VOLUME 39 1970 PART II

THE ULSTER MEDICAL JOURNAL

PUBLISHED BY
THE ULSTER MEDICAL SOCIETY

CONTENTS

CONTENTS

THE ULSTER MEDICAL JOURNAL

NOTICE TO CONTRIBUTORS

1. Authors are reminded that concise and clearly expressed papers are those most welcomed by readers and by the Editorial Board.

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).

3. References should be given as in the publications of the British Medical Association and in most other modern British journals. If contributors are uncertain of the correct abbreviation for the title of any journal, as given in the World List of Scientific Periodicals, they should give the full title.

4. Tables and illustrations should be reduced to a minimum, and should be sent detached from the typescript of the paper. Line drawings should be used whenever possible. All illustrations must be in a finished form ready for reproduction. Authors will be charged for all blocks at cost price. Half-tone blocks require to be printed on special art paper. Authors will be responsible for the cost.

5. Order for reprints must be given when the author returns the printer's proof. The cost of these may be obtained from the printers in advance.

6. Editorial communications should be sent direct to the Editor, Dr. J. E. Morison, D.SC., M.D., The Laboratory, Belfast City Hospital. The Editor will be glad to advise authors on the preparation of their manuscripts.

ADVERTISEMENTS

First advertising forms go to press thirty days in advance of the date of issue. In forwarding copy, time must be allowed for setting up and submitting proof. All communications for space must be sent to:

Advertising Agent, Ulster Medical Journal,
c/o Messrs. Dorman & Sons Ltd.,
Holmes Street, Belfast 2.

DATES OF PUBLICATION

It is hoped to issue a Winter and Summer number each year in February and September.

THE ULSTER MEDICAL SOCIETY

P.O. Box 222.
Belfast City Hospital,
Belfast, 9.

Dear Sir (or Madam),

If you are not a member of the Ulster Medical Society, we would appeal to you to give the question of joining your consideration. The Society has been in existence since 1862, and has always been active in keeping its members interested in the advances in medical science. Meetings are held at intervals of a fortnight during the winter months, and papers are contributed by members and distinguished guests. Facilities are provided for doctors to meet informally afterwards and have a cup of tea. *The Ulster Medical Journal, the official organ of the Society, is issued to all Fellows and Members free of charge.*

May we, therefore, appeal to you to join the Ulster Medical Society, and so enable us to widen its influence and sphere of usefulness still further? A proposal form is appended: your proposer and seconder must be Fellows of the Society.

If you do not wish to become a member of the Society, will you consider entering your name as a subscriber to THE ULSTER MEDICAL JOURNAL? The subscription is fifteen shillings per annum, payable in advance to the Honorary Treasurer.

We remain,
Yours faithfully,

R. S. ALLISON, *President.*
J. MACD. G. HARLEY, *Hon Secretary.*
N. C. NEVIN, *Hon. Treasurer.*

MEMBERS **£1. 1s.** (A Member is one who is less than seven years qualified. He or she will automatically become a Fellow seven years after qualification and be liable to the higher subscription rate.)

FELLOWS.—1 (a) Annual subscription of Fellows resident, practising or holding an appointment within ten miles of Belfast, **£3. 3s.**; (b) husbands and wives in the above category who are both Fellows will be entitled to pay a combined subscription of **£4. 4s.**; 2 (a) annual subscription of Fellows resident, practising or holding an appointment outside the above area, **£2. 2s.**; (b) husbands and wives in the above category who are both Fellows will be entitled to pay a combined subscription of **£3. 3s.**; 3, annual subscription of retired Fellows, provided that any Fellow who, by reason of retirement either through age or illness, is no longer engaged either in private practice or in salaried employment, shall be entitled, *on application*, to pay an annual subscription of **£1. 1s.** only, and provided always that such Fellow has previously paid to the Society a subscription at the current rate for an uninterrupted period of at least ten years, or during such time has been in practice or service abroad.

All Fellows and Members of the Society who have paid subscriptions for 40 years or alternatively having been a Fellow or Member for 20 years and reached the age of 65, or more, shall be exempt from any further subscription.

LIFE MEMBERSHIP—Fellows and Members shall be eligible to become Life Members, **£31. 10s.**

To DR. N. C. NEVIN,
DEPARTMENT OF MEDICAL STATISTICS,
INSTITUTE OF CLINICAL SCIENCE,
GROSVENOR ROAD, BELFAST BT12 6BJ.

.....19.....

Dear Sir,

We nominate for $\frac{\textit{Membership}}{\textit{Fellowship}}$ *of the Ulster Medical Society—*

Name of Candidate .....

Postal Address .....

.....

Year of Qualification and Degrees .....

.....

Signature of Proposer .....

Signature of Seconder .....

EXCHANGES: Exchange journals and all relevant correspondence should be addressed to:
QUEEN'S UNIVERSITY MEDICAL LIBRARY,
INSTITUTE OF CLINICAL SCIENCE,
GROSVENOR ROAD, BELFAST BT12 6BJ.
NORTHERN IRELAND.

BOOKSELLERS: All correspondence, orders and payments for institutional and private subscribers, through booksellers, should be sent to:
THE HONORARY TREASURER,
ULSTER MEDICAL JOURNAL,
c/o QUEEN'S UNIVERSITY MEDICAL LIBRARY,
INSTITUTE OF CLINICAL SCIENCE,
GROSVENOR ROAD, BELFAST BT12 6BJ.
NORTHERN IRELAND.

SUBSCRIPTIONS: Individuals who are not members of the Society wishing to take out a direct subscription should send a banker's order for fifteen shillings payable to the Ulster Medical Society (Northern Bank, Shaftesbury Square, Belfast), Ulster Medical Journal Account, to Dr. N. C. Nevin, Department of Medical Statistics, Institute of Clinical Science, Grosvenor Road, Belfast BT12 6BJ. This covers one volume (two numbers) of the Journal.

THE
ULSTER MEDICAL JOURNAL

PUBLISHED ON BEHALF OF THE ULSTER MEDICAL SOCIETY

VOLUME 39 1970 PART II

DEVELOPMENT OF ANAESTHESIA IN NORTHERN IRELAND

By JOHN C. HEWITT, M.D., F.F.A.R.C.S.(Eng.), F.F.A.R.C.S.(I.),
Consultant Anaesthetist, South Belfast Hospitals,
and
JOHN W. DUNDEE, M.D., Ph.D., F.F.A.R.C.S.(Eng.), F.F.A.R.C.S.(I.),
Professor of Anaesthetics, The Queen's University of Belfast

THE Belfast Medical School has been in existence since 1835, and the University since 1845; but prior to 1908 it was a College of the Royal University of Ireland. After this date it was granted a separate Charter as the Queen's University of Belfast. The medical school has always enjoyed a good reputation, but anaesthesia as a speciality was slow to develop, and had little status prior to the 1939-45 war. After this time anaesthetists had to struggle hard to establish and maintain parity with their colleagues, and to achieve this they had to have academic qualifications at least equal to those in the major specialities.

There is little information about anaesthesia here in the nineteenth century but the following was extracted from the annual reports of the Belfast General Hospital by Dr. Maurice Brown:

1850 First mention of chloroform in Belfast General Hospital. Surgical report, Belfast General Hospital: "We are sorry also to notice an increase in another class of cases, attempted suicide, 18 of whom were admitted since our last report all of these we happily succeeded in saving. 42 surgical operations have been performed, several of them under the influence of chloroform. The facts in reference to this agent are not yet sufficiently numerous to enable us to recommend or condemn its general use. It is perhaps, however, only right that we take this opportunity of stating that it requires great caution and considerable experience to render its administration safe. The number of pupils attending . . ."

1851 1st April–1st September. Annual report of Belfast General Hospital: "The use of chloroform which tends so much to allay the sufferings of the patients during an operation has been more generally adopted than formerly, and with decided success, no injurious effects having, in any case, resulted from its employment in this establishment. A considerable number of students attended. An important change has been made . . . the light improved."

1852 "Chloroform, we may remark, has continued to be used in almost every case of surgical operation, with the happiest effect in the alleviation of human suffering and it is very satisfactory to report that in no case has the least unpleasant result followed its use."

1853 "Chloroform has been administered to the patients, when practicable, and with most gratifying results in alleviating both mental dread and physical pain and it is our duty to put it on record that during the several years it has been in use here and in the many hundred cases to which it has been exhibited in this institution, no accident whatever or evil has followed its administration."

1854 "In all serious operations and indeed frequently in minor cases, chloroform has continued to be used with great success in relieving pain and in no case in this hospital has its use been attended with any serious or unpleasant result."

1855 "The mortality has not been 6 per cent and after 103 operations only 5 patients died, 19 of which were capital amputations with 2 deaths. This latter, it may be remarked, is as low a morality as could be presented by any hospital in the Kingdom. The exhibition of chloroform may have materially tended to produce this happy result. At all events, anaesthesia has been administered, as hitherto, without any evil result, in every case of painful operation performed, with the effect of enirely overcoming that mental stress and bodily suffering which must otherwise be endured."

These reports indicate, as Dr. Brown points out, that chloroform, one of the great medical discoveries, was not accepted in Belfast until 1852, five years after it had first been used in Edinburgh. One hopes that we would not now be so conservative.

There appear to have been two opinions on anaesthesia held by surgeons practising during the latter half of the 19th century. First, the minority view, mainly held in England but not in Scotland, that anaesthesia should be practised by specialists (or chloroformists as they were called) and the second view propounded by Joseph, First Baron Lister that "professional anaesthetists were unnecessary if a simple routine was followed during administration." In 1861 and again in 1870 and 1882 he wrote in Holmes' System of Surgery to the effect that the action of chloroform on the heart was unimportant, but its action on respiration was all important; and, in particular, respiratory obstruction was to be avoided, by strong traction on the tongue, if necessary. He continued: "The appointment of a special chloroform-giver to a hospital is not only entirely unnecessary, but has the great disadvantage of investing the administration of chloroform with an air of needless mystery, and withholding from the students the opportunity of being trained in an important duty, which any one of them may be called upon to discharge on commencing practice, and which, though certainly simple, is better performed after some practical initiation."

This is mentioned in order to suggest that this was the view held by most surgeons in the North of Ireland prior to 1939 and, we understand, in the rest of the United Kingdom, Europe and America. However, prior to the turn of the century some German and Swiss surgeons were realising the importance of skill and training in anaesthesia and were agitating for special courses of training. In 1903, Dumont of Berne wrote: "Nothing is more ridiculous than the diffidence with which the administrator of an anaesthetic accepts a subordinate role in the operation. He is just as important a personage as the operating surgeon, for the patient's life depends upon him . . ."

Here in Ulster it took nearly fifty years for the majority of surgeons to be converted to this opinion of anaesthesia. Those anaesthetists who enjoyed consultant status prior to 1953 had to have a Doctor of Medicine degree, or other higher qualification, as well as the diploma in anaesthesia. After 1953, when the F.F.A.R.C.S. (England) by examination was introduced this qualification was recognised by the Northern Ireland Hospitals Authority as the standard for consultants. In 1960 the F.F.A.R.C.S.I. was introduced and accorded equal status.

The poor reputation and status of anaesthesia was not surprising when one considers that, prior to the 1930s, methods and drugs were almost unchanged here since mid-19th century. It was usually open chloroform and ether with ethyl chloride for induction and for short procedures. The anaesthetic was not thought to be important and was given by any inexperienced doctor or student, and often by nurses outside hospital. Staff anaesthetists were few, engaged in general practice, and available for only the minority of cases. They were not always skilled and experienced.

The senior surgeons, from whom most of this information was gleaned, all agreed that morbidity and mortality were high in association with anaesthesia and surgery. Chest complications and paralytic ileus were common and, failing these, it required 48 hours for the patient to "recover from the anaesthetic", the usual effects being vomiting and headache. Deaths on the operating table, or soon after, were common enough though coroners were easily satisfied, and legal actions rare. Occasionally a patient was sent back to bed without operation when some serious trouble developed during induction of anaesthesia. Relatives and family doctors usually asked: "How did he take the anaesthetic?" The question is sometimes still asked in rural districts and the anaesthetic is occasionally called "the chloroform". Many of these catastrophies were caused by chloroform or its misuse: probably the other common cause was regurgitation and aspiration.

Surgeons had to shoulder responsibility for both surgery and anaesthesia, so it is not surprising that they resorted to local and nerve block techniques whenever possible. Many were short-tempered, unlike the present placid and disciplined generation. It was customary about fifty years ago, or more, for trainee surgeons to spend their first year after hospital residence giving anaesthetics; and nearly all of them had deaths on the table. Professor P. T. Crymble, a former Professor of Surgery, boasted that he was unique in this respect, having no deaths during his term; whereas his contemporaries each had at least two during their short anaesthetic careers. Many true stories are told of anaesthetic incidents, some amusing but most of them tragic. For example, Professor Macafee's tale of the general practitioner who insisted on anaesthetising his own patient for a forceps delivery by a consultant obstetrician. The doctor had been away all afternoon at a country funeral and the obstetrician had been hoping to have the patient delivered before he came back. Unfortunately he returned slightly inebriated in time to give the anaesthetic, which he started by putting the Schimmelbusch mask on the patient's foot as she lay in the lithotomy position. The obstetrician asked if it would not be better on the other end. He agreed and, after this not very promising start, carried on with the anaesthetic as if nothing unusual had happened. Another story, known personally to one of the authors, concerned the house surgeon who was inducing a patient with chloroform and ether mixture by open mask while

the surgeon scrubbed and looked on. Suddenly the surgeon said: "Don't give her any more, doctor, she's dead," as indeed she was.

Sir Geoffrey Organe's most interesting John Snow Lecture "Anaesthesia 1939" given to the Association of Anaesthetists in October 1969 shows, rather surprisingly, that anaesthetists and the speciality in England, and even in London, did not have very much better status than here prior to 1939. Certainly they were not accepted as members of the medical staff of teaching hospitals until a few years before the 1939-45 war.

Experiences of individual surgeons varied, but H. P. Malcolm, now retired, and in his mid-eighties, states that general anaesthesia for abdominal surgery was so unsatisfactory in the nineteen-twenties and thirties that he usually resorted to subcostal nerve block in addition. There were, of course, some exceptions, and the first skilled anaesthetist of whom we have any knowledge was Victor George Leopold Fielden, the only specialist anaesthetist of his time in Northern Ireland.

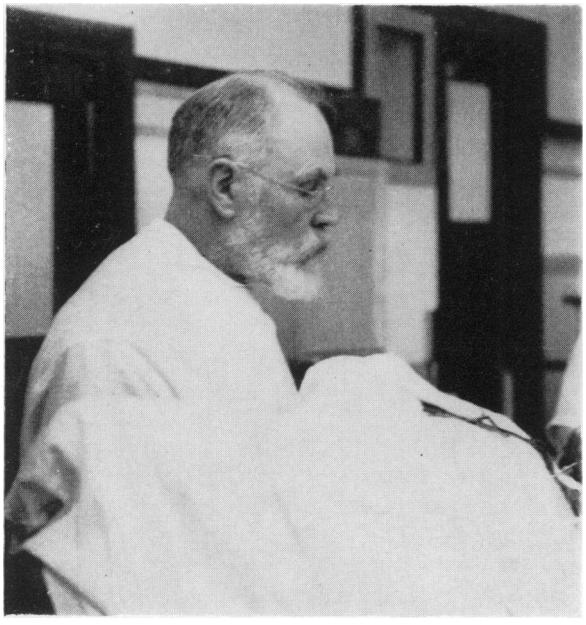

FIG. 1. *Dr. Fielden in the theatre of wards 11 – 12. Photograph by J. E. Morison in Summer, 1937.*

He was not a whole-time anaesthetist since he also held the appointment of Lecturer in Pharmacology and Material Medica, and did some general practice. Even now pharmacology would be regarded as a sound approach to anaesthesia. He was a remarkable man, though his standards might not now be acceptable. Born in 1866, in Plymouth, where his father was a Royal Naval Officer, Victor Fielden's family moved to Belfast when he was 16, his father having left the Navy and joined the Board of Trade. He finished his schooling at the Royal Belfast Academical Institution, the second oldest grammar school in Belfast, having been at Heriot's, Edinburgh, before this. He qualified as a pharmacist in 1890 and M.B. in 1892.

Some time after this he became associated with Sir William Whitla, Professor of Materia Medica and Therapeutics and a celebrated physician, assisting him in the prepartion of his first book, which became a standard work on the subject. Later, he became lecturer in the Department of Therapeutics, becoming the temporary head of the department when Whitla retired in the nineteen-twenties. It must have been a disappointment to him when he did not succeed to the Chair. However he was reputed to be an indifferent lecturer who had little control over students. Many stories are told of the pranks played on him by students many of

whom, just after the first war, were tough ex-soldiers and a good deal older than usual.

Fielden was a big man with rough skinned hands, attributed to having worked in operating theatres during the Listerian carbolic spray era. He obtained his M.D. with Gold Medal in 1912 for a thesis on the pharmacology of ethyl chloride. This was supported by many experiments on laboratory animals, dogs, cats, rabbits and frogs. In his preface he states: "It is an attempt to add to the limited knowledge of the action of an anaesthetic which is now largely used but whose pharmacological effects have not received much attention." It was an exceptionally fine work, though we might not now agree with all his conclusions. As far as we know, Fielden's techniques were limited to inhalation anaesthesia. He favoured the Vernon Harcourt apparatus for chloroform and he was still using it in the early 1940s. Mr. Barry Crymble relates how he did his student anaesthetics about 1942 with the Vernon Harcourt apparatus supervised by Dr. Fielden. Prior to the first war he is said to have made and used a transportable nitrous oxide-oxygen machine for minor anaesthetics. He worked with such celebrated surgeons as Robert Campbell (brother of Sir John the obstetrician), A. B. Mitchell, Sir John Byers, Professor Thomas Sinclair, Andrew Fullerton (later Professor of Surgery) and Sir John Walton Browne. Other younger surgeons working at this time were Howard Stevenson, P. T. Crymble (later Professor), S. T. (later Sir Samuel) Irwin and Thomas Kirk. These men operated over a wide area, in different hospitals and nursing homes, and even in the patients' own houses; and Fielden often accompanied them as anaesthetist as far as the western counties of Ireland. There were few motor-cars, and those not reliable, so travel was frequently by rail, and horse-drawn car to finish the journey.

The authors remember him well during the late nineteen-thirties and early nineteen-forties, and during the war years he was still working. He was a tall bearded man of impressive appearance (fig. 1). He died in June 1946 a few days short of his eightieth birthday. He wrote and published other papers, mainly on pharmacological subjects not connected with anaesthesia.

Next in succession was Stafford Geddes who qualified M.B. in 1915 and who died in May 1969 having retired 13 years earlier. He saw many developments in anaesthesia and surgery, from the closed inhalers of Clover, Ormsby, Ombredanne and Lucas, to the Schimmelbusch mask (introduced in 1916) as well as morphia and atropine premedication. Prior to this the patient's head was turned to one side and the secretions drained from the mouth by a gauze wick. He remembered having tonsillectomy, under local analgesia, when aged 13, performed by Sir John Walton Browne.

Boyle's apparatus and the Shipway were introduced in the early nineteen-twenties and blood transfusion in the late twenties. Dr. Geddes became a whole time anaesthetist about 1925. He worked at the Royal Victoria, Ulster and Samaritan Hospitals; and he shares with Dr. Claire McGucken of the Mater Hospital the distinction of being the first whole time specialist anaesthetist in this region, and perhaps even in Ireland. He became, for his time, quite skilled and he was using Magill's endotracheal tubes for some time prior to 1930. (Geddes was one of the few subscribers to the early issues of the British Journal of Anaesthesia and his gift of them to the Anaesthetic Department was greatly appreciated).

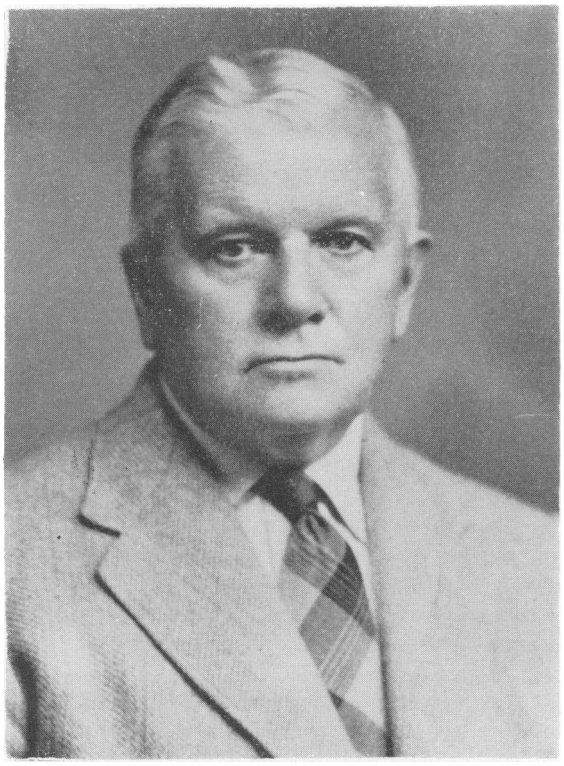

FIG 2. *Stafford Geddes, M.B.,* 1915. *Died May,* 1969

Dr. Claire McGucken (M.B. 1923), after her house surgeon post at the Mater Hospital, spent six months as resident anaesthetist in the West Middlesex Hospital, London. Here she worked with some well known surgeons, including Rodney Maingot, and learned to use the Boyle's apparatus, the Shipway, the Clover, ethyl chloride closed inhalers, and also endotracheal anaesthesia. When she returned to Belfast she worked at the Mater as its first whole-time anaesthetist for three and a half years, from 1924 to 1928. She then married Mr. James McSparran, later a well known barrister, and retired from medical practice. She used all the techniques which she had learned in London, and the hospital acquired a Boyle's apparatus at this time. She preferred, however, when endotracheal anaesthesia was required, to allow the surgeon to insert the tube.

In the early 1920s local analgesia was widely used by surgeons. H. P. Malcolm and the late G. R. B. (Barney) Purce had probably learned these techniques during their war servcie. Other younger surgeons – Ian (later Sir Ian) Fraser, J. S. Loughridge and the late C. A. Calvert worked in Britain and elsewhere during the nineteen twenties and brought back and encouraged the use of new anaesthetic techniques. Tonsil dissections were done from 1927, but anaesthesia was for a number of years by insufflation through a Boyle Davis gag. Early endotracheal anaesthesia for tonsils was also by insufflation.

The year 1927 saw the introduction of rectal ether. From 1929–34 rectal bromethol (Avertin) had a spell of popularity; and Dr. John Boyd obtained his M.D. in 1933 for a thesis on its use. Some surgeons were pushing it as a complete anaesthetic and there were complications, including deaths in children. The great indication for rectal Avertin was as basal anaesthesia in surgery for toxic goitre. Prior to the discovery of thiouracil, patients with thyrotoxicosis were amongst the most serious surgical risks; and many died following operation. Avertin seemed to reduce the dangers by damping down the post-operative "toxic" reaction which caused many of the deaths.

Dr. Olive Anderson, qualified in 1917 and still practising, relates how she stayed

for two days with a patient whose unconsciousness was prolonged due to inadvertent overdosage. Dr. Anderson worked in military hospitals in Britain from 1917–19 before returning to Belfast where she combined anaesthesia and general practice. She was sufficiently progressive and enthusiastic in the early nineteen-twenties to spend several weeks at the Westminster Hospital with Dr. (later Sir Ivan) Magill.

About 1935 J. S. Loughridge inserted radium needles under intravenous hexobarbitone. He also introduced percaine and decicaine in the early 1930s and suggested the use of Avertin in 1929 to Mr. Thomas Kirk. Spinal anaesthetics were given, usually by the surgeons, from the nineteen-twenties and perhaps earlier. Novocaine and stovaine were used, and later heavy and light percaine (later Nupercaine. There were some serious complcations and deaths, and the late R. J. McConnell, surgeon at the Royal Victoria Hospital, Belfast, stated that he knew personally of two cases of permanent paraplegia following spinal analgesia. He must have thought that these resulted from errors in technique because he had no objection to using these agents in his own patients (given by one of the authors) during the period 1946–49. Spinal anaesthesia was used commonly for inguinal, perineal, and bladder operations, and in gynaecology, until 1953 when two serious post-spinal accidents were reported from England. Since then it has been little used in the province and it has now been largly replaced by extradural block.

James Wilson Heney, M.B. 1922, D.A. 1929, was visiting anaesthetist to Royal Victoria and Ophthalmic hospitals until his death, in July 1950, at the early age of 50.

George Hamilton, M.A. (T.C.D.) 1920, M.B. (Queens) 1927, D.A., was a general practitioner anaesthetist on the staff of the Royal Victoria Hospital until a short time before his death in December 1967 at the age of 80. Before qualifying in medicine he had been a Church of Ireland clergyman.

We give brief thumbnail sketches of some of the 'younger juniors'. John Boyd, qualified 1926, combined anaesthesia with general practice until the beginning of the 1939–45 war, when he became a whole time anaesthetist. He was an expert in endrotracheal work and had been intubating since the mid or late 1930s. He did much paediatric work and wrote and published papers on rectal Avertin and cyclopropane. Florence McClelland, qualified in 1938, trained with Dr. John Gillies of Liverpool and Edinburgh in 1941, before returning to Belfast in early 1942. She retired from practice a few years ago, about the same time as Vida Lemon who is a native of New Zealand. James Elliott, qualified in 1938, spent 2 years as biochemist and resident anaesthetist at the Royal Victoria Hospital. He then spent eight months in Central Middlesex Hospital, London, before returning to Belfast in the spring of 1942. Fred Bereen returned from army service in 1946 having been an anaesthetist serving mainly overseas. W. M. Brown returned to Belfast in early 1946 having trained at the Westminster Hospital with Dr. (now Sir Ivan) Magill during 1944–45. He had been invalided out of the Navy. These, with John A. Macaulay of the Mater, were the first modern-trained and whole-time specialist anaesthetists and were responsible for training the post-war 'bulge' of trainees who were mainly ex-service doctors until the Department of Anaesthetics was established in 1958.

In 1946 the pattern of anaesthesia for major abdominal surgery was intravenous induction followed by nitrous oxide-oxygen and either (1) intercostal or paraverte-

bral nerve block, or low spinal sometimes for pelvic surgery, *or* (2) deep general anaesthesia, usually endotracheal, with ether and/or cyclopropane. If this was inadequate chloroform was often given. Cyclopropane was widely used at this time for all types of case, including thoracic, in spite of the explosion risk. Indeed for many years it continued to be the anaesthetic of choice in obstetrics. It was considered here, as elsewhere to be the anaesthetic of choice for poor risk patients. This continued popularity is interesting, in spite of its cost, and the fact that just a few years ago in the American National Halothane study it was shown to have the worst record of morbidity and mortality of any of the drugs or techniques studied. Most of us never found it completely satisfactory for major abdominal work, because it did not seem to produce as good relaxation as ether or chloroform, even when the patients had reached the stage of extreme respiratory depression and thereafter continued to be hand ventilated with a high percentage of oxygen. This was a dangerous practice from the cardiac point of view; but despite this not many cases of cardiac arrest were ever recorded.

These dangerous practices ceased when curare was widely available and accepted. Its acceptance depended partly on the demonstration that, contrary to what many predicted, the accompanying light anaesthesia did not cause shock. About this time, or soon after, the Birmingham accident surgeons showed that shock meant blood loss in the vast majority of cases. In the winter of 1946–47 curare was introduced by W. M. Brown who had seen it used experimentally in England prior to this. One of the authors (J.W.D.) started using it in Londonderry at the end of 1947. However, John A. Macaulay of the Mater got a small quantity of Introcostrin through an American serviceman and used it about two years earlier. This was a cruder and less standardised preparation which was superseded by Tubocurarine.

Many young graduates saw the potential of anaesthesia as a speciality in the immediate post-war years and, like other centres, there was a great influx of trainees. For those who elected to train in Northern Ireland the "apprentice" system was all that could be offered and some combined this with intensive courses in other centres. The majority, however, had their basic training in England and returned home for senior trainee posts. By the early 1950s all hospitals in Ulster had one or more consultants engaged solely in anaesthesia, with a standard of practice comparable to elsewhere in the United Kingdom.

If anaesthesia for general surgery was unsatisfactory prior to the 1940s it was extremely poor for dentistry. Local anaesthesia, even with a comparatively safe drug such as procaine, was sometimes not completely effective. The introduction of lignocaine (Xylocaine), a more effective as well as reasonably safe drug, was a landmark in dentistry.

General anaesthesia for dentistry, prior to the 1920s and even later, consisted of chloroform and ether, ether, or ethyl chloride; endotracheal methods were rarely used and the dangers of inhalation of debris were often not appreciated. The use of gas and air before the first war and later gas and oxygen, with throat packing, minimised one risk, but added another – that of asphyxia due to inadequate oxygen; because anaesthesia could rarely be produced without some asphyxia. These cases were almost always done upright in the dental chair and it would be impossible to assess the morbidity and mortality. This morbidity and

mortality has continued even since the last war, in spite of the use of adjuvants such as ethyl chloride (a dangerous one), trilene, halothane and intravenous agents later.

Dr. J. C. Smyth, who taught for many years in the Dental Department, and who retired about 10 years ago, claims that there were never any serious effects from general anaesthesia in the Department. The authors, however, know of some deaths and many "incidents" both inside and outside hospital. One strong young farmer was given itrous oxide by a dentist but "did not take it well" and ended up on the floor. A second attempt was made to anaesthetise him and this time he died. A surgeon friend reported that, when he was a registrar working for his F.R.C.S., he had nitrous oxide-oxygen administered by a trained anaesthetist in the dental chair for extraction of one tooth. Following this he had a 24-hour period when he was unable to concentrate properly. One can only conclude that he had had some degree of cerebral anoxia.

Even today, many general anaesthetics in the dental chair are given by comparatively untrained and unskilled doctors (or dentists). Some even act as anaesthetist and dental surgeon, which should not be acceptable. Even when the anaesthetist is trained and experienced the facilities and conditions are often below standard; and we may yet conclude that all dental anaesthetics should be endotracheal, with the patient horizontal, under conditions comparable to those enjoyed by patients in hospital.

The lack of a university teaching department was rectified by the appointment of one of the authors (J.W.D.) as Senior Lecturer in 1958. He brought to the post a large experience in teaching and research gained mostly in Liverpool (with T. Cecil Gray) and Philadelphia (in the University of Pennsylvania with R. D. Dripps and his colleagues). The effect of this appointment on the morale of the trainees and the status of the anaesthetists was very great and soon an extensive teaching programme was running in which not only the university staff but all the clinicians participated and which was well supported by senior consultants. This liaison between academic and clinical staff is still well maintained and in this respect anaesthesia has set a pattern which few specialities could emulate.

Sir Ivan and Lady Magill

It was appropriate that one of the best known graduates of the Belfast Medical School, Dr. (now Sir) Ivan Magill should be invited to give the inaugural lecture at the opening of the new department. Magill's pioneering work on

endotracheal tubes in thoracic anaesthesia have earned him a permanent place in the annals of the history of anaesthesia. Professorial status for the speciality was achieved five years ago and this also raised the status of the anaesthetist.

Lack of laboratory space compelled the research work of the department to be largely of a clinical nature and this is reflected in the publications from Belfast. The field of intravenous anaesthesia has benefitted from the various papers on new barbiturates, propanidid, effects of drugs on arteries and veins, and the studies which have helped to elucidate the factors which influence induction complications. Premedication has also been investigated in detail, with studies of opiates, phenothiazines, anti-emetics and tranquillisers. Many colleagues have collaborated in these investigations, all of which are the result of much team work. Perhaps the nature and extent of the investigations can be judged by a recent survey of findings from 10,000 dilatation and curettage operations (Morrison, Hill and Dundee, 1968). The work of Drs. G. W. Black and L. McArdle on the peripheral vascular effects of inhalational anaesthetics has also come from Belfast, and the present Senior Lecturer in Anaesthetics – Dr. R. S. J. Clarke – has contributed appreciably to anaesthetic literature. Research has also been carried out in the Respiratory Failure Unit of the Royal Victoria Hospital (with Dr. R. C. Gray), and much work has been done in the difficult topic of relief of chronic pain.

Because of its unique position and size, with only one university department serving the whole province, there is a tendency for general teaching hospital consultant appointments to be held by those who have first worked for several years in provincial hospitals. Exceptions to this are consultants with an interest in specialised fields such as respiratory failure and intensive care, cardiac surgery and paediatrics. Contact between the consultants in the country and centre is well maintained by an active anaesthetic society (Northern Ireland Anaesthetist's Group of the British Medical Association), and by the trainees who go to work for periods of up to 2 years in these hospitals. This latter is considered to be a most valuable part of their training. Patient-contact is easier to maintain in a small provincial hospital than in a large teaching hospital complex, and anaesthetist participation in pre- and post-operative care is greater in the smaller units.

There is probably no single teaching group in Britain which, within one campus, can offer trainees such an orderly rotation between various specialities, as that of the Belfast hospitals. One of the advancements pioneered by the present Professor is a planned rotation of juniors between the various hospitals in the city. It is accepted policy that the majority of beginners (senior house officers or 1st and 2nd year residents) be located in Belfast and a small committee amicably agrees on the rotation of its 20 or so beginners. Anaesthesia has recently successfully pioneered "day release" courses for both primary and final fellowship. It would be outside the scope of this short review to describe the training programme in detail, particularly as this has been described (Dundee, 1965). Its popularity is evidenced by the many foreign graduates who train here. At the time of writing there are three Indian graduates (all with F.F.A.R.C.S. or D.A.) enrolled as Ph.D. students.

Finally, it is worth noting that anaesthesia has succeeded in breaking down political and religious barriers in this small troubled island, to an extent which is only equalled by rugby football. The Faculty of Anaesthetists of the Royal College

of Surgeons in Ireland was instituted in 1950 and the Fellowship (F.F.A.R.C.S.I.) instituted in 1961. This College is located in Dublin, yet for many in the Northern part of the country it is the "Alma Mater" as far as anaesthesia is concerned. The present authors, although both fellows of the English college, are members of the 12-strong Board of the Irish Faculty. With Dr. S. H. S. Love, one of the writers (J.W.D.) was a foundation fellow. Rather than rivalry, there is a very active co-operation betwen the English and Irish Faculties, but, on purely economic grounds, it is often easier for those working in Ulster to attend scientific meetings in Dublin or other parts of the Republic, than in England, Scotland or Wales. Many of the Juniors in the South have part of their training in Belfast, and relationships between the anaesthetists in the two parts of this country are excellent.

We are greatly indebted to the following who contributed much historical information for the preparation of this account: Mrs. Lamont, Belfast (daughter of the late Dr. Fielden), Dr. Robert Marshall, Sir Ian Fraser, Mr. J. S. Loughridge, Mr. H. P. Malcolm, Professor C. H. G. Macafee, Dr. Olive Anderson, Dr. Stafford Geddes, Dr. W. M. Brown, Dr. J. Elliott, Dr. John Macaulay, Dr. D. V. McCaughan, Mrs. James McSparran (formerly Dr. McGucken) and Dr. J. C. Smyth, Dental Surgeon and formerly Lecturer in the Department of Densitry. We also wish to acknowledge the valuable assistance of Miss J. Webster, Medical Librarian, The Queen's University of Belfast.

References

DUNDEE, J. W. (1965). *Anesth. Analg. Curr. Res.*, 44, 890.
MORRISON, J. D., HILL, G. B. and DUNDEE, J. W. (1968). *Brit. J. Anaesth.*, **40**, 890.

ASSESSMENT OF RAPID E.S.R. ESTIMATION USING AN INCLINED TUBE

By J. D. H. MAHONY, M.D., M.R.C.P.(Glasg.), D.C.H., D.R.C.O.G.
Royal Victoria Hospital, Belfast

IT IS WELL-KNOWN that failure to keep an E.S.R. tube vertical will result in a falsely high reading. An inclination of as little as 5° will cause sedimentation to take place more rapidly. Inclining the tube reduces the vertical distance of fall and increases the horizontal area of cross-section by the reciprocal of that factor.

The Martin E.S.R. kit consists of a tube of the same bore as the standard Westegren tube. It is supplied with a wooden case which serves two functions :

(1) To act as a carrier for the tube.
(2) To act as a holder so that the tube may be held either vertically or at 30°.

The makers claim that when the tube is held in the latter position a 7 minute reading will correspond to a one-hour reading on a standard vertical tube. It should be added that the reading must be taken from the side (i.e. in profile) and not from the front (i.e. 'en face') because the thin red line of R.B.C.'s which collect on the dependent surface of the tube make it impossible to get a correct reading from a front view.

An accurate 7 minute E.S.R. estimation would be of tremendous value in general practice and in busy casualty departments. Unfortunately the first 15 controlled tests carried out with the sloping tube indicated that the makers' claims of accuracy for this period were quite untenable (See table: tests 1–15). Results number 1 and 10 show that even a very elevated E.S.R. could be overlooked if a 7 minute reading were relied upon.

The search for an *accurate* E.S.R. estimation using an inclined tube was hence abandoned, but further tests were carried out to ascertain whether a rapid screening test which would serve an alerting function in indicating a *significantly raised E.S.R.* could be devised using this apparatus. A total of fifty controlled tests were carried out against the standard vertical Westegren pipette (See table test 1–50). A number of preliminary trials (not recorded here) had seemed to indicate that a 12 minute reading on the inclined tube might be the most useful for this purpose. It was arbitrarily decided to regard as 'significantly raised' readings of 15 mms. per hour and over with respect to the vertical tube and 30 mms. and over with respect to the 12 minute reading on the inclined tube.

RESULTS

Applying the criteria of significance given above, it was found: –

(i) In 36 out of 50 comparative tests (72 per cent) there was agreement between the results from the standard Westegren 1-hour readings and the sloping (30° horizontal) 12 minute Martin readings.
(ii) In 10 out of 50 comparative tests the screening test was too sensitive, i.e., – there were 20 per cent of false positives given by the Martin apparatus (See tests numbers 3, 7, 15, 23, 25, 28, 32, 34, 41 and 42).

Test No.	Standard Vertical 1 hr.	30° Sloping 7 min.	30° Sloping 12 min.	Test No.	Standard Vertical 1 hr.	30° Sloping 12 min.	Test No.	Standard Vertical 1 hr.	30° Sloping 12 min.
1	129	8	126	**16**	110	70	**33**	12	29
2	30	54	74	**17**	30	65	**34**	14	31 F.P.
3	3	7	43 F.P.	**18**	4	18	**35**	55	80
4	3	2	11	**19**	15	33	**36**	51	90
5	19	2	17 F.N.	**20**	43	41	**37**	19	36
6	22	18	48	**21**	8	27	**38**	21	52
7	13	12	30 F.P.	**22**	25	107	**39**	13	26
8	24	3	20 F.N.	**23**	10	45 F.P.	**40**	5	25
9	6	2	6	**24**	20	40	**41**	3	35 F.P.
10	96	4	85	**25**	13	55 F.P.	**42**	5	35 F.P.
11	6	2	10	**26**	18	32	**43**	45	56
12	8	5	20	**27**	15	20 F.N.	**44**	17	43
13	34	11	26 F.N.	**28**	10	46 F.P.	**45**	3	12
14	3	2	10	**29**	19	36	**46**	33	57
15	10	7	30 F.P.	**30**	35	80	**47**	3	24
				31	15	36	**48**	4	11
				32	8	35 F.P.	**49**	10	26
							50	3	9

F.P.=False Positive F.N.=False Negative

(iii) In 4 out of 50 comparative tests the screening test failed to alert the presence of a significantly raised standard E.S.R. reading.
(See tests number 5, 8, 13 and 27).

Comment

It is acceptable that a screening test should err on the side of over-sensitivity rather than the opposite. If one thinks of a burglar alarm the point is made. Ten "false alarms" in 50 is perhaps rather high, but in 4 of these (numbers 7, 15, 25 and 34) the alarm was only marginally too sensitive.

False negatives (see numbers 5, 8, 13 and 25) are of much more serious import, but in the instances where the alerting function of the sloping tube failed, the standard E.S.R. readings were 19, 24, 34 and 15 mms. respectively, so it is fair to say that no markedly raised E.S.R. was missed.

Conclusion

It is concluded that in the use of an inclined tube as a means of rapid E.S.R. estimation is not a practical proposition. The 7 minute E.S.R. suggested by the makers could be dangerously misleading. The 12 minute screening test, though much more satisfactory, is still not thought to be sufficiently reliable for use in general practice or in busy outpatient departments.

It should be stressed that the apparatus is neat and portable. When the stand is used to hold the tube vertically it behaves exactly like a standard Westegren tube. Moreover, the tube is filled from below using a syringe. This should recommend it on grounds of hygiene alone.

Thanks are due to the nursing staff and particularly Mr. Harry Dougan of the Special Clinic, Royal Victoria Hospital, who helped to set-up and read many of these tests.

STRESS FRACTURES OF THE NECK OF THE FEMUR

by T. G. PARKS, D.St.C. BAIRD and R. I. WILSON
The Royal Victoria Hospital, Belfast

Introduction

THE FIRST recorded case of stress fracture of the femoral neck was described by Blecker in 1905. Since then, many isolated cases have been reported, but it was only in the past decade that any large series emerged. In 1962 Jeffrey described eight patients with spontaneous fractures of the neck of the femur, and pointed out that two distinct varieties of the condition occur. Fatigue or stress fractures occur in young active adults after strenuous and prolonged exercise, in addition to spontaneous fractures in elderly patients without a history of strenuous physical activity. It was with this second variety that his paper was concerned. Four of his eight cases had previously been subjected to radiotherapy for pelvic neoplasms and have been rejected by some authors as true stress fractures.

Ernst (1964) reported thirteen cases in young military recruits in training and he drew attention to the difficulty of pinning the fractures and the slowness of the lesions to heal. Devas (1965) reviewed fifty-one cases from the literature and added thirty-two fractures occurring in twenty-five patients. Half of the patients were over sixty-five years of age and the fractures were often associated with osteoporosis, rheumatoid-arthritis or steroid therapy. Blickenstaff and Morris (1966) reported a series of forty-one femoral neck fractures occurring in thirty-six young men during the first eight weeks of basic military training.

Classification

Devas (1965) described two types of stress fracture of the femoral neck.

(a) The transverse type in which the fracture line develops at right angles to the lines of stress, and displacement is common. This lesion is seen more often in older patients. The first radiological sign is a crack in the superior surface of the femoral neck.

(b) The compression type in which the first radiological sign is internal callus near the lower border of the femoral neck. Subsequently, a crack is demonstrable radiologically but there is little tendency to displacement. This type usually tends to occur in younger patients.

Blickenstaff and Morris (1966) introduced an alternative classification.

(a) Those with only endosteal callus, periosteal callus, or both without overt fracture line.

(b) Those with a fracture line in the calcar region or across the neck, but without displacement.

(c) Those in which displacement occurs.

Present Study

The purpose of this paper is to report a further 13 stress fractures of the femoral neck occurring in 12 patients, and to draw attention to the aetiological factors and the histological findings in this condition.

TABLE I

STRESS FRACTURE OF THE FEMORAL NECK

Case	Sex & Age	Symptoms	Length of History	Associated Diseases	Displacement	Treatment	Result
1.	F. 69	Pain and limp	1 month	Osteoporosis ++	None	Crutches, non-weight-Bearing	Excellent
2.	F. 81	Pain in hip	6 weeks	Osteoporosis ++	Minimal	Bed-rest	Good
3.	F. 71	Pain and limp	5 months	Osteoporosis +	Considerable	None	Good
4.	F. 71	Discomfort	6 months	Osteoporosis + Previous inter-trochanteric fracture	Moderate	Walking-stick	Good
5.	F. 56	Pain and stiffness	9 months	Thyrotoxicosis. Mild osteoporosis.	Considerable	Raise to shoe	Good
6.	F. 66	Pain in hip	2 months	Rheumatoid-arthritis - no steroids	Considerable	Austen-Moore prosthesis	Good
7.	F. 56	Pain in bed	3 days	Rheumatoid-arthritis - no steroids	Moderate	Bed-rest	Good
8.	F. 54	Pain in left hip	10 weeks	Mild osteoporosis Rheumatoid-arthritis - no steroids	Mild	Subtrochanteric osteotomy	Poor
	F. 59	Pain in right hip	5 weeks	"	Mild	Austen-Moore prosthesis	Good
9.	M. 39	Pain in hip	2 years	Genito-urinary T.B.	None	None	Excellent
10.	M. 58	Pain in hip	3 weeks	-	Considerable	Charnley's replac-ement Arthroplasty	Excellent
11.	F. 79	Pain in hip	3 years	Osteoporosis ++	None	Traction	Good
12.	F. 73	Pain in hip	4 months	Rickets in childhood - varus deformity of femoral necks. Diabetes	None	Blade plate	Good

Age and Sex

Table I summarises the main clinical features of the twelve patients in the present series. There were ten females, all of whom were post-menopausal; the youngest was fifty-four years old and the average age was sixty-seven years. The two male patients in the series were aged thirty-nine and fifty-eight years respectively.

Length of History

The duration of symptoms before presentation at hospital varied considerably in different individuals from three days to three years, with an average of seven months. In most instances, the symptoms became more severe before referral to hospital.

Symptoms

Pain was the presenting symptom in every case. In some patients, the pain was of moderate severity, while other patients described a mild ache or discomfort. Two patients complained of limp associated with the pain. Pain was usually of gradual onset, and there was a history of trauma in only one patient (Case 4). This was a 71year-old woman, who had a previous intertrochanteric fracture which had healed satisfactorily on Russell traction. There was no evidence of fracture of the femoral neck in any of the X-rays taken during the five-month period after the accident, but a film taken at the end of the fifth month revealed slight resorption of bone on the upper surface of the femoral neck (Fig. 1a). However, an X-ray taken ten months after the initial injury (Fig. 1b) showed a new fracture line with surrounding callus, and the patient stated that for the last five months she had had pain in the hip which she attributed to the original fracture.

Figure 1a

Radiological Findings

In all cases a fracture line was discernible at some stage during the period of obervation, but on occasions this was only a minute crack in the superior aspect of the femoral neck (Fig. 2). In other cases, the predominant feature on the initial X-ray was marked internal callus near the lower border of the femoral neck, although a fracture line was usually also demonstrable on the initial X-ray (Fig. 3). In seven in-

stances the fracture line was traverse to the lines of stress of the femoral neck; in another two cases the fracture was almost transverse; in four cases it was definitely oblique to the lines of stress.

The degree of deformity varied widely. In six cases there was moderate or considerable displacement; in three there was minimal displacement; in four cases there was no shift.

Associated Diseases

In seven of the female patients, X-ray of the bony skeleton revealed a mild or moderate degree of osteporosis, and three women suffered from mild rheumatoid-arthritis. None of these patients was on steroid therapy Case 5 had previous thyrotoxicosis, which had been

Figure 1b

Figure 2

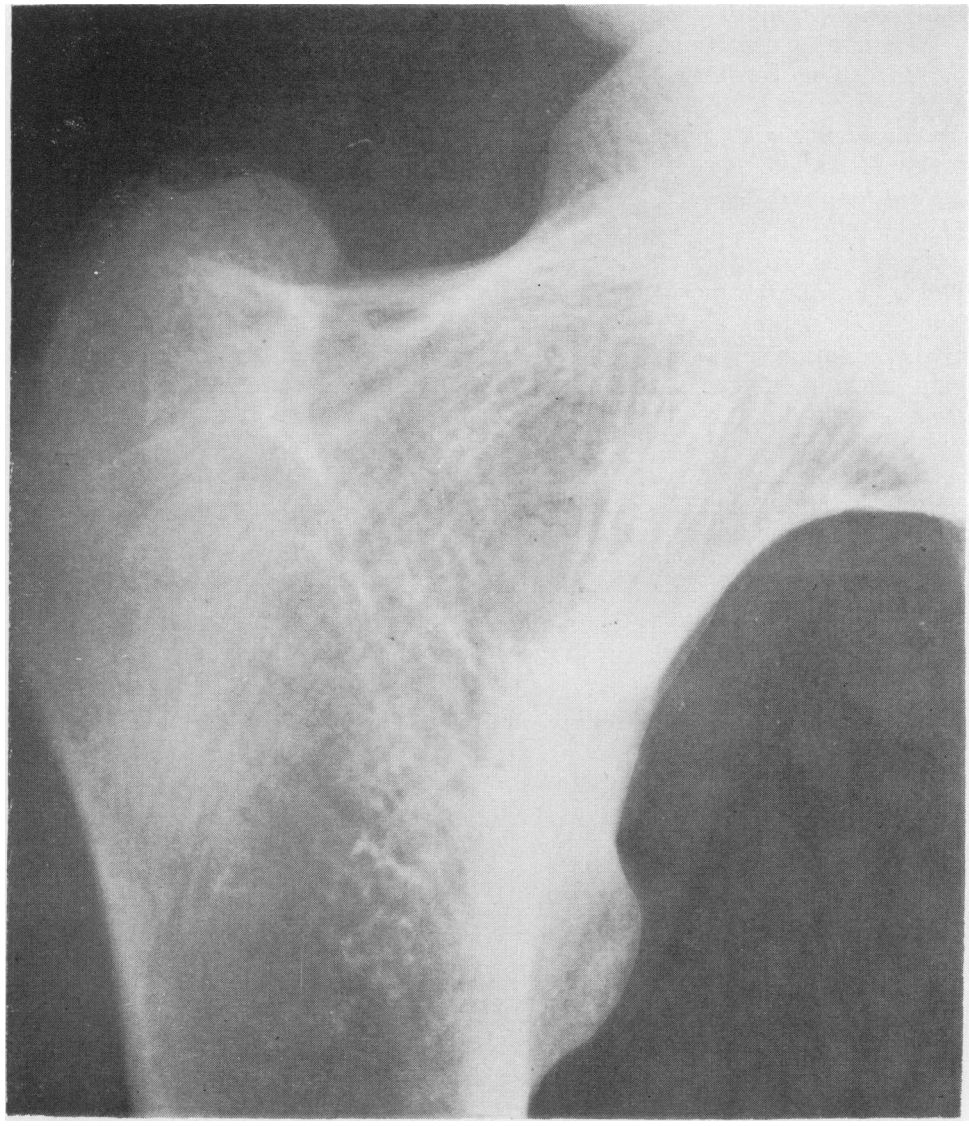

Figure 3

managed medically, and she was euthyroid at the time she developed hip symptoms. Case 12 had marked bowing of the shafts of both femora and varus deformity of the femoral necks, secondary to rickets in childhood. One of the male patients (Case 9) was under treatment for genito-urinary tuberculosis at the time the diagnosis of stress fracture of the femoral neck was made. The bony skeleton was otherwise apparently normal.

Differential Diagnosis

Metastases in the femoral neck was the main condition which had to be ruled out. In one patient (Case 10) it was necessary to perform open biopsy to exclude serious bone pathology. Other cases have been encountered which are initially considered as possible instances of stress fracture of the femoral neck, but were eventually excluded because the patients were found to have other bone pathology, such as fibrous dysplasia.

Treatment

There was only one case of bilateral fractures in the series (Case 8). This patient presented at the age of fifty-four with a ten-week history of pain in the left hip, and x-rays revealed a stress fracture of the femoral neck with a mild degree of displacement (Fig. 4a). A subtrochanteric osteotomy was performed but the patient continued to have symptoms, which seemed to result from non-union at the osteotomy site. The stress fracture healed satisfactorily. At the age of 59 years she developed a stress fracture of the right femoral neck (Fig. 4b) which was successfully treated with an Austen-Moore prosthesis. Another patient treated by prosthetic replacement also had a satisfactory outcome. One patient had open biopsy performed to exclude a secondary deposit, followed by insertion of a Charnley's low-friction replacement arthroplasty. In case No. 12 a blade plate was inserted for an undisplaced basal stress fracture causing severe symptoms.

Eight cases managed on conservative lines, which ranged from bed-rest to the use of various weight-relieving devices, made a good or excellent recovery as judged by the patient's symptoms, in spite of a moderate degree of varus deformity in some cases on referral to hospital.

Histological Findings

In two cases, excision of the head and neck of femur and histological examina-

Figure 4a

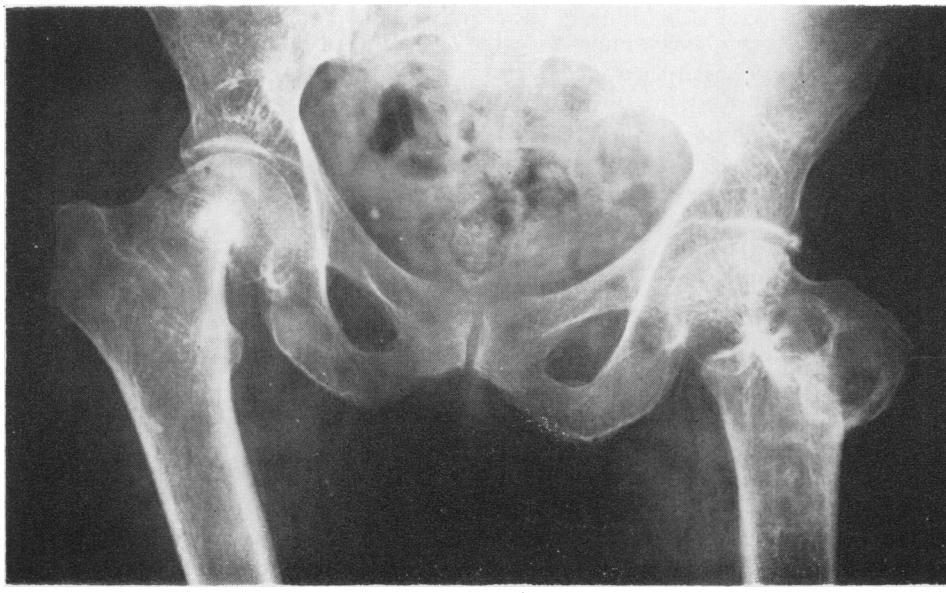

Figure 4b

tion were carried out five weeks and eight weeks after the onset of symptoms. Histologically, the material showed areas of denser bone corresponding to the region of the stress fracture. Here there was some increase of rather dense collagenous fibrous tissue between th bone trabeculae. There was a scarcity of recent callus formation and very little evidence of healing of the fracture site. There was no active proliferation of osteoid tissue as occurs in a repairing fracture site. Appearances were in keeping with a slow migration of the femoral neck into the head, with a reactive proliferation of fibrous tissue and a few osteoblasts along pre-existing bone trabeculae.

Discussion

The term "Stress fracture" is preferable to "Fatigue fracture" because, as Devas (1967) pointed out, there is no factual evidence of pathology in bone corresponding to fatigue in metal where the term "Fatigue fracture" is used. It would seem that a fracture may occur (a) in apparently normal bone under prolonged or excessive physical strain, (b) in weak bone under normal stress and (c) in bone at a mechanical disadvantage, i.e., a varus femoral neck.

There has been much speculation as to why stress fractures should occur in healthy young adults. Blickenstaff and Morris (1966) pointed out that bone subjected to repeated submaximum stresses may be the seat of excessive osteoclastic activity, with initial osteoporosis and subsequent callus formation. Henschen (1936) believed that these fractures were the result of displacement of the crystalline molecular structure of bone by repeated rhythmic movements. The radiological changes are the result of a stress reaction, and the appearance of a fracture line is part of the reaction or process rather than a single momentary act.

Although the condition has now been well documented in healthy young adults, e.g., military recruits, it is almost unknown in adolescence. Devas (1963) reported a case in an undernourished child of fourteen years. According to Wolfe and Robertson (1945), stress fractures of the femoral neck seldom occur before closure of the capital epiphysis.

There would appear to be an incidence of 10 to 25 per cent of stress fracture in the other femoral neck in patients who have had one side affected (Devas 1965, Blickenstaff and Morris 1966). Patients should, therefore, be advised to report immediately any discomfort in the opposite hip so that an early diagnosis may be possible. Avoidance of excessive strain is also advisable, even in the younger group with apparently normal bones.

Some authors advise internal fixation in all cases where a crack can be identified. Devas (1965) recommends surgical intervention in those cases where the fracture line is transverse to the lines of stress, as displacement is more likely in these cases. The importance of using pins of the Moore or Newman type is stressed because of the danger of avascular necrosis of the femoral head, particularly in younger patients, if a trifin nail is used.

In the present small series, there was surgical intervention in five of the thirteen hips and, where prosthetic replacements were used, the results have been good. In the eight hips where conservative treatment was instituted the results have been good, irrespective of the degree of displacement. No further displacement occurred during the period of treatment and, clearly, surgical intervention is not always necessary. It should be remembered that even if some displacement has occurred and the fracture is obviously healing when first seen, operation may not be required.

Summary

Pain was the presenting symptom in the thirteen stress fractures of the femoral neck occurring in twelve patients reviewed. Osteoporosis and rheumatoid-arthritis were important predisposing factors. The overall prognosis was good and, in particular, patients treated conservatively had a satisfactory outcome.

Acknowledgments

Our thanks are due to Mr. P. H. Osterberg, Mr. J. H. Lowry and Mr. B. T. Crymble for permission to include a number of cases under their care. Dr. J. E. Morison very kindly helped with the pathology. We are grateful to Mr. W. J. Hurst, Photographic Department, Royal Victoria Hospital, Belfast, for providing the illustrations.

References

Blecker, A. (1905). *Med. Klin.*, Berl. **1**, 305.
Blickenstaff, L. D. and Morris (1966). *J. Bone Joint Surg.*, **48A**, 1031.
Devas, M. B. (1963). *J. Bone Joint Surg.*, **45B**, 528.
Devas, M. B. (1965). *J. Bone Joint Surg.*, **47B**, 728.
Devas, M. B. (1967). *Brit. Med. J.*, **i**, 235.
Ernst, J. (1964). *J. Trauma.*, **4**, 71.
Henschen, B. (1936). *Arch. Klin. Chir.*, **186**, 98.
Jeffrey, C. C. (1962). *J. Bone Joint Surg.*, **44B**, 543.
Wolfe, H. R. I., and Robertson, J. M. (1945). *Lancet* **2**, 11.

CIRCULATORY AND METABOLIC CONSIDERATIONS IN THE TREATMENT OF STROKES

By ALEX. R. TAYLOR,
Department of Neurological Surgery, Royal Victoria Hospital, Belfast

Paper read to the Ulster Medical Society, 12th March, 1970.

BY THE nature of our medical training on the subject of strokes we have come to regard them as pathological varieties, thrombotic, embolic or haemorrhagic, and, in facing their treatment, we probably have mental pictures of diseased blood vessels obstructed by clots, or emboli from a distant source of primary disease. Or we may carry with us a picture of an haemorrhage from the lenticulo-striate artery, examples of which are found in most student textbooks, rare as they are in clinical practice. We see a brain torn irremediably asunder by a dark red haemorrhage in the internal capsule. These pictures are rather daunting to the doctor concerned with treatment. He may have heard of some very dashing surgery to remove emboli and he may know of rare cases where removal of a cerebral haematoma temporarily improved a dismal situation. In the long term, anticoagulant therapy has its advocates for the prevention of further strokes; and there appears frequently in the literature an illustrious sea captain who was operated on for an incompletely obstructed carotid artery, after which he could write and talk properly which he could not do before operation. After we have finished with surgical possibilities we turn to the fruitful field of rehabilitation. But the immediate prospect for the patient who becomes suddenly hemiplegic this day is not encouraging.

It is not right that this should be so, because, in the last 10 years, the medical profession has realized that cardiac infarction is a treatable disorder. The coronary sufferer has an area of ischaemic muscle which cannot survive very long without glucose and oxygen, the stroke sufferer has an area of ischaemic brain which cannot survive long without glucose and oxygen. They both have the same pathological lesion – obstruction of an arterial branch, large or small, and it is an identical local manifestation of a general disorder which everyone above the age of 16 has more or less – the scourge of twentieth-century man – arteriosclerosis.

Why then do we rush to the coronary sufferer's aid on the street or in his home and wring our hands over the stroke sufferer? The reason is that their biochemical and physiological problem is not the same, although their arterial lesions are. Ischaemic cardiac muscle under conditions of anaerobic glycolysis loses intracellular potassium and becomes irritable and subject to arrhythmias. Severe untreated arrhythmia – ventricular fibrillation – is fatal and is the almost invariable cause of death in the first few hours. Ischaemic brain also becomes acidotic and, to a lesser extent, irritable; but electrical instability in the brain may have no clinical manifestations or, at the worst, may be expressed as an epileptic seizure which is a non-fatal condition. The tendency of the stroke patient is towards improvement, not sudden death, as the normal circulation of the surrounding brain comes to the aid of the oxygen-deprived infarct. For this reason medical science has not found it necessary to stir its ingenuity to help limit cerebral infarction as

it has to limit cardiac infarction, and the attitude of mind which says "You can do nothing about a stroke" has persisted to the present time.

There is, however, no reason why it should be allowed to persist any longer and it is the purpose of this paper to set forth the measures which can reasonably be taken to reduce immediate damage to the brain of the stroke patient. I should make it clear that, from this point on, I am talking about vascular occlusions and making the assumption that all the necessary measures have been taken to exclude the presence of haemorrhage – subarachnoid or intra cerebral. The extent of the brain damage caused by vascular occlusion will be partly determined by the condition of the cerebral arterial tree at the time of ictus. A young man spontaneously thrombosing his internal carotid artery may experience a very brief hemiplegia or none at all. The surrounding arteries are probably healthy and resilient and can quickly dilate to bring oxygen and glucose to where they are required. The aged arteriosclerotic patient is less likely to be able to compensate for a major artery occlusion as his available reserves for dilatation are less. About this situation so far the eager therapist can do nothing, but he can act to use the available vessels to their maximum. To see why he can act we must go back a few years to one of the most important observations in the history of cerebral physiology made – as such observations often are – casually, and without full realization at the time of their significance. Feindel & Perot (1965) observed, at operations in the Montreal Neurological Institute, red veins emerging from an area of old infarction and scarring. These veins were carrying blood highly saturated with oxygen. The following year physiologists from Copenhagen (Lassen, 1966) described hyperaemia surrounding areas of acute infarction and this was confirmed by their radiologists who could show areas of increased perfusion on angiograms. This phenomenon was given the title of "luxury perfusion" or "intracerebral steal". These are bad terms because they have no scientific meaning and smack of the occult. It could be more properly called 'para-ischaemic hyperaemia' which is accurately descriptive. It occurs because of the metabolic change in anoxic brain resulting in the accumulation of CO_2 and lactates and a fall in tissue pH. This is of such a degree that the small vessels in the vicinity all dilate maximally. At the same time the collateral vessels are also dilating in response to a fall in intravascular pressure setting up a high to low pressure gradient. Well oxidized arterial blood is now reaching fully dilated arterioles and capillaries and makes its way to the veins still oxygen-saturated and under a higher than normal pressure. It is difficult to believe that nature should behave in this wasteful way in a cerebral emergency, but it has been shown that this hyperaemia happens predictably under controlled experimental conditions. The important factor emerging from these observations is that, as a result of the paradoxical behaviour of blood vessels, CO_2 normally increasing blood flow in the brain by acting as a dilator of cerebral vessels, now decreases blood flow by dilating the collateral vessels and allowing blood to bleed out of the infarcted area. Fortunately the converse is also true. The behaviour of normal and ischaemic brain in response to inhaled CO_2 can be well shown in an experiment described*. A cat's left middle

*This was illustrated by the author. Unfortunately the figure was lost at a late period by the block makers and, with the author's temporary absence abroad, we have been compelled to go to press without the line block. Editor.

cerebral artery had been occluded at operation one week before. When inhalation of CO_2 began blood flow increased on both the normal right and ischaemic left side. After a few seconds blood flow fell steadily on the left side while it continued to rise on the right until the CO_2 was shut off, when blood flow returned to normal over an equal number of seconds, rising on the ischaemic and falling on the normal side. The blood flow reacts to CO_2 in a manner directly opposite to the normal physiological response. For the converse reasons, reduction of circulating CO_2 mediates a reduction of blood flow in the normal brain and an increased blood flow in an ischaemic area distal to an arterial obstruction.

That therapeutic use could be made of this paradox was first shown by Soloway (1968). In a series of cats with ligated middle cerebral arteries, he showed that the area of infarcted brain was much larger in untreated dogs than in those treated by prolonged hyperventilation, reducing the arterial pCO_2 to around 20 mg. The stage would now appear to be set for the introduction of controlled hyperventilation in the treatment of cerebral vascular obstruction. Clinicians have, so far, been doubtful about the risks involved because, in the absence of regional monitoring apparatus, it is difficult to record directly the effect that hypocapnia is having on the infarcted area at the time of hyperventilation. However, Rossanda and Gordon (1969) have recorded a fall in mortality of 15 per cent in the treatment of coma of all types since the introduction of prolonged hyperventilation into their resuscitation regime. It is a droll contradiction that one of the first treatments of stroke ever proposed, rebreathing from a paper bag to raise arterial pCO_2, may now be shown to produce the exact opposite of the desired therapeutic result.

As oxygen lack is the big cause of cerebral tissue death, it would seem probable that the administration of oxygen under pressure would support the cellular activity required to ensure survival until the circulatory reserves could come to the rescue. A rising pO_2, however, causes cerebral vasoconstriction and it has been found experimentally that the resulting fall in cerebral blood flow more than counters the effectiveness of a rising intravascular oxygen content. Hyperbaric oxygen has so far proved disappointing in practice in the treatment of strokes.

The inability of oxygen by itself to preserve cell life and activity underlines the fact that the cell's metabolic needs are multiple. In over-simplified terms, the minimum cell requirements in the partial absence of oxidative glycolysis would appear to be another energy source, either anaerobic glycolysis or the intracellular breakdown of lipoprotein or amino-acids. The hypoxic brains of diffusely arteriosclerotic elderly patients showing symptoms of early or advanced dementia, are benefitted metabolically and clinically by the infusion of glucose and insulin. Metabolically it is found that cerebral glucose utilization increases, and clinically the patients' performance in memory, orientation and attention tests improves. It should be noted that glucose infusion alone does not cause this improvement, nor does insulin alone, which first causes hypoglycaemia and actually reduces glucose oxidation. As oxygen alone is also unsuccessful in stroke therapy, it may be that we also have to give some enzyme or some high energy phosphate compound with it before it assists oxidative glycolysis, apparently the most essential activity to maintain life in nervous tissue.

Having mentioned the possibility that phospholipids might help the project of keeping a cerebral infarct as small as possible, mention can finally be made

of some work done in Chicago and contributed to by a distinguished alumnus of this School, Dr. Sean Mullan. Working in a team headed by Dr. Ishii (Ishii, 1966) he showed that cat brain made anoxic by extradural compression could be assisted electrically and functionally by the infusion of cytidine diphosphate choline (CDP). When the animal had reached the stage of drowsiness and stupor and when the EEG. record had become slow and irregular, intravenous infusion restored restless and eventually purposeful activity, and returned the EEG. to a normal rhythm. These effects lasted for 40–50 minutes, after which the animal's conscious level relapsed.

This discourse is becoming more speculative, but it retains its clear objective – to utilize the biochemical knowledge we possess to keep as many cerebral cells as possible working and therefore living until the collateral circulation comes to the aid of brain temporarily struggling with hypoxia. In this we have the same aim as the cardiologists, to reduce the infarct to the smallest possible volume. To the cardiac patient the prize is life, to the brain-damaged patient the prize is a much more active and higher quality survival. A stroke should not be thought of as a harbinger of death, or even doom. Two of the last three American presidents had ischaemic coronary or cerebral attacks before they began four years of what must have been one of the most demanding and stressful jobs in the world, and they both survived the completion of their tasks to enjoy further years of useful, active life. We should now accept the challenge offered to medicine by the stroke as we have answered the challenge of coronary thrombosis.

References

FEINDEL, W. and PEROT, P. (1965). J. Neurosurg, **22**, 315.

ISHII, S. (1966). "Brain Swelling" in *Head Injuries* edited by CAVENESS, W. and WALKER, A. E, Philadelphia, Lippincott.

LASSEN, N. A. (1966). *Lancet* **2**, 113.

ROSSANDA, M. and GORDON, E. (1969). "Artificial hyperventilation in the treatment of patients with severe brain lesions" in *Cerebral Blood Flow* edited by BROCK, M. and others. Berlin, Springer Verlag.

SOLOWAY, M., NADEL, W., ALBIN, M. S. and WHITE, R. J. (1968). *Anaesthesiology*, **29**, 975.

KIDNEY TRANSPLANTATION IN NORTHERN IRELAND

By **MARY G. McGEOWN, M.D., Ph.D., F.R.C.P.E.,**
J. P. ALEXANDER, F.F.A.R.C.S.,
S. D. CLARKE, M.Ch., F.R.C.S.,
J. C. HEWITT, M.D., F.F.A.R.C.S.,
J. A. KENNEDY, M.Ch., F.R.C.S.,
J. G. McEVOY, M.D., M.R.C.P.,
S. D. NELSON, M.R.C.P.I.
from The Renal Unit, Belfast City Hospital

IT WAS shown by Ullmann as long ago as 1902 that it is possible to transplant the kidney of a dog from its normal site into the neck and renal function will result. He was also able to demonstrate that a kidney taken from another dog, or even from a goat, would also function, but he does not appear to have carried his experiments further. Carrel, working from 1905 to 1910, confirmed Ullmann's report that a kidney could be transplanted from the flank to the neck of the same dog (autotransplant) and would function satisfactorily. He also transplanted a kidney from a dog to a bitch (homotransplant), removing both of the bitch's own kidneys and initially the animal remained well with good kidney function but ultimately the transplanted kidney ceased to function.

Almost another 50 years were to elapse before the first attempt to transplant a kidney into a human being was carried out in 1951 by Scola. This transplant was technically satisfactory, and the kidney produced some urine at first, but, as in the case of Carrel's dogs, the kidney was rejected after a short period. This operation however showed that in the human, as in the dog, it was technically feasible to transplant a kidney.

Much research into the nature of the rejection process was carried out in both this country and the United States by Simonson, Dempster, and Murray, mainly by the study of the behaviour of skin grafts in mice. It had become clear that it ought to be possible to transplant kidneys without fear of rejection, between individuals whose genetic similarity was sufficiently close. The appreciation of this principle led to the first transplantation of a kidney between identical twins in Boston in 1954. This operation was successful and the kidney continued to function for eight years before the glomerulonephritis, which had been the original disease in the patient's own kidneys, attacked the transplanted organ and the patient died of coronary artery disease. Over the next five years attempts to transplant kidneys between identical twins were carried out at a number of centres both in America and Europe. Some of these transplants failed for technical reasons or because of sepsis but in none of them was there any evidence that the kidney was rejected. It is obvious that relatively few patients who reach end stage renal failure will be fortunate enough to have an identical twin who is able and willing to provide a kidney. There was therefore a considerable stimulus to develop a method of preventing rejection of the transplanted organ when kidneys were interchanged between less closely related individuals.

The earliest attempts to prevent the rejection process depended on whole body radiation, and were used in transplants between related individuals. While it was shown as long ago as 1958 that this method would prevent rejection of the kidney, it almost invariable resulted in the death of the patient because of radiation damage to other tissues, especially to bone marrow. These attempts however did demonstrate that it was possible to prevent rejection of the kidneys by recipients who would otherwise not tolerate such a graft.

Further research work on transplantations between dogs by Murray and Calne was directed towards developing a method of suppressing rejection by the use of drugs, at first of the 6-mecaptopurine group. A closely related drug, azathioprine, gave promising results in Calne's dog experiment, and in 1962 it was used for a human patient who received a kidney from a patient recently dead during an open heart operation. The kidney continued to function satisfactorily, despite several rejection crises over the next few months, and sustained the patient for nearly two years, at which point he was given a second graft.

While azathioprine was a major advance over whole body radiation as a method of preventing rejection, it too is toxic to bone marrow and reduces resistance to infection. During the early 60's many other drugs were used for the purpose of damping down the rejection reaction, and in the hope of being able to control this with less hazard to the patient as a whole. Cyclophosphamide, and drugs of the actinomycin group, proved to be even more toxic than azathioprine. It was however discovered that corticosteroids were valuable, probably because of their role as anti-inflammatory agents, and they began to be used in combination with azathioprine, which it was then possible to use in smaller dosage. This became, and still remains, the main method of preventing rejection in patients who have received kidney transplants.

While the combination of azathioprine and steroid has proved a very valuable and therapeutically useful method of preventing rejection of transplanted kidneys it is a kind of blunderbuss therapy, and attempts have been made to produce a more specific attack on the rejection process. The main cell which invades the kidney during the rejection process is the small lymphocyte and attempts have been made to use an antilymphocyte serum for prevention of rejection. It has been possible to produce potent antilymphocyte sera which are effective anti-rejection agents. These sera have recently been purified which removes some of their undesirable side effects. The use of antilymphocyte serum for prevention of rejection has not yet become widespread. This is largely because it is difficult to produce a satisfactory serum and to purify it to the degree of specificity required. Also, there have been reports that patients treated with antilymphocyte serum have developed lymphosarcoma. The possible role of the serum, vis-a-vis the other anti-rejection agents used, in the production of lymphosarcoma in these patients, still remains to be clarified.

At first the results of transplantation of cadaver kidneys were less successful than that achieved by the use of live, related donors, but with increasing experience the results obtained with cadaver donors now closely approach those possible with the use of live donors. In the British Isles, at any rate, kidney grafts taken from live donors have now become rare and the main work depends on the use of cadaver kidneys.

Another factor which has contributed greatly to the successful development of kidney transplantation has been the availability of a satisfactory method of replacing temporarily the function of the kidney by the use of some form of artificial kidney. A patient who has reached end stage renal failure is ill, wasted and usually suffering from an extreme degree of hypertension as well as the biochemical abnormalities resulting from the failure of the kidney to excrete the waste products of metabolism. Such a patient is in no fit state for a major operation, especially one coupled with the use of the toxic drugs required to prevent rejection of the transplanted organ. By the use of the artificial kidney it is possible to return such a patient to a reasonable state of health and maintain him in this state until it is possible to find a kidney suitable for transplantation. Moreover, if the kidney is taken from a cadaver it will not usually function immediately and there will be a period of two to three weeks following the transplant operation before worthwhile function begins. During this period the anoxic damage to the kidney during the period when it was without circulation is repaired. The artificial kidney is used to tide the patient over the period until the transplanted kidney is capable of maintaining him.

So far the problem of matching the kidney to be transplanted to its recipient patient has not been mentioned apart from the question of identical twins. Complex tissue antigens enter into the rejection progress which occurs when a whole organ is transplanted. Our understanding of these is at present still rather rudimentary but sufficient is known to enable some attempt to be made to match kidneys with the recipient patient. The ideal case is that of the identical twin donor where the donor and recipient are furnished with identical sets of antigens. Other less closely related donors share to a lesser or greater extent the same antigens, but also usually have some which differ. Red cell antigens are important in this context and the ordinary rules which apply to blood transfusion have to be observed, but the Rh antigen does not appear to be important. Other tissue antigens are of considerable importance and the growing understanding of these has contributed greatly to the improvement in the results of transplantation between unrelated donors. For the present at any rate, tissue typing is regarded as being similar to lymphocyte typing. Lymphocytes can be typed using antisera by a method analogous to that applied to red cell grouping, though the grouping is more complex and less well understood. It is clearly unlikely that in random unrelated individuals there will be identity of the known tissue groups and some degree of "mismatching" is to be expected. In theory, the less the degree of "mismatch" the easier it ought to be to prevent the rejection reaction following transplantations. The clinical course of the fate of the kidney does not always follow the prediction of the tissue matching but it is thought that this is largely due to imperfections of technique and lack of understanding of the relative importance of different tissue antigens. If the tissue typing of a relatively large panel of patients requiring kidney grafts is known, then the chance of obtaining a good match for the kidneys of any individual donor is greatly enhanced. The modern approach to this problem is to tissue type the potential recipients and record their tissue groups in a computer. When donor kidneys become available the computer selects the best available match in terms of tissue typing. As an additional precaution the recipient's serum is tested directly against lymphocytes taken from the potential

donor to test for preformed recipient antibodies which might lead to early and disastrous hyperacute rejection of the kidney. The computer approach to tissue typing requires that a number of centres pool their respective recipients and their donors. Since the time the kidney can be preserved is limited, other factors besides the "best possible match" have to be taken into consideration.

Position in Northern Ireland 1962–1965

When kidney transplantation began to move out of the realm of pure experiment, in 1962, there was already an established Renal Unit in Northern Ireland. This had been set up in the Belfast City Hospital in 1959 for the purpose of treating renal failure of acute origin where it seemed likely that the patient's own kidney would recover worthwhile function if the patient could be supported for a relatively short period of time. Inevitably some of the patients who were treated with the artificial kidney did not over recover worthwhile kidney function and there were at that time no facilities for the long term support of these patients by repetitive artificial kidney treatment. These circumstances led to an early interest in kidney transplantation.

In 1962 a patient appeared in kidney failure who had an identical twin. The twins were mature adults and the healthy twin was willing and able to donate a kidney to her sister. The transplantation was carried out in Belfast but the transplanted kidney never functioned. Over the next three years a number of patients with end stage renal failure were treated for short spells of time with the artificial kidney and investigated with a view to the possibility of providing a kidney donor from their family Two patients were sent to other centres in Great Great Britain for kidney transplants up to 1964 but neither of these patients survived. It is interesting that neither of them died from rejection, but from technical complications of the transplant procedure.

Position in Northern Ireland 1965–1969

At the beginning of 1965 it became possible to make a more consistent attempt to maintain patients by long term artificial kidney treatment. The technique of preparation of an arteriovenous shunt was developed in Northern Ireland by Mr. Will Hanna and this enabled the same pair of blood vessels to be used for repetitive haemodialysis. The only equipment then available was the coil kidney which had originally been provided for the Renal Unit, and until the end of 1965 it was possible to provide treatment for only one patient with chronic renal failure. However, early in 1965 contact was established with St. Mary's Hospital in London, which was by that time very actively engaged in developing kidney transplantation. Our first patient was sent to St. Mary's in April 1965 and had a kidney transplant at the end of that month. The patient still survives with virtually normal kidney function, the kidney having been taken from an unrelated cadaver donor.

Following this successful transplant a continuing arrangement with first St. Mary's Hospital, and later with Professor Calne's Renal Unit in Cambridge, was developed. When a patient appeared in the Renal Unit here who seemed in every way suitable for a transplant he was presented to one or other of the units involved in transplantation and if they found him acceptable, an arrangement was reached whereby the patient was maintained by long term haemodialysis here until he could be transferred for a space in their transplantation programme. In

due course, usually following several months or even a year or more of haemodialysis here, the patient was transferred to the unit which had accepted him and the transplant was carried out there. After two to three months the patient returned to Northern Ireland and his subsequent anti-rejection therapy and management has been carried out through the Renal Unit here.

Towards the end of 1965 it became possible to support up to four patients on a long-term basis by haemodialysis, largely due to the generosity of Mr. Megaw of the Belfast City Hospital. He permitted the expansion of the Renal Unit into what had previously been a cystoscopy theatre. This room was converted into a two bed dialysis unit and the first Kiil kidneys were acquired. The Kiil kidney is more suitable for the long-term treatment of the chronic patient because it does not require priming blood for each dialysis.

TABLE I

Results of transplantation in Northern Ireland patients

	Patients Transplanted	*Patients Surviving*	*Percentage Survival*
1962–64	3	0	0
1965	2	2	100
1966	3	3	100
1967	2	2	100
1968	7	2	28
1969	5	4	80
1970	7	7	100
Total	29	20	70

The work of maintenance haemodialysis with a view to transplantation therefore continued in the main block of the Belfast City Hospital until the summer of 1968 when the new Renal Unit behind the Ava block became available. The results in terms of transplantation are shown in Table 1. All patients shown as surviving in the Table have good kidney function, most with a creatinine clearance above 50 ml/min. They are treated with aziathioprine and steroids only. They have a normal diet and fluid intake and most do not require any hypotensive therapy. They are all capable of useful employment.

It is of considerable interest that all the patients who have survived have received their kidneys from cadaver donors. In 1968 two patients received kidneys from parent donors but neither patient survived. In one of these patients the kidney was rejected acutely despite the fact that tissue typing suggested that the outlook for the kidney was good. The other patient died from fulminant chickenpox.

The tissue typing results are known of the patients transplanted from 1968 onwards but until the last patient transplanted in 1969, the tissue typing was not known in advance of the transplantation, with the exception of the two live donor cases already mentioned.

The provision of the new Renal Unit at Belfast City Hospital, with its special ventilation and its own theatre, made it possible to commence kidney transplantation here. In preparation for this the team connected with the Renal Unit was strengthened by the addition of the part-time services of two surgeons, an immunologist and two anaesthetists. The facilities for long-term maintenance by haemodialysis have not been greatly increased by this building and it is possible to support only six patients at any one time. However, a 10-bed chronic dialysis unit is in the process of building and should be ready for use by the spring of 1971. The maximum number of transplants that could be managed with the present facilities is about twelve per annum and this number would depend on all circumstances being favourable, including the appearance of suitable donors at the appropriate time when patients were ready to receive them.

In November 1968 the first transplant was carried out in the Renal Unit. The operation and the post-operative course were smooth and complicated only by the expected period of tubular necrosis during which the patient was maintained by artificial kidney treatment. By three weeks the patient became self supporting and was discharged from hospital. However, the retrospective tissue typing showed that the kidney was a poor match for the patient and it was predicted that the kidney would be rejected within a relatively short space of time, and indeed this happened after 14 weeks. Eleven further transplants have been carried out since then. There have been a number of technical complications but despite these the eleven patients remain alive and all have satisfactory kidney function. The earlier transplants have shown a slow improvement in kidney function and the two earliest ones now have creatinine clearance of over 80 ml. per minute.

The last patient from Northern Ireland to be transplanted elsewhere was in January 1969. After 17 months the patient died following a severe rejection of the kidney.

While the current results using cadaver kidneys have produced very encouraging results it must be remembered that the patients dialysed and transplanted account for only a small proportion of those patients who need it. A survey carried out in Northern Ireland has shown that in 1968 some 50 patients aged between 15 and 55 reached end-stage renal failure and as far as can be determined these patients were medically suitable for dialysis and transplantation. There were an additional 57 patients within this age group who reached renal failure but in whom there appeared to be some medical contra-indication to this form of treatment.

When the 10-bed chronic dialysis unit was planned during 1966/67 the emphasis in treatment for end-stage renal failure was directed largely towards chronic dialysis rather than towards transplantation. It was planned to augment the hospital dialysis service by training patients for home dialysis. The 10-bed unit would provide for hospital dialysis for up to 30 patients and it could train up to 12 patients for home dialysis per annum. Therefore once the unit was initially filled, which to judge from the figure mentioned above would be well within the first year of operation of the unit, it would become possible to treat only 12 new patients going into home dialysis per annum, plus possibly 12 patients to be transplanted within the existing service. The service would therefore be able to treat only about half the new patients appearing each year.

The logical solution for this problem would be to develop the transplantation service to a stage where approximately 50 transplants could be carried out per annum. This would require a considerable outlay in salaries for additional staff, but appears to be possible. As the cost of the proposed provisions of home dialysis for 12 patients per annum is very large, this could be done out of this sum, still allowing for home dialysis treatment for the few patients who would prove unsuitable for transplantation, and show a substantial saving in cost. An estimate of the possible saving over a five year period of the cost of transplantation as opposed to the provision of home dialysis for 12 new patients per annum would be of the order of £168,000.

In addition to the advantage of providing treatment for most, if not all, patients who would require it, an increase in the transplant service to this level would provide a much better form of treatment for the patients. The patient who has received a successful transplant is free from the necessity of machine treatment two or three times a week, from the hazards attached to the repetitive use of vessels for dialysis, and from the restrictions of diet and fluid intake entailed. In addition patients who have been transplanted achieve a much better level of health than is possible by repetitive dialysis.

A major problem to be faced in the development of transplantation to this level is the supply of donor kidneys. We in Northern Ireland, in common with all other Renal Units involved in transplantation, are faced with an apparent shortage of suitable kidney donors. It is therefore pertinent to look at the problem from this point of view. As the work here and in most centres in Great Britain depends on the supply of cadaver donors it is important to consider whether there is in fact a real shortage of of donor kidneys or whether this may be only apparent.

Kidneys for use for transplantation must be removed and chilled within one hour of the death of the donor so that the donor must die in hospital. The cause of death should not have been associated with infection, malignant disease or prolonged low blood pressure, the last of which would lead to anoxic damage of the graft. The age of the donor patient is of less importance and kidneys can be taken and grafted successfully from patients about the age of eight up to 60 or more years. Most suitable donors die from accidents, especially from head injuries, primary brain tumours which do not tend to spread outside the skull, subarachnoid haemorrhage, cerebro-vascular damage to the brain, or possibly from coronary thrombosis or during cardiac surgery. Patients known to have proteinuria, hypertension or elevated blood urea prior to death would not be acceptable.

There is little information available about the potential numbers of such patients, but Friedberg, Larsen and Larsen (1970) reported that in their 900-bed hospital in Copenhagen there were 44 acceptable cadaveric kidney donors in one year, as judged by a survey of autopsies. Their hospital does not include a neurosurgical unit. Patients who are brought in dead or who die following accidents are dealt with separately by the Institute of Forensic Medicine and are not included in their figures. As their criteria for the selection of donors were rather strict and patients dying from accidents were excluded, their figures are probably an underestimation of the number of available donors.

In theory each potential donor enables two patients with end-stage renal failure

to have transplants. We would therefore appear to require 25 donors per annum to enable us to treat our 50 potential patients. This however is likely to be an underestimate of the number of donors required as we have found in our limited experience that a surprising number of kidneys are unsuitable from a surgical point of view because of multiple vessels. Our probable need of donors is more likely to be 35 than 25 per annum. Judging from the Copenhagen survey, this number of donors ought to be available within the Belfast hospitals.

Although the kidney must be removed and chilled within one hour of death it can be kept in a cold condition for a period of 10 to 12 hours without significant further deterioration. This space of time is sufficient for tissue typing to be carried out and for kidneys to be removed from one centre to another if no suitable recipient is available locally. As this aspect of the service is developed it will enable kidneys to be used for transplantation which would otherwise be wasted. This kind of exchange is already taking place and on five occasions we have sent kidneys across to London or elsewhere and two of our patients have received transplants of kidneys obtained from other centres.

Ethics and the Law

The present conditions for taking kidneys for transplant are laid down by The Human Tissue Act of 1961. If an individual's wishes as to the disposal of his own body are known these have to be respected. If the deceased's wishes are not known, permission for removal of organs for transplantation can be given by relatives. If after "undertaking such reasonable enquiry as may be practicable" the relatives cannot be contacted, then the person in charge of the body can give permission. In practice most transplant centres use kidneys only when a relative has given permission.

The need to obtain donor organs must not be allowed in any way to influence the treatment of the patient who becomes the donor. Members of the transplantation team must not in any way be involved in the treatment of the potential donor and no unnecessary investigations are performed with the exception of the removal of a small volume of blood for red cell grouping and tissue typing. The Coroner's permission must be obtained for the removal of the kidney. In practice most coroners are sympathetic to the needs of transplantation and will usually allow removal of organs for transplantation unless this would prevent them from establishing the cause of death.

Before the organs are removed death must be pronounced to have taken place by two doctors who are not members of the transplantation team, one of whom must be qualified at least five years. Thus it can be seen that great care is taken that the possibility of an organ becoming available for transplantation will not in any way run counter to the normal medical care of the potential donor.

Kidneys for grafting are therefore taken from dead patients under these safeguards and it is difficult to see how there can be any ethical objection to the transplantation of cadaver kidneys. The inevitable tragedy to the family of the loss of a near and dear relative cannot be made worse by removal of a kidney for transplantation. Indeed the use of the kidneys for transplantation may provide some small measure of comfort in tragic circumstances. As Professor Calne has said, "Most of us would make every endeavour to save a man drowning, many

would risk life and limb in the attempt. To donate one's organs after death is a similar act of charity which involves no risk at all yet can provide another human being with the gift of life."

The work described here has been carried out by the united efforts of many people, too numerous to mention individually. We are greatly indebted to nursing staff, technicians, registrars and research fellows and to all branches of the laboratory service. Without all these and the help of consultant colleagues who provided cadaver kidneys, it would be impossible to function as a Renal Unit.

We are especially grateful to colleagues in St. Mary's Hospital, London and in Addenbrooke's Hospital, Cambridge, who carried out kidney transplants for our earlier patients.

References

FRIEDBERG, M., LARSEN, N. A., LARSEN, S. (1970). *Proc. European Dialysis and Transplantation Ass.*, 39.

CALNE, R. (1970). *A Gift of Life*. Medical and Technical Publishing Co., Aylesbury.

ABO BLOOD GROUPS AND PARKINSON'S DISEASE

***VIJAY K. KAK, M.S.Agra., F.R.C.S.Eng., F.R.C.E.Ed.,**
Senior Neurosurgical Registrar
and
DEREK S. GORDON, M.Ch., F.R.C.S.Ed.
Consultant Neurosurgeon
Department of Neurological Surgery, Royal Victoria Hospital, Belfast
(Northern Ireland)

THE PIONEERING work of Aird, Bentall and Roberts demonstrated a significant excess of blood group A in patients with carcinoma of the stomach. Blood group distribution in diseases of the central nervous system has received little attention. Strang, in the only reported investigation on Parkinson's disease, found an increased incidence of blood group 0 in a series of 450 patients in Sweden. This paper presents a statistical analysis of the ABO blood group distribution of patients with Parkinson's disease in Northern Ireland.

MATERIALS

The data are from the hospital records of 187 patients (98 women and 89 men) treated for Parkinson's disease in the Department of Neurological Surgery, Royal Victoria Hospital, Belfast, and these were considered representative of the disease in the community. Comparison is made with a control series of 27,650 blood donors from the same population.

TABLE I

Comparison of ABO blood group distribution of 187 *patients with Parkinson's disease with that of the* 27,650 *controls.*

Blood	*Patients*		*Controls*		
Group	*Total No.*	*Percentage.*	*Total No.*	*Percentage*	χ^2
O	100	53.48	14,931	54.00	0.009
A	48	25.67	9,152	33.09	3.113
B	30	16.04	2,765	10.00	6.828
AB	9	4.81	802	2.91	2.329
Total	187	100.00	27,650	100.00	12.279
Total	$\chi^2=12.279$		d.f.=3		$0.01>P>0.001$

RESULTS

Table I shows the distribution of ABO blood groups in 187 patients with Parkinson's disease compared with that found in the 27,650 controls. A larger number of patients with Parkinson's disease had blood group B, and a smaller number blood group A. The Chi^2 test gave a p value <0.01, indicating that these

*Present address: Assistant Professor of Neurosurgery, Postgraduate Institute of Medical Education and Research, Chandigarh, India.

TABLE II

Parkinson's Disease.

Relative incidence in persons of Group O and B compared with incidence of one in persons of Group A (derived by Woolf's method).

Blood Group	*Relative Incidence*	χ^2	*P*
O	1.28	1.964	0.2 >P>0.1
B	1.62	5.335	0.05>P>0.02*

*Statistically significant.

differences were significant to a highly probable degree. Group O distribution was approximately the same in the two series. Further consideration of the small excess of group AB was deferred because of the relatively small numbers.

The relative incidence of blood groups O and B compared with group A in patients with Parkinson's disease is given in Table II. The relative incidence of group B compared with group A was significantly greater than unity ($P<0.05$) and probably significant though not to a highly probable degree.

DISCUSSION

Woolf's method has been used to compare and combine these data with the Swedish figures as reported by Strang. The number of patients from Finland and Norway in Strang's paper was considered to be too small to be included in this analysis (Table III).

TABLE III

Calculation of combined estimate of incidence ratio of Parkinson's Disease in blood groups O and A

Country	*Total number of patients (O+A)*	*Relative incidence O: A*	χ^2	P
N. Ireland	148	1.28	1.9643	0.2 >P>0.1
Sweden	388	1.32	7.2104	0.01>P>0.001
χ^2 *Analysis*:	Total χ^2	d.f.=2	9.1747	0.02>P>0.01
	Heterogeneity	d.f.=1	0.0364	0.9 >P>0.8
	Diff. from unity	d.f.=1	9.1383	0.01>P>0.001

In Sweden the incidence of blood group O in patients with Parkinson's disease is significantly greater than that of blood group A. The Northern Ireland data reveal a low incidence of blood group A as compared with blood group O, and a high incidence of group B in patients with Parkinson's disease. Combination of these two sets of data reveals a similar incidence ratio of Parkinson's disease in

both the populations (O:A). However, this is significant only in the Swedish series ($P<0.01$). Obviously further studies are needed in different geographical areas on similar lines before any deductions can be put forward. It is towards this end that the present study was undertaken.

Summary

The ABO blood group distribution in 187 patients with Parkinson's disease in Northern Ireland showed a deficiency of blood group A and an excess of blood group B, when compared with the controls.

Acknowledgements

We wish to express our thanks to Dr. J. D. Merrett of the Department of Medical Statistics, Queen's University, Belfast, for help and advice with the statistical analysis. Mr. Scott of the Northern Ireland Blood Transfusion Service kindly provided the control data.

References

Aird, I., Bentall, H. H. and Roberts, J. A. F. (1953). *Brit. med. J.* **1**: 799.

Strang, R. R. (1966). *Neurology (Minneap).* **16**, 1051.

Woolf, B. (1955). *Ann. hum. Genet.* **19**, 251.

THE PROBLEM OF COMMUNITY REINTEGRATION OF SUBNORMAL PATIENTS DISCHARGED FROM HOSPITAL

D. N. MacKAY, M.A., Ph.D.
Muckamore Abbey Hospital, Muckamore, Co. Antrim

J. J. M. HARBISON, B.A., M.Sc.
Department of Mental Health, The Queen's University of Belfast

INTRODUCTION

THE AIM of the Special Care Service in Northern Ireland is to help the mentally subnormal to help themselves to lead useful and contented lives in the community. Scally and MacKay (1964b) found that about one in three patients who were registered as requiring special care were under residential care. At present, approximately the same proportion of over 6,000 patients are in hospitals or institutions. Their rehabilitation poses many problems. One is the establishment of good prognostic indicators which will help hospital personnel to predict the degree of success a discharged patient will enjoy in the community. For a small number of patients, such indices are not required: some severely physically and mentally handicapped patients whose parents cannot or will not look after them at home have a nil probability of release and, therefore, the question of reintegration into society does not arise.

But for many, discharge from hospital is an important event. In subnormality, as in mental illness, there are two related dangers involved in institutionalisation. The first is that of premature discharge when there is the danger that a patient might soon be on the waiting list for re-admission. The second is the fact that prolonged institutionalisation may have deleterious effects on overall intellectual level (Crissey, 1937; Strauss and Kephart, 1939; Lyle, 1959, 1960), on personality (Barton, 1959; Goffman, 1961) and on social competence (Schiphorst, 1968; Elliott, 1969). It would appear, therefore, that there is an optimum length of stay in hospital: if discharge takes place before or after this interval, it might be expected that adjustment to community life would be made more difficult.

Several common-sense assumptions are often made about other factors which might be related to the degree of success or failure in community adjustment (Windle, 1962). These can be briefly stated as follows:

(i) Young people are more flexible and adaptable than older people. Therefore, the young subnormal discharged from hospital is at an advantage.

(ii) The brighter patient has a better chance of success than the comparatively dull person.

(iii) Females discharged from hospital to the community may have fewer stresses to withstand (Harbison, McKay and Weir, 1967) and the probability of their requiring re-admission may be consequently less than that of the male.

(iv) A patient who goes out to employment immediately following discharge is better off than the patient who returns home and then has to search for a job.

(v) A patient who has had a foretaste of community life in terms of "trial leave" has a better idea of the problems facing him and can, therefore, plan more effectively than the patient who is discharged without such leave.

This report describes the post-hospital histories of patients discharged from Muckamore Abbey in 1962 and investigates the relationship between the factors outlined above and community adjustment.

Subjects, Method and Criteria of Success

Nelson (1964) analysed a cohort of 137 subnormal patients discharged from Muckamore Abbey in 1962. He found that the turnover rate for that year was 19 per cent. As this is considerably in excess of the 5.6 per cent estimated by Windle (1962) for United States institutions, we suspected at the outset that there was a danger that the hospital might have employed a "revolving door" policy of discharge in that year. Nelson divided the discharges into four main groups: (i) Hospital planned e.g., improved behaviour (Group HP); (ii) Others e.g., specific request for discharge by parents against medical advice (Group O); (iii) Temporary admissions (Group T) and (iv) Deaths.

Our five year follow-up of this cohort was made possible largely by the structure and policies of the Special Care Service. The administrative, medical and other provisions for the ascertained mentally handicapped (special care patients) in Northern Ireland are very well suited to this type of study. Responsibility for them, irrespective of their age, is vested in the one body and is not divided as in England and Wales. Social workers and doctors are in frequent contact with their patients both in hospital and in the community. Records on patients are extensive and easily available and progress reports on discharged patients are frequently made. For the purposes of this paper, three further terms related to the informal grading of patients should be defined: "low grade" refers to patients with IQ's of less than 20, "medium grade" to those with IQ's 20-49 and "high grade" to those with IQ's over 50. (The latest grading system of the International Classification of Diseases is now used). For more details see Scally and MacKay (1964a) and Nelson (1964).

All the records of discharged patients were examined and social workers were, in certain instances, asked to supply up-to-date information or details over and above routine reports.

Because of the heterogeneity of our cohort (which included patients of all three grades and of ages at discharge ranging from under nine to over fifty), the main problem was how to assess their success or failure in society. The simplest, most objective and most often used definition of success was adopted and defined as "the amount of time spent in the community, out of mental hospitals, special care institutions or prison in the five or so years since discharge". In addition, other factors such as employment, attendance at day centres, reasons for re-admission, etc., were examined.

Results

A simple five point code was drawn up to relate each patient's success or failure in terms of the amount of time spent in the community in months out of

a possible maximum of 64. Of the 127 patients discharged alive in 1962, it was possible in 1968 to obtain records on 124 and full records on 122. In the following tables N's may vary by one or two in release totals because certain types of information were unreliable or because low grade cases have been omitted.

TABLE I

Overall success/failure rates of the hospital planned and other discharges, together and separately, according to months in the community.

Code	*Time (months) in community* (1962–67)		*H.P. and* 0[1] (*N*=87)	*H.P.*[2] (*N*=51)	0[2] (*N*=36)
I	60–64	Very successful	61% (53)	80%	58%
II	50–59	Successful	10% (9)		
III	15–49		14% (12)	10%	20%
IV	5–14	Unsuccessful	6% (5)	10%	22%
V	0– 4	Failures	9% (8)		

[1]Actual numbers in brackets

[2]Difference between H.P. and 0., $\chi^2=4.98$, $0.1>P>0.05$.

Table I shows the code and the numbers of patients in the HP and O groups and in both groups combined. (Temporary patients will be discussed later). It will be seen from the second and third columns that we designated those patients who had remained in the community for 60 or more months as 'very successful'; those in the community for 50-59 months as 'successful'; those in the community for fewer than 14 months as 'unsuccessful' and those who had spent fewer than four months as 'failures'. According to these criteria, 71 per cent of both groups were either successful or very successful. Fifteen per cent were either unsucessful or outright failures. Surprisingly, the difference between the two groups in terms of outcome is not significant although the HP group tended to fare better. Because of this insignificant difference the HP and O groups will now be combined.

We next examined the common sense assumptions about the relationships between the factors mentioned earlier in this paper (age, grade, etc.) and outcome. Table II gives a summary of the results.

It will be seen that age, sex, or grade of patient was not related to outcome. Patients who went out to residential or daily employment and lived in the community fared significantly better than others. The employment officers of the service carry out an intensive follow-up programme with patients newly placed in jobs (J. Erwin, personal communication, 1970). Further, those who had a foretaste of community life in the form of trial leave also did well. Length of hospitalisation was also related to outcome, but in a most peculiar way. Patients in codes I and II

TABLE II

Summary of the relationship between possible prognostic indicators and outcome.

	Variables	
Outcome and	Grade	N.S.
	Sex	N.S.
	Age	N.S.
	Length of hospitalisation	P<0.001
	Trial leave	P<0.2>0.1
	Discharge reasons specific	P.<0.01

(successful) and in codes IV and V (unsuccessful) had been hospitalised, on the average, for very nearly the same lengths of time (24 months), while those in codes III had a mean hospitalisation period of approximately nine months.

Few of the discharged patients were assured of employment immediately after leaving hospital. But many were found jobs by the employment officers of the Special Care Service, or found jobs for themselves, at some time during the five year period. We were interested in how the members of the cohort were occupied in this period. Thirty-eight in the HP and O groups were gainfully employed and 47 attended day centres, or spent their time in other ways. Forty-five per cent of the patients were gainfully employed at some time during the five years. The number of jobs held by individuals ranged from one to eleven, with a median of 2.5 in the H.P. group and a median of 1.5 in the O group.

Of greater interest than the mere number of jobs held is the length of time spent continuously in one form or other of employment. Fifteen were so employed for less than one year and 22, or 60 per cent, held their longest job for a year or more.

The next obvious step was to determine whether success or failure in terms of the five point code was related to employment. Table III shows the number of patients in each of the five categories who were employed. The difference between those in codes I and II and the rest is significant ($p<0.02$).

TABLE III

Numbers of patients employed in success/failure categories.

Success/Failure	Total	Employed
I	53	28[1]
II	9	4[1]
III	12	3
IV	5	1
V	8	1

[1]Codes I and II employed versus the rest, $\chi^2=6.05, P<0.02$.

The types of jobs held by these patients were quite varied. Over two-thirds (71 per cent) held by the male patients in both the HP and O groups involved outdoor work and of these the commonest was labouring. All the female patients in both groups had indoor jobs, factory work and domestic employment being the commonest. Of the fully documented cases relating to the cessation of employment, it was found that half of the jobs were terminated for reasons connected with the patients' demeanour, standard of work, etc., and half for reasons unconnected with the patients' ability or behaviour (e.g., redundancy, seasonal work).

The third large group within the cohort comprised patients who had been in the hospital on a purely temporary basis. Nearly half had been admitted in order to enable their parents to have a holiday. The rest were admitted for miscellaneous reasons such as dental treatment, relief in times of crisis in the home and so on. During the following five year period many were re-admitted for the same kinds of reason. But, at the end of the five years, it was noted with some concern that 43 per cent of these temporary admissions were now under permanent residential care.

The finality implicit in the concept of permanent residential care is worth examining. In this context, and in the case of individuals, it is defined as a nil or negligible probability of release except by death. So large was the number of temporary cases who changed to permanent residents over the five year period that we attempted to determine how many patients in the HP, O and T groups now required, or presented overwhelming evidence for shortly requiring, permanent hospitalisation.

TABLE IV

Numbers in three release types who require, or will shortly require, permanent hospital care.

Success/Failure Code	Patients now requiring permanent hospital care
I	4
II	5
III	11
IV	8
V	8

It will be seen from Table IV that 36 patients from all groups fall into this category. This represents 29 per cent of the total cohort dicharged over five years ago. It will also be seen from the Table that those individuals who now require, or will shortly require, permanent residential care do not necessarily come from the unsuccessful codes IV and V although there are proportionately more in these categories than in I and II.

Discussion

The findings of this survey can be briefly recapitulated. Nearly three-quarters of the patients discharged in the HP and O groups from Muckamore Abbey over five years ago have been successful in that they have managed to stay out of any type of statutory residential units (mental or special care hospital, prison, etc.) for at least 75 per cent of the time since release. Fifteen per cent have been adjudged unsuccessful in that they have exeprienced considerable periods of rehospitalisation or imprisonment. The possibility (mentioned in the introduction) that this hospital was operating a revolving door policy for all patients, is not upheld by the evidence. Neither the grade nor the sex nor the age of the patient at discharge was related to outcome. But the factors of length of hospitalisation, trial leave and specific reasons for discharge were related to outcome. Nearly half of all the patients were gainfully employed at some time during the period since discharge and, of these, 60 per cent held their longest job for a year or more. Further, those who experienced employment were more likely to be successful than those who did not. Perhaps the most disturbing finding was that 29 per cent of the cohort now require, or will shortly require, permanent residential care.

This discussion will take as its starting point the fact that, in terms of the original criterion of success/failure, 71 per cent of the discharged patients in the HP and O groups have been adjudged as successful. As was mentioned earlier, this evidence does not support the view that the hospital allowed for premature discharges. And yet it is paradoxical that, despite this overall success, twenty nine per cent of all patients in all three groups now require, or will shortly need, permanent hospital care.

As far as patients in the T group are concerned, the commonest reason for permanent re-admission is not difficult to find. The patients become too awkward behaviourally, or too awkward as nursing problems, for ageing parents to cope with and the only resort is hospitalisation. If a similar situation holds for the HP and O groups, then a rather interesting point emerges: it is highly likely that we have not so much established the success or failure of a few of the patients themselves but have instead indirectly estimated the abilities of the parents and relatives to keep them in the community.

If the success of a few of the younger patients in the community depends to some extent on the parents' or relatives' ability to supervise them, then it follows that an unknown number of the current cohort who are still in society may at some future date require permanent institutionalisation. In some cases this will mean permanent residential care at one of the three special care hospitals in Northern Ireland. It is highly likely in other cases the two hostels at present acting as "half-way houses" between hospital and community will cater for those patients who can still hold down a job but require the minimum of supervision hitherto provided by the parents. But a serious situation may arise for both hospital personnel and the patients themselves if the pattern of events we have described repeats itself for all dicharge cohorts. That is to say, if approximately one third or more of all patients discharged annually from hospital eventually require permanent hostel or hospital care, then the present waiting lists for admission to these units will

increase alarmingly. It is, therefore, essential that the patients in the present three groups of discharges be followed up over the next few years to determine

(a) how many eventually find their way into residential units,
(b) how many survive in the community when the family "props" have fallen away,
(c) how many will continue to work in the community but live in hostels.

In this way it will be possible to gauge more accurately the likely re-admission rate of discharged patients. The future provision of special care "family" homes will, of course, affect hospital accommodation demands.

Allowing for this fact of eventual and permanent institutionalisation, it is clear nevertheless that many patients get on well in the community and that some survive even when their parents die and family supervision ceases. The popular view that subnormals cannot be employed or, at best, that they are shiftless and move from one job to another is not substantiated by the evidence of this survey. Although the largest number of jobs held by any individual in the HP and O groups was eleven, the number of jobs held by most patients fluctuated between one and four. In fact, this job record is remarkable in view of the high unemployment rates in the province.

Thus far, the patients in the groups have been treated as numbers. It would be of interest to give three examples of the type of patient in our sample: one "sucessful" patient (code I) from the HP group, one from the T group, one "unsucessful" patient (code IV).

A succesful patient: A male, epileptic, high grade, born April, 1950, the third in a family of five. Referred to the Special Care Service at the age of 16, the main reason, apart from suspected subnormality of intelligence, being his uncontrollable temper. At the time of his ascertainment, both parents had been attacked with various implements, including a knife and they were anxious to have him institutionalised immediately. Following declaration he was admitted to a Special Care Hospital where he remained for exactly one year. While on leave to his home in May, 1958, he obtained employment as a labourer in an abattoir and refused to return to residential care. The parents reported that he behaved well and that "he had changed completely". Three months later he was declared redundant and commenced stool-making at home. However, his behaviour deteriorated and his family were again subjected to physical abuse. He was admitted to Muckamore Abbey in 1959 where, apart from one unsuccessful attempt to reintegrate into community life, he remained until 1962. He was finally discharged from hospital early in 1962 and has never had to be re-admitted. His behaviour over the follow-up period has fluctuated but has never reached previous lengths. He has been employed in several jobs and his behaviour appears to be at its best when he is fully occupied.

A "temporary" patient: A female, high grade, spastic diplegia, born 1945, declared a person requiring special care at the age of 16. She was difficult to control at home because of marked emotional immaturity. A year later (1962) she was admitted to Muckamore Abbey on a temporary basis in order to allow her parents to have a holiday. Five months later she was re-admitted to hospital because of her increasingly bad behaviour at home and she has stayed there ever since with only occasional weekend leave. She is never likely to return to the community on a permanent basis.

An "unsuccessful" patient: A male, epileptic, high grade, born August, 1936, the only child in the family. Referred to the Service by his practitioner. He is slightly deaf and had spent some time in an institution for the deaf and dumb where he had learned simple crafts. At the time time of his referral he was described as a well-mannered, clean boy and the

main problem concerned his future training. However, a year later, while living with relatives, he became obstreperous and his employment record deteriorated to the point where he lasted only a few days in any job. In 1953 he was admitted to Tower Hill Special Care Hospital in Armagh and this marked the beginning of constant moves between hospital, prison and the community. He can be violent at times and, when at home, often terrorises his relatives. He has absconded from hospital several times and on more than one occasion has had to be escorted back from England. He has also been imprisoned, usually on charges of larceny. His record of misdemeanours is too long to give in detail. It is highly unlikely that he will ever experience an appreciably lengthy and unbroken period of community life.

A further follow-up study is planned with the same cohort and attempts will be made to determine whether differences in community reintegration are reflected by differences in personality factors. Such surveys are essential for the establishment of prognostic indicators in the rehabilitation programmes for the mentally abnormal.

We should like to thank Miss M. A. Green who helped us greatly with the records and Dr. T. W. H. Weir who encouraged us and gave much valuable advice. We are also very grateful to Dr. W. McC. Nelson who kindly provided us with his original records of the patients.

References

BARTON, R. (1959). *Institutional Neuroses*. Bristol: Wright.

CRISSEY, O. L. (1937). *Child Develpm.*, **8**, 217.

ELLIOTT, M. E. R. (1969). *An investigation of the social competence of normal and subnormal children living under different types of residential care*. Unpublished B. A. Thesis, The Queen's University of Belfast.

GOFFMAN, E. (1961). *Asylums. Essays on the Social Situations of Mental Patients and Other Inmates*. London: Pelican Books.

HARBISON, J. J. M., MACKAY, D. N. and WEIR, T. W. H. (1967). *Irish J. med. Sci.*, **501**, 421.

LYLE, J. G. (1959) *J.ment.Defic.Res.*, **3**, 122.

LYLE, J. G. (1960). *J.ment.Defic.Res.*, **4**, 1.

NELSON, W. McC. (1964). *Acta psychiat.Scan.*, **40**, 50.

SCALLY, B. G. and MACKAY, D. N. (1964a). *Irish J. med.Sci.*, **6**, 267.

SCALLY, B. G. and MACKAY, D. N. (1964b). *Acta psychiat.Scan.*, **40**, 203.

SCHIPSHORST, B. (1968). *Spec.Educ.*, **57**, 26.

STRAUSS, A. A. and KEPHART, N. C. (1939). *Amer.Assoc.ment.Def.*, **44**, 137.

WINDLE, C. (1962). *Amer.J.Ment.Defic.*, **66**, Monogr. Supp., Whole No. 5.

PREGNANCY IN THE UNMARRIED MOTHER

By B. NORMAN BARWIN, M.R.C.O.G.
Jubilee Maternity Hospital, Belfast City Hospital

DURING THE past decade there have been vast changes in our society. Among these changes have been the changing pattern of social morality and the changes that have occurred in our so-called permissive society. About 8 per cent of all births are to women in the teenage group (*British Medical Journal*, 1965) and 8 per cent also occur in the unmarried mother. The problems that arise are both social and obstetrical. There have been many studies carried out on complications of pregnancy and labour but unfortunately most of these have been based on different age levels, different racial groups and different diagnostic criteria for the pregnancy syndrome. The purpose of this study was to assess all the cases of illegitimate births during 1969 in the Jubilee and Gardner Robb Maternity Hospitals. The study was further extended to include 150 cases of married primigravida during the same period.

Between 1948 and 1955 some 200 girls aged 13–15 years in England and Wales had babies, but over the period 1956-66 the number rose steadily. Though the number of legitimate births increased slightly, and reached a peak increase of 20 per cent in 1964 and has since decreased slightly, the number of mothers in the younger age groups increased and according to the Registrar General's Classification, there was more than a fivefold increase in mothers aged 15 or less. This is a new social phenomenon. There is an explosion of illegitimate births affecting especially the younger age groups (Russell 1970). Not only is there a dramatic increase in the number of illegitimate births among the young teenagers, but the birth rate among these girls is rising disproportionately.

In the North of Ireland there is a marked increase in the number of illegitimate births in all counties. This increase of illegitimate birth rate also shows an increase in the stillbirth rate and the neonatal mortality rate.

The adequacy of antenatal care was not easy to assess, but it is interesting to note that 20 per cent of unmarried mothers were admitted as emergencies, whereas only 10 per cent of married mothers were admitted for this reason. While 72 per cent of married mothers booked before 28 weeks only 45 per cent of the unmarried mothers booked before 28 weeks.

The majority of unmarried mothers were in the 17-20 age group, whereas the married mothers were mainly in the 21–25 year-old age group.

Factors in Pregnancy

Pre-eclamptic toxaemia

This has been defined in this study as blood pressure of 140/90 mm of mercury or higher after 20 weeks maturity associated with proteinuria and/or oedema. The overall incidence of pre-eclampsia was 14 per cent which correlates well with the incidence in unmarried mothers. Unclassified toxaemia was found in 15 per cent of the study group with patients who showed hypertension without either proteinuria or oedema. The incidence was only 5 per cent in the married mothers

group. The age distribution is also interesting in that the married mothers showed the greatest incidence of pre-eclampsia in the 21–25 age group, whereas the unmarried mothers had the greatest incidence in the 17–20 age group. These results were also found by Claman and Bell (1964), Semmens (1965), Lewis and Nash (1967) and Utian (1967). However, all cases of pre-eclampsia were mild and settled well with bed rest and sedation. There was one case of a stillborn baby thought to be due to the pre-eclampsia, but no neonatal deaths or eclampsia.

Anaemia

This was the most striking finding in the study. Anaemia was defined as a haemoglobin of less than 10.3 gm. per cent. The incidence of anaemia was in the order of 20 per cent as compared with the overall incidence in the married mothers of 13 per cent. More interesting is the fact that the incidence of anaemia appeared to increase the older the patient. The conclusion drawn was that most married mothers received on the whole better antenatal care. The high incidence of anaemia could possibly be explained by the lack of antenatal care of the unmarried mothers.

The period of gestation

Labour began at 36 weeks or earlier in 15 per cent of unmarried mothers. Surgical induction of labour was carried out followed by oxytocin in 40 per cent of the cases, as compared with an incidence of 49 per cent in the control group. The majority of these were for unclassified toxaemia, pre-eclampsia and post-maturity. The prematurity rate in this series was 10 per cent as compared with 2 per cent in the control group, which agrees with the findings of Utian (1967). The average birth weight of the study group was 6 lb 15 oz (3,145g) and of the control group 7 lb 4 oz (3,290g). This was thought to be not statistically significant.

Weights of the babies/prematurity rate

As has been found by Hulka and Schaes (1964), Semmens and McGlamory (1960) and Stine et al. (1964) unmarried mothers had a high incidence of premature babies and babies of small birth weight. Apart from the babies weighing less than $5\frac{1}{2}$ lb there appears to be no significant difference in the weights of the babies of unmarried mothers and married mothers.

Factors in Labour

Duration of labour

Labour in the unmarried patient tends to be shorter than in the married, and as the unmarried patients are in general younger, this suggests a correlation between age, behaviour and the duration of labour.

Method of delivery

The spontaneous vaginal delivery rate was 85 per cent in the unmarried mothers as compared to 83 per cent in the married mothers. The caesarean section rate was 3 per cent in the unmarried mother as compared with 6 per cent in the married mother, one caesarean section being for disproportion in the post-mature baby and the other two being for placenta praevia, malpresentation and cephalopelvic disproportion.

No significant difference was found in the two groups with regard to malpresentation in labour and this has been found in most other studies (Sinclair1952, Poliakoff 1958). There was one case of relative cephalopelvic disproportion in the

TABLE
Pregnancy in the unmarried mother

	% *Unmarried*	% *Married*
Normal delivery	85.7	83.0
Caesarean sections	3.0	6.0
Forcepts delivery	10.0	8.0
Vacuum extraction	1.3	3.0
Surgical induction	40.0	46.0
Twins	1.3	1.0
Stillbirths/1,000	5.3	3.0
Unbooked patients	20.0	10.0

study group thought to be due to a positional disproportion, occipito-posterior and a postmature baby.

The indications for anaesthesia, general or local, directly paralleled the indications for operative delivery. There was no substantial difference in the incidence of episiotomy or vaginal and perineal lacerations in the two groups. There were no cervical or third degree perineal lacerations in any of the cases. The incidence of postpartum haemorrhage was high, though not signficantly different in both groups, being 5 per cent in the study group and 7 per cent in the control group. The average third stage blood loss was 180 ml. in the study group compared with 200 ml. in the control group.

Behaviour in labour

Although behaviour in labour was a purely subjective assessment done by different midwives, it was classified as "good", "satisfactory" or "bad", and it is interesting to note that the behaviour of unmarried patients was considerably better than that of the married patients. As was stated by Stearn (1963), many of these girls have been taken away from their families and immediate friends and no fear of labour had been instilled into them, and one of the more potent causes of inertia was therefore not experienced. In the present study the definite tendency to conservatism, in view of the high illegitimacy rate, probably accounted for the slightly more prolonged second stage of labour. An interesting feature of behaviour in labour is that it tends to be worse in both the study group and the control group the older the patient.

SOCIAL IMPLICATIONS

With the increase in acceptance of premarital sexual relationships between young people, the apparent advantages of the permissive society are seldom portrayed in the personal and family tragedies that may flow from such a relationship. The number of adoptions decided before the patient left the hospital was found to be 30 per cent. Furthermore, about 7 per cent married after the commencement of antenatal care. Of the late bookings it is difficult to assess how many emergency admissions of married mothers were not married at conception. Another interesting feature is that, of the illegitimate births, 20 per cent were of a parity greater than one.

Neonatal Mortality

A striking feature is noted here in that the neonatal mortality rate is higher in the unmarried mother than in the married mother. The neonatal mortality rate is also noted to be higher the later the antenatal booking, but also may well be related to the higher incidence of prematurity.

Conclusions

Three major obstetrical problems were revealed in this study of pregnancy in the unmarried mother.

1. *Increased incidence of pre-eclampsia.* In the unmarried mothers 14 per cent developed a classifiable pre-eclampsia. Most studies show a slightly higher incidence of pre-eclampsia than in this series. This may perhaps be attributed to the variation in diagnostic criteria in the different institutions. The reason for this high incidence of toxaemia is not apparent (Sinclair 1952; Asnar and Bennett 1961; Stearn 1963; Hasson and Falls 1964).

2. *Increase in prematurity rate.* It has been shown in this study that unmarried mothers have an increased tendency to begin spontaneous labour before term. These findings are in contrast to those of Bochner (1962). Both Bochner and Stearn found that the birth weights were much the same as in the control groups. Birth weight is to some extent reflected in a higher perinatal mortality rate in the unmarried mothers.

3. *Anaemia.* The correlation between unmarried mothers, their age and anaemia was discussed. It is interesting to note that the incidence of anaemia is considerably higher in unmarried mothers as compared to the control group, and, furthermore, the incidence of anaemia increases with increasing age of the mother.

Finally, a further finding was the perinatal and neonatal mortality which was considerably higher in the unmarried mother as compared to the married mother.

I wish to thank Professor Pinkerton, Dr. G. Harley and Dr. C. Whitfield for access to case records of patients in their care.

References

British Medical Journal (1952). **2**, 1384.
Claman, A. D., and Bell, H. M. (1964).*Amer. J. Obstet. Gynec.*, **90**, 350.
Lewis, B. V. and Nash, P. J. (1967). *Brit. med., J.* **1**, 733.
Poliakoff, S. R. (1958) *Amer. J. Obstet. Gynec.* **76**, 746.
Russell, J. K. (1970). *Practitioner,* **204**, 401.
Semmens, J. P. (1965). *Obstet. Gynec.*, **26**, 77.
Stearn, R. H. (1963). *Lancet*, **2**, 1083.
Utian, W. H. (1967). *Brit. med. J.*, **1**, 733.

OBSERVATIONS ON THE BACTERIOLOGY OF THE URINE AND LIQUOR IN PREGNANCY AND LABOUR

By MUTASIM ABUBAKR MUSTAFA, M.B.(Kartoum), M.R.C.O.G.
and
J. H. M. PINKERTON, M.D.(Belfast), F.R.C.O.G.
The Department of Gynaecology, The Queen's University of Belfast

URINARY TRACT infections are now among the commonest bacterial infections. In England and Wales some 6,000 to 7,000 patients die every year from uraemia, about 3,000 of them between the ages of 5 and 55 years (Brit. med. J., 1967), and many of these die as the result of chronic urinary tract infection. Pregnant women are particularly prone to such infection both symptomatic and asymptomatic. These considerations have led to the recent widespread interest in the bacteriology of the urine in pregnancy. As the urine of the fetus is an important constituent of the amniotic fluid (Young and Martin, 1963), the bacteriology of the liquor amnii should reflect, to some extent, the condition of the urinary tract of the fetus.

Patients and Methods

All the patients admitted to the Royal Maternity Hospital, Belfast are investigated for significant bacteriuria. Of the 1,300 patients admitted during the period of this study, 1,000 were antenatal and the remaining 300 were in labour.

Examination of Urine

Early morning midstream specimens of urine were obtained from antenatal patients on the second day of admission to hospital and the specimens were examined within two hours of collection. Midstream or catheter specimens of urine were obtained on admission from patients admitted in labour and were refrigerated at 4°C until they could be cultured. Logarithmic dilutions of the urine were made in nutrient broth and 1 ml. from each dilution was transferred to a MacConkey plate which was incubated at 37° overnight. Significant bacteriuria in this study is defined as the presence of 100,000 (10^5) or more *E. coli* per ml. in two or more consecutive daily specimens of urine. The identity of *E. coli* was confirmed by standard biochemical tests (Cowan and Steel, 1965).

Specimens of Urine at Various Times of the Day

Four specimens of urine per day were obtained from each of 20 patients, 10 of whom had significant bacteriuria. As well as early morning urine, urine passed at 12 midday, 2.00 p.m. and 4.00 p.m. was examined and the count of *E. coli* per ml. of each specimen was recorded against its time of collection. All specimens were examined within two hours of collection.

Bacteriology of Liquor Amnii

Specimens of liquor amnii were obtained from 200 Rhesus negative patients of gestational periods of 28 to 34 weeks, who had amniocentesis performed during the period of this study. Of these, 10 had significant bacteriuria at the time of amniocentesis. Logarithmic dilutions of the liquor amnii were made in nutrient broth and 1 ml. from each dilution was transferred to a MacConkey plate and 1 ml. to blood agar plate. The plates were incubated at 37°C overnight.

TABLE I

Incidence of significant bacteriuria in pregnancy and labour

	Antenatal patients	*Patients in labour*
Total number of patients examined	1,000	300
Patients with significant bacteriuria	47 (4.7%)	10 (3.3%)
$\chi^2=1.02$ d.f.=1	0.50>P>0.30	

RESULTS

Out of 1,000 patients examined during the antenatal period, 47 (4.7 per cent) had significant bacteriuria and 10 (1 per cent) had a count of 100,000 or more *E. coli* per ml. on one occasion only and out of 300 patients examined during labour, 10 (3.3 per cent) had significant bacteriuria (table I).

The results of examination of urine at various times of the day from 10 patients with signifiant bacteriuria showed that the counts of early morning urine were significantly higher than those of the remaining three specimens. The latter showed no statistically significant difference between each other ($F=6.141$, $n_1=3$, $n_2=27$, $0.01>P>0.001$). In nine out of the 10 patients with significant bacteriuria all the four specimens examined per day showed counts above 100,000 *E. coli* per ml. (table II), while in the 10 patients who had no significant bacteriuria the counts in the four specimens were variable with no specific pattern and none of the counts reached 100,000 *E. coli* per ml.

TABLE II

Results of examination of urine passed at various times of the day by 10 *patients with significant bacteriuria*

	E. Coli per ml. of urine specimen			
Patients	*Early morning*	12.00 *midday*	2.00 *p.m.*	4.00 *p.m.*
1	10^8 x 9	10^7 x 8	10^7 x 6	10^7 x 8
2	10^5 x 2	10^5	10^5	10^5
3	10^6	10^5 x 7	10^5 x 5	10^5 x 9
4	10^5 x 2	10^5	10^4	10^4
5	10^8 x 2	10^5 x 6	10^5 x 8	10^5 x 6
6	10^5 x 7	10^5	10^5	10^5
7	10^6	10^5	10^5 x 4	10^5 x 5
8	10^6	10^5 x 6	10^5	10^5
9	10^8 x 3	10^6	10^5 x 5	10^5 x 6
10	10^8 x 2	10^7	10^5 x 9	10^5
Average square root	80.34	16.76	12.68	13.51
F=6.141	$n_1=3$	$n_2=27$	0.01>P>0.001	

Also the 200 specimens of liquor amnii, including those from the 10 patients with significant bacteriuria, were sterile on culture.

Discussion

In an earlier screening survey of antenatal patients in this hospital with the tetrazolium chloride (T.T.C.) test, significant bacteriuria occured in 4.7 per cent (Pinkerton et al., 1965). This is in complete agreement with our present results and confirms the value of the T.T.C. test as a reliable method of screening antenatal patients for significant bacteriuria as here defined.

In this study, a significant bacteriuria occurred in 4.7 per cent of antenatal patients and 3.3 per cent of patients in labour. There was no statistically significant difference between these figures ($0.5>P>0.3$). A slightly higher incidence in the antenatal period could be due to the fact that while all specimens obtained from the antenatal patients were of early morning urine, those obtained during labour were not. A study of urine passed at various times of the day shows that counts of *E. coli* are always highest in the early morning. Kass (1955) related this to a longer incubation period in the bladder, and Waters and his associates (1967) to more suitable urinary pH and osmolality.

The sterility of all specimens of liquor amnii could mean that the urinary tract of the fetus is not invaded by bacteria even when the pregnancy is associated with significant bacteriuria or, on the other hand, it could result from the inhibitory action of the liquor amnii on the growth of bacteria which was demonstrated by Gudson (1962) and Galask and Synder (1968).

In conclusion it is suggested that, as the present definition of significant bacteriuria depends on the number of bacteria in the urine, examination of early morning urine provides a more sensitive test for significant bacteriuria than examination of midday urine. Although the liquor amnii was sterile in all our patients, including those with significant bacteriuria, further studies of larger numbers including those with overt clinical infection are necessary.

Summary

Significant bacteriuria occurred in 4.7 per cent of antenatal patients and 3.3 per cent of patients examined during labour. Early morning urine always gave significantly by higher counts of *Escherichia coli* than midday urine and the liquor amnii specimens examined, including those from patients with significant bacteriuria, were all sterile on culture.

We thank Dr. J. M. Dunbar and Mr. J. Evans for bacteriological assistance, and Miss M. Weller for typing the script.

References

Brit. Med. J. (1967). **1**, 581.

Cowan, S. T. and Steel, K. J., (1965). *Identification of Medical Bacteria*, p. 66, London: Cambridge Univ. Press.

Galask, R. P. and Snyder I. (1968). *Amer. J. Obstet. Gynec.*, **102**, 949.

Gudson, J. (1962). *J. Immunol.*, **88**, 494.

Kass, E. H. (1955). *Amer. J. Med.*, **18**, 764.

Pinkerton, J. H. M., Houston, J. K. & Gibson, G. L. (1965). *Proc. roy. Soc. Med.*, **58**, 1041.

Waters, W. E. Sussman, M., and Asscher, A. W. (1967). *Brit. J. prev. soc. Med.*, **21**, 129.

Young, M., & Martin, J. D. (1963). *British Obstetric and Gynaecological Practice*, 3rd ed., pp. 59-60. London: Heinemann Medical Books.

NON-TRAUMATIC CLOSTRIDIAL MYONECROSIS

By J. G. CAMBLIN
Senior House Officer, Royal Victoria Hospital, Belfast

and J. G. KINLEY
Now Consultant Surgeon, Moyle Hospital, Larne

GAS GANGRENE is defined as an invasive anaerobic infection of muscle, which is characterised by massive tissue death and by variable degrees of gas production. It is caused by the following organisms of the Clostridial group: *C. perfringens (welchii), C. novyi (oedematiens), C. septicum (feseri), C. fallax, C. bifermentans* and *C. histolyticum.* There are numerous other strains within this group but the above mentioned are the only strains capable of producing gas gangrene without any other organism being present (MacLennan 1962). Gas gangrene can also be caused by anaerobic streptococci. In almost all cases these organisms gain entry via a wound that has been contaminated by soil, faeces or foreign body.

Non-traumatic gas gangrene is a much rarer phenomenon and of nine reported cases there has been only one survival of three weeks, the others dying within the first forty-eight hours (Marty and Filler 1969). In these cases there has been no visible external portal of entry and almost all the patients were more susceptible to disease by being either diabetic or on cytotoxic agents. In this case the patient was an elderly man who was neither diabetic nor receiving cancer chemotherapy. He had an adenocarcinoma of the caecum and presented as gas gangrene.

Case Report

The patient was a thin elderly male of seventy-four years of age who was brought to Lagan Valley Hospital because of severe pain in his left thigh. He was so ill that he was unable to give a history but his wife was able to give a clear account of his illness. He had had no previous hospital admissions but one year earlier he had attended as an out-patient for investigation of abdominal pain, and had a barium meal carried out which was normal. Six months later he began to complain of upper left abdominal pain, loss of appetite, weight loss and constipation. He had had diarrhoea for four days prior to admission and the day before admission his abdominal pain had increased and he had vomited. The pain radiated into the left thigh which was discoloured, being dusky-blue in colour.

On examination he was pale and had a normal temperature, the pulse rate was 84 per minute in sinus rhythm and the blood pressure was 130/80 mm. Hg. There was no evidence of heart failure. There was generalised tenderness over the abdomen and this was maximal in the right iliac fossa. Guarding and rebound tenderness were also present. A rectal examination revealed only faeces. Femoral pulses were good, no leg oedema was present and joint movements were normal. The left thigh was swollen, bruised and tender. He lay with the leg semi-flexed and abducted and on palpation the thigh was crepitant throughout its medial aspect. A diagnosis of gas gangrene was made and the patient prepared for laparotomy. The only laboratory data of significance was an Astrup of pH of 7.10 and a base excess of–17.5.

Operation

A lower right paramedian incision was made and foul smelling, faeculent pus was found in the peritoneal cavity. A large fungating carcinoma of the caecum was present but without evidence of perforation or lymph node involvement. There was no visible lesion of the pelvic peritoneum. A right hemicolectomy was carried out with end to end anastomosis in two layers. The wound was then closed in layers with drainage, and attention now focused on the left thigh.

The skin of the left thigh was now more extensively bruised and had developed several large fluid filled blisters which had not been present at the start of the operation. An incision from the medial end of the inguinal ligament to the knee joint was made and the necrotic skin and muscle excised. The muscle excision comprised the entire adductor group which was black and crepitant. The raw area was dressed with saline soaked swabs.

Treatment

The patient was started on penicillin 1 mega q.i.d. and gastric aspiration and intravenous infusion commenced, the solution containing tetracycline 500 mg. per litre. Four units of blood i.e. two litres and 10 ml. calcium solution were given at operation. Sodium bicarbonate 100 meq. was also given to correct acidosis. In spite of this the patient's condition rapidly deteriorated and he died six hours after admission.

Laboratory Data

C. septicum was isolated from a culture swab taken from the thigh at operation. The organism was sensitive to penicillin and tetracycline. The segment of bowel comprising the right colon and terminal ileum showed a fungating tumour eight centimetres across situated on the antero-medial aspect of the caecum. This was surrounded by an area of oedema and fibrinous exudate that extended to the ascending colon. A few adjacent lymph nodes were slightly enlarged. Histological examination showed frank carcinoma in some areas but the rest of the tissue was difficult to recognise due to extensive necrosis. The germinal centres of the lymph nodes were enlarged. A sample of the excised thigh muscle which was black and crepitant at operation, showed inflammatory cell infiltration and marked oedema which separated the muscle fibres apart, and in addition spaces which must have contained gas were seen. A minor degree of atheroma was detected in the great vessels at post mortem only.

Discussion

The source of any clostridial infection is direct from the gastro-intestinal tract or indirectly via soil and water that have been contaminated by faeces. This infection is a hazard in any surgical procedure involving areas liable to contamination by faecal material. In other reported cases of non-traumatic gas gangrene the sources were perforated colonic lesions, cholecystitis and in one case from a perforated duodenal ulcer (Cabrera 1965, Marty 1969, Eraklis 1969, and Rose 1966). In the present case a colonic lesion was present in the form of a non-perforated but fungating carcinoma of the caecum. Usually clostridia are only of serious importance if they enter the circulation and cause a clostridial septicaemia (MacLennan 1962). When one thinks of the number of wounds and incisions that are exposed to clostridia or from which the organism may be cultured, surprisingly few ever develop gas gangrene.

As to why the lesion should develop in the opposite thigh to the presumed source of infection is not known. There was no direct communication between the caecum and the left thigh and the peritoneal wall of the pelvic cavity was macroscopically intact. It is possible that the organisms entered the circulation and seeded to the muscle of the left thigh. Such clostridial infections are common in lower animals and here no macroscopic source is found. The dog is very susceptible to *C. septicum* but this is a slightly different strain from that which effects man. The organisms are carried in the tissue as parasites but this is not known to happen in man (MacLennan 1962). It has been known for a contaminated wound to harbour spores in the scar for up to fourteen years and for them then to germinate to cause gangrene, but this patient did not have any such scar.

It has been found that clostridial myonecrosis is most often located in areas of large muscle mass such as the buttocks, thigh and shoulder. The affected muscles have not been normal as the organism is anaerobic and cannot grow in aerobic conditions. It is found associated with vascular damage due to arterial disease or to blunt trauma and similar conditions may also be produced by cold or shock. All these factors produce local tissue anoxia with associated regional acidosis from the lactic acid produced by the muscle itself (Rose 1966, Whyland 1960). The lowering of the pH does not markedly affect the organism but does promote the proteolytic enzymes produced by them. The major factor in this is the alpha toxin which promotes muscle cell death and thus allows the organisms to grow (MacLennan 1962). It is the circulating toxins that produce the widespread toxaemia, shock and death.

This patient was treated in the recognised manner by intravenous infusion to restore circulating blood volume, bicarbonate to correct acidosis, antibiotics, and by excision of the necrotic tissue to remove the focus of infection. In spite of this he died as a result of continuing shock. Hyperbaric oxygen therapy is strongly advocated by many authors (Rose 1966, Eraklis 1969) but was not readily available to us. From this and other reported cases a patient presenting as localised gas gangrene of an extremity without local trauma has most likely a perforating lesion or a carcinoma of the gastro-intestinal tract as the source of organisms. This being so, rapid treatment of the gangrene with removal of all dead tissue and laparotomy is essential, but even with the most energetic measures no patient has survived longer than three weeks. Possibly the only method by which the present uniform mortality may be circumvented is by prompt diagnosis, resuscitation and early radical surgery together with hyperbaric oxygen therapy when available.

Summary

A case of a fungating adenocarcinoma of the caecum in a non-diabetic male which presented as non-traumatic clostridial myonecrosis of the contralateral thigh is reported. The standard resuscitation, operative and antibotic measures are described and the uniformly fatal outcome to date is noted.

We are grateful to Mr. G. I. Young, Consultant Surgeon of the Lagan Valley Hospital, Dr. J. E. Morison of the Pathology Department of the Belfast City Hospital, and to Dr. W. Shepherd of the Bacteriological Department of the Belfast City Hospital, for permission to report this case.

References

Cabrera, A., Tuskada, Y., Prickren, J. W. (1965). *Cancer*, **18**, 800.
Eraklis, A. J., Filler, R. M., Pappas, A. M., Bernhard, W. F. (1969). *Amer. J. Surg.*, **117**, 485.
MacLennon, J. D. (1962). *Bact. Rev.*, **26**, 177.
Marty, A. T., Filler, R. M. (1969). *Lancet* **ii**, 79.
Rose, H. D., Bukosly, R. J. (1966). *J. Amer. med. Ass.*, **198**, 1368.
Whyland, W. A., Levin, M. N. (1960.). *Amer. J. Surg.*, **99**, 77.

BOOK REVIEW

PREVENTIVE MEDICINE IN MEDICAL CARE. By Kurt Schwarz. (Pp 216. £2.50). London: H. K. Lewis, 1970.

The author of this book combines his appointment as Senior Lecturer in Preventive Medicine and Public Health at the University of Leeds with those of Assistant Medical Officer to the City of Leeds and Consultant Physician to the United Leeds Hospitals. By virtue of these appointments he is in the unique position of being able to take a broad view of the epidemiology of infectious and non-infectious disease from both the hospital and clinical and the community and social standpoints. The first edition comes at an opportune time when much emphasis is being placed on the social and preventive aspects of disease and on the interrelationship beween he environment and the health of its citizens. There is justification for bringing a greater content of medical care to the patient in his normal home envinorment.

On reading this volume one is continually reminded of the importance of health education and preventive medicine generally, and as disciplines which will undoubtedly assume greater importance in the "unified" health services of the future. The author lays stress on this approach by subdividing chapters under such headings as "pre-symptomatic diagnosis", "primary and secondary prevention", "early diagnosis" and "public health aspects". He further emphasises the theme in his reference to the importance of "screening" in medical care, in the surveillance of "at risk" groups in the community and in the emphasis on "specific projects" with public co-operation, e.g. in the fields of cancer diagnosis and accident prevention.

A criticism of this book could be that in the short space of just over 200 pages the author attempts too much. He has not set out to write a textbook of clinical medicine (there is often insufficient clinical data to make an accurate diagnosis), neither is this a treatise on social medicine but it is a valiant attempt to wed the two and almost succeeds in doing so. The book certainly fulfils the author's claim to be "a practical guide to the practice of preventive medicine and the application of preventive medical procedures to individuals and the community". In addition to being a valuable guide for senior undergraduate and post graduate students it offers to doctors in public health, occupational health and general practice perspectives in priorities for the promotion of community health and for the prevention and control of specific disorders. For more advanced students who wish to expand their knowledge by additional reading a list of relevant literature is given at the end of chapters; in all there are forty eight recommended references for further study.

In this interesting and very readable book the author by combining the clinical and the social has introduced a new trend which will no doubt be further developed by authors in the future, a future which promises not only many changes in health service structure but in the whole field of undergraduate and post graduate medical education. J.McA.T.

References

Cabrera, A., Tuskada, Y., Prickren, J. W. (1965). *Cancer*, **18**, 800.
Eraklis, A. J., Filler, R. M., Pappas, A. M., Bernhard, W. F. (1969). *Amer. J. Surg.*, **117**, 485.
MacLennon, J. D. (1962). *Bact. Rev.*, **26**, 177.
Marty, A. T., Filler, R. M. (1969). *Lancet* **ii**, 79.
Rose, H. D., Bukosly, R. J. (1966). *J. Amer. med. Ass.*, **198**, 1368.
Whyland, W. A., Levin, M. N. (1960.). *Amer. J. Surg.*, **99**, 77.

BOOK REVIEW

PREVENTIVE MEDICINE IN MEDICAL CARE. By Kurt Schwarz. (Pp 216. £2.50). London: H. K. Lewis, 1970.

The author of this book combines his appointment as Senior Lecturer in Preventive Medicine and Public Health at the University of Leeds with those of Assistant Medical Officer to the City of Leeds and Consultant Physician to the United Leeds Hospitals. By virtue of these appointments he is in the unique position of being able to take a broad view of the epidemiology of infectious and non-infectious disease from both the hospital and clinical and the community and social standpoints. The first edition comes at an opportune time when much emphasis is being placed on the social and preventive aspects of disease and on the interrelationship beween he environment and the health of its citizens. There is justification for bringing a greater content of medical care to the patient in his normal home envinorment.

On reading this volume one is continually reminded of the importance of health education and preventive medicine generally, and as disciplines which will undoubtedly assume greater importance in the "unified" health services of the future. The author lays stress on this approach by subdividing chapters under such headings as "pre-symptomatic diagnosis", "primary and secondary prevention", "early diagnosis" and "public health aspects". He further emphasises the theme in his reference to the importance of "screening" in medical care, in the surveillance of "at risk" groups in the community and in the emphasis on "specific projects" with public co-operation, e.g. in the fields of cancer diagnosis and accident prevention.

A criticism of this book could be that in the short space of just over 200 pages the author attempts too much. He has not set out to write a textbook of clinical medicine (there is often insufficient clinical data to make an accurate diagnosis), neither is this a treatise on social medicine but it is a valiant attempt to wed the two and almost succeeds in doing so. The book certainly fulfils the author's claim to be "a practical guide to the practice of preventive medicine and the application of preventive medical procedures to individuals and the community". In addition to being a valuable guide for senior undergraduate and post graduate students it offers to doctors in public health, occupational health and general practice perspectives in priorities for the promotion of community health and for the prevention and control of specific disorders. For more advanced students who wish to expand their knowledge by additional reading a list of relevant literature is given at the end of chapters; in all there are forty eight recommended references for further study.

In this interesting and very readable book the author by combining the clinical and the social has introduced a new trend which will no doubt be further developed by authors in the future, a future which promises not only many changes in health service structure but in the whole field of undergraduate and post graduate medical education. J.McA.T.

BOOK REVIEWS

SEXUALITY AND AGGRESSION IN MATURATION. NEW FACETS. Edited by H. Sydney Klein. (Pp. 72. 10s.). London: Baillière, Tindall & Cassell, 1970.

This booklet contains the 1969 Winter Lectures delivered under the auspices of the British Psycho-analytical Society. For those in tune with the psychoanalytic approach they will provide a useful guide to its application to three important areas of general interest. The lectures include one dealing with permissive upbringing and not surprisingly point to the dangers of children being exposed to information beyond their comprehension. A plea is made for greater understanding of young motor cyclists, particularly those who use their machines in a neurotic fashion. The lecture from which the title of the booklet is derived, is a comprehensive discourse on the problem of the identity of 'self' in which psychoanalytical, ethological and existentialist view points are put forward to explain the origins of the forces at work in the process of growing up.

For others who are uncommitted to the conceptual models implicit in these lectures, they will in the reviewer's opinion, provide an interesting account of how the other half look at some difficult and pressing problems

J.G.G.

AIDS TO POSTGRADUATE MEDICINE. By J. L. Burton (Pp. 136. 20s.). Edinburgh and London: E. & S. Livingstone, 1970.

THIS book is intended to provide an aid to revision for candidates taking the Membership examination of the various Royal Colleges of Physicians. A short section entitled "Hints on the Clinical Examination" is followed by skeleton lists of information subdivided into the various specialities such as Chest Disease, Dermatology and Microbiology, and illustrated in a few instances by diagrams or line drawings. There is a short bibliography but no index. The layout of the book is good and the classified lists are logical and comprehensive, although in some cases of doubtful accuracy (for example, azotaemic osteodystrophy is listed as a cause of osteoporosis, and typhoid fever as a cause of sinus bradycardia, and the Graham-Steell murmur is said to be due to mitral stenosis mimicking pulmonary regurgitation). Abbreviations and initials are often used without explanation, and the frequent occurence of "etc". in the lists is irritating and uninformative.

Despite these shortcomings this little boook should prove very useful to candidates attempting to classify and memorize the large numbers of facts required for examination purposes.

L.E.M.

AN INTRODUCTION TO MEDICAL GENETICS. By J. A. Fraser Roberts. Fifth Edition. (Pp xiv+296; figs. 126. Boards 50s; paper 35s). London: Oxford University Press, 1970.

THERE was a long interval between the first and second edition of this most valuable book, but later editions have reflected the increasing speed of advances in genetics and the book itself continues to make genetics understandable to those who have no formal training and whose interest is essentially in the medical aspects of genetics. This understanding is not easily attained, but we doubt if any other book will prove as interesting and instructive, both to the older physician who has learnt little of genetics in the past and to the present day student trained in biology and perhaps well informed on plant and animal genetics.

J.E.M.

BOOK REVIEWS

SEXUALITY AND AGGRESSION IN MATURATION. NEW FACETS. Edited by H. Sydney Klein. (Pp. 72. 10s.). London: Baillière, Tindall & Cassell, 1970.

This booklet contains the 1969 Winter Lectures delivered under the auspices of the British Psycho-analytical Society. For those in tune with the psychoanalytic approach they will provide a useful guide to its application to three important areas of general interest. The lectures include one dealing with permissive upbringing and not surprisingly point to the dangers of children being exposed to information beyond their comprehension. A plea is made for greater understanding of young motor cyclists, particularly those who use their machines in a neurotic fashion. The lecture from which the title of the booklet is derived, is a comprehensive discourse on the problem of the identity of 'self' in which psychoanalytical, ethological and existentialist view points are put forward to explain the origins of the forces at work in the process of growing up.

For others who are uncommitted to the conceptual models implicit in these lectures, they will in the reviewer's opinion, provide an interesting account of how the other half look at some difficult and pressing problems

J.G.G.

AIDS TO POSTGRADUATE MEDICINE. By J. L. Burton (Pp. 136. 20s.). Edinburgh and London: E. & S. Livingstone, 1970.

THIS book is intended to provide an aid to revision for candidates taking the Membership examination of the various Royal Colleges of Physicians. A short section entitled "Hints on the Clinical Examination" is followed by skeleton lists of information subdivided into the various specialities such as Chest Disease, Dermatology and Microbiology, and illustrated in a few instances by diagrams or line drawings. There is a short bibliography but no index. The layout of the book is good and the classified lists are logical and comprehensive, although in some cases of doubtful accuracy (for example, azotaemic osteodystrophy is listed as a cause of osteoporosis, and typhoid fever as a cause of sinus bradycardia, and the Graham-Steell murmur is said to be due to mitral stenosis mimicking pulmonary regurgitation). Abbreviations and initials are often used without explanation, and the frequent occurence of "etc". in the lists is irritating and uninformative.

Despite these shortcomings this little boook should prove very useful to candidates attempting to classify and memorize the large numbers of facts required for examination purposes.

L.E.M.

AN INTRODUCTION TO MEDICAL GENETICS. By J. A. Fraser Roberts. Fifth Edition. (Pp xiv+296; figs. 126. Boards 50s; paper 35s). London: Oxford University Press, 1970.

THERE was a long interval between the first and second edition of this most valuable book, but later editions have reflected the increasing speed of advances in genetics and the book itself continues to make genetics understandable to those who have no formal training and whose interest is essentially in the medical aspects of genetics. This understanding is not easily attained, but we doubt if any other book will prove as interesting and instructive, both to the older physician who has learnt little of genetics in the past and to the present day student trained in biology and perhaps well informed on plant and animal genetics.

J.E.M.

BOOK REVIEWS

SEXUALITY AND AGGRESSION IN MATURATION. NEW FACETS. Edited by H. Sydney Klein. (Pp. 72. 10s.). London: Baillière, Tindall & Cassell, 1970.

This booklet contains the 1969 Winter Lectures delivered under the auspices of the British Psycho-analytical Society. For those in tune with the psychoanalytic approach they will provide a useful guide to its application to three important areas of general interest. The lectures include one dealing with permissive upbringing and not surprisingly point to the dangers of children being exposed to information beyond their comprehension. A plea is made for greater understanding of young motor cyclists, particularly those who use their machines in a neurotic fashion. The lecture from which the title of the booklet is derived, is a comprehensive discourse on the problem of the identity of 'self' in which psychoanalytical, ethological and existentialist view points are put forward to explain the origins of the forces at work in the process of growing up.

For others who are uncommitted to the conceptual models implicit in these lectures, they will in the reviewer's opinion, provide an interesting account of how the other half look at some difficult and pressing problems

J.G.G.

AIDS TO POSTGRADUATE MEDICINE. By J. L. Burton (Pp. 136. 20s.). Edinburgh and London: E. & S. Livingstone, 1970.

THIS book is intended to provide an aid to revision for candidates taking the Membership examination of the various Royal Colleges of Physicians. A short section entitled "Hints on the Clinical Examination" is followed by skeleton lists of information subdivided into the various specialities such as Chest Disease, Dermatology and Microbiology, and illustrated in a few instances by diagrams or line drawings. There is a short bibliography but no index. The layout of the book is good and the classified lists are logical and comprehensive, although in some cases of doubtful accuracy (for example, azotaemic osteodystrophy is listed as a cause of osteoporosis, and typhoid fever as a cause of sinus bradycardia, and the Graham-Steell murmur is said to be due to mitral stenosis mimicking pulmonary regurgitation). Abbreviations and initials are often used without explanation, and the frequent occurence of "etc". in the lists is irritating and uninformative.

Despite these shortcomings this little boook should prove very useful to candidates attempting to classify and memorize the large numbers of facts required for examination purposes.

L.E.M.

AN INTRODUCTION TO MEDICAL GENETICS. By J. A. Fraser Roberts. Fifth Edition. (Pp xiv+296; figs. 126. Boards 50s; paper 35s). London: Oxford University Press, 1970.

THERE was a long interval between the first and second edition of this most valuable book, but later editions have reflected the increasing speed of advances in genetics and the book itself continues to make genetics understandable to those who have no formal training and whose interest is essentially in the medical aspects of genetics. This understanding is not easily attained, but we doubt if any other book will prove as interesting and instructive, both to the older physician who has learnt little of genetics in the past and to the present day student trained in biology and perhaps well informed on plant and animal genetics.

J.E.M.

THE PHYSIOLOGY OF BONE. By Janet M. Vaughan, D.M., F.R.C.P. (Pp. 323. £5 boards, £2.50 paper). Oxford: Clarendon Press, 1970.

THE author of this valuable book, Dame Janet Vaughan, is one of the most respected and beloved of Britain's women scientists. Until recently she was Principal of Somerville College Oxford, and the Honorary, but very active, Director of a flourishing M.R.C. Group in Oxford working on Bone-seeking Isotopes. Her knowledge of bone and of the people who study bone is unparalleled. Dame Janet modestly states in her Preface that the book is a bird's eye view, and she hopes that it may be of use to medical students and their teachers. In fact it is a book which everyone working in the fields of bone and mineral metabolism, whether laboratory scientist, metabolic physician or orthopaedic surgeon, will read with profit—not only because "The Physiology of Bone" is a mine of information and of valuable modern references to the literature, but also because of the author's infectious enthusiasm and mature judgment. Dame Janet never pretends that a question has been answered satisfactorily when in her view it has not. As a result, any budding research worker in the bone field will find in her book a host of good problems to work on—and that alone would make the price of the book a first-class investment.

The enormous interest in bone physiology and mineral metabolism in recent years, and the great advances in knowledge which have been made, amounting to a revolution in calcium biology, have stemmed from technical advances—in electron microscopy, micro-radiography, histo-chemistry, autoradiography, X-ray diffraction and protein chemistry—but the most significant achievements have resulted from the use of radioactive isotopes to follow the flux of mineral ions between gut and bone and kidney. Dame Janet's own research has centred around the use of isotopes, so not unnaturally isotope work is treated very fully and authoritatively in the book under review. Nevertheless, the author treads through the wider morasses and minefields of bone structure, chemistry and function with only an occasional slip. Her knowledge is vast, and her judgment is sure. Above all she stimulates, exemplifying the quotation at the beginning of her book, "Take from the altar of knowledge the fire not the ashes."

J.J.P.

THE TRAINING OF GOOD PHYSICIANS. By Freemont J. Lyden, H. Jack Geiger, and Osler L. Peterson. (Pp. xvi+245. 66s. 6d.). Cambridge, Mass.: Harvard University Press, 1968.

THIS is a retrospective study of the training and career decisions of nearly two thousand physicians who graduated from twelve widely scattered medical schools. Obviosly the problems of training in a Welfare State are somewhat different from the free-for-all medicine in the U.S.A. Students from the lower socio-economic groups have little chance of graduating in medicine, and though 10 per cent of the doctors investigated were the sons of doctors even this recruitment becomes more difficult with the increasing cost of medical education. As in Britain there is a very careful selection of medical students. Residency training—corresponding to our registrar system of appointments—often requires parental or marital support. This influences much more than in Gt. Britain the eventual aims of the medical graduate. A wealthy background enables specialisation— a mediocre one—a life in general practice. Teachers and researchers come twice as often from the more expensive private schools.

The American system produces both the best and the worst of medical education. As the best there are some of the great medical scientists—as the worst the poorly trained physician for solo general practice. It is difficult to predict how long the present system, based as it is on many multifactorial factors in selection of medical students and on their opportunities for post-graduate experience and training can continue. In the training of the average doctor we have litlte to learn. Possibly in the post-graduate research centres America can still help our brighter graduates but in general there is still a more general application of Hippocratic principles in the Health Service of Great Britain than in the more highly competitive practice in the U.S.A.

J.H.B.

THE PHYSIOLOGY OF BONE. By Janet M. Vaughan, D.M., F.R.C.P. (Pp. 323. £5 boards, £2.50 paper). Oxford: Clarendon Press, 1970.

THE author of this valuable book, Dame Janet Vaughan, is one of the most respected and beloved of Britain's women scientists. Until recently she was Principal of Somerville College Oxford, and the Honorary, but very active, Director of a flourishing M.R.C. Group in Oxford working on Bone-seeking Isotopes. Her knowledge of bone and of the people who study bone is unparalleled. Dame Janet modestly states in her Preface that the book is a bird's eye view, and she hopes that it may be of use to medical students and their teachers. In fact it is a book which everyone working in the fields of bone and mineral metabolism, whether laboratory scientist, metabolic physician or orthopaedic surgeon, will read with profit—not only because "The Physiology of Bone" is a mine of information and of valuable modern references to the literature, but also because of the author's infectious enthusiasm and mature judgment. Dame Janet never pretends that a question has been answered satisfactorily when in her view it has not. As a result, any budding research worker in the bone field will find in her book a host of good problems to work on—and that alone would make the price of the book a first-class investment.

The enormous interest in bone physiology and mineral metabolism in recent years, and the great advances in knowledge which have been made, amounting to a revolution in calcium biology, have stemmed from technical advances—in electron microscopy, micro-radiography, histo-chemistry, autoradiography, X-ray diffraction and protein chemistry—but the most significant achievements have resulted from the use of radioactive isotopes to follow the flux of mineral ions between gut and bone and kidney. Dame Janet's own research has centred around the use of isotopes, so not unnaturally isotope work is treated very fully and authoritatively in the book under review. Nevertheless, the author treads through the wider morasses and minefields of bone structure, chemistry and function with only an occasional slip. Her knowledge is vast, and her judgment is sure. Above all she stimulates, exemplifying the quotation at the beginning of her book, "Take from the altar of knowledge the fire not the ashes."

J.J.P.

THE TRAINING OF GOOD PHYSICIANS. By Freemont J. Lyden, H. Jack Geiger, and Osler L. Peterson. (Pp. xvi+245. 66s. 6d.). Cambridge, Mass.: Harvard University Press, 1968.

THIS is a retrospective study of the training and career decisions of nearly two thousand physicians who graduated from twelve widely scattered medical schools. Obviosly the problems of training in a Welfare State are somewhat different from the free-for-all medicine in the U.S.A. Students from the lower socio-economic groups have little chance of graduating in medicine, and though 10 per cent of the doctors investigated were the sons of doctors even this recruitment becomes more difficult with the increasing cost of medical education. As in Britain there is a very careful selection of medical students. Residency training—corresponding to our registrar system of appointments—often requires parental or marital support. This influences much more than in Gt. Britain the eventual aims of the medical graduate. A wealthy background enables specialisation— a mediocre one—a life in general practice. Teachers and researchers come twice as often from the more expensive private schools.

The American system produces both the best and the worst of medical education. As the best there are some of the great medical scientists—as the worst the poorly trained physician for solo general practice. It is difficult to predict how long the present system, based as it is on many multifactorial factors in selection of medical students and on their opportunities for post-graduate experience and training can continue. In the training of the average doctor we have litlte to learn. Possibly in the post-graduate research centres America can still help our brighter graduates but in general there is still a more general application of Hippocratic principles in the Health Service of Great Britain than in the more highly competitive practice in the U.S.A.

J.H.B.

NURSING CARE OF THE UNCONSCIOUS PATIENT. By P. Mountjoy and B. Whythe. (Pp. 104; figs. 11. 15s.). London: Baillière, Tindall and Cassell, 1970.

THIS excellent book has been written by experienced nurses working in a specialised neurosurgical/neurological unit and is mainly directed at the nurses who are the centre of the team looking after the unconscious patient.

It commences with a brief, but clear, outline of the anatomy of the brain and after listing the causes of unconsciousness discusses the equipment necessary to deal with this particular state of the patient.

The immediate nursing care and assessment of the patient is complete and well presented as are the observations and the reason for the frequency in recording. In the chapter on continuing nursing care the authors have stressed the need for accuracy in recording of observations and strictly adhering to the frequency in performing the nursing tasks. However, in dealing with the feeding of the unconscious patient stress should be made to the possibility of regurgitation of stomach contents if the patient does not have his pharyngeal reflexes intact. Also the problem of markedly decreased gastric absorption, as seen in states where long term muscle relaxants have been used has been only briefly mentioned: this necessitates the intravenous use of high calories protein fat and vitamin solutions, and whereas this has only been mentioned (p.75) there is a long discussion on the composition and technique of intragastric feeding.

The section on tracheostomy is based on good practice, but humidification is required for the entire period of tracheostomy and not just "for the first few days". No mention is made of pre-oxygenation of the patient before tracheal suction, which is especially important in the small child, and if not carried out can lead to rapid anoxia and cardiac arrest.

Dealing with drug overdose it is good to see that pressor drugs have little place in the treatment of hypertension, whereas in certain cases the use of sympathetic blocking drugs combined with maintenance of blood volumes have a useful function.

The place of physiotherapy by nurses and physiotherapists both in the acute stage and during rehabilitation, has been stressed and to how much this determines the extent of return to normality of the patient. The authors also stress how good personal relationships between the team and the patient can contribute to, and accelerate recovery.

Altogether, this little book should have a very worth while place in the reading of these people, especially nurses connected with the team involved in the care of the unconscious patient. It deals very adequately with this type of patient, but should have also dealt with some of the long term problems of the unconscious patient in respiratory failure. J.W.D.K.

PAGET'S DISEASE OF BONE. By Hugh C. Barry, B.Sc., F.R.C.S., F.R.A.C.S. (Pp. vii+196; figs. 100. 80s). Edinburgh and London: E. & S. Livingstone, 1969.

THIS is a beautifully produced and well written monograph on a relatively rare disease with a peculiar geographical distribution, often with a prolonged course and with variable initial symptoms but typical features in the advanced case.

The author, who is senior orthopaedic surgeon in the Royal Prince Alfred Hospital in Sydney, Australia, gives a scholarly historical survey, discusses its variable incidence, its pathology and its radiological manifestations. He describes treatment in general, fractures and their treatment and the development of neoplastic changes. His review is supported by a careful study of Australian cases, thus he is able to tabulate 90 cases with fractures and 116 cases where neoplastic change occurred. It is supported by a detailed study of the literature, and yet it remains highly readable, a valuable record of personal study and thought and a useful source of reference. J.E.M.

NURSING CARE OF THE UNCONSCIOUS PATIENT. By P. Mountjoy and B. Whythe. (Pp. 104; figs. 11. 15s.). London: Baillière, Tindall and Cassell, 1970.

THIS excellent book has been written by experienced nurses working in a specialised neurosurgical/neurological unit and is mainly directed at the nurses who are the centre of the team looking after the unconscious patient.

It commences with a brief, but clear, outline of the anatomy of the brain and after listing the causes of unconsciousness discusses the equipment necessary to deal with this particular state of the patient.

The immediate nursing care and assessment of the patient is complete and well presented as are the observations and the reason for the frequency in recording. In the chapter on continuing nursing care the authors have stressed the need for accuracy in recording of observations and strictly adhering to the frequency in performing the nursing tasks. However, in dealing with the feeding of the unconscious patient stress should be made to the possibility of regurgitation of stomach contents if the patient does not have his pharyngeal reflexes intact. Also the problem of markedly decreased gastric absorption, as seen in states where long term muscle relaxants have been used has been only briefly mentioned: this necessitates the intravenous use of high calories protein fat and vitamin solutions, and whereas this has only been mentioned (p.75) there is a long discussion on the composition and technique of intragastric feeding.

The section on tracheostomy is based on good practice, but humidification is required for the entire period of tracheostomy and not just "for the first few days". No mention is made of pre-oxygenation of the patient before tracheal suction, which is especially important in the small child, and if not carried out can lead to rapid anoxia and cardiac arrest.

Dealing with drug overdose it is good to see that pressor drugs have little place in the treatment of hypertension, whereas in certain cases the use of sympathetic blocking drugs combined with maintenance of blood volumes have a useful function.

The place of physiotherapy by nurses and physiotherapists both in the acute stage and during rehabilitation, has been stressed and to how much this determines the extent of return to normality of the patient. The authors also stress how good personal relationships between the team and the patient can contribute to, and accelerate recovery.

Altogether, this little book should have a very worth while place in the reading of these people, especially nurses connected with the team involved in the care of the unconscious patient. It deals very adequately with this type of patient, but should have also dealt with some of the long term problems of the unconscious patient in respiratory failure. J.W.D.K.

PAGET'S DISEASE OF BONE. By Hugh C. Barry, B.Sc., F.R.C.S., F.R.A.C.S. (Pp. vii+196; figs. 100. 80s). Edinburgh and London: E. & S. Livingstone, 1969.

THIS is a beautifully produced and well written monograph on a relatively rare disease with a peculiar geographical distribution, often with a prolonged course and with variable initial symptoms but typical features in the advanced case.

The author, who is senior orthopaedic surgeon in the Royal Prince Alfred Hospital in Sydney, Australia, gives a scholarly historical survey, discusses its variable incidence, its pathology and its radiological manifestations. He describes treatment in general, fractures and their treatment and the development of neoplastic changes. His review is supported by a careful study of Australian cases, thus he is able to tabulate 90 cases with fractures and 116 cases where neoplastic change occurred. It is supported by a detailed study of the literature, and yet it remains highly readable, a valuable record of personal study and thought and a useful source of reference. J.E.M.

A PHYSIOLOGICAL APPROACH TO CLINICAL NEUROLOGY. By James W. Lance, M.D., M.R.C.P., F.R.A.C.P. (Pp. xi+246, 84s.). London: Butterworths.

IN his preface the author declares that however brilliant the physiological advances made in the understanding of other species, they are profitless for man until applied to him. This has been the problem of neurophysiology for a considerable time. The clinical neurologist has been nurtured in finding answers to the questions: "Where is the lesion?" and "What is the lesion?" In doing so recourse is made to anatomy and pathology and where these are inadequate to syndrome compilation and philosophy. Less attention has been given to analysing the signs and symptoms in diseases of the nervous system in terms of what is known in the human of the functioning of its individual parts. Some highly sophisticated experiments have been carried out in animals which cannot be uncritically referred to the human.

Dr. Lance has successfully attempted to redress the balance in this book. He keeps to his brief giving information on human physiology only and is not swayed from it when he deals with such subjects as posture, labyrinthine function and the muscle spindle, on which many eminent clinicians have floundered. The eleven chapters will interest a wide section of people. I was very impressed with the unpretentious photographs of clinical tests such as Hoover's sign on page 44, the illustration of involuntary movements and posture and the many line darwings and record traces from patients. The chapters on vertigo contains a clear explanation of the very complex physiological principles underlying the history taking and examination of patients with vertigo. The newer neuro-otological tests are briefly described in a way that allows the average neurologist to no longer regard them as part of neuro-oto-astrology. In the further editions which must surely follow perhaps the principles of the electromyogram could be more fully expounded and the contribution of psychology in the study of patients treated with brain-bisection, towards understanding the physiology of behaviour, elaborated.

This slim volume contains a great deal of facts which are a tribute to the author's concise and clear writing. I am sure many would gain by reading it. The medical student, both pre-clinical and clinical, would find the description of the reflex arc and the reticular formation less overwhelming than in many standard physiology textbooks. Those preparing for post-graduate degrees would be facilitated because basic medical science intermingles with classical clinical signs and the art of neurological examination is enhanced. This is a book to be read by the pre-clinical and clinical teacher to bring nearer a truly integrated curriculum. I would advise the clinical psychologist and the medical biologist to browse through its covers, even if only for a glimpse at the problem. Dr. Lance may describe himself as a clinical neurologist and an amateur physiologist but his book bridges a gap. L.J.H.

HEART TROUBLE IN THE FAMILY. By Anne J. Molloy, A.I.M.S.W., and Henrietta S. M. Chater-Jack, A.I.M.S.W. (Pp. 104. 15s.). London: Heart and Chest Association.

THE authors of this little book have not made any attempt to describe the medical aspects or details of treatment of the common heart diseases, but nevertheless, they have managed to convey a considerable amount of helpful information. They use a series of case histories to illustrate handicaps and difficulties likely to be experienced by patients suffering from different types of heart disease. They suggest appropriate ways of preparing small children for hospital treatment, again through the medium of case histories, describing the role of parents and other members of the family in providing essential support without producing over-dependance.

As medical social workers the authors are able to provide much helpful inofrmation about possible sources of financial support where necessary. M.G.McG.

A PHYSIOLOGICAL APPROACH TO CLINICAL NEUROLOGY. By James W. Lance, M.D., M.R.C.P., F.R.A.C.P. (Pp. xi+246, 84s.). London: Butterworths.

IN his preface the author declares that however brilliant the physiological advances made in the understanding of other species, they are profitless for man until applied to him. This has been the problem of neurophysiology for a considerable time. The clinical neurologist has been nurtured in finding answers to the questions: "Where is the lesion?" and "What is the lesion?" In doing so recourse is made to anatomy and pathology and where these are inadequate to syndrome compilation and philosophy. Less attention has been given to analysing the signs and symptoms in diseases of the nervous system in terms of what is known in the human of the functioning of its individual parts. Some highly sophisticated experiments have been carried out in animals which cannot be uncritically referred to the human.

Dr. Lance has successfully attempted to redress the balance in this book. He keeps to his brief giving information on human physiology only and is not swayed from it when he deals with such subjects as posture, labyrinthine function and the muscle spindle, on which many eminent clinicians have floundered. The eleven chapters will interest a wide section of people. I was very impressed with the unpretentious photographs of clinical tests such as Hoover's sign on page 44, the illustration of involuntary movements and posture and the many line darwings and record traces from patients. The chapters on vertigo contains a clear explanation of the very complex physiological principles underlying the history taking and examination of patients with vertigo. The newer neuro-otological tests are briefly described in a way that allows the average neurologist to no longer regard them as part of neuro-oto-astrology. In the further editions which must surely follow perhaps the principles of the electromyogram could be more fully expounded and the contribution of psychology in the study of patients treated with brain-bisection, towards understanding the physiology of behaviour, elaborated.

This slim volume contains a great deal of facts which are a tribute to the author's concise and clear writing. I am sure many would gain by reading it. The medical student, both pre-clinical and clinical, would find the description of the reflex arc and the reticular formation less overwhelming than in many standard physiology textbooks. Those preparing for post-graduate degrees would be facilitated because basic medical science intermingles with classical clinical signs and the art of neurological examination is enhanced. This is a book to be read by the pre-clinical and clinical teacher to bring nearer a truly integrated curriculum. I would advise the clinical psychologist and the medical biologist to browse through its covers, even if only for a glimpse at the problem. Dr. Lance may describe himself as a clinical neurologist and an amateur physiologist but his book bridges a gap. L.J.H.

HEART TROUBLE IN THE FAMILY. By Anne J. Molloy, A.I.M.S.W., and Henrietta S. M. Chater-Jack, A.I.M.S.W. (Pp. 104. 15s.). London: Heart and Chest Association.

THE authors of this little book have not made any attempt to describe the medical aspects or details of treatment of the common heart diseases, but nevertheless, they have managed to convey a considerable amount of helpful information. They use a series of case histories to illustrate handicaps and difficulties likely to be experienced by patients suffering from different types of heart disease. They suggest appropriate ways of preparing small children for hospital treatment, again through the medium of case histories, describing the role of parents and other members of the family in providing essential support without producing over-dependance.

As medical social workers the authors are able to provide much helpful inofrmation about possible sources of financial support where necessary. M.G.McG.

CELL AND TISSUE CULTURE. By John Paul. 4th Edition. (Pp. xi+430; figs 60; plates 16. 45s.). Edinburgh and London: E. & S. Livingstone, 1970.

IT is now more than ten years since Dr. Paul introduced from the Tissue Culture Association's Summer School the idea, which is now well realised, that temporary or continuous multiplication of mammalian cells is practical laboratory politics. Since then his book has come to the fourth edition, and the unaltered arrangement of the book, following many advances, is a tribute to the partition of subjects in the earliest edition.

The parts deal with cell structure, preparation of materials, special techniques and, finally, applications of the method. There are now four very useful appendices dealing with formulae for media, commercial sources of materials, standard cell lines, and nomenclature.

Part one contains a necessary amount of theoretical information which is simply presented and kept well within bounds. Part two is full of practical advice, ranging from glass-cleaning to designing a tissue-culture laboratory, and will reassure the most timid of those who have previously been discouraged by imaginary difficulties. Part three deals with tissue culture, organ culture, cell culture and cloning and has a new chapter on large scale culture of cells. Part four has three chapters on a great variety of applcations including virological techniques.

All chapters have numerous and most apposite references to the literature of cell culture. Many line diagrams have been retained and the advantage to a novice of seeing where the carotid arteries of a bird may be found or what a "Cornwall" syringe is, need not be stressed.

The books is indispensible to those in a tissue-culture laboratory and the readers will find a lucid practical account in which theory and history are kept in proper perspective. K.B.F.

THE DEVELOPMENT OF THE INFANT AND YOUNG CHILD – Normal and Abnormal. By R. S. Illingworth. Fourth Edition. (Pp. xii+382; figs. 169. £2). Edinburgh: E. & S. Livingstone, 1970.

PROFESSOR Illingworth is surely the most prolific of paediatric authors. This textbook has reached its fourth edition in only a decade, and the latest version represents a considerable achievement, with extensive revision and the addition of a new section which indicates the limitations of developmental assessment. The author's experience and wisdom are evident throughout, so that it is difficult to find much to criticise, and full account is taken of work published as recently as 1969. There are excellent photographic illustrations, but some of the figures in the text are printed on too small a scale, while the examples of a child's drawing are frankly confusing, inasmuch as they indicate a mental age considerably in advance of the chronological age (perhaps the work of a young Illingworth?).

The book is essential reading for candidates for higher paediatric qualifications, and has no equal for this purpose.. In addition, no paediatrician employed by hospitals or local authorities can afford to ignore it, and family doctors will find it a mine of practical information. The style of writing makes it readily comprehensible to laymen, and the advice on child rearing, while perhaps a counsel of perfection, would be diffcult to better.

Recommended without reservation. J.A.D.

MEDICAL RESEARCH COUNCIL: ANNUAL REPORT, APRIL 1969—MARCH 1970. (Pp.vii+90. 9s. (45p)). London: H.M. Stationery Office, 1970.

THIS is a factual review of the aims and methods by which the Medical Research Council distributed over 19 million pounds on medical research. It lists all the advisory committees of the Council, and, in varying detail, the workers and institutes receiving support. It describes briefly in selective reviews some of the research supported by the Council. The more complete and instructive reviews of various aspects of medicine included in former reports are absent, and many of these accounts are so lacking in detail that they indicate only the broad avenue of approach and little of the results achieved or the background of the work.

The report will be of interest to those active in research, but of less general interest than the review sections of previous reports. J.E.M.

CELL AND TISSUE CULTURE. By John Paul. 4th Edition. (Pp. xi+430; figs 60; plates 16. 45s.). Edinburgh and London: E. & S. Livingstone, 1970.

IT is now more than ten years since Dr. Paul introduced from the Tissue Culture Association's Summer School the idea, which is now well realised, that temporary or continuous multiplication of mammalian cells is practical laboratory politics. Since then his book has come to the fourth edition, and the unaltered arrangement of the book, following many advances, is a tribute to the partition of subjects in the earliest edition.

The parts deal with cell structure, preparation of materials, special techniques and, finally, applications of the method. There are now four very useful appendices dealing with formulae for media, commercial sources of materials, standard cell lines, and nomenclature.

Part one contains a necessary amount of theoretical information which is simply presented and kept well within bounds. Part two is full of practical advice, ranging from glass-cleaning to designing a tissue-culture laboratory, and will reassure the most timid of those who have previously been discouraged by imaginary difficulties. Part three deals with tissue culture, organ culture, cell culture and cloning and has a new chapter on large scale culture of cells. Part four has three chapters on a great variety of applcations including virological techniques.

All chapters have numerous and most apposite references to the literature of cell culture. Many line diagrams have been retained and the advantage to a novice of seeing where the carotid arteries of a bird may be found or what a "Cornwall" syringe is, need not be stressed.

The books is indispensible to those in a tissue-culture laboratory and the readers will find a lucid practical account in which theory and history are kept in proper perspective. K.B.F.

THE DEVELOPMENT OF THE INFANT AND YOUNG CHILD – Normal and Abnormal. By R. S. Illingworth. Fourth Edition. (Pp. xii+382; figs. 169. £2). Edinburgh: E. & S. Livingstone, 1970.

PROFESSOR Illingworth is surely the most prolific of paediatric authors. This textbook has reached its fourth edition in only a decade, and the latest version represents a considerable achievement, with extensive revision and the addition of a new section which indicates the limitations of developmental assessment. The author's experience and wisdom are evident throughout, so that it is difficult to find much to criticise, and full account is taken of work published as recently as 1969. There are excellent photographic illustrations, but some of the figures in the text are printed on too small a scale, while the examples of a child's drawing are frankly confusing, inasmuch as they indicate a mental age considerably in advance of the chronological age (perhaps the work of a young Illingworth?).

The book is essential reading for candidates for higher paediatric qualifications, and has no equal for this purpose.. In addition, no paediatrician employed by hospitals or local authorities can afford to ignore it, and family doctors will find it a mine of practical information. The style of writing makes it readily comprehensible to laymen, and the advice on child rearing, while perhaps a counsel of perfection, would be diffcult to better.

Recommended without reservation. J.A.D.

MEDICAL RESEARCH COUNCIL: ANNUAL REPORT, APRIL 1969—MARCH 1970. (Pp.vii+90. 9s. (45p)). London: H.M. Stationery Office, 1970.

THIS is a factual review of the aims and methods by which the Medical Research Council distributed over 19 million pounds on medical research. It lists all the advisory committees of the Council, and, in varying detail, the workers and institutes receiving support. It describes briefly in selective reviews some of the research supported by the Council. The more complete and instructive reviews of various aspects of medicine included in former reports are absent, and many of these accounts are so lacking in detail that they indicate only the broad avenue of approach and little of the results achieved or the background of the work.

The report will be of interest to those active in research, but of less general interest than the review sections of previous reports. J.E.M.

CELL AND TISSUE CULTURE. By John Paul. 4th Edition. (Pp. xi+430; figs 60; plates 16. 45s.). Edinburgh and London: E. & S. Livingstone, 1970.

IT is now more than ten years since Dr. Paul introduced from the Tissue Culture Association's Summer School the idea, which is now well realised, that temporary or continuous multiplication of mammalian cells is practical laboratory politics. Since then his book has come to the fourth edition, and the unaltered arrangement of the book, following many advances, is a tribute to the partition of subjects in the earliest edition.

The parts deal with cell structure, preparation of materials, special techniques and, finally, applications of the method. There are now four very useful appendices dealing with formulae for media, commercial sources of materials, standard cell lines, and nomenclature.

Part one contains a necessary amount of theoretical information which is simply presented and kept well within bounds. Part two is full of practical advice, ranging from glass-cleaning to designing a tissue-culture laboratory, and will reassure the most timid of those who have previously been discouraged by imaginary difficulties. Part three deals with tissue culture, organ culture, cell culture and cloning and has a new chapter on large scale culture of cells. Part four has three chapters on a great variety of applcations including virological techniques.

All chapters have numerous and most apposite references to the literature of cell culture. Many line diagrams have been retained and the advantage to a novice of seeing where the carotid arteries of a bird may be found or what a "Cornwall" syringe is, need not be stressed.

The books is indispensible to those in a tissue-culture laboratory and the readers will find a lucid practical account in which theory and history are kept in proper perspective. K.B.F.

THE DEVELOPMENT OF THE INFANT AND YOUNG CHILD – Normal and Abnormal. By R. S. Illingworth. Fourth Edition. (Pp. xii+382; figs. 169. £2). Edinburgh: E. & S. Livingstone, 1970.

PROFESSOR Illingworth is surely the most prolific of paediatric authors. This textbook has reached its fourth edition in only a decade, and the latest version represents a considerable achievement, with extensive revision and the addition of a new section which indicates the limitations of developmental assessment. The author's experience and wisdom are evident throughout, so that it is difficult to find much to criticise, and full account is taken of work published as recently as 1969. There are excellent photographic illustrations, but some of the figures in the text are printed on too small a scale, while the examples of a child's drawing are frankly confusing, inasmuch as they indicate a mental age considerably in advance of the chronological age (perhaps the work of a young Illingworth?).

The book is essential reading for candidates for higher paediatric qualifications, and has no equal for this purpose.. In addition, no paediatrician employed by hospitals or local authorities can afford to ignore it, and family doctors will find it a mine of practical information. The style of writing makes it readily comprehensible to laymen, and the advice on child rearing, while perhaps a counsel of perfection, would be diffcult to better.

Recommended without reservation. J.A.D.

MEDICAL RESEARCH COUNCIL: ANNUAL REPORT, APRIL 1969—MARCH 1970. (Pp.vii+90. 9s. (45p)). London: H.M. Stationery Office, 1970.

THIS is a factual review of the aims and methods by which the Medical Research Council distributed over 19 million pounds on medical research. It lists all the advisory committees of the Council, and, in varying detail, the workers and institutes receiving support. It describes briefly in selective reviews some of the research supported by the Council. The more complete and instructive reviews of various aspects of medicine included in former reports are absent, and many of these accounts are so lacking in detail that they indicate only the broad avenue of approach and little of the results achieved or the background of the work.

The report will be of interest to those active in research, but of less general interest than the review sections of previous reports. J.E.M.

MODERN TRENDS IN PSYCHOLOGICAL MEDICINE – 2. Edited by John Harding Price. (Pp. ix+381. 110s). London: Butterworths. 1970.

READERS of modern psychiatric texts will be struck by the emergence of techniques of investigation that stand four square with any to be found in the rest of medicine. Arm chair philosophising is being steadily replaced by sophisticated methods of enquiry even in areas of human behaviour where the complexity and diversity of intervening variables present the most formidable problems facing any investigator. 'Modern Trends' presents a composite picture of advances on a broad front. In addition to the work of clinicians there are chapters dealing with psychology, ecology, social and administrative psychiatry, genetics, biochemistry, electrophysiology, neuro-anatomy and psychological methods of treatment. The extensive bibliographies to be found at the end of each chapter will provide psychiatrists with a valuable guide to a study in greater detail of many of the topics discussed. Neurologists, psychiatrists and general physicians will find much to interest them in these pages. Anorexia nervosa, a condition that often receives scant attention in general texts, is thoroughly discussed from every aspect, including treatment and will be of great value to physicians and psychiatrists alike. The chapter dealing with the pathological anatomy of the temporal lobe draws attention to infective and neoplastic causes of recent memory disorder whilst the debate regarding reactive and endogenous depression is taken a stage further. Regarding treatment, it is interesting that pharmacological remedies were not dealt with in a seperate chapter, as were some psychological procedures. There could be several explanations for this, but perhaps it was felt that they could be dealt with more appropriately within the broader context of other measures used in the treatment of those conditions described.

This is a book that will be read with interest by physicians who want to know what is happening in their sister speciality. Psychiatrists will find it useful as will those preparing for higher examinations.

J.G.G.

MODERN TRENDS IN GASTROENTEROLOGY—4. Edited by W. I. Card and B. Craemer. (Pp. ix+373; illustrated. £4.75). London: Butterworth, 1970.

THIS is the fourth series Modern Trends in Gastroenterology. In this series Dr. Wilfred Card has been joined by Dr. Brian Craemer as joint Editor. Dr. Craemer has a wide interest in and experience of small intestinal disease and this may explain the emphasis of the present series. Of 16 chapters, 12 are devoted wholly to small intestinal disease and 4 deal with conditions such as Crohn's disease or intestinal tuberculosis which largely involve the small intestine. As a current review of small intestinal disease this book is very valuable and the treatment of such growing points as the study of the bacteria of the small intestine by Dr. Tabaqchali and Professor Booth and of Crohn's disease by Dr. J. Lennard Jones is particularly helpful.

It is, however, unfortunate that wide areas of gastroenterology are not mentioned. There is no discussion of the important changes in understanding of the mechanism of gastro-oesophageal reflux and its control. Nothing is said about advances in the medical or surgical treatment of peptic ulcer and that important endodermal diverticulum, the liver, is scarcely mentioned. One would have thought that, for example, the recent advances in virology relating to hepatitis would have been worthy of a chapter.

The Editors state that the volume does not aim to be comprehensive. However, the selection is so restricted as to belie the title of the series. At £4.75 it is an expensive review of recent small intestinal studies.

A.M.C.

MODERN TRENDS IN PSYCHOLOGICAL MEDICINE – 2. Edited by John Harding Price. (Pp. ix+381. 110s). London: Butterworths. 1970.

READERS of modern psychiatric texts will be struck by the emergence of techniques of investigation that stand four square with any to be found in the rest of medicine. Arm chair philosophising is being steadily replaced by sophisticated methods of enquiry even in areas of human behaviour where the complexity and diversity of intervening variables present the most formidable problems facing any investigator. 'Modern Trends' presents a composite picture of advances on a broad front. In addition to the work of clinicians there are chapters dealing with psychology, ecology, social and administrative psychiatry, genetics, biochemistry, electrophysiology, neuro-anatomy and psychological methods of treatment. The extensive bibliographies to be found at the end of each chapter will provide psychiatrists with a valuable guide to a study in greater detail of many of the topics discussed. Neurologists, psychiatrists and general physicians will find much to interest them in these pages. Anorexia nervosa, a condition that often receives scant attention in general texts, is thoroughly discussed from every aspect, including treatment and will be of great value to physicians and psychiatrists alike. The chapter dealing with the pathological anatomy of the temporal lobe draws attention to infective and neoplastic causes of recent memory disorder whilst the debate regarding reactive and endogenous depression is taken a stage further. Regarding treatment, it is interesting that pharmacological remedies were not dealt with in a seperate chapter, as were some psychological procedures. There could be several explanations for this, but perhaps it was felt that they could be dealt with more appropriately within the broader context of other measures used in the treatment of those conditions described.

This is a book that will be read with interest by physicians who want to know what is happening in their sister speciality. Psychiatrists will find it useful as will those preparing for higher examinations.

J.G.G.

MODERN TRENDS IN GASTROENTEROLOGY—4. Edited by W. I. Card and B. Craemer. (Pp. ix+373; illustrated. £4.75). London: Butterworth, 1970.

THIS is the fourth series Modern Trends in Gastroenterology. In this series Dr. Wilfred Card has been joined by Dr. Brian Craemer as joint Editor. Dr. Craemer has a wide interest in and experience of small intestinal disease and this may explain the emphasis of the present series. Of 16 chapters, 12 are devoted wholly to small intestinal disease and 4 deal with conditions such as Crohn's disease or intestinal tuberculosis which largely involve the small intestine. As a current review of small intestinal disease this book is very valuable and the treatment of such growing points as the study of the bacteria of the small intestine by Dr. Tabaqchali and Professor Booth and of Crohn's disease by Dr. J. Lennard Jones is particularly helpful.

It is, however, unfortunate that wide areas of gastroenterology are not mentioned. There is no discussion of the important changes in understanding of the mechanism of gastro-oesophageal reflux and its control. Nothing is said about advances in the medical or surgical treatment of peptic ulcer and that important endodermal diverticulum, the liver, is scarcely mentioned. One would have thought that, for example, the recent advances in virology relating to hepatitis would have been worthy of a chapter.

The Editors state that the volume does not aim to be comprehensive. However, the selection is so restricted as to belie the title of the series. At £4.75 it is an expensive review of recent small intestinal studies.

A.M.C.

THE HUMAN KIDNEY. WHAT EVERYONE SHOULD KNOW. By James F. Mowbray, M.B., B.Ch., M.R.C.P. and Richard A. Parker, M.D. (Pp. 58. 12s.). London: Chest and Heart Association, 1970.

THIS little book of 57 pages, according to its title has been written for everyone, but readers without previous knowledge of the kidney would find it difficult reading. In a book of this type the information needs to be presented in very simple form, in non-technical language, with ample clear illustrations.

This books contains five illustrations, most of which are not particularly helpful for the type of reader envisaged. One illustration is a microphotograph of the renal cortex and another an electron microphotograph of tubules, neither of which could convey much to the uninitiated reader Renal histology can be of little value to those who are unaware of the normal anatomical relationships of kidneys, ureters, bladder, prostate and urethra, but a simple diagram showing these relationships has not been included. The section on dialysis would have been clearer had a simple diagrammatic representation of an artificial kidney been given and indeed the text refers to such a figure, but it in fact shows arterial and venous tubules leading from a shunt along a limb.

From the viewpoint of the more informed reader, there are a number of sweeping statements almost amounting to inaccuracies. At least one dangerously misleading statement is made "dialysis is now common practice in any hospital"... a statement which is clearly untrue and minimizes the amount of accurate "know-how" required for dialysis therapy to be successful.

A simple factual book describing the anatomy and functions of the kidney, containing a very brief outline of the main types of kidney disease, would be of value for the now numerous people without medical or nursing training who work in association with real units. Such a book might also be useful for the families of patients suffering from terminal renal disease. Perhaps it could be written more easily by a renal physician, with his more continuous need to explain his work to lay people, than by authors working with research backgrounds in immunopathology and pathology, however distinguished they may be. M.G.McG.