of the bladder outlet under varying internal pressures of fluid. Before the periscope was inserted the outlet appeared closed but was very lax to the examining finger. When the periscope was inserted a few ml. of water was sufficient to show the bladder outlet dilating and with 10 ml. water pressure the outlet was widely dilated and it was possible to obtain photographs of this outlet.

An attempt was then made to raise the bladder outlet from below by pressing upwards in the region of the anterior vaginal wall. It was very difficult to produce any upward movement by this means, but on pressing upwards in the region of the anus and perineal body and in the ischio-rectal region a definite upward movement occurred and the bladder outlet closed. Unfortunately, it was not possible to photograph the closed bladder neck during this procedure, but it gave the clue to the most efficient way of raising the pelvic floor and the bladder outlet with the minimum amount of squeezing of the urethra below the outlet region.

On trying the effect of this upward pressure on normal people during the act of micturition it was found that if firm pressure was exerted in the perineal region behind the bulbar urethra in the male, and behind the vagina and the perineal body in the ischio-rectal region in the female, the flow could be stopped much more easily than by squeezing the urethra during the act of micturition. As well as this the act of micturition could not be initiated under these conditions.

A micturating cysto-urethrogram was then carried out on a male patient with the flow of urine stopped by squeezing the urethra, and then stopped by raising the perineum. It was found that when the flow was stopped by squeezing the urethra the contrast medium came down as far as the constriction and all the urethra proximal to this point was dilated as compared with the size shown in a film taken during normal micturition. When the flow was stopped by raising the perineum the urethra was empty and the bladder outlet was tightly closed (Figs. 1 and 2).

It appeared from the results of these experiments that raising the perineal region was a much more efficient, and possibly a less harmful, method of stopping the

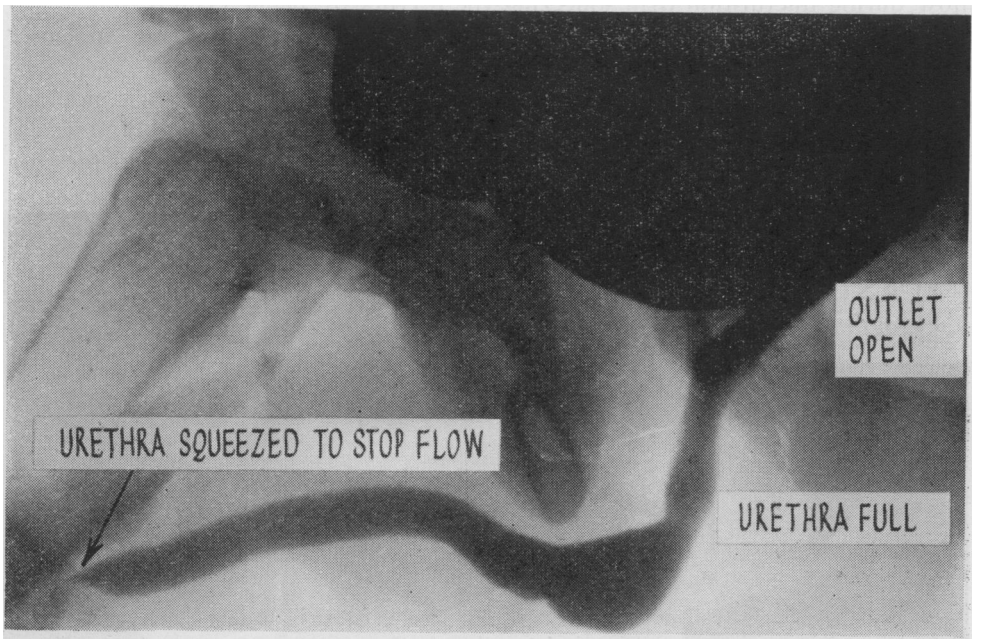

FIG. 1.—Micturating cysto-urethrogram taken immediately after starting to squeeze the urethra in an attempt to stop the flow.

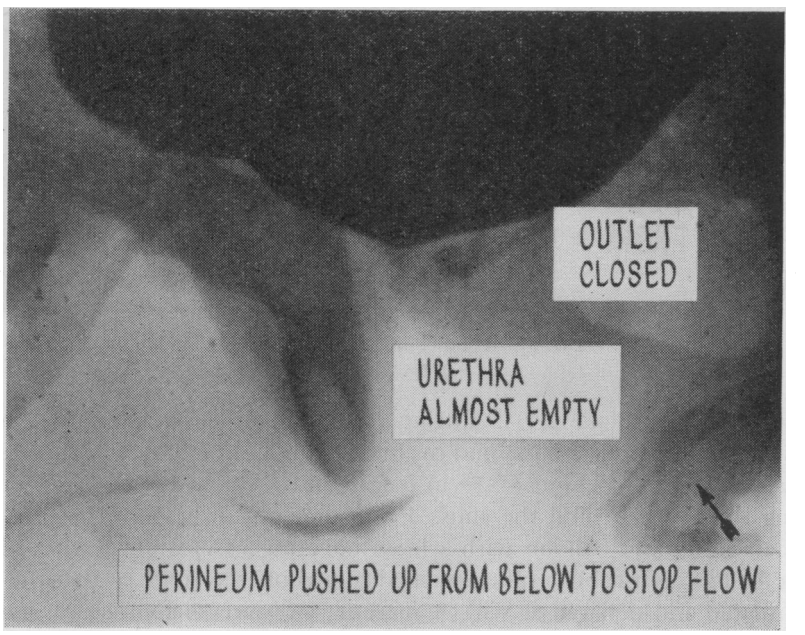

FIG. 2.—Micturating cysto-urethrogram taken immediately after the perineum had been pushed upward manually to stop the flow.

flow during micturition than squeezing the urethra by penile clamps, and it was therefore decided to attempt to produce the lifting by means of an appliance which could keep this force constantly in action.

An appliance was then designed, which now takes the form of a belt moulded round the patient in the region of the crest of the ilium and passing downwards and forwards towards the pubis and therefore not exerting any marked pressure

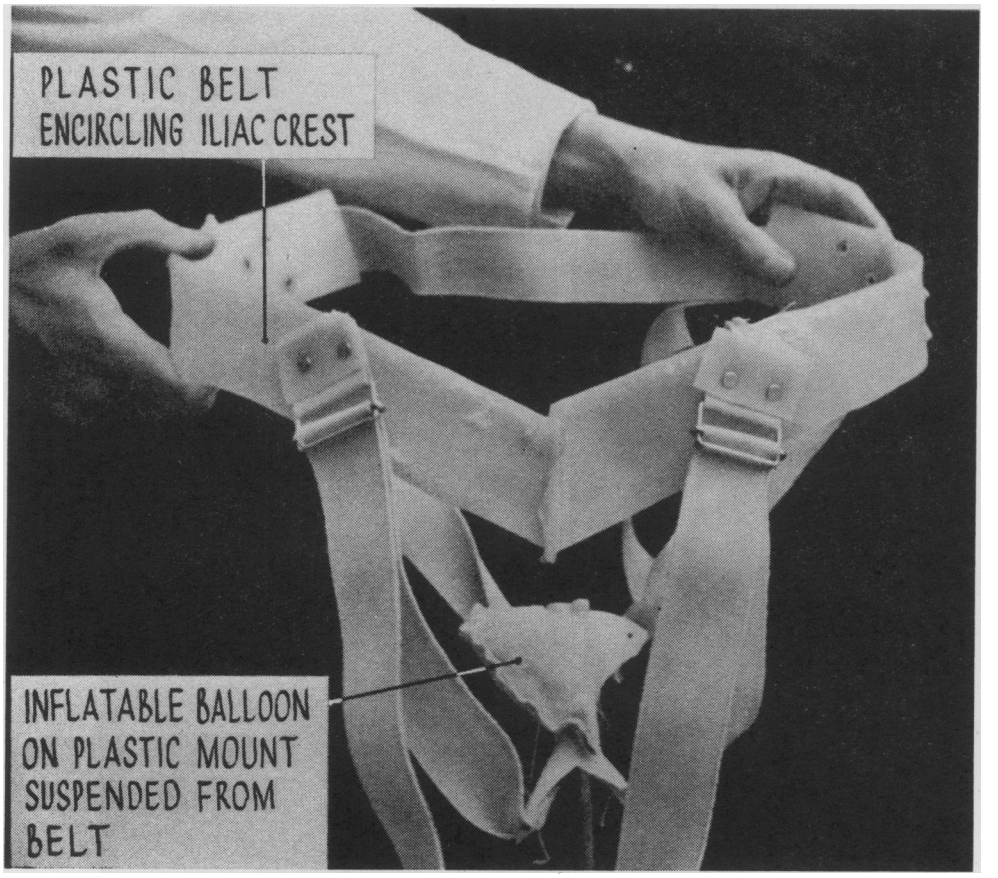

FIG. 3.—Prototype of the Appliance.

on the abdominal wall (Fig. 3). Fitting into the perineum, and pulled upwards towards the belt in front and behind by firm straps and buckles, is a sheet of fairly firm plastic material of about 6″-7″ in length and 1″ in width in front, gradually increasing to 3″ just behind the anus. Projecting upwards from the plastic sheet is an inflatable rubber balloon with a loose covering of chamois leather. Leading from the balloon is a rubber tube attached to a rubber syringe so that the balloon can be inflated and deflated at will. A mercury or water manometer is sometimes included in the system to measure the pressures in the balloon under different

conditions. It is considered that it may be possible later to replace the rubber balloon with sponge rubber of a proper shape and firmness.

This appliance was then tested on a number of normal subjects and it was found possible to prevent the act of micturition. It was also quite easy to stop it at any stage by inflating the balloon. Several females noticed that for as much as half an hour after the belt was removed it was difficult to micturate and one female had some degree of frequency of micturition for twelve hours following a prolonged test with the appliance.

A number of patients with incontinence of urine or enuresis due to a variety of causes were then subjected to a series of experiments in the operating theatre and the following observations were made.

(1) Using the appliance in each of these patients, male or female, it was possible to prevent micturition occurring and to stop it at any stage by inflating the balloon.

(2) With a mercury manometer in circuit with the balloon it was found that the pressure required to stop micturition was usually in the region of 40 mm. Hg., but these figures have not been obtained in a sufficient number of cases to be of significance and in certain types of incontinence much higher pressures were required.

(3) Using the instrument as a rough guide to the perineal pressures on these patients it was found that coughing or straining raised the pressure in the balloon as did pressing on any part of the patient's abdomen or lower thorax.

(4) The pressures of fluid in the bladder, as measured by a water manometer attached to a catheter in the bladder, showed a very sensitive response to tilting the head end of the table, even though the tilt took place in the mid-lumbar region and the pelvis was not moved at all. When the upper part of the patient's body was lowered below the horizontal the pressure in the bladder fell, and when the head end was raised the pressure rose.

(5) It was possible to lower the pressure in the bladder by lowering the head and then to introduce more fluid into the bladder than the patient could comfortably allow in the horizontal position. If the catheter was then removed it was possible to bring the patient slowly to the horizontal position without the discomfort appearing for some time. This test has been repeated on a number of patients and it has been possible to "steal" several extra ounces of fluid into the bladder by this means. It is considered that this may be a useful means of increasing bladder capacity.

Clinical Trials.

An extensive clinical trial has now been started, using the appliance as a method of controlling incontinence of urine due to a variety of causes. This trial is not yet sufficiently advanced to report as a series of cases classified according to percentage success in each type of incontinence and it is considered more useful at the present stage of the investigation to report isolated cases from certain of the main groups of incontinence.

Case 1.—Before the special appliance was designed a male patient was referred from a medical ward in the Belfast City Hospital. He was 55 years old and had been incontinent of urine since removal of his prostate seven years before. He was a severe epileptic and of rather low mentality. Each night he wet the bed and by day, although he had the mentality to attempt to get to a urinal, he seldom got there in time as the urge to micturate came suddenly and uncontrollably. A belt was applied and a firm pad of cotton wool placed in the perineum and held in position rather inefficiently with straps slung to the belt. When he wore this appliance he kept dry by night, and during the day the urge to micturate was much less powerful and he was able to empty his bladder when he wished by loosening the straps applied to the belt. He was then transferred back to the medical ward, where he began to complain of the appliance hurting him, and after a few days he suddenly refused to wear it. He was discharged home as a "failed belt," with the proviso that the belt might have worked if he had had the mentality to use it. Three months later he was sent for again as the belt had been improved in design in the interval, and it was thought that he might consent to wear the new type of belt. He arrived at the ward wearing the old belt which he had purloined when he was discharged, and stated that as long as he wore the belt he kept dry. He was not believed and was admitted to the ward, when it was soon obvious that he was quite truthful, and during the week that he was kept in he was always dry unless the belt was taken away from him, when he immediately became as wet as ever.

Cases 2 and **3.**—A colleague very kindly referred two gynæcological patients with diurnal enuresis and they were fitted with belts. Both had had several repair operations with no relief of symptoms. There was some degree of stress incontinence in each case in that laughing caused a slight leakage, but the main complaint was that they were constantly becoming wet when walking about doing their normal tasks and that there was nocturnal frequency. These were intelligent women and they had no difficulty in wearing the belts. They were also extremely co-operative and were able to adjust the perineal pressure to the point where micturition became impossible. In each case the diurnal incontinence was completeley relieved and the nocturnal frequency was cured in one and markedly improved in the other.

Cases 4 to **7.**—Four males, aged 18 to 20, with nocturnal enuresis were then treated successfully with the belt, and three of these volunteered the information that, when the balloon in the perineal region was blown up, they lost the desire to micturate, and when the pressure fell the desire to micturate came back suddenly.

Cases 8 to **11.**—Of several hundred enuretic children only four have as yet been treated, two boys and two girls aged 9-11. The boys were both relieved at once, but one of the girls who had a low bladder capacity was not relieved. No concentrated trial has yet been attempted on the young children as suitable belts are in short supply.

Case 12.—A man aged 35 was referred in August, 1959, having been an enuretic till the age of 15. At that age he stopped wetting the bed or wetting himself by day, but the enuresis was replaced by gross frequency of micturition. He had to pass urine five to six times each night and could seldom hold it for more than half an hour by day. The belt was applied at the height of his urgency and as soon as it was on he stated that he no longer felt any desire to pass urine, and in fact he delayed passing it for three hours. As soon as he took it off an intolerable desire to micturate occurred. It was decided to attempt to replace the effect of the belt by improving his own perineal muscles by electrical stimulation and exercises. He was started on this treatment after he had been wearing the belt for ten days. After a few days he noticed much less urgency when he removed the belt and with a further week of treatment he was able to dispense with the belt altogether and has had no frequency by day or night up to date (October, 1959).

Case 13.—The belt was then tried on a girl of 19, who had never had a dry night and who had marked diurnal frequency. Using the belt she immediately became dry at night, but before using perineal exercises or faradism, she immediately became wet as soon as the belt was discarded. In her case it has also been possible to discard the belt following a ten-day course of perineal exercises and faradism. She is most emphatic that all desire to pass urine leaves her when the balloon is inflated. A manometer has been attached to the balloon on several occasions and she can indicate accurately the point at which the desire to micturate leaves her. In each case, with her it is when the pressure in the balloon reaches 30 mm. Hg.

Case 14.—A boy aged 15 was referred in 1956 with a diagnosis of spina bifida cystica, fæcal impaction and complete incontinence of urine. He had an operation scar over his lower lumbar and upper sacral spines. He wore a rubber receptacle into which the urine dripped. Investigation showed gross trabeculation of the bladder, wide bladder neck, and reflux occurring into both ureters which were grossly dilated in their whole extent. His bladder neck was tightened by a plastic operation and, following this, he was able to hold his urine for three hours by day but he was still incontinent by night. In June, 1959, he was fitted with a belt and since then he is completely controlled at night. He is still wet if he leaves off the belt at night in spite of several courses of faradism and exercises to the perineal region.

Case 15.—A man, aged 42, with spina bifida cystica, had nocturnal enuresis and gross precipitancy of micturition by day, amounting sometimes to diurnal enuresis. This patient was able to control his nocturnal and diurnal enuresis by using the appliance, but has been unable to dispense with it in spite of faradism and exercises to the perineum.

Cases 16 to 24.—A group of six cases of disseminated sclerosis and three cases of spinal cord damage producing spastic paralysis and urinary incontinence were then investigated, using the appliance. The incontinence of all these patients took

the pattern of gross precipitancy and frequency associated with a varying degree of cystitis and a low bladder capacity. It is obvious that this type of patient represents a tremendous challenge to any form of treatment, and that the criterion of usefulness of any treatment must be much lower than complete dryness and prolonged holding of urine.

Any method which can render such a patient a little more comfortable and ensure less frequency and urgency must be considered a worthwhile procedure. It was, therefore, encouraging that three patients within the group of nine were markedly improved. The first patient was referred from neurological wards of the Belfast City Hospital; he had disseminated sclerosis, incontinence and a shallow bedsore 1″ in diameter over his sacrum. The appliance was able to keep him dry by diminishing the gross precipitancy, and the nocturnal frequency was changed from 4-5 to 1-2 with a similar improvement in the diurnal frequency. It is interesting that after ten days' treatment with the appliance his bedsore healed.

Another male patient showed rather similar improvement, but occasionally, even when the belt was applied, his precipitancy was such that incontinence occurred.

One female patient could be controlled very well by the appliance, but immediately on deflating the balloon the precipitancy occurred, and it has been impossible as yet to prevent the urine soiling the bed, though an attachment is being designed which may possibly get over this difficulty. Although the remaining six patients showed slight improvement it was not considered enough to record as a success for the perineal pressure. In this small series the indications are that the difficulty in controlling the incontinence depends on the degree of spasticity of the abdominal muscles, and it is considered that at an early stage it will be worthwhile subjecting a patient to a sub-costal nerve block to try the effect of this on the intra-abdominal pressure as indicated by the balloon in the perineum with the manometer attached. The problem of the low bladder capacity is not insoluble, as several patients have had this capacity raised to a significant degree in seven to ten days (producing as much as four extra ounces capacity).

The final group tested with perineal pressures was the group of elderly uncooperative senile patients with or without hemiplegia. Over one hundred of this type of patient with incontinence of urine are nursed in the Geriatric Unit at the Belfast City Hospital. They represent the most dreadful problem of all, as they are totally resistant to all attempts to help them by means or appliances or belts. Whereas the disseminated and spinal patients were exceptionally cooperative, these senile patients used all their strength to resist the treatment. It will always be more difficult to keep such patients dry than to allow them to be wet, and possibly very difficult to keep them even a little dryer than before. Even the task of finding out how often they become wet proved to be a formidable one, and I am very grateful indeed to the Nursing Staff of the Geriatric Unit for undertaking this task. It is not possible to present the figures yet, but it appears that 5-7 times per day is a rough average with several patients wet more than twelve times per day, and all the patients wet several times per night.

Since the patients refused to wear any type of appliance which has been devised up to the moment, it was considered worthwhile to attempt to produce perineal pressures by sitting those patients who could be got out of bed on a special pad on the seat of the chair. There are obvious mechanical flaws in this method in that accurate pressure at the correct place is difficult to achieve, but even with this crude method several patients showed a very marked diminution in the number of times they were wet. One patient who was wet twelve times per day had one dry day and has gone down to 4-5 times wet per day with no other treatment than sitting him on a soft moulded sponge rubber pad. Several other patients have been definitely improved, but many show no change at all.

Discussion.

At this initial stage of the clinical and experiment work it is not possible to explain the reasons for all the findings or how they fit in with the established theories of the physiology of bladder control.

This present work appears to indicate that the smooth muscle in the region of the bladder outlet plays an important, but secondary part in bladder control, and that it is directed in its task by the striated muscles of the pelvic floor, which when they contract and elevate the bladder neck region tend to produce closure of the bladder outlet even in post-mortem bladders where the smooth muscle could not possibly contract actively. When the voluntary muscles are in a state of flaccid paralysis due to a lower motor neurone lesion the bladder outlet becomes widely dilated. It is not necessary to postulate a flaccid paralysis of the smooth muscle as the cause of this, as the lowering of the neck region produces a tendency to dilatation that could not be overcome by the smooth muscle contraction and it must dilate just as surely as it must dilate if there is persistent severe distal obstruction in the urethra where there can be no question of dysfunction of the muscle due to a nerve lesion.

It might safely be said that the bladder neck region with its smooth muscle and abundant elastic tissue is an extremely efficient machine which is worked by the voluntary muscles surrounding it. Occasionally the machine itself is misshapen and inefficient due to congenital abnormalities, but more frequently it becomes so because of abnormalities which affect the striated muscle in the first instance.

When the bladder outlet becomes dilated and incompetent from any cause a constant desire to micturate is usually present, possibly due to afferent impulses initiated in the posterior urethra by the stimulus of the urine. One certain method of producing this dilatation and incompetence is by using a penile clamp as a method of trying to alleviate incontinence of urine. The urine must go as far as the position of the clamp and the bladder outlet must tend to become more and more dilated by the contained fluid. As has been seen earlier, this occurs in post-mortem bladders when the urethra is constricted during the flow.

No attempt has been made in this work to study the possible functions of the voluntary external sphincter as distinct from the rest of the muscles of the pelvic floor. Similarly the bulbo cavernosis and ischio cavernosis have not been the subject of any study. It has been found by other workers that blocking the

pudendal nerve with local anæsthetic does not produce incontinence of urine, but that the bulbous urethra is not emptied properly under these conditions and dribbling occurs at the end of micturition as the urethra slowly drains the urine from the bulbous urethra which should normally be compressed by the bulbo cavernosis to express the last drops of the urine. The old name for the muscle, M. Ejaculator Urinæ, was therefore highly descriptive.

It is apparent from dissections of the voluntary external sphincter that it is ideally formed and placed for closing the urethra, but whether it ever has to do this in normal people without the aid of the lifting force of some of the levator fibres might be questioned.

The different parts of the levator ani have been studied intensively by various workers and an attempt has been made to allot a separate function to each part. In lower animals various parts of it undoubtedly have the function of wagging or swishing the tail or of depressing it firmly into the perineum. In man it might be that these functions have been replaced by those which are concerned with support of the pelvic floor against the added weight of the abdominal viscera due to the upright position, and that the levatores ani in man might tend to contract as one complete unit and possibly along with the voluntary sphincters of the bladder and the rectum. On the other hand, in man various new achievements have been added to the simple holding or passing of excreta which occurs in lower animals. It is possible to pass urine and to hold back flatus or fæces, to pass flatus and to hold back fæces, to stop the act of micturition rapidly and to prevent it in the presence of an uncomfortably distended bladder. It is obvious that an efficient afferent nerve supply which reaches cortical level is essential for this state of affairs and also that various voluntary muscles must be called into action rapidly at different times and that the pattern of the muscle groups must be very important indeed. At the same time it appears from this present work that when all the levator ani contracts the result is an elevation of the bladder neck, a closure of the bladder outlet and an inability to micturate. From the point of view of the treatment of incontinence of urine it may be considered encouraging that this elevation of the complete pelvic floor can be achieved by artificial means, and that it can control incontinence of urine.

Though in its initial stage, this work has been presented in order that by using these artificial pressures we may relieve some of our patients, both young and old, who are at present living in great distress, and also that by experimenting with the pressures we may gain some knowledge of the mechanics of the bladder outlet in relation to certain operations that are performed in that region. At the moment, although the various "sling" and repair operations and operations for tightening the bladder neck produce some very good results, it is not quite certain what the curative manipulation has been, since each operation produces several structural changes, each of which may be the effective one. As well as this there are some failures which cannot be satisfactorily explained on the basis of our present knowledge of the physiology and pathology of bladder control. It is thought that some of these failures may be relieved by appliances, and also

that it may increase our knowledge of the difficult subject of the physiology of bladder control and its relation to the pathology of incontinence of urine.

Summary.

Unfixed bladders from 350 post-mortems have been studied from a mechanical point of view in a special machine.

In these bladders it has been found that lifting the bladder neck region without squeezing it causes the outlet to close and the bladder to hold very high pressures without any leakage occurring.

In the living human subject upward pressure on the perineal and anal regions stops the flow of urine and when the flow is stopped by this method the bladder outlet closes.

It has been found possible to maintain this upward pressure on the perineum by an appliance and to bring relief to patients with certain types of incontinence of urine.

I am extremely grateful to Professor Biggart for permission to examine the post-mortem bladders; to all those who performed the post-mortems for their very great kindness and skill in removing the bladders by a rather difficult dissection, and for allowing me to do so many dissections of the pelvic floor; to the physicians and surgeons of various hospitals who gave me the opportunity of seeing suitable patients; to Professor Pritchard, and all the staff of the Anatomy Department of Queen's University for criticism and practical help; and to a succession of resident pupils at the Belfast City Hospital for their invaluable assistance in making the appliances.

REVIEW

THE NUFFIELD FOUNDATION: Report for the Year ending 31st March, 1959. (Pp. xii+201). Oxford: The University Press, 1959.

The grant allocations made by the Nuffield Foundation in the year 1958-59 for the first time exceeded £1,000,000. Roughly a quarter of this was spent in the Commonwealth—mostly in Africa—and the rest was spent at home on scientific, medical and social projects, and on fellowships.

This is a useful review of work in many fields of science and medicine. The Foundation continues its major interest in fundamental research in biology. In medicine studies range from one by thirty general practitioners on the distribution of mental illness in the community to studies of 'slipped disk' as a result of ageing in cats, and in social research one grant is to help to provide coffee bars and dance floors for young people in the new towns. This is a record of wide ranging and imaginative stewardship.

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In the living human subject upward pressure on the perineal and anal regions stops the flow of urine and when the flow is stopped by this method the bladder outlet closes.

It has been found possible to maintain this upward pressure on the perineum by an appliance and to bring relief to patients with certain types of incontinence of urine.

I am extremely grateful to Professor Biggart for permission to examine the post-mortem bladders; to all those who performed the post-mortems for their very great kindness and skill in removing the bladders by a rather difficult dissection, and for allowing me to do so many dissections of the pelvic floor; to the physicians and surgeons of various hospitals who gave me the opportunity of seeing suitable patients; to Professor Pritchard, and all the staff of the Anatomy Department of Queen's University for criticism and practical help; and to a succession of resident pupils at the Belfast City Hospital for their invaluable assistance in making the appliances.

REVIEW

THE NUFFIELD FOUNDATION: Report for the Year ending 31st March, 1959. (Pp. xii+201). Oxford: The University Press, 1959.

The grant allocations made by the Nuffield Foundation in the year 1958-59 for the first time exceeded £1,000,000. Roughly a quarter of this was spent in the Commonwealth—mostly in Africa—and the rest was spent at home on scientific, medical and social projects, and on fellowships.

This is a useful review of work in many fields of science and medicine. The Foundation continues its major interest in fundamental research in biology. In medicine studies range from one by thirty general practitioners on the distribution of mental illness in the community to studies of 'slipped disk' as a result of ageing in cats, and in social research one grant is to help to provide coffee bars and dance floors for young people in the new towns. This is a record of wide ranging and imaginative stewardship.

MODERN TRENDS IN VASCULAR SURGERY

By **H. C. DALES, M.Ch., F.R.C.S.**

Vascular Unit, Belfast City Hospital

SUCH rapid advance has occurred over the past few years in the surgical treatment of disease of large arteries that this work is no longer experimental and is now soundly established. The majority of cases are due to arterio-sclerosis which involves certain segments of the vascular tree, leaving the remainder relatively free from disease. The most frequently involved segments are:

1. Superficial femoral artery and upper part of popliteal artery.
2. Common iliac artery.
3. Aorta up to the level of the renal arteries.
4. Bifurcation of common carotid artery.
5. Origin of the vertebral artery.
6. Coronary arteries.
7. Cerebral arteries.

While the disease is segmental it always involves multiple segments, and treatment of one segment must take into consideration any other segments involved.

ARTERIAL DISEASE AS IT AFFECTS INDIVIDUAL ARTERIES.

1. Femoro Popliteal Artery

Femoral artery disease usually only causes symptoms when thrombosis of the affected area occurs, and these are intermittent claudication, rest pain, and gangrene. Intermittent claudication is due to the fact that the collateral circulation is unable to carry the large blood supply required for exercise, and rest pain occurs when the collaterals are themselves narrowed to such an extent that they are unable to supply enough blood for the limb at rest. The usual cause of gangrene is digital artery thrombosis following trauma and infection of a digit, as the blood supply required to combat infection is not available, and the infection spreads rapidly, causing thrombosis of the digital vessels. Emboli from the primary clot may also cause gangrene by blocking the digital vessels. If intermittent claudication is present in a patient without ischæmic heart changes, then relief of the obstructed femoro-popliteal artery is justified, but if cardiac ischæmia is present then relief of the intermittent claudication may permit the patient to walk so far that he dies of a coronary thrombosis. However, even in the presence of cardiac ischæmia, relief of an obstructed femoro-popliteal artery is justified for the presence of gangrene or threatened gangrene, as it may save a limb, and the operation itself does not cause any more upset to a patient than an amputation. As the superficial femoral artery and upper part of the popliteal

artery are usually grossly affected, but the common femoral artery and lower part of the popliteal artery relatively normal, the best method of treatment is to do a by-pass operation, joining the common femoral artery to the lower part of the popliteal artery. While a homograph is probably still the best material to use for the by-pass, woven Teflon is likely to prove equally satisfactory. Due to the gross amount of disease commonly present in the superficial femoral and upper popliteal artery, endarterectomy, at this site, is usually not advisable.

Case Examples.—Mr. G. T., age 53, complained of intermittent claudication in both legs, which was much worse in the left, for about eleven years, and had had a left lumbar sympathectomy performed in 1949, the intermittent claudication had become much worse over the past six months. On clinical examination no pulse was palpable below the femoral in either leg and the left foot was colder than the right. Femoral arteriogram showed that the left superficial femoral artery was narrowed in its upper third and completely blocked in its lower two-thirds. On the 26/6/59, using a Rob technique, a Teflon synthetic prosthesis was inserted into the left leg, to by-pass the block, and anastomosed above to the common femoral and below to the popliteal artery. The following day the posterior tibial artery was easily palpable in the left leg. On the 14/9/59 his condition was very satisfactory and there had been marked improvement in his intermittent claudication distance.

Mr. W. McG., age 42, complained of intermittent claudication in his left calf on walking 100 yards and pulses were absent below the femoral. A left femoral arteriogram showed a block in the superficial femoral artery about 4″ in length, commencing in the mid-thigh. On the 9/6/59, through incisions in the mid-thigh and popliteal space, endarterectomy was carried out, using Cannon's knives and the blood flow through the femoral artery re-established. On the 13/7/59 he was able to walk from Finaghy to Carlisle Circus, Belfast, a distance of about five miles.

2. Common Iliac Artery.

Involvement of the common iliac artery with secondary thrombosis, which may be bilateral and often extends into the lower end of the aorta, results in intermittent claudication of the buttock and thigh. Because it is high up the vascular tree, a good collateral circulation is usually available, and gangrene of the foot rarely follows unless it is accompanied, as it sometimes is, by a femoro-popliteal block when there would be added the syndrome referred to in "l." Again, whether or not treatment should be carried out at this site will depend on whether or not the patient's cardiac condition will permit exercise after the condition has been treated. At this site endarterectomy is the method of choice because only a short segment of vessel is involved and experience has shown that it is comparatively easy to clear with a good clinical result.

3. Abdominal Aorta.

Thrombosis of an arterio-sclerotic abdominal aorta causes what is usually referred to as Leriche's Syndrome, and this consists of fatigue in the legs, inability to maintain an erection, and bilateral intermittent claudication of the legs extending up to the buttocks. When the aorta alone is involved there is very little risk

of gangrene to the lower limbs, but when it is accompanied by a femoro-popliteal block there is a grave risk of gangrene in the limb. Occasionally the thrombosis may extend upwards to involve the renal arteries and this results in hypertension (Goldblatt kidney). The usual treatment is endarterectomy of the abdominal aorta, and if necessary the renal arteries are also cleared. Sometimes, however, a trouser graft is employed or a trouser prosthesis. This is inserted so that the upper end is anastomosed to the aorta above the block and the two lower ends to the common iliac arteries.

4. Common Carotid Artery.

Stenosis at the bifurcation of the common carotid artery may be either partial or complete. It causes episodes of paralysis of the opposite arm and leg, and occasionally blindness of the eye on the same side as the involved artery; and also sometimes speech, and more rarely, swallowing are affected. Complete stenosis is untreatable at present, but it is very important to recognise the cases of partial stenosis as they can be easily treated with good results. With partial stenosis, the clinical course is episodal, and it has been suggested that episodes of paralysis occur when the occluding plaque of arterio-sclerosis is temporarily enlarged by a small hæmorrhage behind it, or by a temporary clot building on the plaque, or by a small embolus passing upwards, or when any cardiac condition occurs which temporarily reduces the blood pressure so that insufficient blood is reaching the brain for a short period through the stenosed artery, for example, with an attack of paroxysmal tachycardia or a coronary thrombosis. It is estimated that about 20 per cent. to 25 per cent. of all strokes are due to partial occlusion of the origin of the internal carotid artery, and the diagnosis can be made by the history of episodes of paralysis, the presence of a murmur over the carotid bifurcation, and by an arteriogram of the common carotid artery which will show a filling defect at the origin of the internal carotid artery. Treatment consists of excising the plaque of arterio-sclerotic tissue, and to do this the blood supply to the brain must be clamped off after exposure of the bifurcation of the carotid artery. In order to prevent cerebral damage during the time that the arteries are clamped off, either a by-pass must be temporarily put in between the upper part of the internal carotid artery and the common carotid artery or the operation must be done under hypothermia at about 29° C. At this temperature the blood supply to the brain can be safely cut off for about twenty minutes while the plaque of atheroma is removed. If the condition is bilateral the second side is done about three months later.

5, 6, and 7. Vertebral Coronary and Cerebral Arteries.

At present there is no established treatment for arterio-sclerosis of the vertebral, coronary, or cerebral arteries.

The Treatment of Aneurysms.

An aneurysm of the abdominal aorta will rupture and cause death within a few years of its onset, and there is also the risk of emboli passing downwards and causing gangrene of the limbs. Consequently all of these cases should be treated.

The best method of treatment is by excision of the lumbar aorta and upper parts of the common iliac arteries and replacement with either a prosthesis or a homograft. If the renal arteries are involved this is not possible without hypothermia, which is inadvisable with present technique, on account of the large amount of shock associated with the operation, and wiring of the aneurysm is a safer operation.

Peripheral aneurysms, for example, of the femoral or popliteal artery, are also usually due to arterio-sclerosis, but on rare occasions may be due to trauma. The condition presents as a pulsating swelling in the affected area, and the main danger is that emboli may leave the sac and pass down the distal vessels, causing gangrene of the limb; rupture may also occur. Because of the very high risk of gangrene, all these aneurysms should be treated and the present method consists of ligating the vessel above and below the aneurysm and putting in a by-pass graft. As only a short segment is required, a saphenous vein graft is satisfactory, but a homograft artery or prosthesis may also be used. A dissecting aneurysm is a rare but usually fatal condition. The patient complains of a very severe pain in the chest, back, and abdomen, and as the aneurysm spreads downwards the pain also spreads down and may eventually involve the lower limbs. There is associated collapse, but commonly the blood pressure does not fall in the early stages, and this is a point of differentiation from coronary thrombosis. On rare occasions natural cure may occur by the dissecting aneurysm re-entering the normal lumen, but in the vast majority of cases the dissecting aneurysm ruptures, causing rapid death. If a case of dissecting aneurysm is suspected, a retrograde aortagram should be carried out and if the diagnosis is confirmed immediate operation is indicated. At operation, the aorta is opened by a vertical incision at the lower end of the dissecting aneurysm after the aorta has been clamped above and below. A new opening for the dissecting aneurysm is then made into the normal lumen by suturing the intima distally and the aorta sewn up. When the new opening has been made into the normal lumen the dissecting aneurysm collapses, and this is followed by thrombosis and fibrosis of the tract.

Case Example.—Mrs. B. S. was well until July, 1957, when she noticed a sudden pain in the lower abdomen of a crushing nature associated with vomiting and sweating. This pain recurred a year later and she then noticed that her abdomen was swollen. On examination 25/5/59 she was found to have a huge abdominal aneurysm which had marked pulsation, and the patient's only complaint at that time was the presence of a "clock" ticking in her abdomen.

On the 30/6/59, through a long paramedian incision, a huge aneurysm of the abdominal aorta about 12" in diameter, which extended from just below the renal arteries to just beyond bifurcation of the aorta, was found and the aneurysm resected. The aorta was joined to the common iliac arteries by inserting a Teflon prosthesis. Histology showed that the aneurysm was due to atheroma. On the 14/9/59 she was perfectly well with normal pulses in both legs and feet.

Complications of Cervical Rib.

Arterial symptoms from a cervical rib are extremely rare and when they do occur they are associated with a very large cervical rib which presses on the subclavian artery, causing dilitation of the artery just beyond the pressure area,

and in this dilitation, thrombosis occurs. Periodically, pieces of dot are detached from this area and pass distally to block the bifurcation of the brachial artery. This results in pain in the muscles of the hand and forearm on exercise, particularly exercise with the arms elevated, a feeling of "pins and needles" in the hand, and pallor or cyanosis in the hand particularly on elevation of the limb. The radial side of the hand is usually involved first and most prominently. The syndrome occurs in episodes, each episode being due to a fresh embolus. These cases of large cervical rib with involvement of the subclavian artery are associated with a prefixed cervical plexus, and therefore pressure on the cervical plexus does not occur so that mixed arterial and nerve lesion syndromes do not occur. Treatment consists of removal of the cervical rib and, if necessary, part of the first thoracic rib until all pressure is removed from the subclavian artery. A cervical sympathectomy is done at the same time.

Homograft versus Prosthesis.

At present the most controversial topic in degenerative vascular surgery is whether or not a homograft is superior to a synthetic prosthesis. A homograft is a graft which has been taken from a post-mortem human body, and a synthetic prosthesis is a tube of some such material as nylon or terylene. While there are many people who advocate one or the other, general opinion is that homografts are superior but that the most recent prosthesis, namely, woven Teflon, may prove as satisfactory as a homograft. The collection of homografts, their storage, and preparation for operation, is an extremely skilled and difficult procedure requiring a large amount of manpower and fairly expensive equipment, and it would thus seem that if a satisfactory synthetic prosthesis has been produced, except for the very specialised centres with a homograft bank already functioning, the synthetic prosthesis will be the most commonly used in the future.

ACCIDENTAL HYPOTHERMIA

By **A. H. G. LOVE, M.B., and R. A. WOMERSLEY, M.D.**
The Department of Medicine, Queen's University, Belfast

ACCIDENTAL hypothermia, occurring as a result of illness, or, in the healthy, on undue exposure to cold, is well documented. The condition may, however, be commoner than is generally recognised and may occur in circumstances that would not ordinarily be associated with the diagnosis. The purpose of the present paper is to present a case of accidental hypothermia occurring in a man who, so far as is known, was never outside the house at the relevant time, and who lived with two other adults.

CASE REPORT.

A 59-year-old man was admitted to hospital at 10.30 p.m. on 8th January, 1959, in a comatose state. He was a known diabetic and usually well stabilised on soluble insulin, 12 units, and neoprotamine hagedorn insulin, 22 units. A history obtained from his brother was that the patient had been feeling unwell for the three days prior to admission and had not eaten his usual diet. His insulin dosage had been given as usual. On the day of admission he was found unconscious in the bathroom. Reference to his diabetic chart showed that he had suffered from peripheral neuritis and circulatory insufficiency in the legs.

On examination, he was a fairly obese man with a pale, cold skin and collapsed veins. He was comatose, but responded to painful stimuli, with movement of all limbs. There were no localising signs in the central nervous system and the plantar responses were inactive. There was no shivering, but all the limb muscles and the muscles of the neck showed a marked rigidity. There were early bilateral cataracts; the fundi were normal. In the cardiovascular system the pulse was found to be regular, at a rate of 40 beats per minute, and the blood pressure was 80/40 mm. Hg. The heart sounds were normal and there were no abnormal signs in the lungs or abdomen. The urine contained no sugar and no acetone. Temperature was recorded on a clinical thermometer as 97° F. The clinical diagnosis was thought to be hypoglycæmia, with the possible complication of a coronary thrombosis accounting for the circulatory failure.

Treatment was begun with the intravenous infusion of glucose in sufficient quantities to produce and maintain a glycosuria. At each insertion of the infusion needle the patient moved his arms and on one occasion opened his eyes, only to relapse once more into complete inertness. The electrocardiogram showed a sinus tachycardia and intraventricular block, but no evidence of cardiac infarction. The serum electrolytes were normal and the blood urea 58 mgms. per cent. After twelve hours the coma state was essentially unchanged. At this time the rectal temperature was taken with a low-reading thermometer and found to be 85° F. The true ætiology of the coma was then apparent, and treatment for hypothermia commenced.

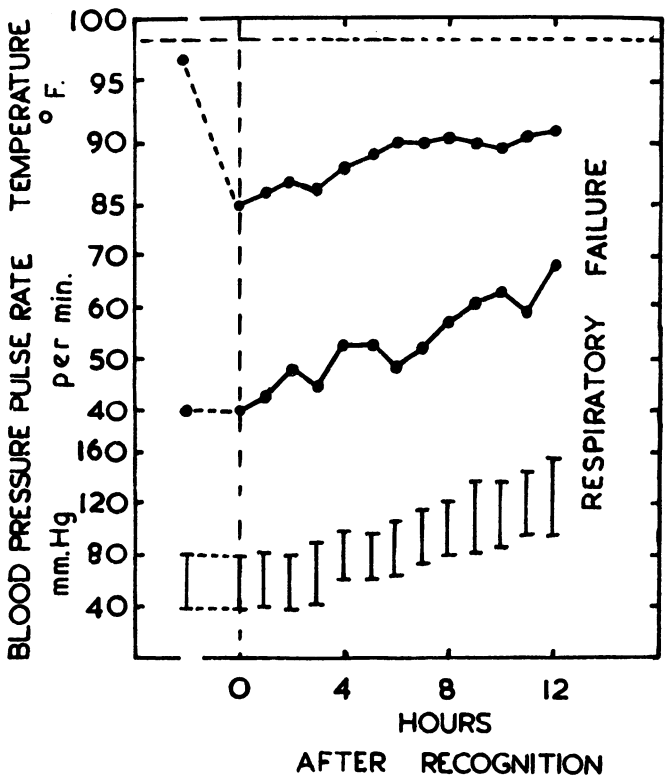
The patient was covered with a blanket and placed under heat cradles. Frequent rectal recordings of the temperature were made and the objective was to supply sufficient heat to raise the temperature by 1° F. every four hours. An intravenous infusion of 5 per cent. glucose was established and 100 mgms. of hydrocortisone acetate were given in the drip. The pulse rate and blood pressure were recorded at frequent intervals. The patient's progress is shown in

the figure. When the temperature had risen to 91° F., the pulse to 66/min. and the blood pressure to 150/90 mm. Hg., respiration suddenly ceased and could not be restarted.

Post-mortem examination showed atheroma of the coronary arteries and myocardial fibrosis, but no evidence of recent infarction. The lungs were œdematous, with evidence of early bronchopneumonia. The pancreas was fibrotic, with an area of acute pancreatitis. The adrenals, kidneys and brain showed no significant changes.

Discussion.

Apart from being a recognised surgical and therapeutic procedure, hypothermia may occur accidentally in clinical practice in a variety of circumstances. It has been reported following alcoholism (Laufman, 1951), in states where metabolism



is depressed, such as hypopituitarism (Sheehan and Summers, 1952) and myxœdema (Le Marquant, Hausman and Hemsted, 1953), in newborn infants (Mann, 1955), in barbiturate poisoning (Eason and Macnaughton, 1956), and as a complication of senility, myocardial infarct, paraplegia and diabetic coma (Rees, 1958).

Accidental hypothermia presents two problems; firstly, its recognition and secondly, its treatment. Non-recognition of the condition usually results from

failure to consider hypothermia as a diagnosis and from the use of the common clinical thermometer in recording the temperature. Clinical thermometers do not read lower than 95° F. and, even so, are not always shaken to the lowest mark. The temperature of the patient reported here was initially recorded as 97° F. and it was not until the diagnosis of hypothermia was considered and a low-reading thermometer used that the true temperature was recorded. In making the diagnosis, mouth and rectal temperatures may be misleading and it is useful to seek confirmation from finding a low temperature in freshly voided urine. If the patient has been exposed to cold in the open, as in the case described by Laufman (1951), the diagnosis is at once suggested, and it may be indicated in patients with depressed metabolism or who have been in coma. The present case is remarkable in that hypothermia developed for no obvious reason in a man not only in his own house, but living with two other adults. The minimum outside temperatures on the three days prior to his admission were 26° F., 27° F., and 28° F. It is unlikely that the initial cause of his coma was hypoglycæmia and that hypothermia developed as a consequence of this, since the interval between his being found comatose and his admission was too short. It seems more likely that hypothermia had been developing slowly over a long period.

On clinical examination in hypothermia there is usually a bradycardia, a low blood pressure and collapsed peripheral veins. The electrocardiogram may show abnormal T-waves or evidence of heart block. The peripheral circulatory failure is partly due to hæmo-concentration, resulting from transfers of fluid from the vascular to the interstitial compartments. There may be a leucocytosis and in some cases the blood sugar has been elevated (Smith, 1942; Fay and Smith, 1941). Despite the fall in temperature, shivering is not a conspicuous finding, although generalised muscular rigidity is common. Semi-coma is usual when the temperature reaches 85° F. and becomes progressively deeper as the temperature falls. The lowest recorded temperature, with survival, is 64.4° F. (Laufman, 1951).

Treatment depends on the duration of hypothermia and is either rapid or slow rewarming, together with ancillary measures. Moderate rewarming is not advocated (Burton and Edholm, 1955). Rapid accidental lowering of temperature is only common in war-time and may be treated by rapid rewarming. In clinical practice, hypothermia is usually of twelve or more hours' duration. If rapid rewarming is applied to these patients, fatal circulatory failure due to peripheral vasodilation occurs. If moderate rewarming is used, vasodilation in the skin may occur without warming of the blood, and in these circumstances the central temperature, which is always higher than the skin temperature, may fall acutely by 1 or 2° F. and death ensue from cardiac arrest. Slow rewarming should achieve a rise of body temperature of approximately 1° F. every four hours. At ward temperature the patient's own metabolism may be sufficient to achieve this. If a heat cradle is used, constant care is needed to prevent the temperature rise being too rapid. Rewarming at this rate permits the shift of fluid from the interstitial to the vascular space and avoids the circulatory collapse that otherwise occurs as vasospasm passes off.

Despite the initial high blood sugar that occurs in some cases, there is depletion of liver and heart glycogen, probably due to glycogen mobilisation during the initial shivering and later muscular rigidity. There is also evidence of adrenal damage (Crosse-Brockhoff, 1950). Intravenous infusions of glucose and hydrocortisone should, therefore, be made. Thyroid extract should only be given to those cases where hypothermia complicates myxœdema, and digitalis is best avoided because of the danger of ventricular fibrillation.

Summary.

A case of accidental hypothermia is reported. The diagnosis may be overlooked unless a low-reading thermometer is used. Certain precipitating causes are usually evident and a social history may be informative. In the treatment, slow rewarming is indicated if the period of hypothermia is longer than a few hours. Supportive measures to combat hypoglycæmia and adrenal failure are indicated. It is probable that the condition is commoner than is generally recognised.

We wish to thank Dr. J. Evans for seeing this patient and giving his advice.

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REVIEW

MANUAL OF CHEST CLINIC PRACTICE IN TROPICAL AND SUB-TROPICAL COUNTRIES. By A. J. Benatt, M.D. (Pp. vii+100; illustrated. 10s. 6d.) London and Edinburgh: E. and S. Livingstone.

Benatt spent the years 1950-1956 abroad working for W.H.O. in Thailand and Tunisia. He found that success depended largely on detail, and this book is concerned chiefly with precise instructions for dealing with the organization of chest clinics and techniques for sputum collection and examination, tuberculin testing, B.C.G. vaccination, and simple laboratory procedures. The information is clearly presented, but will be of limited interest and little originality to workers in this country.

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CHANGING TRENDS IN GENERAL PARESIS

By **CECIL B. KIDD, M.B., D.P.M.**

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THERE is much recent medical literature on the subject of syphilis as a 'dying disease.' King (1958), in deploring the commonly held view that venereology is in decline as a specialty, suggests that the proportion of late syphilis may well have increased to-day since treatment has become easier to administer, and less systematic therapy is given in the early stages. Redmill (1959) emphasizes that the official statistics from the V.D. centres give a false indication of the real occurrence of syphilis, and draws attention to the study of the late manifestations of this disease as a more reliable index of its prevalence.

With few exceptions, all cases of general paresis in the city of Belfast of the type requiring in-patient treatment are received into Purdysburn Hospital. The trends of morbidity and mortality in this disease from the experience of this centre have been investigated as an authentic index of the prevalence of this form of late syphilis in a large urban community.

METHOD.

The annual reports of Purdysburn Hospital were studied and figures prepared from the details they provided. Two ten-year periods, 1929-1938 and 1949-1958 were surveyed, thus making a twenty-year difference for contrast and comparison. Both periods could be considered as late post-war, and therefore important from the view of syphilis morbidity. During the first ten-year period there were full facilities in the hospital for Lange, serological and spinal fluid tests, thus ensuring the authenticity and scientific value of the records.

All the patients classified as general paretics in the longstay hospital population were reviewed clinically, and details were noted in terms of sex, age, standards for diagnosis, readmission rate and treatment provided.

Table 1 shows clearly that general paresis of the type requiring admission to the mental hospital is encountered less frequently in the last ten years than twenty years previously. Table 2 shows that in these same periods there has been a marked decline in mortality. In both tables the extent of these trends is clarified.

On review of the longstay patients, positive Wassermann in the C.S.F., paretic Lange curve, neurological evidence of neurosyphilis and psychiatric evidence of general paresis constituted basic diagnostic standards to which each patient should conform before being considered for inclusion in the series. Of the thirty patients classified as general paretic, twenty-one (thirteen males, eight females) were considered suitable on these terms. In age they were evenly spread between the years of forty-five to seventy. Eleven were first admissions, nine were second, and only one was a third admission. Twelve had been treated with penicillin, eighteen with arsenicals, and sixteen with hyperpyrexia, either by malaria or

inductotherm. Each patient has had specific anti-luetic treatment and all have had combinations of at least two methods. The sex ratio in this group of longstay patients is: male/female, 1.68 : 1.

Discussion.

Classical general paresis in present-day mental hospital experience is a rare entity, and the proportion has reached a very small percentage of the total

TABLE 1.

Total Hospital Admissions and Percentage of General Paretics, 1929-38 and 1949-58.

	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	Total
Male	- 215	197	177	241	249	268	288	307	256	257	2455
	8.8	13.2	13.5	7.1	8.0	6.3	6.9	5.9	7.8	7.8	8.18%
Female	- 228	191	190	233	203	257	314	202	242	282	2402
	1.7	4.7	3.7	1.3	1.9	2.7	1.9	1.9	1.2	1.1	2.24%
Both	- 443	388	367	474	452	525	602	569	498	539	4857
	5.2	9.0	8.2	4.9	5.3	4.6	4.3	4.2	4.6	4.3	5.25%

M/F ratio (Total) = 3.65 : 1

	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	Total
Male	- 332	319	327	372	411	447	444	539	618	699	4508
	1.2	1.2	0.9	2.4	0.9	3.4	0.4	0.3	1.2	–	1.13%
Female	- 338	450	426	405	435	492	544	552	701	800	5143
	0.3	0.4	–	0.2	–	0.4	–	0.3	0.1	–	0.17%
Both	- 670	769	753	777	846	939	988	1091	1319	1499	9651
	0.7	0.7	0.4	1.2	0.4	1.8	0.2	0.3	0.6	–	0.62%

M/F ratio (Total) = 6.64 : 1

admissions. These figures, whose importance lies in their being representative of the half-million population of the city of Belfast, tend on the whole to confirm the findings of Berg and Kirman (1959) that in England and Wales general paresis is now much less important than it was. The fact that there have been no deaths attributable to general paresis in this centre since 1953 gives gratifying indication of the effectiveness of treatment of neurosyphilis.

Consideration of the cases of general paresis in the longstay hospital population suggests that they consist of the 'hard core' of irreversibly arrested syphilitics described by Lomholt (1944). Their mental and physical state has remained unaltered in spite of both early and subsequent treatment. Comparison of the sex ratio figure of this 'arrested group' with those of the two surveyed admission periods shows that females appear here in greater numbers than would be

TABLE 2.

TOTAL HOSPITAL MORTALITY AND PERCENTAGE DUE TO GENERAL PARESIS, 1929-38 and 1949-58.

	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	TOTAL
Male	- 111	82	58	71	96	76	81	108	83	85	851
	18.9	23.2	29.3	16.9	15.6	13.2	23.5	8.3	10.7	8.2	16.2%
Female	- 91	53	58	93	79	99	117	99	78	46	843
	10.9	7.2	8.6	7.5	2.5	6.1	4.3	3.0	7.7	4.3	6.2%
Both	- 202	165	116	164	175	175	198	207	161	131	1694
	15.3	15.1	18.9	11.5	9.6	9.2	12.1	5.8	9.3	6.9	11.8%

	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	TOTAL
Male	- 86	90	76	85	71	83	90	90	108	131	916
	3.5	5.5	1.3	2.4	4.2	–	–	–	–	–	1.5%
Female	- 84	114	99	95	81	126	117	117	110	133	976
	1.2	2.6	2.0	–	–	–	–	–	–	–	0.6%
Both	- 170	204	175	180	152	209	207	213	218	264	1892
	2.3	3.9	1.7	1.1	1.9	–	–	–	–	–	1.05%

anticipated. This may indicate a poorer prognosis in females, or it may in part represent the greater reluctance of females to enter hospital. Bonugli (1959) has noted the fact of later diagnosis of early syphilis in females, and comments that this may lead to a greater propensity for developing tertiary manifestations of the disease.

General paresis is no longer a fatal disease, and although it occurs much less frequently than before, it is still far from being a clinical nonentity. Whereas syphilis may appear to be on the decline, the concomitant popularity of complacency may go hand in hand with the insidious increase of future late syphilis. It will be interesting to see if the present fall-off continues, and does not

produce an increase as speculated by King (1958). It could be presumed that, whereas the outlook may appear disarmingly bright, the lower morbidity is due to early treatment with the better facilities of the V.D. clinics. Systematic control and early prevention of the sequelæ of primary syphilis would appear to be the hallmark of success, a view forcefully reiterated by Merritt (1945), who claimed that "The medical profession has the means of preventing symptomatic neurosyphilis, and it is criminally negligent if it does not avail itself of them."

Summary.

(1) The present trends in morbidity and mortality of general paresis are viewed in the light of the experience of the mental hospital population of a large urban community.

(2) Figures tend to confirm the experience of epidemiologists in England and Wales.

(3) Factors concerned with the longstay general paretic patient are considered.

(4) The outlook for the future is discussed, emphasizing the need for early treatment and prevention of the sequelæ of primary syphilis.

I wish to thank Dr. F. S. Bonugli, Consultant Physician, Department of Venereology, Royal Victoria Hospital, for his advice and encouragement, and Dr. C. B. Robinson, Resident Medical Superintendent, Purdysburn Hospital, for permission to publish these findings.

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URINARY INCONTINENCE IN LONGSTAY MENTAL PATIENTS

By CECIL B. KIDD, M.B., D.P.M.,
and J. CALDBECK MEENAN, M.B., D.P.M.
Purdysburn Hospital, Belfast

URINARY incontinence is a major problem in the nursing care of patients in psychiatric hospitals, and the tendency has been to regard it as an inevitable concomitant of old age or advanced mental illness. Now, however, there is a more dynamic and physiological approach to the condition (Vincent, 1959), and it is worthwhile to review the situation and assess the background against which the newer methods of treatment could subsequently be tried.

METHOD.

Purdysburn Hospital is the largest mental hospital in Northern Ireland and the bed complement, which varies between 1,800 and 1,900, represents 95 per cent. of all mental in-patients formerly resident in the city of Belfast. Over a two-day period every unit in the hospital was visited and 1,837 case notes were studied by us and details were noted of the patient's name, age, status, date of admission, diagnosis, sphincteric control, and whether or not they were bed-ridden. In some instances where a patient had been in the hospital for many years an interview was necessary to reassess the diagnosis in terms of current terminology, using the established nomenclature of diseases as a basis.

1. All patients registered under Act of Parliament as requiring Special Care	Mental Deficiency Group.
2. All schizophrenic disorders, including paraphrenia and schizo-affective states	Schizophrenic Group.
3. All psychoses and confusional states primarily due to arteriopathic disorder	Arteriosclerotic Group.
4. Psychosis, dementia or degeneration of the brain attributable to the senium	Senile Group.
5. Presenile dementia, Pick's disease, Alzheimer's disease	Presenile Group.
6. The affective disorders	Affective Group.
7. Diseases, syndromes and addictions due to alcohol	Alcoholic Group.
8. Organic brain disease other than conditions listed elsewhere	Organic Group.
9. Paranoid states, personality disorders and psychopathies, psychoneurosis	Others.

For the purpose of this survey patients were considered to be incontinent when, despite routine or habit training methods, they remained irresponsibly incontinent by day and by night and had been so for at least three months. These strict criteria eliminated those patients who were only occasionally incontinent or who would have been incontinent had it not been for active nursing attention. Longstay patients were considered to be those who had been under the care of the hospital for at least one year since the date of their last admission, and bed-ridden patients those who were not out of bed for longer than two hours in any one day.

Results.

Patients considered to be suitable for inclusion in the survey numbered 1,700 and of these 314 (18.5 per cent.) were found to be incontinent, of whom 118 were male (representing 14.2 per cent. of the male population) and 196 were female (22.6 per cent. of the female population). In the series only 59 were bedridden, but of these 49 were incontinent (43 female, 6 male).

The total hospital population and the incontinent patients were then considered in age, sex, and diagnostic sub-groups. In each sub-group the observed number of incontinent patients was compared with the expected number taking the series as a whole. Examination of the results thus tabulated showed significantly more observed than expected incontinence in three groups:—

1. Mentally deficient females (25 observed, 16.76 expected, $\chi^2 = 4.06$).
2. Females in the arteriosclerotic group (75 observed, 51.77 expected, $\chi^2 = 10.44$).
3. Males in the senile group (15 observed, 8.48 expected, $\chi^2 = 5.01$).

Whereas significantly less incontinence than expected was found in three groups:—

1. Males in the schizophrenic group (45 observed, 63.28 expected, $\chi^2 = 5.29$).
2. Males in the organic group (4 observed, 11.35 expected, $\chi^2 = 4.76$).
3. Males in the affective group (1 observed, 7.91 expected, $\chi^2 = 6.05$).

The population in the groups presenile, alcoholic and others was too small for comparison to be made and no other findings were significant at the $P > 0.05$ level.

Discussion.

The finding that in general there is a higher rate of incontinence amongst the female patients is in agreement with the observations of Adams and Cheeseman (1951) in geriatric patients.

In considering the various sub-groups in which significant findings were noted, various factors were seen to be at work.

In the mental deficiency group there was a significantly greater amount of incontinence in females under the age of 50 as compared with the series as a

whole. This is probably explainable by the interplay of other inconstant factors, for this group as defined consisted of a wide variety of mental defectives ranging, for example, from frank idiots to high grade feeble-mindedness with a comparatively high I.Q. A disproportionately large number of low level mental defectives amongst the females could account for the relatively greater incontinence rate.

In the arteriosclerotic and senile groups two important variable factors are at work, namely, the occurrence of local genito-urinary disease, notably prostatic in the male and gynæcological in the female, and the fact that the stage of the disease process at which the patients are hospitalized differs with social and economic circumstances. In the arteriosclerotic group females showed relatively more incontinence as might be expected, but even allowing for the greater liability of the female it is difficult to understand why the males of the group did not have more incontinence than the series as a whole. A similar disparity is seen in the senile group where males showed significantly more incontinence, this time in contradistinction to the females.

In both these groups there was a steady increase in the proportion of incontinence with each older age group. This is at variance with the findings of Thompson (1949), who observed that in a series of elderly chronic sick in Birmingham there was little difference in the age groups 60-69, 70-79, and over 80, and concluded that "incontinence in either sex was not a consequence of old age."

In the schizophrenic group males were found to have significantly less incontinence whilst the same was not true of females. This is possibly an indication of the greater effectiveness of habit training methods in the male patients.

The results in the affective group showed significantly less incontinence in males, but, although the figures are statistically significant, the numbers involved were too small to be of much clinical importance.

In the organic group results too are of less importance because of the multiple variable factors at work in this heterogeneous group which included patients suffering from post-encephalitic psychosis, general paresis of the insane, Huntington's chorea, multiple sclerosis, epileptic psychosis and brain tumour.

The high incidence of incontinence amongst bed-ridden patients is striking and is consistent with the views expressed by Warren (1943) and Wilson (1948), who emphasized the importance of avoiding confinement to bed.

Our overall impression is that except for the schizophrenic group which requires further investigation there is little basic difference between the incontinence in our patients and that found in geriatric patients. We believe that any newer methods of treatment that prove effective in these latter will equally be of benefit to incontinent patients in mental hospitals. This belief is based on the consideration that the difference between those patients forming the largest sub-groups in our series, i.e., arteriosclerotics and senile psychotics, and those in geriatric or general hospitals is essentially one of degree only, the disease process in each case being of the same underlying pathology.

SUMMARY.

Seventeen hundred longstay mental patients were investigated and 314 (18.5 per cent.) were found to be incontinent of urine.

Breakdown into diagnostic, sex and age groups showed statistically more incontinence in comparison with the series as a whole in female mental defectives, female arteriosclerotics and male senile psychotics, and significantly less in male schizophrenics.

Relatively few patients in the series were bedridden, but 85 per cent. of these were incontinent. The importance of avoiding confinement to bed is emphasized.

Senile and arteriosclerotic patients constitute the main problem as they do in general and geriatric hospitals.

We are indebted to Dr. E. A. Cheeseman and Mr. J. D. Merrett, Department of Medical Statistics, Queen's University, Belfast, for their help and advice in the preparation of this paper; to Professor J. G. Gibson for his interest and encouragement; and to Dr. C. B. Robinson, Resident Medical Superintendent, Purdysburn Hospital, for permission to publish these findings.

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REVIEW

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Each chapter consists largely of relevant quotations from the reference books and there is very little original thought in the whole composition.

The author has overlooked the fact that, quite apart from any organised psychosomatic methods, the duration of labour has shortened considerably over the last twenty years. This is largely due to an altered attitude on the part of the patient, better education, and the virtual disappearance of rickets.

Much of what the author claims for psychosomatic methods can be attained by such a simple therapeutic remedy as raspberry tea.

It is difficult to see the value of this publication. C. H. G. M.

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A CASE OF ANOREXIA NERVOSA TREATED BY A COMBINATION OF PSYCHOTHERAPY, INSULIN AND RESERPINE

By **J. C. DAVISON, M.D., B.Sc.**
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and
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RECENT contributions to the literature reflect the conflict of opinion regarding the etiology and treatment of anorexia nervosa. It has been described as a somatic disorder (Williams, 1958), a neurosis (Du Bois, 1949-50), and an illness caused by somatic, psychological, and environmental factors (Rathod, 1958).

CASE REPORT.

A girl of fourteen years was admitted to Belfast City Hospital on 10th December, 1956. There was a history of progressive loss of appetite over a period of twelve months, vague abdominal pain, and loss of some sixty-three pounds—her weight before the onset of symptoms having been about one hundred and thirty-seven pounds. She had begun to menstruate at the age of twelve years and had been quite normal in this respect until she started to lose both weight and appetite, since when she had not menstruated. The patient was extremely thin and emaciated. She took virtually no food spontaneously and, although not actually refusing it, had to be coaxed to take even the smallest quantity. She expressed acute dislike for all food.

Physical examination revealed no abnormality apart from profound emaciation.

Radiological investigation of chest, abdomen, gastro-intestinal tract and urinary system showed nothing abnormal, except for a small calcified abdominal gland. E.S.R. (Westergren) was 2 m.m. in one hour, and the blood W.R. was negative. No occult blood was found in the stools.

Psychiatric examination revealed her to be mentally alert with no psychotic or depressive features.

Psycho-therapeutic interviews were commenced with particular reference to topics which appeared to have a strong emotional significance for her. These were:—

1. The recent emigration of her sister.
2. Some difficulty with school work.

After nineteen days, it was clear that she was making no progress and it was decided to give her soluble insulin, starting with 5 units each morning and increasing daily by 5 units to a maximum of 30 units. Two hundred grams of

glucose and adequate vitamins were given orally each day, and she was encouraged to take as much food as possible, although without much success. The total gain in weight was only four and a quarter pounds in the following seventeen days. She was then also given reserpine 1 mg. twice daily. In six days she had gained eleven pounds and for the first time stated that she felt hungry, taking food spontaneously. After seven days reserpine was discontinued when œdema of the lower limbs and sacrum was noticed. She continued to have thirty units of insulin daily until her discharge from hospital thirty-six days after her physical treatment had started. She had gained thirty-two pounds weight in these thirty-six days.

Following her discharge from hospital, she continued to attend as an out-patient for psycho-therapeutic interviews. By the end of another sixty days she had gained a further forty-two pounds, and was actually heavier than she had been before the commencement of her illness. Her mother reported that she was happy, had an excellent appetite and was quite back to her former state of robust health.

Comment.

This case is of interest for several reasons. There was no improvement after psychotherapy alone. There was some improvement (gain in weight of four and a quarter pounds) after treatment with insulin over a period of seventeen days, and a dramatic improvement (increased appetite and eleven pounds weight gain) in a period of six days when reserpine was given in addition to insulin. Furthermore, the gain in weight continued after reserpine had been stopped and she continued to make progress, even when insulin was omitted and psychotherapeutic interviews substituted.

Dally, Oppenheim, and Sargent (1958) suggest that reserpine alone makes a patient depressed and consider that chlorpromazine should be used instead. They found an average gain in weight of 4.2 pounds per week, but mentioned one case where weight increase was thirty-two pounds in fifty-six days, and another in which the patient gained twenty-five pounds in twenty-seven days. In the case reported above the total gain in weight over a period of ninety-six days was seventy-four pounds.

Using insulin and reserpine in cases of anorexia nervosa, one forms two fairly strong clinical impressions, namely: —

1. One large daily dose of insulin appears to be more effective than the same amount given in two or three divided doses.
2. Reserpine certainly causes depression if given over a lengthy period or to those who have shown previous depressive personality traits. It seldom appears to cause depression when given over short periods or to those with no such depressive traits.

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REVIEWS

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IN his second line the author states that neither of the two words "involutional melancholia" has any specific meaning. It is rather difficult to discuss the ætiology of a condition, the existence of which is in doubt. Evidence is produced to show that the morbidity risk for the so-called "endogenous" affective disorders amongst the sibs and parents of proband material does not differ from that found amongst the relatives of a group described as involutional melancholics. Thus the genetic evidence confirms his original doubts. A depressive illness may be precipitated for the first time by the climacteric, but there is no proof that the illness and the physiological event are casually related.

Social factors are briefly dealt with in the monograph. J. G. G.

MENTAL RETARDATION; ITS CARE, TREATMENT AND PHYSIOLOGICAL BASE. By Hans Mautner, M.D. (Pp. vii+280. 35s.) London: Pergamon Press, 1959.

THIS book has been rapidly produced, judging from the recent dates of some of the references quoted. It would seem to be based on lecture notes expanded here and there as the author considered necessary. In spite of this some passages remain obscure. The title of the book is rather misleading, should the reader expect to find the subject matter treated in the traditional manner. Mental retardation is dealt with almost exclusively in terms of pathology and biochemistry, with the emphasis on the latter. The author has collected a comprehensive and

up-to-the-minute bibliography on subjects ranging from inborn errors of metabolism to mental deficiency associated with kidney diseases. His canvas is extensive, and although it will not completely satisfy the neurologist, the pædiatrician, and the psychiatrist, it serves the useful purpose of providing each with an up-to-date list of references in the other related fields. The text is not at all critical, but refers in barest outline to the sources quoted. On occasions the author shows special interest in some subjects, for example, the rôle of birth trauma in the ætiology of mental retardation.

Clinical descriptions cannot always be relied upon to be entirely accurate, as is the case with Friedreich's ataxia (p. 37). Prophylaxis and therapy is discussed in five pages, the emphasis being almost entirely on physical agents such as the dangers to the fœtus of X and other irradiation. The rapidly expanding expanding field of social and industrial education which is at the heart of "Special Care" is left untouched.

It should not be assumed that this book is without value. On the contrary, it provides a valuable panoramic view of the somatic approach to the problem, bringing together every kind of physician interested in children. This profitable union of disciplines can only serve to stimulate an exchange of knowledge that could lead to a better understanding of the ætiology of some kinds of mental deficiency. J. G. G.

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In his preface the editor states that this book has been written for the general practitioner. In an introductory chapter Lord Cohen of Birkenhead enunciates some valuable guiding principles which the diagnostician would do well to follow. Early diagnosis often means provisional diagnosis, but this is not to be despised, for usually the practitioner must take action without waiting for proof which would satisfy the scientist. "The live problem is to be preferred to the dead certainty."

This book, however, takes us much further than provisional diagnosis. It contains twenty-five chapters, each written by a recognised authority in his subject. The salient points in the patient's history, the special signs to be elicited, the laboratory and radiological investigations concerned in accurate differential diagnosis are presented in full array.

Nevertheless, it is more than a work of reference. It is a book to be read and digested. Being the distilled wisdom of the authors, it is not light reading, but the effort is well worth while. W. G. F.

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Only the first two chapters are regarded by the editors as historical contributions, but many would consider the greater part of the material presented as having already passed into the history of empirical treatment in psychiatry, even at the time when the conference was held.

The protagonists of deep insulin therapy at the conference cling tenaciously to their faith in the efficacy of this method of treatment, tending to minimise controlled observation of its effects in favour of clinical impressions at the bedside. No serious attempt is made to refute the conclusions of those carefully designed investigations that showed clearly that the results of such treatment could at least be equalled when other pharmacological agents were used, provided the psychological setting in which they were given was the same. The conference included papers on the uses of modified insulin therapy in psychiatry and also reference was made to biochemical studies designed to explore the mode of action of the drug.

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