VOLUME 44 1975 No. 2

THE ULSTER MEDICAL JOURNAL

PUBLISHED BY
THE ULSTER MEDICAL SOCIETY

The Ulster Medical Journal

VOLUME 44

PUBLISHED BY
THE ULSTER MEDICAL SOCIETY
1975

CONTENTS

CONTENTS

Fellows and Members of the Ulster Medical Society receive the Journal Free. Details as to subscriptions on back page.

This publication is available in microfilm from Xerox University Microfilms, 300 North Zeeb Road, Ann Arbor, Michigan 48106

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 alterations in printer's proof in excess of 50p per sheet (16 pages).

3. References should be restricted to those really necessary, and useful and cited as in the publications of the British Medical Association and in most modern British journals. Either the full title of a journal or its correct abbreviation as given in *World List of Scientific Periodicals* or *World Medical Periodicals* should uniformly be employed.

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 may be charged for all blocks at cost price.

5. Orders 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, Professor 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:

Tradepress, 10 Kinnaird Street, Belfast BT14 6BE.
Telephone 746757

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.

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 is the direct descendant of the Belfast Medical Society founded in 1806), 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.* The Society will soon be rehoused in its own Rooms (in the new buildings at the Medical Biology Centre) which will replace the Whitla Medical Institute which had to be vacated in 1965.

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 know any Fellows please contact the Honorary Secretary. All persons registered as medical practitioners under the Medical Acts shall be eligible for election as members of the Society (Constitution, Section VI). Temporary membership may be allowed at the discretion of the Council.

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 £2.00 per annum, payable in advance to the Honorary Treasurer.

J. E. MORISON, *President.*
D. R. HADDEN, *Hon. Secretary.*
N. C. NEVIN, *Hon. Treasurer.*

MEMBERS **£1.5.** (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, **£3.15;** (b) husbands and wives in the above category who are both Fellows will be entitled to pay a combined subscription of **£4.20;** 2 (a) annual subscription of Fellows resident, practising or holding an appointment outside the above area, **£2.10;** (b) husbands and wives in the above category who are both Fellows will be entitled to pay a combined subscription of **£3.15;** 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 **£1.15** 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, **£31.50.**

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 £2.00 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.

CONTENTS

Fellows and Members of the Ulster Medical Society receive the Journal Free. Details as to subscriptions on back page.

This publication is available in microfilm from Xerox University Microfilms, 300 North Zeeb Road, Ann Arbor, Michigan 48106

THE
ULSTER MEDICAL JOURNAL

PUBLISHED ON BEHALF OF THE ULSTER MEDICAL SOCIETY

VOLUME 44 1975 No. 2

THE HISTORY OF THE CHAIR OF MIDWIFERY AND GYNAECOLOGY IN THE QUEEN'S UNIVERSITY OF BELFAST

by

EMERITUS PROFESSOR C. H. G. MACAFEE, C.B.E., LL.D. (Belfast), D.Sc. (Leeds), F.R.C.S., F.R.C.O.G.

IN 1835 a Medical School was established at the Royal Belfast Academical Institution and in 1837 it was recognised by the Faculty of Physicians and Surgeons, Glasgow, the College of Surgeons, London, the Apothecaries Hall, Dublin and the College of Surgeons, Dublin. Dr. Robert Coffey was appointed Professor of Surgery but left to go to Dublin without ever giving any lectures. He was succeeded by Dr. Thomas Ferrar who also resigned before giving any lectures and was followed by Professor Coffey. The appointments of Thomas Andrews to the Chair of Chemistry, James D. Marshall to that of Materia Medica and Pharmacy and Robert Little as Professor of Midwifery and Diseases of Women and Children completed the establishment of the Medical Faculty with Professor Drummond, the Professor of Anatomy, as first President.

The clinical experience provided for the students was such that it was thought possible for them to be accepted for examination for degrees at London University. It is stated "the students of midwifery have had an unusually large number of cases to attend". In John Jameson's History of the Royal Belfast Academical Institution it is stated "There was momentary embarrassment when it was found that Dr. Little, Professor of Midwifery, was issuing certificates to his students on his own responsibility, thus by-passing the Faculty, and that some students were proposing to use these certificates as Diplomas entitling them to set up in practice. However, the resignation of Dr. Little shortly after saved the situation".

Between 1836 and 1849 when Queen's was established the Medical School turned out about 600 students (Jameson).

Dr. Burden was the only child of a Dr. Henry Burden and was born in India in 1798. On the death of his father and mother, when he was twelve years old, he came

to Belfast to live with his aunts, the Misses Burden. After being apprenticed to business he gave this up and studied medicine under Dr. McDonnell in the Old General Hospital. He then proceeded to Glasgow where he gained his M.D. and returned to Belfast about 1830. For a short time he practised in Newry, but in 1833 he settled in Belfast and was appointed to the staff of the Lying-in Hospital in 1837. When Dr. Little retired in 1840 he was succeeded by Dr. Burden. His appointment to the medical staff of the Lying-in Hospital in 1837 had an important bearing, not only on the Hospital, but also on its future association with the School at the Academical Institution and the Queen's College, when the latter was founded in 1849. In the annual report of the Hospital in 1839 it is recorded "that during the absence of Dr. Burden on a professional tour, on two occasions Dr. Stephenson and Dr. Andrews took charge of the Hospital." It is more than likely that the occasion of the "tour" was to ascertain the teaching arrangements and facilities in other medical schools and Hospitals and to further his candidature for the Chair should it become vacant. In 1849, on the opening of the Queen's College, the Institution closed its medical school, and Professor Burden was one of the medical professors who was successful in obtaining a Chair in the new College.

At this stage the medical curriculum only extended over four years, and an ordinance of 1852 arranged that the lectures on Midwifery should be given on four days per week for six months and, in addition, the candidates must have attended "Practical midwifery at a recognised Midwifery Hospital, with the clinical lectures therein delivered, for a period of three months, in a hospital containing not less than thirty beds; or six months in a hospital containing not less than fifteen beds." It is perhaps difficult nowadays to appreciate what an advance the above regulation envisaged and what it would actually have meant had it been supported by legal means. At that time the General Medical Council had not been established. The Medical Act doing so was not passed until 1858. Although the Irish Medical Schools demanded the requirements for practical training in Midwifery mentioned, it was not until 1886 that a new Medical Act was passed, and for the first time Midwifery is mentioned as a necessary subject for qualification. Up to this, it was possible in some English medical schools to qualify without being examined in Midwifery, and no practical course was required or enforced.

Dr. Burden's curriculum for his systematic lectures is given in Figure 1. He also had instructions for his practical class, of which only one copy remains in existence (Figure 2). Professor Burden instructed his students to visit their patients weekly before delivery. Had he mentioned the importance of this visit and the necessity for testing the patient's urine, he would occupy the position in obstetrics now associated with the name of Ballantyne. The curriculum contains no reference to gynaecology, but one must remember that gynaecology as a separate subject had only celebrated its seventh birthday in 1852 and as such was not yet generally recognised.

Up to 1855 Professor Burden was the only recognised member of the staff of the Hospital, but having secured the admission of medical students he next proceeded to advocate the appointment of additional members of staff. Reference to this achievement is made in a letter which has fortunately been preserved and the following quotation is taken from this letter:

MIDWIFERY

PROFESSOR WILLIAM BURDEN, M.D.

Lectures four times a week, during the winter months, consist of the following subjects: —

Anatomy of the Pelvis, so much as is required for Midwifery. Its measurement and pelvimeters.

Contents of the Pelvis. The functions of the Uterus in its virgin state.

Conception—Length of Gestation—Changes of the Uterus and its apendages during Gestation.

Growth of Child from its earliest seen form until its full Parasitic size.

Graafian Vesicle and Corpus Luteum. Foetus, its Circulation, Signs of Maturity, Weight and Length.

Plural Births.

Proportion of Births and Deaths of Males to Females.

Superfoetation.

Signs of Pregnancy.

Signs of approaching Labour.

Natural Labour, its Progress, also Positions and Progress of Child till its separation from its Mother.

Management of Normal Labour, including the arrangement of the bed and bedroom, and the proper Dress and Posture of the Patient.

Tedious Labour, its Causes and Treatment.

Labour requiring the use of Instruments; their application taught on Models in the Class.

Caesarean Section and Sequltean Operation*—How to prevent the Foetus getting large in the Uterus.

Premature Labour—How to bring it on, and when it is necessary to do so.

Cross Births and their Treatment.

Abortion—How to Prevent it.

Extra Uterine Foetations—How they occur, and their Treatment.

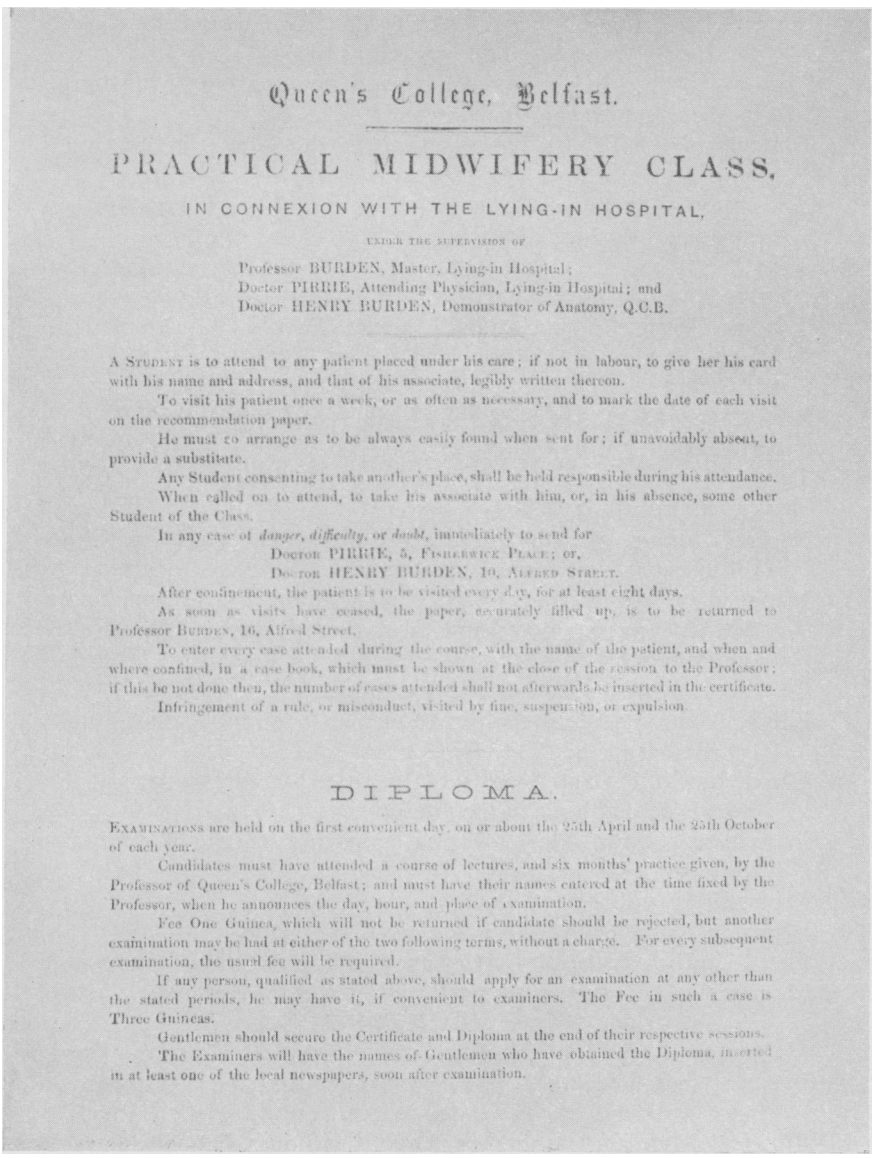
Management of Women after Delivery, and Treatment of such Accidents and Diseases at this period.

Management of Children after Birth, Washing, Dressing, Food, etc., and the choice of a Wet Nurse, and the Treatment of such accidents as take place at this period, or soon after.

Practical Midwifery taught by Pupils attending Patients in their own houses and in the Lying-in Hospital.

* Sigaultean operation.

FIG. 1



Queen's College, Belfast.

PRACTICAL MIDWIFERY CLASS,

IN CONNEXION WITH THE LYING-IN HOSPITAL,

UNDER THE SUPERVISION OF

Professor BURDEN, Master, Lying-in Hospital;
Doctor PIRRIE, Attending Physician, Lying-in Hospital; and
Doctor HENRY BURDEN, Demonstrator of Anatomy, Q.C.B.

A STUDENT is to attend to any patient placed under his care; if not in labour, to give her his card with his name and address, and that of his associate, legibly written thereon.

To visit his patient once a week, or as often as necessary, and to mark the date of each visit on the recommendation paper.

He must so arrange as to be always easily found when sent for; if unavoidably absent, to provide a substitute.

Any Student consenting to take another's place, shall be held responsible during his attendance.

When called on to attend, to take his associate with him, or, in his absence, some other Student of the Class.

In any case of *danger*, *difficulty*, or *doubt*, immediately to send for

DOCTOR PIRRIE, 5, FISHERWICK PLACE; or,
DOCTOR HENRY BURDEN, 10, ALFRED STREET.

After confinement, the patient is to be visited every day, for at least eight days.

As soon as visits have ceased, the paper, accurately filled up, is to be returned to Professor BURDEN, 16, Alfred Street.

To enter every case attended during the course, with the name of the patient, and when and where confined, in a case book, which must be shown at the close of the session to the Professor; if this be not done then, the number of cases attended shall not afterwards be inserted in the certificate.

Infringement of a rule, or misconduct, visited by fine, suspension, or expulsion.

DIPLOMA.

EXAMINATIONS are held on the first convenient day, on or about the 25th April and the 25th October of each year.

Candidates must have attended a course of lectures, and six months' practice given, by the Professor of Queen's College, Belfast; and must have their names entered at the time fixed by the Professor, when he announces the day, hour, and place of examination.

Fee One Guinea, which will not be returned if candidate should be rejected, but another examination may be had at either of the two following terms, without a charge. For every subsequent examination, the usual fee will be required.

If any person, qualified as stated above, should apply for an examination at any other than the stated periods, he may have it, if convenient to examiners. The Fee in such a case is Three Guineas.

Gentlemen should secure the Certificate and Diploma at the end of their respective sessions.

The Examiners will have the names of Gentlemen who have obtained the Diploma, inserted in at least one of the local newspapers, soon after examination.

FIG. 2

"In the following year (1853) a deputation of medical men awaited upon the ladies, and represented that it would improve the position of the Charity and make it more generally known and useful, were the ladies to permit them to join and lecture to students in attendance."

Following this, a medical staff was formed composed of: —Professor W. Burden, described as Master, Dr. R. F. Dill, Dr. J. M. Pirrie and Dr. A. G. Malcolm as secretary and registrar.

The advent of a medical staff and medical students produced a reaction from various quarters, first, from the Charitable Society, the ground landlords of the Hospital. The ladies who founded the Hospital were granted the plot of ground on which the Hospital was built free of charge on condition that it was not used for any other purpose. The Charitable Society now claimed a rent of fifteen pounds per annum on the grounds that, having converted the Institution into a training school for medical students, they were using the Hospital for a purpose for which it was not intended. The managers of the Charitable Society stated that "they have no wish to make a profit out of the Hospital, but will not allow others to do so."

That the feeling against the admission of medical students was intense is shown by the following letter written by Bishop Knox, then Lord Bishop of Down, to the then secretary of the Hospital: —

"Madam,—In reply to your letters soliciting Mrs. Knox's subscription to the Lying-in Hospital I think it right to mention that I consider that Institution has quite altered its character since Mrs. Knox sub.: and I am borne out in this view by a long discussion we had on this subject at the Charitable Society last Saturday. I now find it is a Medical School where students may pay fees for instruction and it is more of a private speculation than a free Institution. Under these circumstances I would require further information before I ask Mrs. Knox to sub.

I am, yours truly,
R. B. Down

The contractions are the Lord Bishop's and in spite of his narrow-minded retrogressive attitude, we are indebted to this prelate because his short letter drew from the ladies a reply which covers six pages of closely written foolscap of great historical value including the following: —

"We shall now state a few of the advantages we feel the Hospital derives from its connexion with a medical staff and attendant students. In the first place we have the *constant* and unpaid attendance of one of the Medical Staff which is a very great advantage, indeed we know that it was owing to the skill and attention received from these medical men that several poor women's lives were saved during the past three years, then the Students who attend have been most kind and attentive at all times to the poor, and when there could not be an efficient nurse procured, their attendance was of the greatest importance."

The ladies had accepted a medical staff and students against their wishes, but when they found that the Charitable Society wished to force them to dispense with what they had acquired they, assisted by Professor Burden, fought the Society tooth

and nail. The dispute was ultimately settled by the Hospital paying an annual nominal rent of £3.3s. However the Charitable Society did not forget this incident, as in 1900 the Society took a High Court action to evict the ladies from the site.

Now, although these ladies had professed such kindly feelings for the medical staff and students while defending *themselves* in public against the Charitable Society, they did not show the same gratitude towards them in private, for, in 1858, they wrote a letter to Professor Burden demanding an annual payment from each member of the staff for the privilege of attending the Hospital.

The medical staff objected, "as (in their own words) we had no idea that, after having so long attended the Hospital we should now be required to pay for attendance." They stated that if the ladies persisted in this attitude, "we must try to get from each student who may hereafter attend the Hospital, half-a-guinea extra." Robbing Peter to pay Paul!

The reply to this was as usual very lengthy, and included the following passage: —

25 Chichester Street,
Jany, 31st, 1859.

"My Dear Sir,—I read your letter of the 31st ult. to the Ladies who met at the Hospital on Monday, 3rd inst., and in reply I have been instructed to say that they feel it to be their duty as Trustees for the funds of that Charity, to insist upon the payment of a small sum by each student who receives the accommodation of the Hospital.

"The very small sum which they now demand will not cover the additional expenses for coal and light, not to speak of the losses in subscriptions which they have met with in consequence of admitting the Medical Men and Students, and also the additional trouble and expense incurred by cleaning after them.

"In consideration of these things, the Committee feel bound as Trustees to guard the funds from being encroached upon or diverted from their legitimate object, which is the relief of poor women, and the Hospital being founded for that object alone, it cannot be considered as a proper disposal of the funds to expend them for the accommodation of Medical Students who cannot in any way be regarded as objects of charity."—and so on for three more pages.

At this period the training of nurses for maternity work was in chaos. The fully-qualified midwife, as we know her today, was non-existent, and the majority of cases only received the attention of a "handy woman," who attended cases by virtue of the fact that she probably had had several children herself and had been present at the confinements of many of her neighbours. Those who took the trouble to acquire any training in a maternity hospital were in the minority, and practised by virtue of a certificate presented by the hospital in which they were trained. There was no Central Examining Body until 1905, although the London Obstetrical Society granted a diploma by examination from 1872.

The Belfast Lying-in Hospital had for a short period before Professor Burden's regime admitted women for training, but this arrangement had lapsed. Owing to frequent appeals from doctors in the city for properly trained midwives, Professor

Burden had evidently tried to have the training of midwives revived, but it would appear from a letter that he had been unsuccessful. He was not prepared to confess defeat, so he admitted a Mrs. Hamil for training with the status of a medical student, charging her a student's fee and giving her private tuition as "she had to be instructed alone."

The two letters in existence concerning this incident are amusing, especially as one of them was written by ladies about a member of their own sex.

The ladies, while allowing the nurse to be admitted, objected to this step on two counts. First, they stated that "It was with considerable reluctance that the Ladies revived the old custom of admitting nurses into the Hospital, as it had generally been productive of great annoyance." Secondly they regarded the charging of a students' fee as an imposition and the private tuition as unnecessary "When they know it is impossible a woman could require or would be capable of receiving so much instruction."

Professor Burden's reply consisted of a very dignified, but nevertheless pointed endeavour to tell the ladies to mind their own business.

The incident reveals the pertinacity of Professor Burden, but in spite of this, it was not until 1879 that the training of nurses was regarded as one of the necessary and important functions of the Hospital—a function to which the ladies on many occasions refer with pride.

Professor Burden by this action had done two things. First, by charging a students' fee he was endeavouring to secure a better type of nurse for the work than had hitherto been possible; and secondly, he had instituted lectures to midwives, which have continued since in spite of the ladies' opinion that women would be incapable of receiving so much instruction.

It will be noted that Dr. Burden mentioned that the nurse had to be instructed alone. This refers to the fact that she could not attend the clinical lectures to students which he had instituted in 1857. In one of the two medical reports of this period it is noted that "Clinical Lectures were delivered weekly by Drs. Pirrie and Dill, and at the end of each Session, all the attending Students received certificates for regular attendancy at Lectures and assiduous attention to both intern and extern practice."

Professor Burden retired from the Chair in 1867, although his name appears in connection with the Hospital until 1869. During his eighteen years as professor he accomplished much in the face of narrow-minded opposition. He secured the admission of medical students and nurses to the Hospital, arranged and supervised their training, instituted a visiting medical staff, and attempted to procure a type of government for the Hospital which was only defeated by the machinations of the Charitable Society. His type of control in its essentials was that adopted by a later authority in 1901. In spite of his great achievements, he was allowed to retire from the Hospital without a single note of regret only a simple statement that he had removed from Belfast. The president of the College at the time went one better, and did not even mention that he had retired!

Following the retirement of Professor Burden, Professor R. F. Dill was appointed

Professor of Midwifery. Professor Dill, a son of the manse, belonged to a distinguished Ulster family to which a wartime Chief of Imperial Staff, General Sir John Dill, and an Ulster Minister of Home Affairs, Sir Dawson Bates also belonged. He was born in Castlefin, Co. Donegal, and for a short time practised with his uncle, Dr. Marcus Dill, in Limavady. He had qualified in Glasgow, and perhaps his inclination towards an obstetric career may have been influenced by the fact that he was, at one stage, associated with Sir James Young Simpson of chloroform fame.

In 1881 the Ulster Hospital, then situated in Fisherwick Place, decided to devote ten beds to the diagnosis and treatment of diseases of women and to appoint a midwife for domiciliary midwifery. A Dr. Elder and Dr. Spedding were to take charge of gynaecology and to collaborate with four dispensary doctors, Torrens, Clements, Wadsworth and Coates, for midwifery. Professor Dill, who held the Chair of Midwifery, joined the staff in a consulting, but most active, capacity. There were no maternity beds in the hospital but the midwifery was taught in collaboration with the four dispensary doctors mentioned. The dispensary doctors were allocated two students each and their training was carried out under the overall supervision of Professor Dill. Professor Dill at this time lived in Fisherwick Place, and therefore was in close contact with the hospital.

When one thinks of the amount of work involved in his University lectures, his civic duties (because remember riots were common in Belfast during this period, and during one of them he lost an eye), and his extensive general practice, it is surprising that he lived to the ripe old age of eighty-one, having held the Chair for twenty-six years.

During this time the Hospital passed through a phase when its position in the eyes of the public and also of the medical students generally deteriorated. I venture to suggest that an important factor in this loss of prestige was that the Hospital had ceased to have any official connection with the College, although it was still a recognised training school.

Professor Dill had no connection with the Hospital during the years he occupied the Chair, and since his successor, occupied the Chair for nine years before he was appointed to the staff in 1902—for thirty-four years (1868–1902) the Hospital and College were not professionally allied.

In 1893 Professor Dill died. This was the centenary year of the Hospital, and the name was changed from the Belfast Lying-in to the Belfast Maternity Hospital and remained so until 1900, when, in order to obtain legal status, the name was again changed to the Incorporated Belfast Maternity Hospital.

On the death of Professor Dill, Dr. John Byers was appointed to the Chair. Professor Byers, like his predecessor, was a son of the manse, and his association with educational establishments was hereditary, as his mother was the founder and first principal of Victoria College, Belfast. He had many interests outside medicine, and his main hobby was the study of the Ulster dialect. In a paper on this, he pointed out that in 1887 for an Englishman to read Shakespeare, he would require a glossary of two thousand words, whereas an Ulsterman would only require a

glossary of two hundred words, as so many Shakespearian words were in constant daily use.

Professor Byers held the Chair for nine years before being appointed Junior Assistant Physician in 1902. His appointment to the staff was not unopposed and he was only allowed to take part in the extern duties of the Hospital, and then only in alternate months. This meant that he attended the Hospital for only six months of every year, and had no facilities for giving instruction to medical students on midwifery in the Hospital, as the extern department of which he had charge only saw gynaecological patients. The only occasions on which it was possible for him to give practical instruction to his students was when summoned to emergencies on the Hospital district.

In the year 1900, the Charitable Society again raised its head and attempted to evict the Ladies' Committee. In view of this dispute it was decided to rebuild on a new site. After various sites had been considered, it was decided by the Board of Governors to build in Townsend Street. The Hospital there, later occupied by Melville Ltd., a firm of undertakers, was opened for the reception of patients on 7th November, 1904; it cost £9,682 and contained twenty-six beds. This site was chosen against the wishes of the medical staff, and finally, having raised their objections, they seem to have washed their hands of the scheme. One must remember that at this stage the active medical staff, even though it had as one of its members the professor of midwifery, had no representative on the governing body. From the minutes of the time one gathers that the medical staff was regarded as a necessary encumbrance of the Hospital, and some of its members were occasionally allowed to "wait upon" those who controlled it. In the matter of the site their advice was not taken.

It was not until 1904 that a resident house-surgeon was appointed, and then only after repeated appeals by the medical staff. The first house-surgeon was Dr. Massy Burnside, who became a well known practitioner in Belfast. The post was entirely unpaid for many years.

In 1907 the house-surgeon was Dr. C. G. Lowry, who is distinguished by the fact that he is almost the only house-surgeon who is *not* mentioned in the medical report as having given "entire satisfaction." His reforming activities, even at this stage, must have disturbed the equanimity of the Hospital.

It was not until the year 1908 that Sir John Byers was allowed to take any official part in the wards. This was after some pressure by the Board of Governors and was only temporary. It is therefore easy to explain why the attendance of students at the Hospital gradually diminished from the beginning of the century until in 1918 only £2. 1s. 9d. was received as students' fees.

On the death of Sir John Byers in 1920, the Chair of Midwifery and Gynaecology was divided, Dr. C. G. Lowry (Figure 3) being appointed Professor of Midwifery and Dr. R. J. Johnstone (later Sir Robert Johnstone) Professor of Gynaecology. Professor Lowry had been an unsuccessful applicant for a vacancy on the staff of the Maternity Hospital in 1909 but on his appointment as Professor the Board of Governors invited him to join the staff. In view of the treatment received by his predecessor, Sir John Byers, he only accepted the invitation subject to certain con-

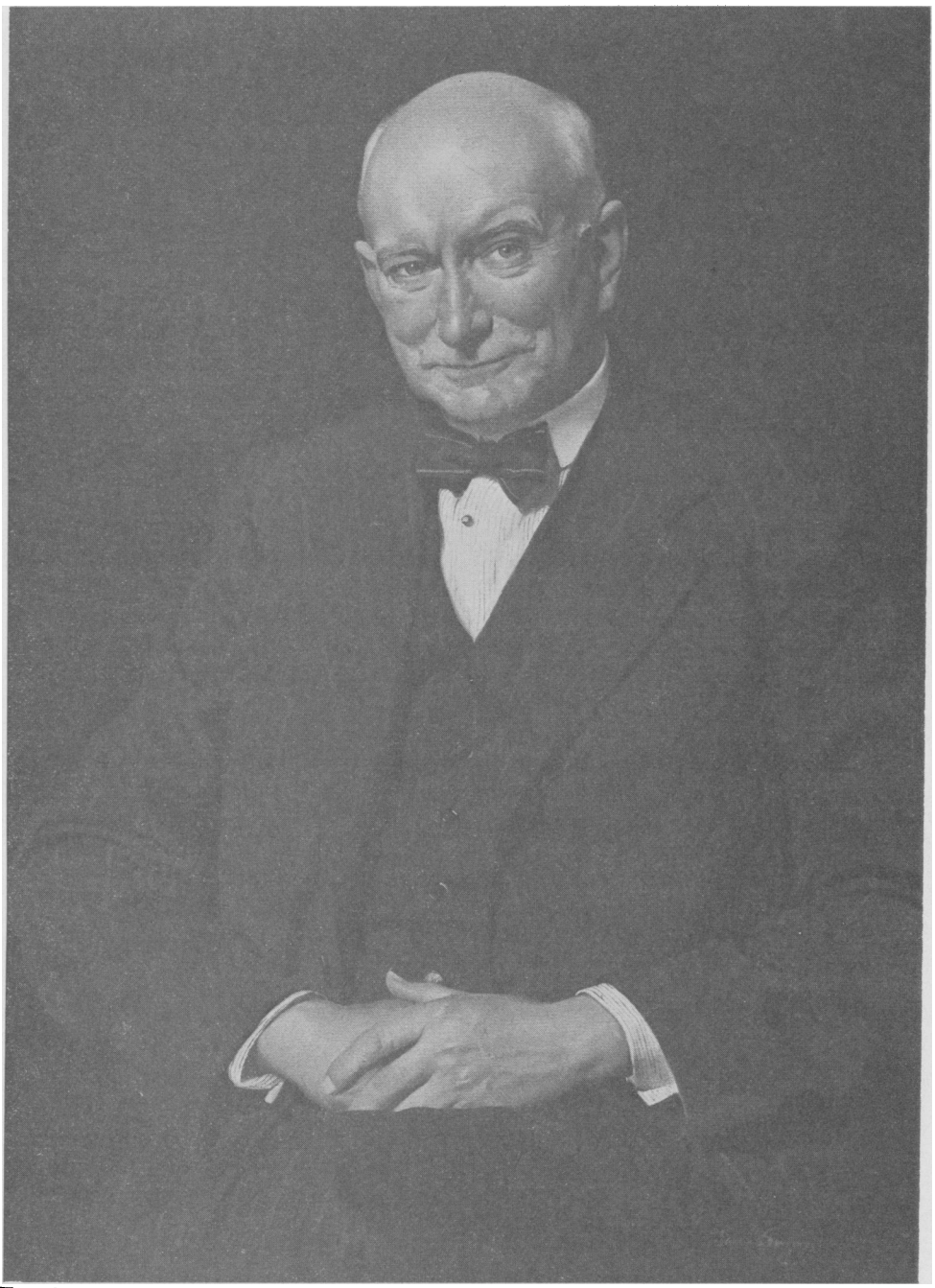


FIG. 3

ditions to which the Governors agreed. One of these was that he should be Chairman of Staff and have access to beds. Professor R. J. Johnstone had been a member of Staff from 1906, but had resigned in 1920 on being appointed to the Chair of Gynaecology, and the other members of Staff were all general practitioners. Professor Lowry arranged a rota of duty for each member of Staff which meant a great deal more work for them. They were not prepared to give this amount of time and service to the hospital and so they resigned.

Professor Lowry's advent on the staff is reminiscent of Professor Burden's. Within five years of his appointment the medical staff had two representatives on the Board of Governors where previously there had been none; an antenatal clinic had been inaugurated; the medical staff with one exception were all consultants, there were four clinical assistants, and the connection with the University had been increased by the appointment in 1923 of a University tutor* and the opening of a residence for students.

In 1924 the University, at the instigation of Professor Lowry, purchased 64–66 Townsend Street just opposite the hospital. These houses were renovated, one for the accommodation of some nine students and the other for a house-keeper and her husband, Mr. and Mrs. Moorehead, and for the Tutor in Obstetrics. There was no lecture theatre or room large enough to accommodate all the students who wished to attend the Professor's clinical lectures so these were held on the lobby on the first floor of the hospital outside the labour ward and the lying-in wards.

The improvements which took place in the Hospital and in the facilities for students meant that the demand on the accommodation in both departments exceeded any extension possible on the existing site. The medical staff, influenced by Professor Lowry, was anxious for the hospital to be amalgamated with Royal Victoria Hospital, whereas some influential members of the Board of Governors were anxious to ensure that it should not be moved from the site in Townsend Street and actually purchased a neighbouring piece of ground on which the Hospital was to be extended.

From the time of his appointment to the Chair, but especially from about 1925 onwards, Professor Lowry with the help and encouragement of the then Professor of Medicine, Dr. James Lindsay, who at this time was Chairman of the Board of Governors, started a campaign to secure a site in the Royal Victoria Hospital complex.

In 1926 Professor Lowry went to Canada and the U.S.A. at his own expense to see the most recently built maternity hospitals. The Marquis of Dufferin and Ava who at that time was Chairman of the Board of Governors of the Royal Victoria Hospital was about to visit Canada and before he went in 1927 Professor Lowry brought him to see Townsend Street Hospital and on that occasion suggested that the Marquis visit the Maternity Hospital in Toronto as well as some other hospitals that Professor Lowry considered worth visiting. When Lord Dufferin returned he was interviewed by the Press and remarked that "Belfast should be ashamed of its

---

* Dr. C. H. G. Macafee was the first University Tutor in Obstetrics holding the post from 1923 till 1925.

City Hall". When the astonished reporter enquired why, Lord Dufferin replied "A city that has a maternity hospital like Townsend Street and a city hall such as they have should be ashamed".

When Professor Lowry proposed the amalgamation of the Royal Victoria Hospital and the Maternity Hospital at a Staff meeting some time later in 1926 or early 1927, one of the Senior Physicians of the Hospital during the discussion got up and proposed "That this matter be discussed that day a year hence". This was accepted and Professor Lowry's proposal was turned down. His reply was "I always knew that physicians were only interested in obstetricians when their wives were having babies. Now that you are all past that . . . ! ! "

In March, 1927, at an annual meeting of the Maternity Hospital chaired by Professor Lindsay the principal speaker was the Right Honourable John Millar Andrews, Minister of Labour and later Prime Minister. To the surprise of everyone Mr. Andrews pointed out that the present hospital was incapable of dealing with the number of patients presenting themselves and suggested the move to the Royal site from both the clinical and academic aspects. Professor Lowry later recounted how coming out from the meeting he said to Professor Lindsay, "Did you put him up to that?" "No" replied Professor Lindsay, "I thought you had! "

At a special meeting of the Board of Governors of the Maternity Hospital on 6th May, 1927, the following note was made:

"The Right Honourable J. M. Andrews, D.L., the Minister of Labour, who it would be remembered, was one of the principal speakers at the Annual Meeting, had communicated with Professor Lowry and intimated that he was greatly interested in the question of providing adequate maternity hospital accommodation for the City and Province. This had led to an interview with the Chairman (Professor Lindsay) and Professor Lowry at which Mr. Andrews stated that he had come to the conclusion that the best manner of securing increasing accommodation would be to seek amalgamation or absorption by the Royal Victoria Hospital. The Chairman said that he thought that this was a good opportunity to make known to those Governors who were present the suggestion of an important public man like the Minister of Labour, and he thought that while the matter was not one that should or could be rushed it should be quietly ventilated among the Ladies Committee and other friends of the Hospital with the object of ascertaining their views on the proposed amalgamation. Lady Byers was well disposed towards the scheme as also were Mrs. R. Campbell and Mrs. Ewart."

During 1927 Professor Lowry was doing his best to secure the amalgamation of the old Maternity Hospital and the Royal Victoria Hospital. He with Professor Lindsay produced a printed circular which was distributed to the staff and members of the Board of Management of the Royal Victoria Hospital. This circular was entitled: "The Need for Better Maternity Accommodation for Belfast and Northern Ireland." On the front of the copy in the Royal Maternity Hospital deed box is written in Professor Lowry's handwriting: "Circular sent to each member of staff and Board of Management of the Royal Victoria Hospital. Our overture was turned *down* in the first instance but subsequently through the influence of Lord Dufferin and Ava was carried".

This circular was signed for the Incorporated Belfast Maternity Hospital by: — J. A. Lindsay, M.D., Chairman of the Board of Governors, Alice F. Ewart, Hon. Seccretary, Edith M. Sinclair, Hon. Treasurer, C. G. Lowry, Chairman of Medical Staff, W. Leslie, F.C.A., Secretary.

The following is a copy of the circular.

THE NEED FOR BETTER MATERNITY ACCOMMODATION FOR BELFAST AND NORTHERN IRELAND

It is a matter of common knowledge that the last 50 years have witnessed a great advance in Medical and Surgical Science, and a coincident fall in the death rate with increased expectation of life. It is not generally known that the death rate in childbirth has during these 50 years remained almost stationary. In fact up to the last 10 years it was stationary. For example, in the year 1850 the death rate in England and Wales per 1,000 births was 5.5; in 1916 it was 5.06; in 1920 the rate in Ireland was 6.26, and if Northern Ireland be taken separately in that year it was 7.7; in the year 1925, which has been the best in Northern Ireland to date, the rate was 4.4 per 1,000.

The figures "4.4 per 1,000" do not convey very much meaning. It will perhaps explain the matter more clearly if it is pointed out that in the year 1925 150 women in Northern Ireland died in pregnancy and childbirth. This represents 1/10 of all the deaths in women between 20 and 45 years of age—thus three women per week lose their lives in what is the exercise of their highest function. These figures are even worse than they appear.

In the hands of specialists in modern institutions the mortality in pregnancy and childbirth is much lower, in fact almost nil. The public conscience is not sufficiently sensitive to the death rate in childbirth. If 150 women per annum lost their lives in a small area like Northern Ireland by some epidemic disease, of unknown cause and with an unusual name, very serious notice would be taken of it. In large areas like England and Wales the total deaths due directly to pregnancy and labour verge at the present time on 3,000 per annum; in the year 1914 they reached the large number of 3,667.

HOW IS THIS STATE OF AFFAIRS TO BE REMEDIED?

1. *By better and more ample hospital accommodation*

In this respect Belfast is seriously behind. The following comparative statement shows the population of eight leading centres, and the number of beds available for clinical instruction in Midwifery.

	Population	*Beds*
Dublin	400,000 approx.	255
Glasgow	1,034,000	108
Edinburgh	420,000	104
Newcastle on Tyne	275,000	70
Cardiff	200,000	50
Leeds	458,000	50
Bradford	286,000	42
Belfast	414,000	26

Poor Law institutions and rescue homes are not included for any centre. Edinburgh and Cardiff at present have schemes on foot to enlarge their accommodation considerably. Belfast, as the capital of a State, has now responsibilities which it had not in the past, and is more and more a resort for complicated and serious cases from the different parts of the counties.

2. *The provision of better educational facilities for students and nurses*

A point which should need no elaboration is the fact that the modern hospital is not only a resort for the sick, but an educational institution where the rising generation of students and nurses receive a training which will enable them in their turn to be of service to the community. Of no type of hospital can this be more truly said than a Maternity Hospital. Whilst the well-to-do will seldom have any cause to resort to it, the attendance that they receive in their own houses will, in great measure, reflect the standard of work that is possible in their local institution. If a maternity hospital is inadequate in teaching facilities, it is inevitable that the students and nurses that pass through it will not have as good opportunities of pursuing their education as those more fortunately placed.

In the most up-to-date centres of medical education it is realised that the teaching of medicine, surgery and midwifery is best carried on in closely affiliated and adjacent institutions. Three of the most advanced best equipped schools on the American Continent—the Royal Victoria Hospital, Montreal; the Toronto General Hospital and the Johns Hopkins Hospital, Baltimore—have already adopted this arrangement. The Johns Hopkins Hospital and the Toronto General Hospital have had the plan in operation for over 20 years, but the maternity portion of the Royal Victoria Hospital, Montreal, has only been officially opened within the last 12 months, and in connection with it there is now a Maternity and Gynaecology Building containing 240 beds. Many London Hospitals, St. Thomas' Hospital and the Middlesex Hospital, have all within recent years opened maternity departments; whilst in Edinburgh, one of the most respected Schools of Medicine in the Country, a step further has been taken in that a new Maternity Hospital will be built in the near future on a site adjacent to the Royal Infirmary, and an amalgamation has been affected between the Boards of Management of the two hospitals and of the medical staffs. This principle is also being adopted in the new medical centre which is being built in connection with the Medical School of Columbia University,

New York. At Riverside Drive a huge institution is in the course of erection. It will amalgamate the Presbyterian which is a General Medical and Surgical Institution, with the Sloane Hospital for Women. A Children's Clinic and a Neurological Clinic are also included in this scheme. When it is completed the teaching facilities of the Medical Faculty of Columbia University will be the most up-to-date in the world.

THE ADVANTAGES OF THIS ARRANGEMENT ARE FOURFOLD

1. *To the patient*

Midwifery, no more than any other department of medicine, can be regarded as a watertight compartment. To achieve the best results for our patients, the services not only of the obstetrician but of the physician, the radiologist and the biochemist are frequently required. Such collaboration can only be secured in a large general hospital. In an institution where these various specialities are represented on the staff valuable time can be saved and more perfect equipment made available at less expense.

2. *Economy*

The funds available can be more economically spent where there is a central organisation for administration; this scarcely needs to be elaborated. The 436 beds of the Royal Victoria Hospital cost about £129 per head per annum. In the Maternity Hospital with 26 beds, although the strictest economy is practised, and our work is not so expensive as that demanded by modern surgery and metabolic medicine, the cost is £175 per bed per annum. This higher figure is the inevitable result of the very much smaller number of beds over which the costs are distributed.

3. *The education of students*

The education of students would be greatly facilitated by their obstetrical training being obtained in the same institution as that in which they receive their medical and surgical instruction. The waste of time which takes place in going between various widely separated institutions would be obviated. In no type of medical practice are emergencies so apt to occur as in obstetrics and with the students on the spot there would be a great chance of unusual or difficult cases being available for demonstration and teaching. Furthermore with obstetrics being pursued in different institutions there is a tendency for the various subjects in the medical curriculum to be divorced in the student's mind. Subconsciously he regards the practice of medicine and surgery as governed by principles quite distinct from midwifery and vice-versa, whereas the teaching of all subjects in the same institution would demonstrate the essential unity of all branches of medical knowledge.

4. *The education of nurses*

The education of nurses in obstetrics would be greatly facilitated. At the present time it is the exception rather than the rule for a general trained nurse in this country to take out her maternity training. In the case of fully trained

nurses this can be gained after six months additional training. An institution which can give the complete training will be an attraction, and it would ensure that those seeking the Maternity Diploma have already had a good foundation on which to build. In this respect the American and Canadian trained nurses are at a considerable advantage as they receive their obstetrical training while still probationers. This is of advantage to the nurse and to obstetrics generally, as the trained nurse makes a more efficient midwife than her untrained sister.

The Governors and staff of the Maternity Hospital are now faced with a serious problem. The Hospital was founded in 1793. It is one of the oldest charities in the city, and has a long and honourable career to its credit. The accompanying graph shows the great increase in its activities during the last 20 years.

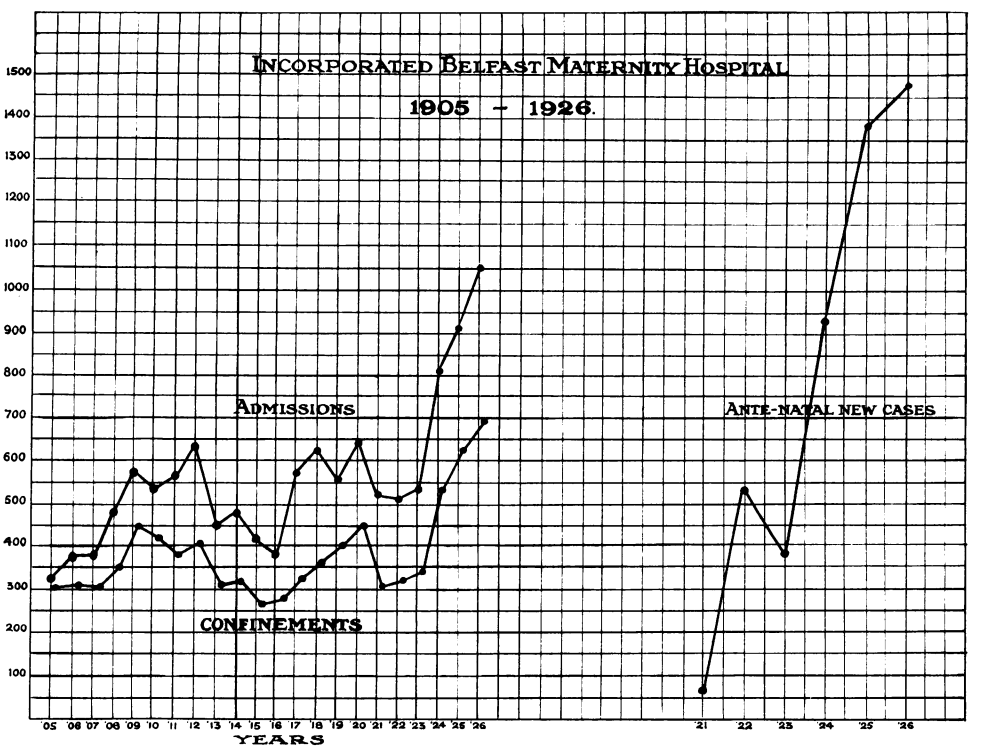


FIG. 4

In 1906 the total admissions were 375; in 1926 – 1050 (Figure 4). The Antenatal Department was opened in 1921. In 1923, 380 new cases were examined; three years later 1,477 (new cases) passed through the department. In 1926 the Infant Clinic was opened and this has already done good work. The numbers dealt with are increasing rapidly. There has been a corresponding increase in the number of students. In 1920 only 10 students

attended the Hospital. In 1926 we had between 60–70. In spite of this increase in the activities of the Hospital, the number of beds is the same as it was when the present Hospital was opened in 1903. The very success of the Hospital has become an embarrassment to those who are responsible for its management. They realise that the time has come when a forward move must be made or they will fail in their responsibilities to the community and to obstetric education. They feel that largely increased accommodation for patients, students and nurses is imperative if the Province and Medical School are not to remain behind other communities.

The Governors, after serious consideration, are convinced that an amalgamation with the Royal Victoria Hospital would best promote that efficiency, economy and educational advantages which are the primary functions of a hospital.

If this opportunity be allowed to pass there is little hope of ever effecting the consolidation of our resources and efforts which those in the forefront of medical education elsewhere recognise as so desirable.

The income of the Maternity Hospital is derived partly from annual subscriptions and partly from dividends and donations and a small amount from patient's contributions. It also receives £750 per annum from the Belfast Corporation as a contribution to the work of the Antenatal Department. Its total income for the year 1926 from these various sources was over £4,600. If all its resources were liquidated it is reckoned that they would realise approximately £25,000. This would represent about one-fourth of the cost of providing an adequate Maternity Block. The Governors are confident that substantial help would be forthcoming from the public if the plan of amalgamating the two hospitals were carried into effect.

The essential fact which cannot be evaded is the high death rate amongst mothers and expectant mothers. When we realise the importance of the mother to her children, her husband and the State, it is almost incredible that any effort should be spared that would rob childbearing of many of its inherent risks. Surely the men of Belfast and Ulster do not think less highly of their womenfolk than the men of Baltimore, Montreal or Toronto, or to come nearer to home of Dublin, Glasgow, Edinburgh or Liverpool.

The Maternity Hospital would welcome amalgamation with the Royal Victoria Hospital as the easiest, most economical and the most efficient method of meeting an urgent public need, and of removing a state of things which is an opprobrium to this city and province.

For Incorporated Belfast Maternity Hospital.

J. H. Lindsay, M.D., Chairman of the Board of Governors.
Alice F. Ewart, Hon. Secretary.
Edith M. Sinclair, Hon. Treasurer.
C. G. Lowry, M.D., Chairman of Medical Staff.
W. Leslie, F.C.A., Secretary.

Townsend Street,
Belfast. June, 1927.

In this memorandum great stress is laid on the question of amalgamation but when the matter was finally settled the new hospital was referred to as the Royal Maternity Hospital and not the Maternity Department of the Royal Victoria Hospital.

On 24th April, 1972, Sir William McKinney, who in 1933 was Hon. Treasurer of the Royal Victoria Hospital, told me that this was done deliberately because it was felt that there might be people who would bequeath money to the Royal Maternity Hospital as an independent hospital who would not bequeath money to a Maternity Department.

In assessing their assets at £25,000 the Governors probably included what they hoped to get for the hospital building. I was astonished to find in the Minutes of the Board of Governors that when the time came to sell the Hospital the only prospective purchaser was Melville & Co., next door. They would only offer £1,000. As no other potential customer appeared the Board had to accept Melville's bid although I expect they thought they would get a great deal more.

Following this Professor Lowry began to appeal to his colleagues in Canada for their help and the following is a copy of a letter sent to Professor Chipman of Montreal.

30th July, 1927.

Dear Professor Chipman,

Since my return from Canada last year I have been engaged in propaganda work with the view of getting a new Maternity Hospital, preferably in connection with the Royal Victoria Hospital where there is ample ground and space to erect the building. I have got the length of the staffs of both hospitals agreeing to the amalgamation, the majority of the Maternity staff are on the Royal staff also which was a help. There is, however, some opposition from some members of the lay Board of the Royal. The Chairman of the lay Board of the Royal is the Marquis of Dufferin and Ava, and I have learned he is visiting Montreal in September . . . I showed him over our Maternity today, which is a very antiquated building, and I asked him if he would make it his business to see the Montreal Maternity while he was in Canada. I think the striking contrast would be a decided object lesson for him. I told him I would write to you. Would it be too much to ask you, or in your absence one of your assistants, to demonstrate what a modern hospital should be? . . . . If you could do a little propaganda showing the educational advantages of the proximity of the two hospitals and the Ross Pavilion I think it would be very helpful". (The rest of the letter deals with salmon fishing).

On the same day and along the same lines he wrote to Professor Hendry of Toronto.

The Marquis visited both the Montreal and Toronto Maternity Hospitals and these visits may have been responsible for the remark he made to the newspaper reporter (which I have already quoted) when he returned to Belfast. The circular quoted above sent to each member of the Medical Staff and Board of Management of the Royal Victoria Hospital is dated June, 1927, and yet in writing these letters to Professor Chipman and Hendry in July Professor Lowry is able to state that he has the support of the Medical Staff of both hospitals. As already mentioned, on

the front of the circular in Professor Lowry's handwriting, are the words "our overture was turned down" so that an earlier approach than June, 1927, must have been made.

For the following details I am indebted to Dr. R. S. Allison, archivist to the Royal Victoria Hospital.

At the Annual Meeting of the Royal Victoria Hospital held on 20th March, 1927, with the Marquis of Dufferin and Ava in the Chair, as part of his speech he said: "They would never rest until they had a Maternity Hospital built as part of that Hospital (the Royal) which could be a credit to the whole of the Province".

Dr. Livingstone, Vice-Chancellor of Queen's, in seconding the adoption of the Reports said "they had in Belfast accommodation for maternity work which was quite inadequate to their needs and unworthy of a city the size of Belfast. They would have in the future, if the proposed scheme went through, a Maternity Hospital of which they could feel proud and one which would meet the needs of those it was intended to serve . . . It was important to see that doctors were well equipped, and it was that need which the proposals of amalgamation designed to meet . . . If the maternity scheme materialised they would be in a position to send out properly trained and properly equipped people for their work."

On the 5th July at a Staff Meeting of the Royal the proposed amalgamation of the Maternity Hospital and the Royal Victoria Hospital was discussed. It is stated "The Staff then carefully considered the questions referred to them by a special Committee of the Board and replied to their questions as follows:

PROPOSED AMALGAMATION OF MATERNITY WITH ROYAL VICTORIA HOSPITAL

Questions for Discussion

1. The real question at issue is, whether the public interest could be better served, and the objective as to teaching schools attained, if local Hospitals under strong Boards of Management retained their individuality or by amalgamation with a central hospital such as Royal Victoria Hospital.
2. Is it the view of the Committee that the same measure of public support would be extended to one great Hospital under one Board of Management assuming one or more local Hospitals were merged with the Royal Victoria Hospital, as is at present given to local Hospitals with their individual Boards of Management and coterie of workers specially interested in, and working for, each Hospital?
3. Assuming the Maternity Hospital had a re-constituted and energetic Board of Management, and was able on its own initiative to raise the capital sum required £50,000 for a 50 bed Hospital or £100,000 for 100 bed Hospital, would its teaching school fill the same requirements as if such a 50 or 100 bed Department was established in connection with the Royal Victoria Hospital?
4. The amalgamation of Maternity with Royal Victoria Hospital if effected would delay indefinitely extension of the present work of the Royal Vic-

toria Hospital as the raising of capital sums such as £50,000 or £100,000 and the relatively increased cost of maintenance (£7,000 to £14,000 per annum) must be viewed as difficult, except after, considerable intervals of time. In this regard serious dissatisfaction would probably arise with Working Class subscribers if the Board of the Royal Victoria Hospital found it impossible for financial reasons to extend its present departments.

5. Is the medical staff of the Royal Victoria Hospital in favour of establishing a Maternity Department in preference to that of a Pay Patients Department, as a decision in favour of the former would put out of court indefinitely the establishment of the latter?
6. It is assumed that present individual subscribers and work people would increase their contributions to the Royal Victoria Hospital in the event of its acceptance of the increased responsibility establishing a Maternity Department?
7. Is it anticipated the annual subscribers and supporters of the Maternity Hospital will transfer their support to the Royal Victoria Hospital in the event of its being merged therewith?
8. In event of amalgamation, would Working Class subscribers be likely to take the view that their female relatives were eligible for admission to the Maternity Department?
9. If the Committee decide in favour of recommending a Maternity Department an effort should be made to obtain £100,000 with the hope that £50,000 would be subscribed, in which event if the additional income was not forthcoming donations and bequests (unless specifically earmarked) could be temporarily used as income, instead of adding to Endowment Fund as at present.

These propositions were put to a meeting of the Medical Staff on 28th September, 1927, and the following points figured in the reply :

AMALGAMATION OF MATERNITY AND ROYAL VICTORIA HOSPITAL

1. The Staff are unanimously of the opinion that as a great General Hospital we are incomplete without a Maternity Department; the establishment of such a Department would be in the interest of our Medical School and of our Nurses, to whom we could give special facilities for an up-to-date maternity training. The association of our Ophthalmic Department would also greatly facilitate treatment of those serious eye affections which are apt to arise in infants.
3. Only on the assumption that it was built as close as possible to the Royal Victoria Hospital and had the benefit of the Special Departments of the Royal Victoria Hospital.
5. The Medical Staff is of opinion that the erection of an up-to-date Maternity Hospital is an even more urgent question than the provision of a Pay Patients Department.

8. In view of the present attitude of the British Medical Association it would not be advisable to further extend the privilege attached to the Working Man Subscribers System.

A. B. Mitchell. 28/9/27.

It would appear that the stumbling block as far as the lay members of the Board were concerned was that the amalgamation would delay the establishment of a private patients block. This was ultimately established through the generosity of two families as the Musgrave and Clarke Clinic. However the approval of the Staff as shown in the Minute signed A. B. Mitchell on 28/9/27 meant that Professor Lowry's efforts from 1921–1927 were being rewarded. On the 10th January, 1928, he again wrote to Professor Chipman as follows: —

"Dear Professor Chipman,

You will be glad to know that the amalgamation of the Royal Victoria Hospital in this City, and the Maternity Hospital is now "un fait accompli". The eye opener that Lord Dufferin got in Montreal and Toronto attributed in no small degree to this happy result. We are now getting out plans etc. We propose to have 100 beds for obstetrics and, if the money comes in in sufficient amount, to have 50 beds for gynaecology and to transfer the gynaecological unit from the Royal Victoria Hospital into the new building."

(The letter goes on to ask if Professor Chipman has any plans he could lend us and also to say that "Mr. Greer will go to Montreal to see your Hospital".)

There are other letters requesting copies of plans from Superintendents in Detroit, Connecticutt, New Jersey and Rhode Island.

Having accomplished all this the next thing was to find £100,000 to build the hospital. The Professor was fortunate in that he had been able to interest the then Duchess of Abercorn, wife of the first Governor of Northern Ireland, in the project. She launched the Appeal on 16th May, 1928, in the City Hall and at this meeting Professor Lowry was the principal speaker. A great deal of his speech (of which I have a copy in my possession) was taken out of the memorandum circulated to the Medical Staff and members of the Board of the Royal Victoria Hospital in June, 1927, but in appealing to the menfolk of Northern Ireland to respond with good donations he finished by quoting a portion of John Masefield's poem dedicated to his Mother:

"What have I done to keep in mind,
My debt to her and womankind?
What woman's happier life repays
Her for those months of wretched days?
What have I done or tried or said

I think I am right in saying that by the time the hospital was opened the necessary money was available but not sufficient for 50 gynaecological beds.

On 31st October, 1933, the Royal Maternity Hospital was officially opened by Mrs. Stanley Baldwin but patients had been admitted since July, 1933. The selection of Mrs. Baldwin as the official opener was due to her interest in the

National Birthday Trust which at that time was greatly involved in investigating the relief of pain in childbirth.

At the opening the Chair was taken by Sir Robert Johnstone, Chairman of the Board of Management at the time. Professor Lowry who, in spite of all the work he had done, was not a member of the platform party and was seated fairly far back in the body of the tent. When the Duchess of Abercorn got up to speak she referred to Professor Lowry and turned round thinking he was on the platform. When she did not see him she said "Where is the Professor?" to find he was near the back of the audiencce.

With the establishment of the Maternity Hospital behind him Professor Lowry proceeded to try to form an academic department. This was very difficult; all he had was share of a lecture theatre in the old Anatomy building (now demolished) at Queen's and a retiring room in which to put his coat. When the Maternity Hospital was built it included a lecture room for students and nurses with adjoining rooms for a library and a nurses tutorial room. This accommodation was used extensively in the teaching of both students and nurses.

Professor R. J. Johnstone was appointed Professor of Gynaecology in 1921 but from 1926 had only a part-time lecturer, myself. He gave his University lectures in the same theatre as Professor Lowry and his clinical teaching was done at the Royal Victoria Hospital. He had been on the staff of the Belfast Maternity Hospital from 1906 to 1920 but on appointment to the Chair of Gynaecology he resigned from the Staff in 1921. He did not cease to have an interest in the developments occuring under the guidance of Professor Lowry and when the Royal Maternity Hospital was opened in 1933 he became the Chairman of its first Committee of Management. He was Senior Gynaecologist on the Staff of the Royal Victoria Hospital where he carried out his clinical instruction of students. He had many interests outside medicine especially after he became a member of the Northern Ireland Government. He chaired a Committee on Primary Education for Northern Ireland on the report of which was based the Education Act a few years later. He retired from the Chair in 1937 having reached the age of 65. Few men could have looked forward with more zest to the leisure which seemed to lie ahead. He was very active physically and intellectually for his years with the prospect of important political interests impending. He was however stricken by a fatal illness from which he died in October, 1938.

On his retirement the two Chairs were again fused Professor Lowry becoming professor of Midwifery and Gynaecology and the University allowed him two part-time lecturers, Mr. H. I. McClure and myself. With his guidance and encouragement publications from the Department began to appear.

Especially from 1937 to 1945, when he retired at the age of 65 years, Professor Lowry supervised and developed the teaching and training of students and postgraduates and raised the reputation of the Department to a high level. In the 24 years in which he had been in the Chair he had taught over 2,000 students. He had made a great contribution to the establishment of a standard of clinical teaching which was recognised as one of the highest not only in the United Kingdom but also in North America. By the success of his efforts to have the Royal Maternity Hospital

built in close proximity to the Royal Victoria Hospital he had, unknowingly, laid a foundation on which modern academic Departments of Midwifery and Gynaecology could be built.

One had to remember that, although he did not contribute much to the literature of his subject, he was only a part-time professor at a salary of £350 per annum. He had only two part-time lecturers, who like himself were in private practice, and there was no physical department in which to work. His tutor in obstetrics was relatively junior and was the only whole time member of the academic staff.

No history of the Department of Midwifery and Gynaecology would be complete without reference to the participation and help of Professor James A. Lindsay, Professor of Medicine 1899–1923. Physicians from time immemorial have been the bitter opponents of obstetricians, but we have reaped the benefit of having had, fortunately for us, at one stage in the history of the Department a physician gifted with long vision. Professor Lindsay, in his capacity as Chairman of the Board of Governors of the Maternity Hospital and of the Board of Management of the Royal Victoria Hospital, was an ideal person to further the prospect of the move to the Royal site, which was so essential to the development of the University Department of Midwifery and Gynaecology. His quiet disposition, unruffled temper in debate, and his enthusiasm smoothed out many a difficulty. The development of the Dental Department was another project in which Professor Lindsay and Professor Lowry took an active part.

In 1945 Professor Lowry was succeeded by Professor Macafee, who was a full-time professor with limited private practice. The limitation meant that the professor's private practice had to be done either in the Musgrave and Clark Clinic or in Johnstone House in the Royal Maternity Hospital. This arrangement became an intolerable burden and in 1950, two years after the establishment of the National Health Service, the Chair of Midwifery and Gynaecology, like that of Medicine and Surgery, became a whole time appointment.

There was by this stage, the prospect of an actual department being available because the Institute of Clinical Science was in the process of being built providing accommodation for Medicine, Surgery, Midwifery and Gynaecology, Social and Preventive Medicine, Therapeutics and Child Health. Incorporated in this building, which was in use from late 1953, was the Medical Library. The changes in the practice and scientific approach to the subject of Midwifery and Gynaecology since 1950 are so great that they would almost deserve a thesis on their own.

References

ALLISON, R. S. (1975). Personal Communication.

JAMESON, J. (1960). *The history of the Royal Belfast Academical Institution,* 1810-1960.

MACAFEE, C. H. G. (1942). *The history of the Belfast School of Obstetrics.* Ulster Medical Journal, 11, 20.

ADVENTURES IN PHYSIOLOGY AT QUEEN'S UNIVERSITY, BELFAST, IN WORLD WAR II

by

PROFESSOR HENRY BARCROFT, M.D., F.R.C.P., F.R.S.

CAMPBELL ORATION 1975

IN the autumn of 1939 William McKee Bonnar, a young medical graduate of exceptional ability, joined the Physiology Department to do research for an M.D. thesis. We discussed what he should do. Research was needed to see if the sympathetic supplied and maintained vasoconstrictor tone in the arteries in human muscles. It did in animals but was said not to in man. I said to Bonnar how nice it would be if one could record the blood flow through a human muscle, then cut its motor nerve supply and see if that increased the rate of the blood flow through the muscle. If so one could conclude that human muscle did have a sympathetic

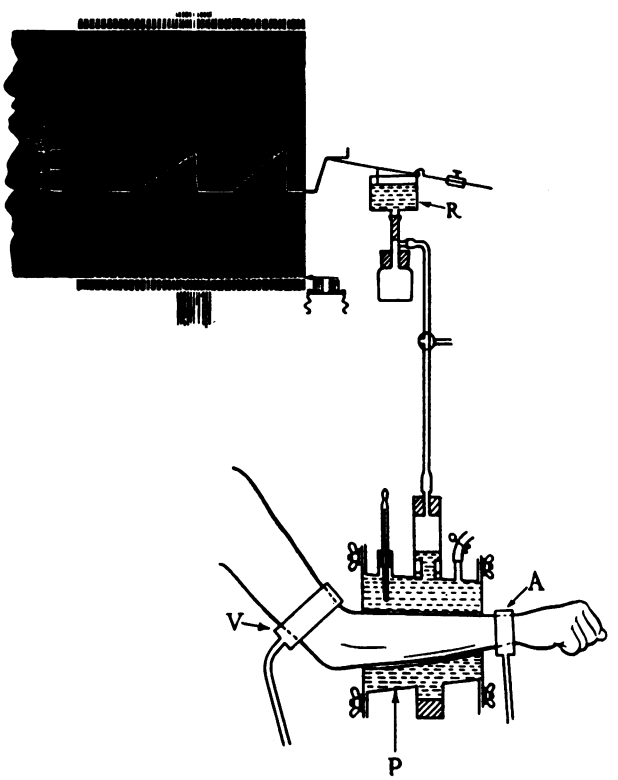


FIG. 1. *Apparatus for the measurement of forearm blood flow by plethysmography.*

innervation which mediated vasoconstrictor tone. Could this be done? Muscle blood flow could be measured in a segment of the human forearm by the plethysmographic method (Fig. 1). The motor nerve supply could be severed, functionally, by blocking the nerves with local anaesthesia. But then we saw a difficulty. Supposing the nerve blocks were followed by hyperaemia in the forearm. This might be because of release of sympathetic vasoconstrictor tone in the cutaneous vessels—only 65 per cent of the tissue contained in the segment of the forearm in the plethysmograph is muscle. Bonnar went away and thought about it. A day or two later he returned. He had looked up the anatomy of the forearm. Just above the elbow the nerve supply to the forearm muscles was in the radial, median and ulnar nerves (which would contain the sympathetic fibres, if any), these nerves did not supply the forearm skin. So Bonnar said: "If we block the deep nerves above the elbow, we should be blocking the nerve supply to the muscle vessels, not to the skin vessels, and if the blocks caused increase in forearm blood flow it would prove that the sympathetic nervous system did supply human muscle vessels and maintain sympathetic vasoconstrictor tone in human muscle."

Bonnar's idea sparked off research by himself, Edholm, Effron and myself. Edholm was Lecturer in Physiology; Effron an American qualifying at Q.U.B. It occurred to us that the blood flow in the forearm segment might be increased because of the emotional stress of the minor surgical operation of injecting local anaesthetic round the radial, median and ulnar nerves. Increase in forearm blood flow following the nerve blocks need not necessarily be due to paralysis of sympathetic nerve fibres. It would be better to record the blood flows in both right and left forearms simultaneously, at any given moment the effect of emotional stress would cause similar changes in blood flow in each limb. If the blood flow through the forearm with nerves blocked exceeded that in the opposite normal forearm, one could safely attribute the fact to the effect of the nerve blocks. A preliminary series of experiments was performed on six subjects in which the forearm blood flow were recorded for 35 minutes. The averaged results, expressed in ml blood flow per 100 ml forearm per minute, are shown in Fig. 2 (top right). One sees a gradual increase in flow, perhaps because the forearms were warming up. However the point is that at any given moment the blood flow (per 100 ml forearm) is the same in one forearm as in the other and that the blood flow in one forearm can be used as a control for the effect of a test procedure in opposite one.

Mr. Loughridge very kindly showed us how to infiltrate local anaesthetic round the radial, median and ulnar nerves. Novocaine was used in those days; to be effective a little adrenaline had to be added to keep the anaesthetic localized. Bonnar soon became an adept at doing the nerve blocks. When successful the muscles of the wrist and hand were paralysed for half an hour or more. Fig. 2 (top left) shows the averaged results of experiments on twenty-five subjects. Note that the rate of the blood flow through the nerve blocked forearm averaged about double that in the opposite control forearm segment. One such experiment was given as a Demonstration before a meeting of the Physiological Society at Cambridge in October, 1941.

So far so good. But did the result necessarily prove that the blood vessels to human muscle had a sympathetic vasoconstrictor innervation? Was there no other

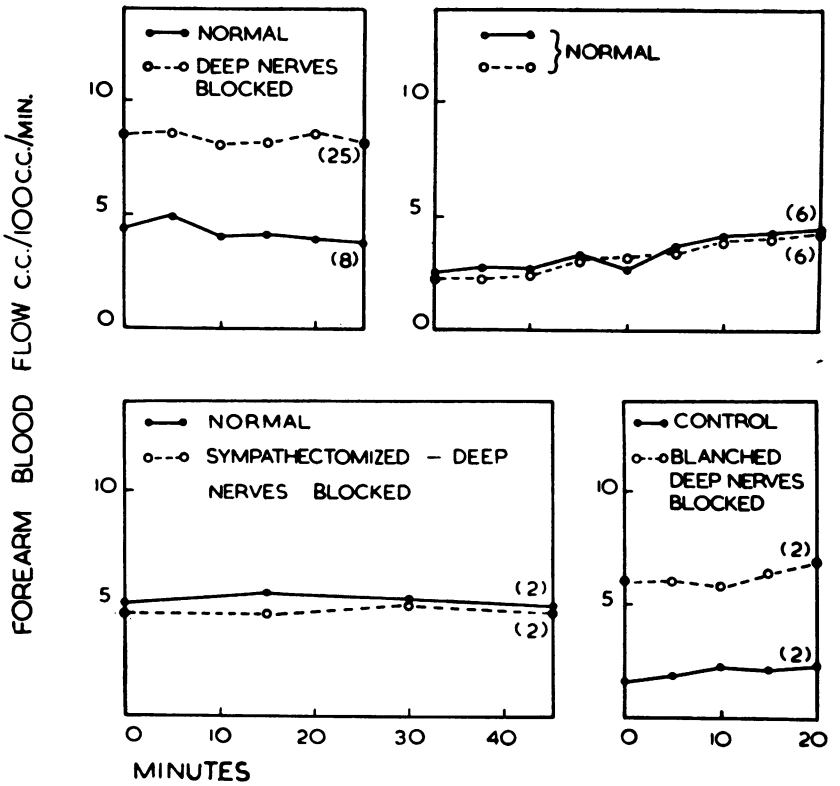


FIG. 2. *For further details see text.*

possible explanation? There was one. Under certain conditions muscular contraction, by compressing the blood vessels within the muscle substance, opposes the passage of blood through the muscle. Now blocking the radial, median and ulnar nerves abolished 'tone' in the skeletal muscles of the forearm; was the hyperaemia following nerve blocks due to abolition of the restriction to flow caused by muscle 'tone'? This could be tested by recording the effect on forearm blood flow of blocking the deep nerves in a sympathectomized subject. Only the motor nerves would be blocked. If the blocks had no effect on forearm blood flow then the increase in flow seen in a normal subject after blocking must be because of blocking of their sympathetic fibres. The difficulty was that there were very few sympathectomized subjects available. Eventually we got the name and address of an elderly man living at Limavady—Mr. Samuel Anderson. He had had a unilateral sympathectomy for causalgia due to a wound in World War I. Bonnar and I went to Limavady and knocked at his door, which opened. As I diffidently strove to explain the object of our visit the door began to close. Just as he was about to disappear it opened a little. "Do you mean come to Belfast for Research?" "Yes" I admitted. "Oh! I thought you'd come about my pension. Of course I will." Another unilateral sympathectomy patient, Mr. Frank McLaughlin, volunteered too. Blocking the

motor nerves in the two sympathectomized forearms did not increase forearm blood flow to above that in the opposite control forearms, as is shown in Fig. 2 (bottom left). That is to say removal of 'tone' by paralysis of the forearm muscles made no difference to muscle blood flow. It looked as if doubling of forearm blood flow after deep nerve blocks in normal subject could be due to release of sympathetic vasoconstrictor tone.

Once again so far so good. One doubtful point still had to be settled. Sometimes the local anaesthetic seeped outwards and anaesthetized one or more of the cutaneous nerves supplying the forearm skin. Could we be absolutely certain that the increase in flow after blocking was not due to release of sympathetic vasoconstrictor tone in the forearm skin? If we had been experimenting on an animal this question could have been settled by skinning the limb. If increase in limb segment flow followed nerve blocks in the skinned limb it would have been because of the removal of sympathetic vasoconstrictor tone from the arterial tree in the skeletal muscles. Impossible in man of course. Now, Professor D. C. Harrison, who had kindly been a subject for a nerve block experiment, suggested to us a way for 'functionally' skinning the human forearm. Namely by the electrophoresis of adrenaline into its skin to arrest the cutaneous circulation. The idea had come to him when reading an American article advocating the treatment of asthma by the electrophoresis of adrenaline into a large area of skin on the back. The electrophoresed skin looked white, and did not regain its normal colour for some hours; evidently adrenaline was absorbed slowly into the body, the author considered this way of administering adrenaline was better than by subcutaneous injection. Be that as it may, at any rate, so far as Prof. Harrison's suggestion was concerned it served our purpose well. Fig. 3 shows the white skin of the forearm after adrenaline electrophoresis. Fig. 2 (bottom right) shows the averaged results of two experiments, in which the blood flow in the 'functionally skinned' forearm is compared with that in the opposite control forearm. Blood flow was doubled after nerve blocks in the functionally skinned limb. We believed that we had now proved that human

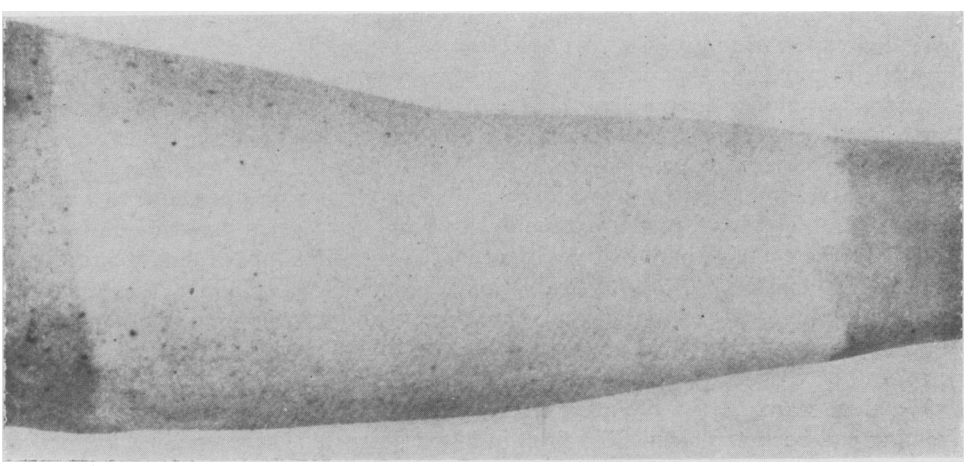


FIG. 3. *Blanching of the forearm skin after adrenaline electrophoresis.*

muscle vessels did have a sympathetic innervation, and that the sympathetic in man mediated vasoconstrictor tone in our muscle vessels (Barcroft, Bonnar, Edholm and Effron 1943).

Professor G. W. Pickering (now Emeritus Professor Sir George Pickering, F.R.S.) was external examiner for Bonnar's thesis including these and other researches. Bonnar was awarded the M.D. with Gold Medal. But it ended tragically; Bonnar joined the R.A.F. and died in a flying accident in Asia.

It was now 1941, London was being bombed heavily. There were many casualties. Edholm happened to be on a visit to London at the time and to meet Professor McMichael, a member of the Medical Research Council's Shock Committee. McMichael and Sharpey-Schafer were about to begin a study of the effect of haemorrhage on the circulation in man. Cardiac output would be measured by cardiac catherization, which they were the first to perform in this country, and they were to study the effect on cardiac output of bleeding the subject a large amount of blood, namely two bottles. Edholm then told McMichael about the finding at Q.U.B. of sympathetic control of the blood vessel in human muscle. As a result Edholm and I were invited to join McMichael and Schafer at the British Postgraduate Medical School during the Summer vacation to work with them and study the effect of massive haemorrhage on the forearm blood flow. Sir Edward Mellanby, the Secretary of the Medical Research Council, suggested that the Friends Ambulance be approached to see if their members would be willing to act as subjects for the catheter and to be bled two bottles of blood. About twenty volunteered. The experiments were done in the afternoon. After recording the effect of bleeding 2 bottles of blood on the cardiac output and forearm blood flow the blood was put back into the volunteer who stayed in hospital overnight and went home the next morning. The results recorded on the first two subjects showed nothing of much interest. And then it happened. During massive bleeding the third subject fainted. There he lay exsanguinated, unconscious, beads of sweat on his forehead, lips ashed grey—he looked like death—I was very frightened, I thought 'we've done it this time.' Not so Otto Edholm, he is made of sterner stuff, he just went on measuring the forearm blood flow. And just because he was (and is) such a skilled experimentalist, his attention was not to be distracted from the ritual of turning several glass taps in proper sequence, a ritual repeated every half minute for forearm blood flow determinations. The subject soon recovered. After the experiment calculations of the forearm blood flow showed a truly remarkable and totally unexpected finding. Forearm blood flow during the faint had *increased*. Now fainting is accompanied by a precipitous fall in arterial blood pressure as was well known. Fall in blood pressure accompanied by increase in forearm blood flow could only be explained on the basis of a marked vasodilatation of the forearm blood vessels. The existence of such vasodilation was quite a new finding. Was the vasodilation in the forearm an indication of a widespread vasodilatation in other parts of the body, so widespread as to explain the precipitate drop in arterial blood pressure?

We then searched the literature to see how the fall in arterial pressure during fainting had been explained. The drop in blood pressure is accompanied by marked bradycardia, as had been known for many years. Michael Foster, towards the end

of the last century, attributed the drop in blood pressure to sudden vagal slowing of the heart which he believed would be accompanied by marked reduction in cardiac output. Sir Thomas Lewis did not agree. He quoted experiments by Starling, on the dog, showing that slowing the heart to half its normal rate did not reduce cardiac output because the output per beat became doubled. Chance gave Lewis the opportunity to put the matter to the test. In World War I he had a clinic for the medical examination of recruits, and a number of them fainted when venous blood was taken for blood tests. As soon as he saw a recruit beginning to faint he injected atropine to stop the bradycardia. Preventing the slowing of the heart did not prevent the fall in blood pressure. Since the fall in blood pressure could not have been due to decrease in cardiac output, then it must have been due to peripheral vasodilatation. It was because of this that Lewis had introduced the now well known name 'vasovagal syndrome' for the faint, to denote vasodilatation and vagal inhibition of the heart occurring simultaneously, but not in a cause and effect relationship. Lewis left it at that. Beyond saying that fall in blood pressure was due to peripheral vasodilatation he did not go.

After reading Lewis's work it occurred to us that the vasodilatation we had observed in the forearm in the faint was quite in accordance with Lewis's postulated peripheral vasodilation.

It was not until the sixth experiment that another subject fainted. Again, the faint was accompanied by precipitate drop in arterial pressure, bradycardia and increase in forearm blood flow, unmistakable sign of vasodilatation in the limb segment. We were coming to believe that these faints, although very alarming, were not dangerous. Blood from enormous numbers of blood donors was being taken, dried and sent to the army in North Africa—about 4 tons of it. The incidence of fainting while giving blood was known approximately and a very rough calculation showed that some 25,000 blood donors must have fainted, without any fatalities so far as we were aware. Now it seemed clear that our most interesting findings were going to be the changes in the circulation during the faint. But the summer vacation was slipping away and for a subject when bled to faint was exceptional. Fortunately Sharpey-Schafer thought of a way of increasing the incidence of fainting. Wide pneumatic cuffs were placed round the upper part of both thighs and inflated to diastolic pressure for half an hour, a procedure that trapped about 750 ml of blood in the distended leg veins, a small venesection then induced fainting. The method had the considerable advantage, too, that releasing the cuffs returned the blood to the subject, obviating the tiresome sterile precautions needed for the transfusion of blood withdrawn by venesection. Fig. 4 shows results obtained in a typical faint. The averaged changes in forearm blood flow in nine subjects before and during and after fainting are shown in Fig. 5 (top left). The work at the Postgraduate School was presented by Sharpey-Schafer at a meeting of the Medical Research Society at University College Hospital and published in the Lancet (Barcroft, Edholm, McMichael and Sharpey-Schafer, 1944).

Assuming that vasodilatation like that in the forearm muscles occurred in all the muscles throughout the body in haemorrhagic fainting Sharpey-Schafer concluded that the total decrease in peripheral resistance would be large enough to explain the marked fall in arterial blood pressure.

Back in Q.U.B. at the beginning of the October term there was still much to be found out. Was the vasodilatation in the forearm during the faint in the muscle or in the skin? If in the muscle was it mediated by the sympathetic nerve supply to human muscle vessels or by a circulation vasodilator substance? And now the B.M.S.A. came to our assistance. Having explained the nature of the research and its importance to the Officers, and our need for volunteers to be subjects, they gave the matter careful consideration, and most generously offered to be subjected themselves and to make our needs more widely known.

Research continued as follows. After loosing the equivalent of 2 bottles of blood and fainting, the skin of the subject, including that of his forearm looks extremely pale. But it was just conceivable that vasodilation in the forearm in the faint could be in the invisible deeper layers of the skin. Now the forearm is mainly muscle but the hand is mainly skin. What happened in the circulation in the hand during fainting? Fig. 5 (top right) shows the averaged results of 6 experiments showing decrease in the rate of the blood flow in the hand in the faint. From this we concluded that the vasodilatation in the forearm was much more likely to be in the forearm muscles

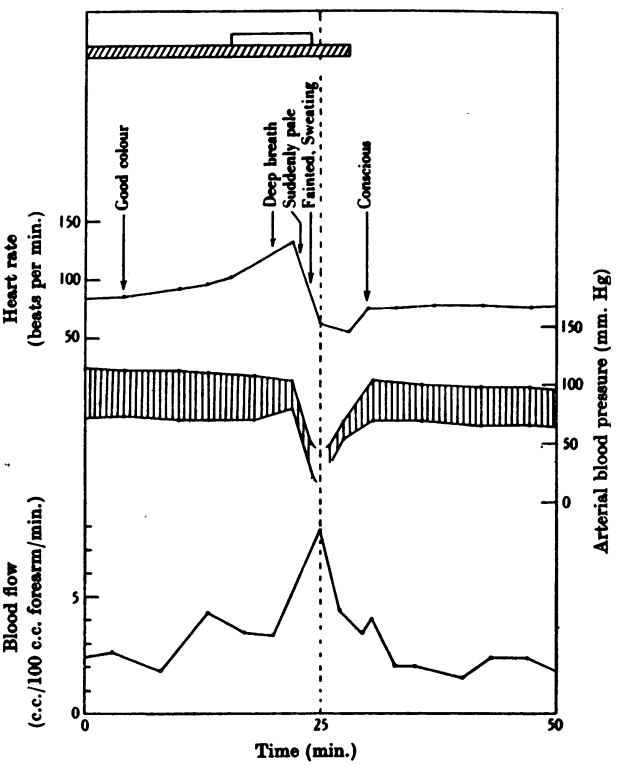


FIG. 4. *Results recorded before, during and after a typical haemorrhagic faint. Shaded rectangle: cuffs on thighs inflated to diastolic pressure. Open rectangle: venesection. Vertical broken line: faint fully developed.*

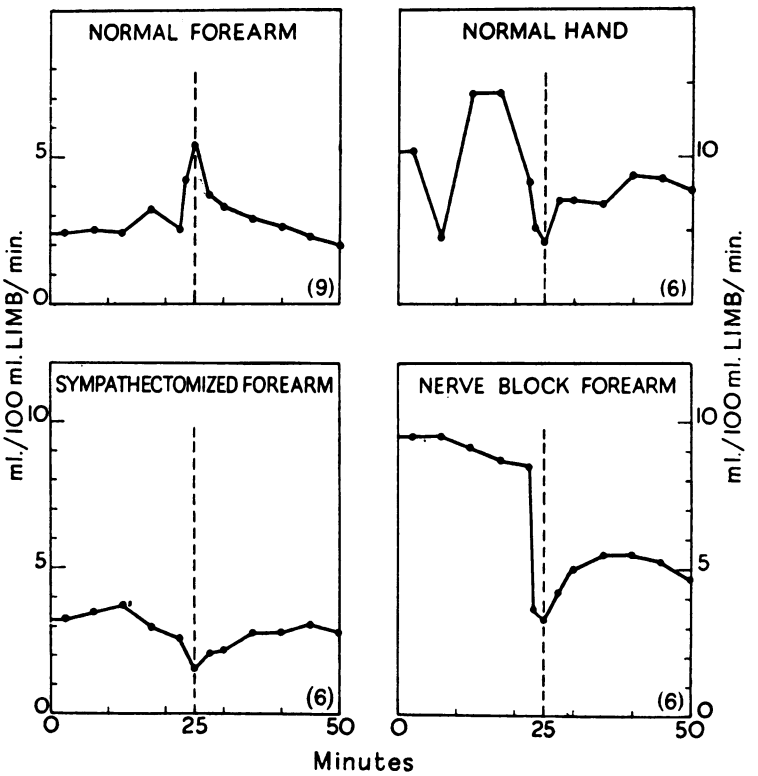


FIG. 5. *Averaged forearm blood flows recorded in the normal hand, sympathectomized forearm and nerve blocked forearm during fainting. Vertical broken line: faint fully developed.*

than in the forearm skin. We then turned to the mechanism of the vasodilatation in the forearm. Was it nervous—mediated by the sympathetic to the forearm vessels? Or hormonal, due possibly to the release of adrenaline which was known to vasodilate the vessels in skeletal muscles. An answer could be got by observing the behaviour of the forearm circulation in the faint in sympathectomized subjects. Few of them were available. Mr. Samuel Anderson kindly volunteered. And so did Edna Mack (now Mrs. Brownlow) a girl of 16 who had been to the Physiology Department for various experiments on more than forty occasions. She and her parents approved the project. Mr. Patrick Fitzgerald, now Professor of Surgery in the National University of Ireland, a friend of Dr. Edholm's had sympathectomized patients in Dublin, who volunteered. Fig. 5 (bottom left) shows the averaged results of the forearm blood flows of six sympathectomized subjects during fainting. Blood flow decreased during these faints, so we concluded that the vasodilatation seen in normal subjects must have been mediated by the sympathetic nerves to the skeletal muscle blood vessels—that is to say mediated by the sympathetic nerves whose existence had previously been proved by following Mr. Bonnar's suggestion.

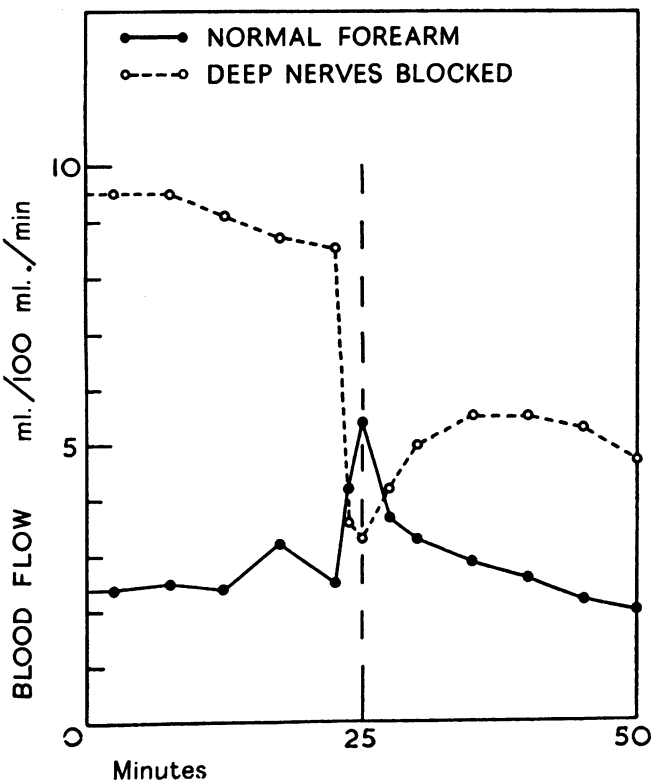


FIG. 6. *Averaged forearm blood flows in nerve blocked forearm during fainting superimposed on average forearm blood flows in the normal forearm. Vertical broken line: faint fully developed.*

Now attention turned to a new question. Animal experiments had shown that the sympathetic had two sorts of fibres to skeletal muscle vessels—vasoconstrictor fibres and vasodilator fibres. Was the vasodilatation in the forearm in the faint due to inhibition of the vasoconstrictor—release of the vessels from vasoconstrictor impulses, or did the opening of the vessels involve active stimuli for vasodilatation via vasodilator fibres? This could be tested by recording blood flows in both forearms, blocking the radial, median and ulnar nerves on one forearm and inducing fainting. If, during the faint, blood flow in the normal forearm exceeded that in the nerve blocked forearm that would be because of the action of vasodilator nerve fibres. Fig. 5 (bottom right) shows the averaged results of the forearm blood flows in six such experiments. Note that blood flow in the nerve blocked forearm is about double that in the opposite normally innervated one. This is explained by the removal of sympathetic vasoconstrictor tone in the muscle vessels by local anaesthesia of the sympathetic fibres in the motor nerves. The forearm blood flows in the nerve blocked forearms have been superimposed on those in the normal forearms in Fig. 6. Note too that in the faint blood flow in the normally innervated

forearm exceeded that in the nerve-blocked forearm. Vasodilatation in the innervated limb exceeded that in the functionally denervated limb. Why? Probably because of the presence of sympathetic vasodilator fibres mediating impulses during fainting, impulses that excited active vasodilatation in the skeletal muscle vessels.

The Q.U.B. studies in post-haemorrhagic fainting were published (Barcroft & Edholm, 1945) and were presented by Dr. Edholm in the second of two Arris and Gale Lectures given at the Royal College of Surgeons in London.

Other questions came. The R.A.F. wanted more research on the reason why airmen went unconscious at high altitudes. Discussions Dr. Edholm had in London led to the arrival at Q.U.B. of a Royal Canadian Airforce Medical Officer, G. W. Manning, and to a great number of experiments on the circulatory changes accompanying hypoxia—that is to say the breathing of oxygen nitrogen mixtures containing 6—10 per cent oxygen. Suffice it to say that the subjects who went unconscious breathing a low percentage of oxygen could be divided into two groups, most, about four out of five, went unconscious, much as during N_2O anaesthesia, with cyanosis, rapid strong pulse, and raised blood pressure, these were the "non-fainters". The fainters, about one in five, went unconscious with a vago-vagal syndrome, pallor, sweating, bradycardia, precipitate drop in blood pressure and vasodilatation in the forearm. Averaged results are shown in Fig. 7.

The precipitate drop in arterial blood pressure and increase in forearm blood flow during hypoxic fainting were demonstrated at the King's College London Physiological Society Meeting on J. E. Reid, a Q.U.B. medical student and were

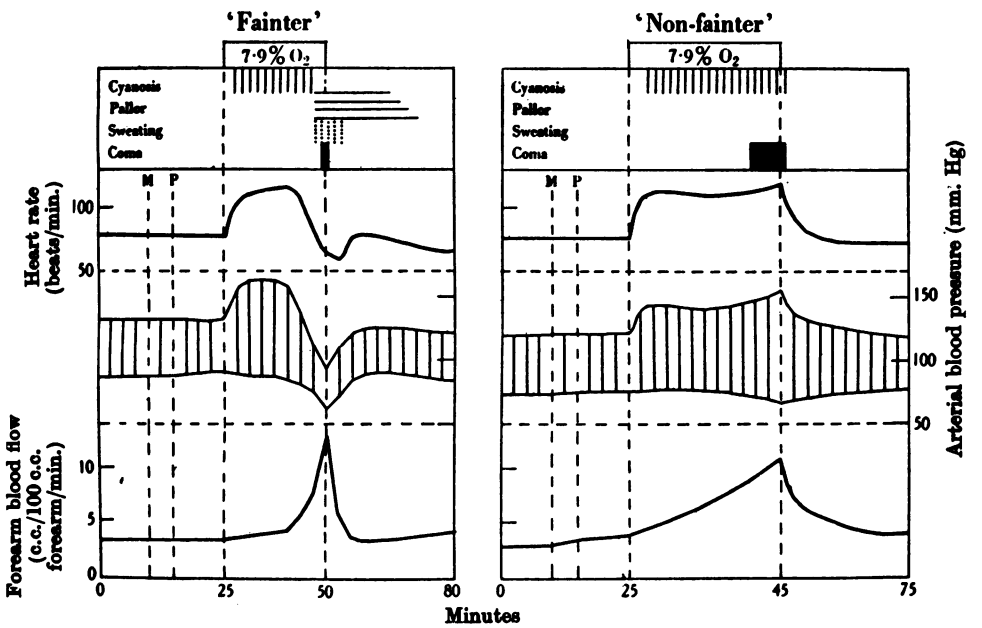


FIG. 7. *Averaged results recorded before, during and after breathing 7–9% oxygen in 'Fainters' and 'Non-fainters'.*

published (Anderson, Allen, Barcroft, Edholm and Manning, 1946).

Mr. President, Ladies and Gentlemen, thank you very much for having listened to me so patiently.

The following kindly volunteered to be subjects for the experiments described in this lecture: S. Anderson, J. Beckett, R. D. N. Blair, Eileen Bonnar, Dr. W. McK. Bonnar, M. Cullaghan, H. Cameron, Barry Crymble, W. Davey, Linde Davison, A. S. Effron, Dr. O. G. Edholm, T. H. Flewett, Dr. Q. H. Gibson, W. A. Gilmore, W. Goldberg, A. F. Griffiths, Professor D. C. Harrison, J. A. Howard, Dr. F. R. Johnson, C. de Largy, J. D. F. Leith, C. S. Lindsay, R. J. Livingstone, Mr. J. S. Loughridge, Dr. J. K. McCabe, H. McClatchey, R. L. McCorry, Miss Macdonald, Miss Edna Mack, Frank McLaughlin, T. A. McQuay, A. B. Morrison, R. A. Neely, J. B. Pyper, Miss Quinn, J. E. Reid, W. E. Stafford, Miss J. O. R. Stewart, G. K. Thomas, E. Trinick, D. H. Tweedie, A. L. Wells, R. F. Whelan and G. Wolfenden.

Addendum

The existence of both a dilator and a constrictor innervation to skeletal muscle blood vessels has been confirmed. At rest the vessels are subjected to considerable constrictor tone and this is varied reflexly in the circulatory apparatus to a variety of stimuli, such as change in posture, exercise and changes in intrathoracic pressure. The vasodilator fibres are not active at rest but contribute to the vasodilatation in muscle in emotional stress (Roddie and Shepherd, 1963). Emotional fainting (from the sight of blood) is accompanied by vasodilatation in the forearm (Greenfield, 1951).

References

Barcroft, H., Bonnar, W. McK., Effron, A. S. and Edholm, O. G. (1943). On sympathetic vasoconstrictor tone in human skeletal muscle. *J. Physiol.*, **102**, 21.

Bonnar, W. McK. (1941). The action of the sympathetic on the blood vessels of human skeletal muscle. M.D. Thesis. Q.U.B.

Barcroft, H. Edholm, O. G., McMichael, J. and Sharpey-Schafer, E. P. (1944). Post-haemorrhagic fainting—a study by cardiac output and forearm blood flow. *Lancet* i, 489.

Barcroft, H. and Edholm, O. G. (1945). On the vasodilatation in human skeletal muscle during post-haemorrhagic fainting. *J. Physiol.* **104**, 161.

Anderson, D. P., Allen, W. J., Barcroft, H. and Edholm, O. G. (1946). Circulatory changes during fainting and coma caused by oxygen lack. *J. Physiol.*, **104**, 426.

Greenfield, A. D. M. (1951). An emotional faint. Lancet i 1302.

Roddie, I. C. and Shepherd, J. T. (1963). Nervous Control of the circulation in skeletal muscle. *Brit. med. Bulletin* **19**, 115.

THE TEN-YEAR PROGNOSIS OF ATHEROSCLEROSIS OF THE LOWER LIMB

by

H. C. DALES, M.D., M.Ch., F.R.C.S.

Musgrave Park, Hospital, Belfast

ATHEROSCLEROSIS is the main cause of obliterative arterial disease and other causes, such as thrombo-angitis obliterans, collagen disease and cystic medial necrosis, are rare. The only exception is embolic occlusion, which is an important and common cause in the presence of acute heart disease (Gillespie, J. A. 1970). All the cases used in this survey had either endarterectomy or a reversed saphenous vein by-pass carried out on them, and the pathology was confirmed by histological examination. Of the 68 cases, 4 were lost and the remaining 64 followed up for a minimum of ten years after operation. There were 52 males and 12 females. The commonest decade was 51–60 years of age. The sex ratio and age grouping is similar to the findings of other authors, for example, Cockett and Maurice (1963), and Watt *et al* (1974).

Two out of the 52 males did not smoke tobacco, and 4 of the 12 females did not smoke tobacco. Juergens *et al* (1960) showed that in men with obliterative arterial disease just over 1 per cent do not smoke tobacco, compared with 25–30 per cent of the normal population. Eastcott (1969) quotes 2,000 patients of lower limb ischaemia with less than 12 male non-smokers. In 1958 the United Kingdom survey showed that 24 per cent of males were non-smokers. Thus, the tobacco smoking habits of the male patients under survey are similar to those reported by other authors. The blood groups were normal for the population. Weight was investigated, and was not significant. Blood cholesterol, blood urea and peripheral blood counts did not reveal any aetiological factor. Approximately 5 per cent of the patients in the survey had a raised fasting blood sugar, but this is small compared to other series, such as Wahlderg (1962), who described the glucose tolerance test as abnormal in nearly half of his patients with atherosclerosis, and Skovborg (1966), who described 20 per cent of a series of 520 patients who, while attending his male clinic for peripheral atherosclerosis, were found to have diabetes.

All cases had obliteration of either the superficial femoral or the superficial femoral and upper third of the popliteal artery. A few of the earlier cases had a direct endarterectomy with simple suture of the incision in the arterial wall, but many had gusset saphenous vein grafting. In this, after endarterectomy, the long saphenous vein is used as a gusset and inserted into the endarterectomised vessel in such a way that there is no narrowing of the artery, and at the end of the operation there is an artery with normal lumen, two-thirds of the wall being the original artery and one-third being the long saphenous vein. Some of the cases were treated by reversed saphenous vein by-pass.

TABLE I
Success Rate of the Arterial Reconstruction

	Total	*Failure Immediate*	*Excellent Immediate*	*Excellent 5 year*	*Excellent 10 year*
30–40	4	2	2	2 (50%)	2 (50%)
41–50	12	2	10	8 (66%)	5 (42%)
51–60	32	2	30	19 (59%)	11 (34%)
61–70	12	1	11	8 (66%)	3 (25%)
71–	4	1	3	0	0
	64	8	56 (87%)	37 (58%)	21 (33%)

The success rate of the arterial reconstruction is shown in Table I. A case was considered as having an excellent result if one or other pedal pulses was present after operation. The immediate follow-up showed an 87 per cent excellent result rate, and this compares very favourably with other authors, such as Eadie (1970), who had a success rate of 72 per cent, and Darling (1964), whose success rate was 75 per cent. Unfortunately, the 5-year follow-up shows only 58 per cent of cases remained excellent. The success rate does not alter much with age until 70 years of age.

At the 10-year follow-up the success rate had deteriorated to 33 per cent, and here the original age of the patient was an important factor, the success rate varying from 50 per cent in the 4th decade to nil in the 8th decade of life. The 5th decade had the best results, namely 42 per cent still excellent at the 10-year follow-up.

The possible causes of the failure of the arterial reconstruction in the 39 cases out of 64 which had been followed for 10 years are shown in Table II. The very

TABLE II
Possible causes of the failure of the Arterial Reconstruction in the 39 cases which had failed in 10 years

Coronary Thrombosis	29 cases (74%)
Cerebral Thrombosis	2 cases
Unknown	8 cases

Fall in blood pressure associated with the coronary thrombosis is probably the aetiological factor in graft failure

high incidence of coronary thrombosis, namely 74 per cent, indicated its supreme importance. It is very likely that the fall in blood pressure, associated with coronary thrombosis, is the aetiological factor in graft failure.

The 10-year life pattern after diagnosis of atherosclerosis of the lower limb is described in Table III, and this shows that 53 per cent of patients developed a coronary infarction during this period, and that 53 per cent of patients had

TABLE III

10-year Life Pattern after diagnosis of lower limb atherosclerosis by biopsy at operation

Age	*Total*	*1st leg excellent 10 years*	*2nd leg Involved*	*Coronary Thrombosis*	*Alive*	*Dead*	*Cause of death*
30–40	4	2 (50%)	4 (100%)	2 (50%)	3	1 (25%)	1 C.T.
41–50	12	5 (42%)	5 (42%)	9 (75%)	8	4 (33%)	3 C.T. 1 Ca Lung
51–60	32	11 (34%)	17 (53%)	17 (53%)	20	12 (37%)	8 C.T. 3 C.V.A. 1 Miscellaneous
61–70	12	3 (25%)	4 (33%)	4 (33%)	9	3 (25%)	1 C.T. 1 Ca Lung 1 Miscellaneous
71–	4	0	4 (100%)	3 (75%)	1	3 (75%)	3 C.T.
	64	21 (33%)	34 (53%)	35 (53%)	41 (63%)	23 (37%)	16 C.T. 3 C.V.A. 2 Ca Lung 2 Miscellaneous

developed clinical signs of obliterative arterial disease in the second limb at this stage. In all 37 per cent of the cases were dead at 10 years, the commonest cause being coronary thrombosis. Naturally, the highest death rate occurred in the ealderly patients, there being little difference in the other decades except that it was surprising that the 6th decade showed a higher death rate than the 7th, due to the higher incidence of coronary thrombosis.

Factors which may influence the life pattern are shown in Table IV. While at 5 years there is little differnce between hyper- and normotensive patients, at 10 years the hypertensive patient had a 50 per cent excellent result compared with 31 per cent of the normotensives. Again, surprisingly enough, the hypertensive sufferers had a 28 per cent mortality as opposed to 42 percent among normotensive patients. This is surprising in view of the Framingham Inquiry, but it may be that hypertension keeps the arterial reconstruction functioning for a longer period than in those patients with normal blood pressures. The percentage of patients who died from coronary thrombosis was about equal in both groups, and the increased death rate in the normotensive patient was due to the two cases of carcinoma of the lung and the two miscellaneous cases. If the electro-cardiograph was normal before operation the prognosis was better, and this was especially so in the 10-year follow-up, where 39 per cent of the cases were excellent as opposed to 25 per cent where a coronary thrombosis had occurred before operation. Similarly, there was a difference in the prognosis as regards mortality, and only 28 per cent of those patients with a normal electro-cardiograph were dead at 10

TABLE IV
Factors which may influence life pattern

Age at onset		*Poor prognosis in elderly*		
		5 year excellent	*10 year excellent*	
Hypertension	28 cases (40%)	18 (64%	14 (50%)	8 dead (28%) 6 C.T. 2 C.V.A.
Normotensive	36 cases (56%)	19 (53%)	11 (31%)	15 dead (42%) 10 C.T. 1 C.V.A. 2 Ca Lung 2 Misc.
Pre-op. C.T.	28 cases (44%)	12 (43%)	7 (25%)	13 dead (47%) 8 C.T. 2 C.V.A. 2 Ca Lung 1 Misc.
Normal E.C.G. pre-op.	36 cases (56%)	20 (55%)	14 (39%)	10 dead (28%) 8 C.T. 1 C.V.A. 1 Miscellaneous
Normal E.C.G. pre-op. C.T. during follow up period	11 cases (16%)	5 (45%)	3 (27%)	9 dead (82%) 8 C.T. 1 C.V.A.
Involvement of second limb	16 cases (25%)	7 (44%)	5 (31%)	8 dead (50%) 6 C.T. 1 Ca Lung 1 C.V.A.

years as opposed to 47 per cent of those who had had a coronary thrombosis before operation. Of those patients who had a normal electro-cardiograph before operation, but developed a coronary thrombosis during the follow-up period, the prognosis was poor, but the figures are too small to be of importance, except the mortality, which shows an 82 per cent death rate if a coronary thrombosis occurs during the follow-up period in the patient who previous to operation had a normal electro-cardiograph. Involvement of the second limb also gives a poor prognosis from the point of view of the arterial reconstruction and mortality. Half of those who had involvement of the second limb were dead within ten years of the arterial reconstruction.

After 10 years, out of the original 64 cases, 21 still have an excellent functioning graft. These 21 cases consider that their life is normal, and those who are of working age are all doing their normal work. Of the 23 cases who died during the follow-up period, 16 deaths were caused by coronary thrombosis, 3 by cerebral vascular accidents, 2 by carcinoma of the lung, and there were 2 miscellaneous causes; i.e., 82 per cent of cases died from cardiac or cerebral disease, and this is close to Bloor's figure of 76 per cent. Coronary thrombosis, both pre-operatively and during the follow-up period, was the most important factor in the prognosis. Involvement of the second limb is also a poor prognostic sign. Atherosclerosis of the lower limb diminishes life expectation, and the average age of death of both males and females was 58.7 years, while the United Nations Statistics give 70.8 years as the normal life expectation.

Summary

The ten-year life pattern of 64 cases of lower limb atherosclerosis following reconstructive arterial surgery is described. Spread of the disease to coronary arteries, second leg and cerebral arteries, indicates a poor prognosis both as regards the life of the patient and the function of the arterial reconstruction. Coronary artery involvement is the dominant factor in the prognosis. In most cases there was a relentless spread of the atherosclerosis but, in spite of this, 33 per cent were alive, with a functioning arterial reconstruction, ten years after operation.

References

BLOOR, K. (1961). *Ann. Roy. Coll. Surg.*, **28**, 36.
COCKETT, F. B., and MAURICE, B. A. (1963). *Brit. med. J.*, **1**, 353.
DARLING, R. C., and LINTON, R. R. (1964). *New Eng. J. Med.*, **270**, 609.
EADIE, D. G. A. (1970). *Brit. J. Hosp. Med.*, **5**, 18.
EASTCOTT, H. H. G. (1969). *Arterial Surgery*. Pitman Medical, London.
GILLESPIE, J. A. (1970). *Brit. J. Hosp. Med.*, **5**, 9.
GORDON, T., KANNEL, W. B., and SORLIE, P. (1972). *Framingham Study, 16 year follow-up.* National Heart and Lung Institute; National Institute of Health. Washington D.C.
JUERGENS, J. L., BARKER, N. W., and HINES, E. A. (1960). *Circulation*, **21**, 188.
WAHLBERG, F. (1962). *Acta med. Scand.*, **171**, 1.
WATT, J. K., GILLESPIE, G., POLLOCK, J. G., and REID, W. (1974). *Brit. med. J.*, **1**, 23.

BONE AND BONE DISEASE

A SYMPOSIUM on "Bone and Bone Disease" was held in the Medical Biology Centre (Q.U.B.) on Friday, 14th February, 1975, under the joint auspices of the Royal College of Physicians of Edinburgh, the Northern Ireland Council for Postgraduate Medical Education, and the Ulster Medical Society. The Symposium proved extremely popular and was attended by over two hundred doctors. The large attendance was commented upon by Dr. R. F. Robertson (Vice-president of the Royal College of Physicians of Edinburgh) who opened the symposium. He remarked that the occasion was unique in that it was the first time the Edinburgh College had "crossed a sea" to participate in a symposium.

The programme was divided into three sessions: Session 1 was chaired by Professor J. J. Pritchard (Department of Anatomy, Q.U.B.), Session 2 by Dr. R. F. Robertson (Royal College of Physicians of Edinburgh), and Session 3 by Professor R. H. Girdwood (Department of Medicine, Edinburgh University). The culmination of the symposium was the annual Sir Thomas and Lady Edith Dixon Lecture, delivered by Professor H. F. DeLuca (Chairman of the Department of Biochemistry, University of Wisconsin, Madison), who gave an erudite and enlightening exposition of the present state of knowledge of the metabolism of Vitamin D. For the lecture the chair was taken by Professor J. E. Morison (President of the Ulster Medical Society).

The following are abstracts of the papers presented. After each session relevant points from the discussion are given.

SESSION 1

A. The Classification of Metabolic Bone Disease (Rickets and Osteomalacia)

Professor C. E. DENT, F.R.S., Ph.D., M.D., F.R.C.P. (Lond.)
Department of Human Metabolism, University College Hospital Medical School, London

The discovery in 1919 that rickets was due to a dietary deficiency led to important improvements in bone disease classification. The superficially similar chondrodystrophies could be adequately distinguished. Classical rickets, healing readily with a few hundred units of vitamin D daily, could be distinguished from the metabolic forms requiring about 100 times more vitamin D, sometimes with other drugs too. Progress in the next 10 years comprised the first classic descriptions of coeliac and renal rickets and then soon after the extension of the latter into three types, "Vitamin D resistant" rickets, renal tubular acidosis and the Fanconi syndrome (in which renal tubular rather than glomerular dysfunction occurs). After this still further subdivisions of these types occurred and in addition quite new causes were and are

still being found. There are now over 30 different types of metabolic rickets, of such diverse origins as phosphate lack from overdosage with aluminium hydroxide, heavy metal poisoning of the renal tubule, as part of the bone disease in primary hyperparathyroidism, from various hereditary renal tubular syndromes, varieties of malabsorption syndromes and perhaps most interesting of all theoretically, from an obscure chemical complication clearly attributable to certain tumours of bone and soft tissue.

B. Investigative Approach to Bone Disease

Professor D. L. GARDNER, M.D., F.R.C.P. (Edin.), F.R.C.Path., M.R.C.P. (Lond.)
Professor of Pathology and Director of the Institute of Pathology,
The Queen's University of Belfast

A full understanding of the nature of a generalised disease of bone often comes only from the use of a wide variety of diagnostic laboratory procedures. Among the most valuable is iliac crest bone biopsy. A cylindrical specimen of dense cortical and of cancellous iliac bone is obtained by a motor driven trephine. The material, which is suitable for x-ray, for microincineration, for scanning—and for direct electron microscopy, is divided longitudinally. This gives (1) a block decalcified in EDTA or in a formic acid/sodium citrate mixture and used to prepare paraffin sections that establish the presence or absence of neoplastic and haemopoietic diseases; and (2) a block embedded in epon wax or araldite to give undecalcified sections. Alternatively, one of the two blocks may be rapidly frozen and used to prepare undecalcified sections at low temperature in a bone cryostat.

Undecalcified sections enable the recognition of the extent of osteoid seams and the diagnosis of the osteomalacic syndromes. The survey of sections from bone in which tetracycline has been incorporated during life as a measure of bone growth is facilitated. Cryostat sections can be used for enzyme histochemistry, in the diagnosis, for example, of hypophosphatasia.

Important systematic studies of bone disease by these and other techniques have been made by Frost. This survey concluded by illustrating the microscopic appearances of some of the principal forms of generalised bone disease and outlined the methods Frost has advocated in their assessment.

After Session 1, Professor J. J. Pritchard (Q.U.B.) made the point that anatomically bones were simple things but they had become "mixed up" with a major portion of the body's metabolic activity and this helped to explain the variety of disorders affecting the skeleton. Professor Pritchard asked how bones bent in osteomalacia/rickets and Professor Dent in reply stated that in children the bending of the femora occurred at the growing ends but that deformity of the femoral neck could occur at the site of a Looser fracture.

C. Metabolic Bone Disease

Dr. M. G. McGEOWN, M.D., Ph.D., F.R.C.P. (Edin.)
Honorary Reader in Nephrology, The Queen's University of Belfast

In the introduction to her paper Dr. McGeown emphasised the importance of clinical examination in the diagnosis of metabolic bone disease.

Disease	*Histology*	*Clinical*	*Radiology*	*Blood Chemistry*	*Aetiology*	*Treatment*
Osteoporosis	Thin, sparse trabeculae, fully calcified.	Brittle: fractures. Pain episodic. Central skeleton deformities fractures.	Poorly calcified spine, pelvis, femora.	Ca → P → Alk phos →	Age types Hormonal Nutritional Disuse	Unsatisfactory
Osteomalacia	Too little *calcified* bone. Trabeculae with osteoid borders.	Aching bones. Tender bones. Soft bone deforms. Muscle weakness.	Poorly calcified whole skeleton. Deformities marked. Looser zones.	Ca ↓ or → P ↓ Alk phos ↑	Vitamin D deficiency Congenital Dietary Malabsorption Renal Tubular syndromes Dialysis osteomalacia	Vitamin D Treat cause
Hyperparathyroidism	Osteitis fibrosa cystica. Bone destruction with fibrous repair.	Generalized bone pain. Bizarre deformities chest, spine, pelvis. "tumours" long bones. Fractures.	Whole skeleton involved—cortical bone loss. Subperiosteal erosions.	Ca ↑ P ↓ Alk phos ↑	Excess PTH	Remove overactive parathyroid gland(s)
Paget's Disease	Osteitis deformans. Bone destruction with excessive bone formation.	Pain variable. Deformities with increased bone thickness.	Characteristic appearances with remaining areas of normal bone—"spotty" bone disease.	Ca → P → Alk phos ↑	Unknown	? any—calcitonin mithramycin glucagon diphosphonates

Session 2

A. Paget's Disease of Bone

DR. V. PARSONS, M.D., F.R.C.P. (Lond.),
Physician, King's College Hospital, London

James Paget's disease of bone is a widespread disease which can affect all of the bones in the body with many features of a diffuse abnormality, not only of bone formation and modelling, but also affecting other connective tissue including the vascular supply to the bone and finer vessels, angioid streaks in the eye.

There is evidence for a familial and geographical incidence of the disease which suggests that it may be of genetic origin and there is evidence that it may be associated with other diseases such as pseudoxanthoma elasticum and possibly thyroiditis.

The presenting symptoms and signs are extremely varied, but patients may present to the orthopaedic surgeons and rheumatologists with arthritis, fractures and sarcoma, to the neurologist with cranial nerve lesions, cervical cord lesions and more rarely mid-brain and cerebral dysfunction, to the cardiologist with heart failure and heart block, to the dental surgeon with difficulties associated with the jaw and dentition and to the metabolic physician because of the derangements found in calcium metabolism when those patients are admitted for other reasons. A proportion of patients are asymptomatic and the disease is brought to light during routine X-rays and biochemical investigations. These latter show characteristic changes in alkaline and acid phosphatases and total urinary hydroxyproline. The radiological, histological and bone scan features are typical.

The clinical picture is occasionally confused by other diseases occurring with Paget's disease, such as carcinoma of the prostate, multiple myelomatosis, osteomalacia, sarcoidosis, all of which need to be disentangled in the particular patient. Treatment involves a full assessment of the patients symptoms. How much of the pain is due to degenerative arthritis? The extent of deformity and periosteal distension, fracture, increased bone blood flow, diversion of blood from muscle to bone, and finally, malignant change. The range of treatment involved include local radiotherapy, antimitotic agents such as mithramycin, diphosphonates and calcitonin (porcine, salmon and human).

B. Mineral Metabolism in Rheumatoid Arthritis

Professor W. W. BUCHANAN, M.D., F.R.C.P. (Glasgow), F.R.C.P. (Edin.)
The Centre for Rheumatic Diseases, Glasgow

It has been recognised for many years that one of the earliest radiological features of rheumatoid arthritis is juxta-articular osteoporosis. However, the pathogenesis of this and generalised osteoporosis has not been explained.

This paper described studies of osteoporosis in a large group of patients with

rheumatoid arthritis, employing three radiological indices—metacarpal, femoral and clavicular. The results show that a significant degree of osteoporosis occurred in both males and females. Osteoporosis was particularly marked in those over 45 years of age, those with arthritis of long duration, and those who had been treated with corticosteroid therapy. Of particular interest was the fact that osteoporosis occurred to the same degree in bones close to joint inflammation e.g. the metacarpal, and those some distance from inflammed joints e.g. mid-point of femur. Studies on the role of zinc in osteoporosis in rheumatoid arthritis were also described. The plasma zinc has been found to be low in patients with the disease, especially those treated with corticosteroid therapy, and the plasma zinc concentration correlated with the degree of osteoporosis.

Finally, the results of more recent studies of serum calcium, phosphorus, alkaline phosphatase, albumin and chloride, were reported which suggest that patients with rheumatoid arthritis have a significant increase in parathyroid activity.

Discussion on Dr. Parson's paper after Session 2, emphasised that Paget's disease could be associated with vitamin D deficiency.

Session 3

A. Clinical Aspects of Vitamin D Metabolism

Dr. T. M. CHALMERS, M.D., F.R.C.P. (Lond.), F.R.C.P. (Edin.)
Consultant Physician, United Cambridge Hospitals

with

M. W. DAVIE, J. O. HUNTER, E. KODICEK, D. E. M. LAWSON, B. PELC and R. SPENCER
Addenbrooke's Hospital, Dunn and Strangeways Laboratories, Cambridge

In Europe vitamin D deficiency is common amongst patients with epilepsy. It was suggested that this was a consequence of hepatic enzyme induction produced by anticonvulsant drugs, which might increase the rate of breakdown of the vitamin. We found, however, that the clearance of radioactive cholecalciferol from the plasma was no faster in epileptics than in controls taking no drugs whatsoever, and a further investigation revealed that the major factor controlling the rate of cholecalciferol clearance was the plasma concentration of 25-hydroxyvitamin D. Nevertheless, studies before and after treatment with ultra-violet light in normal and epileptic subjects demonstrated that at any given concentration of 25-hydroxyvitamin D the rate of clearance of cholecalciferol was significantly faster in epileptics, which strongly supports the suggestion that enzyme induction is important in the pathogenesis of anticonvulsant osteomalacia.

In chronic renal failure resistance to vitamin D and osteodystrophy are thought to be due to impaired production of the renal hormone, 1,25–dihydroxyvitamin D. As a substitute for the hormone itself, which although therapeutically active is

difficult to prepare, we have synthesised the analogue 1-alpha-hydroxycholecalciferol. In four patients with renal osteodystrophy the administration of this substance, in an oral dose of 1.5–2μg daily, has raised calcium absorption, lowered serum parathyroid hormone concentration and produced radiological evidence of bone healing.

In the discussion Dr. V. Parsons suggested that anticonvulsants might have an effect on calcium transport across intestinal epithelium. Dr. Chalmers agreed with this.

B. Hard Tissue Mineralization

DAME JANET VAUGHAN, D.B.E., D.M., F.R.C.P. (Lond.)
formerly Hon. Director, MRC Group for Research on Bone Seeking Isotopes, Oxford

The question of how initial crystal formation occurs in mineralised tissue has long exercised bone physiologists since it is agreed that the concentrations of calcium and phosphate in blood are lower than those required to form new crystals in vitro, though they are sufficient to allow precipitation of calcium phosphate onto crystals already formed. It was originally suggested by Glimcher and his colleagues that the collagen fibres in inorganic matrix might provide heterogenous nucleating sites. Recent experimental evidence suggests that orientation of calcium phosphate concentrates along the axis of collagen fibres is probably only secondary to the formation of such concentrates in non-collagenous matrix. It appears probable that certain cells of bone, cartilage and dentin may, through vesicle formation, enable sufficient concentration of calcium and phosphate to occur in microscopic sites in matrix to act as nucleation centres. The character of these vesicles and the possible part played by the unique character of the glycoproteins present in relatively high concentration in osteoid as compared to calcified bone and of pyrophosphate and phosphatases were discussed. The possible influence of vitamin D metabolites and parathyroid hormone on matrix mineralization were also briefly considered.

In discussion of Dame Janet's paper the epitaxic theory of calcification was emphasised and it was suggested that this theory was more useful in examples of ectopic calcification. The more active role ascribed to the osteoblast by Dame Janet did not invalidate the theory of epitaxy since once microcrystals were formed then presumably they combined with the collagenous component of the osteoid.

Recent Advances in the Study of Vitamin D

H. F. DeLUCA
Steenbock Research Professor and Chairman Department of Biochemistry, University of Wisconsin, Madison, Wisconsin, U.S.A.

THE SIR THOMAS AND LADY EDITH DIXON LECTURE

It is well established that Vitamin D_3 must be hydroxylated on C-25 in the liver and subsequently on C-1 in the kidney to form 1,25-$(OH)_2D_3$ before it can function

at physiological doses. Without apparent further metabolism, the 1,25-$(OH)_2D_3$ stimulates the intestine to transport calcium and phosphate, the mobilization of calcium and phosphate from bone and the reabsorption of calcium in the kidney. In true endocrine fashion, the biogenesis of 1,25-$(OH)_2D_3$ in the kidney is feed-back regulated by 1,25-$(OH)_2D_3$ itself, by serum calcium concentration through the parathyroid hormone and by serum inorganic phosphorus. Although the cellular and molecular mechanisms of this regulation are not known at present, it is clear that the physiologic need for calcium and for phosphorous as revealed by low serum levels of these ions results in stimulation of 1,25-$(OH)_2D_3$ synthesis which then mobilizes these ions from intestine and bone. The level of 1,25-$(OH)_2D_3$ also plays a regulatory role which may be permissive in nature. In the absence of 1,25-$(OH)_2D_3$, the parathyroid hormone and inorganic phosphate of the serum do not regulate the 25-OH-D_3-hydroxylase activity of kidney which is very high in the vitamin D–deficient state regardless of the serum levels of $Ca=$, $PO_4=$and parathyroid hormone.

Hypoparathyroid patients probably produce little 1,25-$(OH)_2D_3$ in response to hypocalcemia and are easily treated with 1 μg/day of 1,25-$(OH)_2D_3$ plus 1 gram of dietary calcium. Renal failure patients who probably lack the ability to synthesise 1,25-$(OH)_2D_3$ are also markedly improved by treatment with 1,25-$(OH)_2D_3$ (1μg 3 times per week). Vitamin D dependency rickets is also treated with 1,25-$(OH)_2D_3$ (1 μg/day) successfully. In all such treatments a synthetic analog of 1,25-$(OH)_2D_3$, namely 1-alpha-OH-D_3, is also effective, but the successful treatment level is about twice that of 1,25-$(OH)_2D_3$. Additional clinical applications of the metabolites of vitamin D_3 were discussed.

SOCIAL FACTORS ASSOCIATED WITH DELAY IN DISCHARGE FROM AN ACUTE MEDICAL WARD

by

***H. L. HALLIDAY, M.B., M.R.C.P.(U.K.), D.C.H., D(Obst).R.C.O.G.,**

and

A. P. GRANT, M.D., F.R.C.P., F.R.C.P.I.

Belfast City Hospital

* Now at the Royal Belfast Hospital for Sick Children

Introduction

THIS pilot study was carried out in Belfast during the period of civil unrest. A general medical ward with a once-weekly take-in of emergency admissions over a 24 hour period was the place of study. In order that beds become available for new admissions each week the turnover of patients must of necessity be rapid. It appeared to us that some beds became 'blocked' by patients who could not be discharged for social rather than medical reasons. It was therefore decided to enquire into some of the social factors associated with this delay in discharge.

Patients and Methods

For a six month period from January 1st 1974 all acute admissions to a Belfast medical ward were studied. Patients dying within 7 days of admission were excluded and 376 patients in total were observed (195 males and 181 females).

The importance of social factors causing delay in discharge was evaluated by two clinicians after discussion of each case. Patients were placed into two groups depending upon whether discharge was delayed for social reasons or for medical reasons. Patients whose discharge was not delayed were also placed in the latter group.

The proportions of patients in each of these two groups were then compared for age, sex, social class, religion, social isolation, diagnosis and area of Belfast in which the patient lived. The proportions for each variable were then compared with that expected i.e. the proportions in the whole sample; and differences in excess of twice the standard error were taken as significant. (In the Tables, proportions that are significantly higher or lower than the proportion of the whole sample are marked by the symbol *).

Results

Age and Sex

Patients of each sex were divided into 2 groups: those under 65 years of age and those over. The results are shown in Table I. For females there was a significant association between age and delay in discharge for social reasons; females over

TABLE I

Proportions of Patients with Social Factors Delaying Discharge by Sex and Age

AGE GROUP	MALE						FEMALE					
	Some Social Factors		No Social Factors		Total		Some Social Factors		No Social Factors		Total	
Under 65 years	25	27.5%	66	72.5%	91	100%	20	29.9%*	47	70.1%	67	100%
Over 65 years	46	44.2%	58	55.8%	104	100%	70	61.4%*	44	38.6%	114	100%
Total	71	36.4%	124	63.6%	195	49.7%	90	49.7%	91	50.3%	181	100%

65 having more than twice the proportion with social factors than the under 65 group. Males over 65 also had more social problems delaying discharge than those under 65 but the difference was not significant. Table I also shows the high proportion of patients over 65 i.e. males 53 per cent and females 63 per cent. Patients over 65 years represented 58 per cent of all admissions.

Comparing the sexes it can be seen that females had more social problems delaying their discharge than males. More than one third of males and almost one half of females had some social factors delaying their discharge from hospital.

Social Class

Each patient was allocated to one of the Registrar General's social classes based upon occupation. To obtain groups with comparable numbers classes I and II, and IV and V were combined. The analysis showed that there was no significant association between social class and social factors delaying discharge for either sex (Table II).

TABLE II

Proportions of Patients with Social Factors Delaying Discharge by Sex and Social Class

SOCIAL CLASS	MALE						FEMALE					
	Some Social Factors		No Social Factors		Total		Some Social Factors		No Social Factors		Total	
I & II	5	50.0%	5	50.0%	10	100%	6	46.2%	7	53.8%	13	100%
III	20	20.6%	50	71.4%	70	100%	27	52.9%	24	47.1%	51	100%
IV & V	44	39.6%	67	60.4%	111	100%	48	47.1%	54	52.9%	102	100%
Unknown	2	-	2	-	4	-	9	-	6	-	15	-
Total	71	36.4%	124	63.6%	196	100%	90	49.7%	91	50.3%	181	100%

For males whose social class was known 5 per cent were from I and II, 37 per

cent from III and 58 per cent from IV and V. For females these figures were I and II 8 per cent, III 31 per cent and IV and V 61 per cent.

Religion

There was no difference between patients of Protestant and Catholic religions in relation to delay in discharge for social reasons in either sex.

Social Isolation

Patients were classified into 2 groups: those living alone and those living with relatives or friends. For males living alone, although the numbers were small, social factors delaying discharge were significantly more common than in the whole sample. (Table III). For female patients there was a similar trend but this was not statistically significant of females. 36 per cent were living alone compared to 14 per cent of males.

TABLE III

Proportions of Patients with Social Factors Delaying Discharge by Sex and Social Isolation

	MALE						FEMALE					
DOMESTIC SUPPORT	Some Social Factors		No Social Factors		Total		Some Social Factors		No Social Factors		Total	
Living with Relations and Friends	54	32.5%	113	67.5%	167	100%	51	44.4%	64	55.6%	115	100%
Living alone	17	60.7%*	11	39.3%	28	100%	39	59.1%	27	40.9%	66	100%
Total	71	36.4%	124	63.6%	195	100%	90	49.7%	91	50.3%	181	100%

Diagnosis

The five commonest diagnoses and all 'other diagnoses' for each sex were analysed. The results are shown in Table IV.

The commonest diagnoses for men were as percentage of male admissions ischaemic heart disease 21.0 per cent, chronic bronchitis 19.0 per cent, pneumonia 11.8 per cent, peptic ulcer 10.8 per cent and stroke 9.7 per cent. For women the commonest diagnoses were as percentage of female admissions ischaemic heart disease 18.8 per cent, stroke 13.8 per cent, pneumonia 12.1 per cent, chronic bronchitis 7.2 per cent and asthma 5.0 per cent. The 'other diagnoses' accounted for 27.7 per cent of male and 43.1 per cent of female admissions but were too varied for individual consideration.

The analysis showed that for males peptic ulcer was a diagnosis carrying a significantly smaller proportion than expected of social factors delaying discharge. For females stroke was a diagnosis associated with an excess of social factors causing delay and asthma with a smaller number than expected.

TABLE IV

Proportions of Patients with Social Factors Delaying Discharge by Sex and Diagnosis

DISEASE GROUP	MALE				FEMALE			
	Some Social Factors		No Social Factors		Some Social Factors		No Social Factors	
Ischaemic Heart Disease	18	42.9%	24	57.1%	18	52.9%	16	47.1%
Chronic Bronchitis	17	45.9%	20	54.1%	6	46.2%	7	53.8%
Pneumonia	12	52.2%	11	47.8%	14	63.7%	8	36.3%
Stroke	9	47.4%	10	52.6%	22	88.0%*	3	12.0%
Peptic Ulcer	3	14.3%	18	85.7%*				
Asthma					1	11.1%	8	88.9%*
Others	12	22.6%	41	72.4%	29	37.2%	49	62.8%
Total	71	36.4%	124	63.6%	90	49.7%	91	50.3%

Area of Residence

Electoral ward areas of Belfast were classified into 3 groups in relation to the civil disturbance—troubled, intermediate and trouble-free. No significant results were obtained though patients admitted from trouble-free areas had a lower proportion of social factors delaying discharge than those from troubled areas—27.3 per cent to 44.1 per cent for males and 39.3 per cent to 58.2 per cent for females (Table V).

TABLE V

Proportions of Patients with Social Factors Delaying Discharge by Sex and Area of Residence

DEGREE OF CIVIL UNREST	MALE				FEMALE			
	Some Social Factors		No Social Factors		Some Social Factors		No Social Factors	
Troubled	30	44.1%	38	55.9%	32	58.2%	23	41.8%
Intermediate	23	37.7%	38	62.3%	34	52.3%	31	47.7%
Troublefree	18	27.3%	48	72.7%	24	39.3%	37	60.7%
Total	71	36.4%	124	63.6%	90	49.7%	91	50.3%

DISCUSSION

Although the numbers in this study were small in view of the heterogeneity of the data, the findings indicate, as might be expected, that older people (over 65) and those living alone are more likely to have social problems delaying their discharge from hospital, than other patients. Women appear to have more of such problems than men and are more likely to be living alone presumably because the expectation of life is considerably greater in women than in men (D.H.S.S. Report 1973). The

discovery that men of all ages living alone have more social problems than expected suggests that they have difficulty coping at home.

The proportion of elderly admissions to Belfast Medical wards may also be increasing. In 1972 51 per cent of patients in Belfast medical wards were over sixty-five (Grant 1975) as compared to 58 per cent in this study.

The findings strongly support the view that more homes for the elderly are required to receive old people who have largely recovered from their illnesses in hospital but cannot manage to look after themselves at home. Further, more geriatric beds are required for those who still need some medical and nursing care but who do not need the full facilities of an acute medical ward.

The proportion of patients from social classes IV and V in this study is high when compared with the proportion of the population of Northern Ireland from these classes—namely 58 per cent to 35.5 per cent for males and 61 per cent to 42.4 per cent for females (Census Reports, 1961). This is in keeping with the findings of others that morbidity is greatest in the lower social classes (Ministry of Pensions and National Insurance Report, 1965; Wald, 1972; Conover, 1973; Townsend, 1974). It is rather surprising then that the increased morbidity in social classes IV and V is not associated with a greater proportion than expected of social factors delaying discharge for either sex. Perhaps this is related to lower utilisation of medical services by the lower income groups as suggested by a recent Finnish study (Purola, et al 1968).

In relation to diagnosis, rehabilitation facilities for females who have suffered strokes may help them to become sufficiently mobile to cope at home or in an old people's residence. The lower than expected proportion of social factors delaying discharge in men with peptic ulcers and women with asthma probably reflects the younger age group of these patients.

Patients admitted from troubled areas have more social problems than others. This effect of the civil disturbance is less than anticipated. Lyons (1973) showed that under conditions of severe civil disturbance there was no increase in acute psychotic illness but that much of the population developed what he called 'a normal anxiety reaction'. This could, in part, explain the increase of social problems in patients admitted from troubled areas and their reluctance to be discharged.

Summary

Three hundred and seventy-six successive admissions to an acute medical ward in Belfast were studied to discover to what extent social factors delayed discharge. 63 per cent of females and 53 per cent of male admissions were over 65 years old. Females over 65 had significantly more social factors delaying their discharge than others. Males, in general had fewer of these factors (36 per cent to 50 per cent) compared to females. Rather surprisingly social class was shown to be unimportant in this respect but patients from the lowest social classes showed a greater morbidity rate than others. Males living alone had significantly more social factors delaying discharge than expected. Females with strokes also had more social factors though those with asthma, and males with peptic ulcers had significantly fewer than

expected from the total samples. Patients of both sexes admitted from 'troubled' areas of Belfast had more social factors delaying their discharge than those from 'troublefree' areas though the differences were not significant.

Acknowledgements

We would like to acknowledge the advice of Professor J. Pemberton of The Department of Social and Preventive Medicine, Queen's University, Belfast, concerning the presentation of the data and to thank Miss Rosemary Thompson who typed the manuscript.

References

Census Reports, Northern Ireland (1961). H.M.S.O., Belfast.

Conover, P. W. (1973). *International Journal of Health Services*, **3**, 357.

D.H.S.S. Report (1973). *Health and Personal Social Services Statistics for England.* H.M.S.O., London.

Grant, A. P. (1975). *Ulster Medical Journal*, **44**, 62.

Lyons, H. A. (1973). *Community Health*, **5**, 163.

Ministry of Pensions and National Insurance (1965). *Report on an Enquiry into the Incidence of Incapacity for Work.* H.M.S.O., London.

Purola T., Kalimo E., Sievers K. and Nyman K. (1968). *Research Institute for Social Security, Helsinki.*

Townsend, P. (1974). *Lancet*, **1**, 1179.

Wald, N. (1972). *Lancet*, **1**, 259.

THE NORTHERN IRELAND COUNCIL FOR POSTGRADUATE MEDICAL EDUCATION

PSYCHIATRY COMMITTEE

Special Mental Health Training Scheme

The Committee has taken over the administration of the Special Mental Health Training Scheme, formerly run by the Professor of Mental Health. The posts under this scheme have proved invaluable in arranging flexible programmes for trainees. Almost all trainees now have the opportunity to get experience in neurology, child psychiatry and mental subnormality; the joint training in the latter two specialties has been favourably commented on at a meeting across the water.

Careers Information and Advice

The Speciality Adviser continued to see pre-registration doctors who used Council's Careers Information and Advisory Service. In addition, the Committee invited all trainees in psychiatry to attend an interview with two of its members to discuss career plans on a general level. In order to ensure objective advice, each trainee was interviewed by the Specialty Adviser and a consultant outside his own area. A small minute of each interview was kept in triplicate, one copy for the trainee, one for his tutor and one for Council's career records, and the information later proved very useful to the Committee in making recommendations to Central Services Agency on the posting of trainees for the coming year. All trainees will, in future, be interviewed annually.

Royal College of Psychiatrists Visits

The Royal College visitors have made two visits to Northern Ireland and should complete the first round of visiting by the early autumn 1975. Although there has been constructive criticism, at the time of going to press no unit had failed to be approved as a training institution.

W.O.McC.

OTOLARYNGOLOGY COMMITTEE

The ENT postgraduate programme during 1974–75 included:

Weekly lectures and demonstrations on basic physiology and anatomy including temporal bone dissection.

Weekly lectures on ENT and para-ENT topics. Guest lecturers included Mr. Ellis Douek (Guy's Hospital), and Mr. Henry Shaw (Royal Marsden Hospital).

Weekly case presentations. This was a new and highly successful feature of the programme in which senior house officers and registrars made formal presentation of interesting and unusual clinical material derived from the in-patient population.

Once-monthly pathology and seminars were presented by Professor F. V. O'Brien to illustrate histological aspects of the biopsy material from patients currently under treatment in the Eye & Ear Clinic, Royal Victoria Hospital and the ENT Department Belfast City Hospital.

G.D.L.S.

OBSTETRICS & GYNAECOLOGY COMMITTEE

Number and Location of Doctors from Northern Ireland who have obtained the MRCOG Diploma (1963–1975)

Year	*Total*	*Employed in U.K.*	*Employed outside U.K.*
1963	3	1 (Deceased)	2
1964	2	–	2
1965	4	2	2 (1 Deceased)
1966	3	3	–
1967	10	4	6
1968	8	2	6
1969	10	1	9
1970	6	5	1
1971	6	2	4
1972	12	6	6
1973	6	3	3
1974	11	6	5
1975	3	3	–

D. Obst.R.C.O.G.

This course is held twice a year; in April at the Royal Maternity Hospital and in October at the Belfast City Hospital. Each course consists of 12 lectures. In addition there will be ward rounds in the Belfast City and Royal Maternity Hospitals.

Part I M.R.C.O.G.

Doctors studying for Part I of the M.R.C.O.G. should enrol for the Basic Medical Sciences Course. In addition, there will be extra classes for M.R.C.O.G. candidates in those subjects not covered in the Basic Medical Sciences Course.

Part II M.R.C.O.G.

Two intensive two-week courses will be held from 3–16 December 1975 and from 12–25 May 1976.

In addition, seminars and discussion groups will be held alternately on Mondays from 4.30–6.00 p.m. from 8 September 1975 to 26 April 1976 (excl. December).

A lecturer and two course members will take part in each seminar.

Postgraduate obstetric rounds will be held on Tuesdays at 4.00 p.m. and on Thursdays at 3.30 p.m. in the Jubilee Hospital; on Mondays at 11.00 a.m. and on Wednesdays at 2.15 p.m. in the Royal Maternity Hospital.

Postgraduate gynaecology rounds will be held on Thursdays at 2.00 p.m. in the Royal Victoria Hospital. Small discussion groups for the Diploma as well as for the Membership will be held regularly in the teaching hospitals.

H.L.

ANAESTHETICS COMMITTEE

While much of the activity of the Anaesthetics Committee is now routine considerable effort continues to be made to ensure that the enthusiasm for postgraduate education in this specialty is maintained at its initial high levels.

Weekly tutorial classes were held during the year for those studying for both the primary and final parts of the F.F.A.R.C.S. examinations. In addition two intensive courses for postgraduate students preparing for the primary F.F.A.R.C.S. were held during the year in October and March. Both courses were well supported by local trainees and also by some from outside Northern Ireland. The excellent pass rate of those sitting these examinations from Northern Ireland is encouraging for those organising the postgraduate teaching programmes.

Much effort is still being given to the supervision of the rotation of trainees in order that they might receive adequate experience in all branches of anaesthesia while contributing to the service commitment in the province. Encouragement is also given to postgraduate anaesthetists to spend some time in research and the Department of Anaesthetics has supervised several studies during the past year.

The committee are still concerned at the loss of experienced trainees who have been attracted to posts outside the United Kingdom. This produces an instability at a level of training which is detrimental to both the teaching and service commitments in anaesthetics in Northern Ireland.

J.W.D.

WOUND INFECTION IN AN ORTHOPAEDIC UNIT

J. G. CAMBLIN, F.R.C.S.,*
Senior Orthopaedic Registrar, Department of Orthopaedics,
Musgrave Park Hospital, Belfast

and

DR. E. S. MITCHELL, F.R.C.P.,
Consultant Pathologist, Musgrave Park Hospital, Belfast

* Now Fellow of Orthopaedic Oncology, University of Florida, Gainesville, Florida.

Wound Infection in an Orthopaedic Unit

RECENTLY, attention has gradually moved away from the quantity and technique of surgical procedures towards the quality of the work. It is in this vein that this study was focused on wound infection following orthopaedic surgery. This has been studied in other centres and the reported incidence has varied from 1.68 per cent (Wilson et al. 1972) to as high as 19.8 per cent when hip arthroplasty alone has been considered (Patterson and Brown 1972; Bingham, Fleenor and Church 1974). Most authors have a reported wound infection rate of 4 to 11 per cent for total hip arthroplasty (Cruess, Bickel and von Kessler 1975, McKee and Watson-Farrar 1966, Bergstrom, Lidgren and Lindberg 1974) and, with the introduction of a laminar air-flow tent, this incidence has been reduced to 3.8 per cent (Charnley 1972, Dupont and Charnley 1972). The main organisms cultured from the wounds in the reported series were *Staphlococcus aureus, E. coli* and *Pseudomonas spp.*

This study reports the incidence of wound infection in an orthopaedic unit over a five-year period. The theatre system used by this unit was not equipped with the sophistication of laminar air-flow systems and systematic antibiotic prophylaxis was not a policy of this unit, even in total hip replacement.

Patients and Methods

Information regarding the number of patients treated in the orthopaedic unit and the nature of their surgical procedures was obtained from the theatre records. The number of patients whose wounds subsequently became infected during the study period, from 1st January 1970 to 30th April 1975 inclusive, was obtained from the records of the bacteriology laboratory at Musgrave Park Hospital, Belfast. In all cases, the infection was confirmed by a positive swab culture and the isolation of the infecting organism. In addition to the overall infection rate in the unit, that for total hip arthroplasty was recorded separately.

Results

Throughout the study period, there was a total of 14,222 surgical procedures carried out in the orthopaedic unit at Musgrave Park Hospital. During this time, a total of 221 infected wounds were recorded, including those that were already

contaminated prior to surgery. This gave a gross overall sepsis rate of 1.55 per cent. However, this figure is misleading in that dirty or contaminated wounds are included and also it fails to take into consideration the changing pattern of medical care. Excluding the contaminated cases, there were 14,111 clean cases treated by this unit since the start of the study period and, of these, only 127 subsequently became infected. This gave an overall avoidable infection rate of 0.90 per cent.

There has been a steady reduction in the annual infection rate due to a decline in avoidable sepsis (Table 1). In 1970, this was comparable to other centres and stood at 1.29 per cent. The current level of avoidable infection for this unit is now 0.62 per cent. Primarily, as a result of this, the overall gross annual infection rate fell from 1.84 per cent (1970) to the present level of 0.74 per cent for all types of surgical procedures.

TABLE 1

Yearly Infection Rate for All Types of Orthopaedic Surgery

Year	*Total cases*	*Total infected*	*Clean cases*	*Avoidable infection*
1970	2713	50 (1.84)	2700	35 (1.29)
1971	2838	53 (1.86)	2811	25 (0.94)
1972	2834	44 (1.55)	2815	25 (0.94)
1973	2689	45 (1.67)	2665	21 (0.79)
1974	2425	19 (0.74)	2407	15 (0.62)
1975*	723	10 (1.38)	713	6 (0.84)

* First 4 months only. Numbers in brackets=percentage.

ARTHROPLASTY

In this unit, total hip arthroplasty only became commonplace in 1969 and over the years this type of operation has increased in frequency. Initially, the Ring or the McKee-Farrar arthroplasty was used but, during 1970, this gave way to the Charnley or the Howse type of total hip replacement. Both the Charnley and the Howse type prosthesis are ccurrently used with equal frequency. The work load of the unit per year regarding this type of surgery and the resulting wound infection rate are shown in Table 2. Of the total of 1,578 such operations, only 39 became

TABLE 2

Incidence of Infection in Total Hip Arthroplasty

Year	1970	1971	1972	1973	1974	1975*	*Total*
Number	150	318	328	328	352	102	1578
Infected	10	10	4	11	3	1	39
Infection rate (percentage)	6.66	3.15	1.13	3.35	0.85	0.98	2.47

* First 4 months only.

infected and thus gave a gross infection rate of 2.47 per cent. The infection rate for the first year of this study was 6.67 per cent and this has been reduced to the present level of 0.85 per cent. This substantial improvement in avoidable sepsis is most encouraging.

This reduction may in part be due to improved technique and also to a change in the type of materials used in the implant. The majority of the hip arthroplasties carried out in 1970 were of the metal-to-metal type and, on the first year of the introduction of the metal-to-plastic arthroplasty systems, the infection rate fell by 50 per cent. It has steadily continued to fall ever since.

Following the success of the hip replacement procedures, a similar approach was considered for arthritis of the knee. Of the many types of such prostheses, the Geomedic and the Marmor prostheses are used in this unit. Although only 30 such implants have been carried out, following their introduction within the last year, it is of interest that none have given rise to any wound infection.

Organisms

On considering the type of organisms concerned, there has been a change in the nature of the infecting agent. In 1970, the majority of wound infections were due to *Staph. aureus* and this organism accounted for 66.6 per cent of cases. During the period of this study, the incidence of this organism has declined so that at present only 46.2 per cent of wound infections were due to this agent. However, during the same period of time, the incidence of Gram negative infections increased from 24 per cent to a current level of 53.9 per cent (Table 3). The majority of the infections in this study were superficial and in almost all cases the organism was sensitive to most common antibiotics.

Table 3

Yearly Incidence of Infecting Agents

Year	*Staph. aureus*	*Gram negative*	*Others*	*Total*
1970	36 (66.67)	13 (24.00)	5	54
1971	42 (70.00)	12 (20.00)	6	60
1972	29 (65.90)	12 (27.27)	3	44
1973	28 (57.14)	17 (34.69)	4	49
1974	10 (55.56)	8 (44.44)	0	18
1975*	6 (46.15)	7 (53.85)	0	13

* First 4 months only. Numbers in brackets=percentage.

During the first few months of this year, the unit has been forced by lack of nursing staff to use only one theatre. The work load for this single theatre has been increased from 113 cases per month, as it was in the preceeding five years, to the present through-put of 181 cases per month. In view of this increased use, it was thought that there would be an associated increase in wound infection. This has not happened. The infection rate for the first four months of this year is exactly

comparable to the same period of 1974. The nature of the infecting organisms has also remained unaltered. The most frequent infecting agents throughout the entire study period were *Staph. aureus, E. coli* and *B. Proteus.* Pseudomonas spp. has only given rise to wound infection since 1973 and is increasing in frequency.

Comment

The incidence of wound infection following orthopaedic surgery has decreased over the study period from 1970 till 1975, mainly due to a reduction in avoidable sepsis. This incidence now stands at 0.62 per cent for all types of surgical procedures. That following total hip arthroplasty has fallen from 6.66 per cent to the present level of 0.85 per cent. Charnley (1972) reports an infection rate of 2.2 per cent following such surgery. In comparison, these results are very encouraging since the theatres in this unit are not fitted with laminar air-flow tents, as used by Carnley in his unit.

It has been suggested that wound infection may be reduced by local antibiotic application in the form of wound irrigation using an antibiotic solution. This has been reported to reduce avoidable wound sepsis to 0.5 per cent (Bingham et al. 1974). It was not the policy of this unit to use antibiotic cover either as an irrigation or systemically unless there was a specific indication for such antibiotic cover. A policy calling for the liberal use of antibiotics could lead to the introduction of resistant organisms which have not been encountered in this unit. The difference between 0.62 per cent in this unit and 0.5 per cent (Bingham, Fleenor and Church 1974) does not seem to warrant such a policy and its attendant risks.

There is at present a proposal to build a new theatre suite for the orthopaedic unit. Each theatre would be provided with a laminar air-flow tent, as used by Charnley and others. If used with current surgical techniques, this should reduce still further the incidence of wound infection, especially following prosthetic implants. There is, unfortunately, a chance that, with the introduction of such a system, attention to detail may not be as strict as at present and thus the end result would be less than satisfactory and not demonstrate the true worth of this improved system.

Summary

In one orthopaedic unit not equipped with laminar air-flow systems a total of 14,222 operations was carried out during the period 1970—April 1975 with an overall avoidable wound infection rate of only 0.90 per cent. The current level for all types of surgery in this unit is now only 0.62 per cent. and compares favourably with other centres. With regard to total hip arthroplasty the infection rate has fallen from 6.66 per cent in 1970 when metal-metal prostheses were used to the present level of 0.85 per cent since the introduction of metal-plastic Charnley or Howse type hip replacements.

The changing pattern of infection from the Gram positive *Staph. aureus* to the Gram negative *E. coli* and *B. proteus* which now accounts for 45 per cent of wound infection is described. The lack of resistant strains of organisms in this unit in the absence of an antibiotic-cover policy is noted.

Acknowledgements

I should like to thank the Staff of the Orthopaedic Unit, Musgrave Park Hospital, Belfast, for their help and co-operation.

References

Bergstrom, B., Lindgren, L. and Lindberg, L. (1974). *Clinical Orthopaedics*, **99**, 95.
Bingham, R., Fleenor, W. H. and Church, S. (1974). *Clinical Orthopaedics*, **99**, 194.
Charnley, J. (1972). *Journal of Bone and Joint Surgery*, **54B**, 61.
Cruess, R. L., Bickel, W. S. and von Kessel, K. L. C. (1975). *Clinical Orthopaedics*, **106**, 99.
Dupont, J. A. and Charnley, J. (1972). *Journal of Bone and Joint Surgery*, **54B**, 77.
McKee, G. K. and Watson-Farrar, J. (1966). *Journal of Bone and Joint Surgery*, **48B**, 245.
Patterson, F. P. and Brown, C. S. (1972). *Journal of Bone and Joint Surgery*, **54A**, 257.
Wilson, P. D., Amstutz, H. C., Czernecki, A., Salvati, E. A. and Mendes, D. G. (1972). *Journal of Bone and Joint Surgery*, **54A**, 205.

TRANSIENT TYCHYPNOEA OF NEWBORN

A review of 28 infants

by

HENRY L. HALLIDAY, M.B., M.R.C.P. (U.K.), D.C.H.

and

B. GARTH McCLURE, M.B., M.R.C.P. (U.K.), D.C.H.

Department of Child Health Q.U.B.

and

Royal Maternity Hospital

Introduction

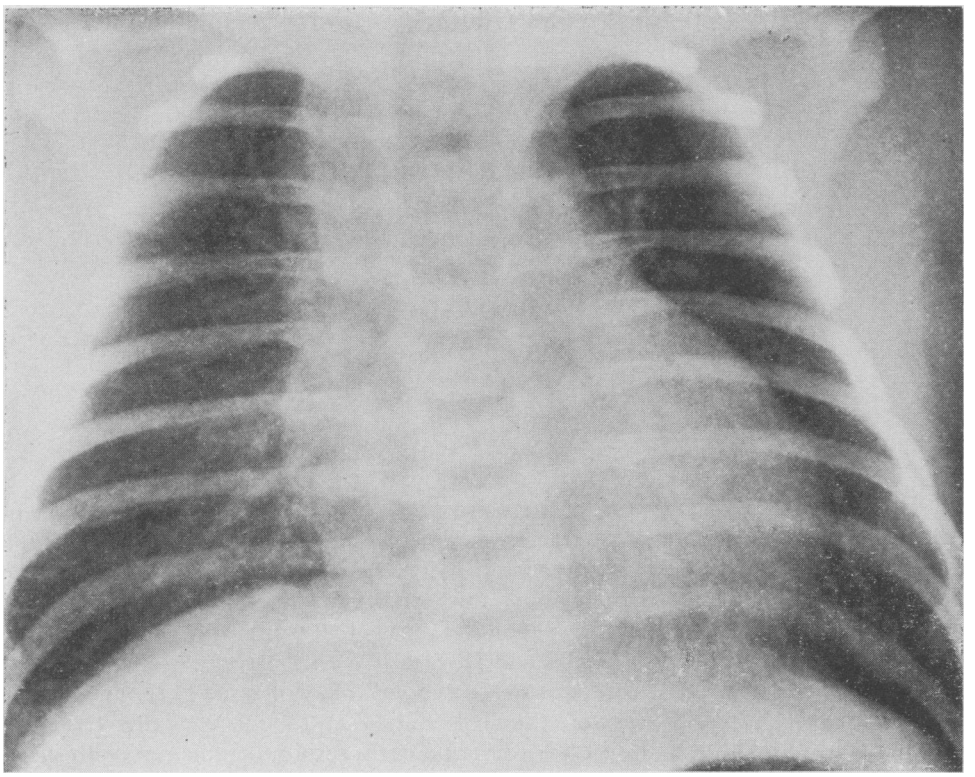
THE term transient tachypnoea of the newborn (T.T.N.) was first used by Avery in 1966 to describe a condition characterised by a rapid respiratory rate during the first hours of life, with few or no accompanying signs of respiratory distress. Since then many authors have written about this syndrome under a variety of titles—"Neonatal Tachypnoea" (Malan 1966), "Transient Respiratory Distress of the Newborn" (Swischuk 1970), "Wet Lung Disease" (Wesenberg et al 1971), "Benign Unexplained Respiratory Distress of the Newborn" (Taylor et al 1971) and "Type II Respiratory Distress Syndrome" (Sundell et al 1971), though this latter term was first used by Prod'hom and others to describe early respiratory distress with insignificant right to left shunting (Prod'hom et al 1965).

The condition is probably due to delayed resorption of lung fluid after birth (Avery 1966). Radiological changes support this view. Radiographs reveal overaeration of the lungs, increased pulmonary vascularity and fluid in the horizontal fissure; free pleural fluid may occasionally be seen in the costo-phrenic angles and Kerley's "B" lines may be found (Kuhn et al 1969) (Figure). The condition is important in that although it is benign and self-limiting, it must be clearly distinguished from the idiopathic respiratory distress syndrome (I.R.D.S.). This latter condition requires active therapy as the natural mortality is high; to apply these techniques toT.T.N. may be dangerous.

The incidence of T.T.N. is unknown but it is probably more common than is realised. We report on 28 neonates with this syndrome.

Patients and Methods

During the 12 month period from 1st August, 1973 to 31st July, 1974, 28 neonates with T.T.N. were admitted to the Infant Special Care Unit at the Royal Maternity Hospital, Belfast (R.M.H.). The diagnosis of T.T.N. was based on the occurrence during the first few hours of life of a respiratory rate of at least 60/min. in the absence of other than minimal signs of respiratory distress. Radiographs were obtained in all the infants.



Radiograph showing over-ifnlation of the lungs, increased pulmonary vascularity, fluid in the right costo-phrenic angle and Kerley's "B" lines.

This group of infants with T.T.N. has been analysed in respect of sex, gestational age, birth weight, onset of symptoms and their duration, maximum respiratory rate, oxygen therapy, the method of delivery and the recorded complications of pregnancy and delivery. The amount of maternal sedation was noted and considered to be excessive if Pethidine 100 mgs. or "Omnopon" 20 mgs. had been given intramuscularly twice within 6 hours or once within 2 hours of delivery.

Results

The Infants

Of the 28 infants, 20 were born in the R.M.H. and 8 were admitted from other hospitals. This gives an incidence of 6 per 1,000 births for R.M.H. patients. Nineteen were born at term and 9 were pre-term (before 37 weeks). Of the 19 term infants, 13 were male and of the 9 pre-term infants, 8 were male. Gestational age varied from 33 weeks to 41 weeks with a mean of 38 weeks and birth weight from 1.7 to 4.0 kg with a mean of 2.9 kg (Table 1).

TABLE I

Patient Population (28)

Birth Place		*Sex*		*Gestational Age*		*Birth Weight*			
RMH	*Other*	*Male*	*Female*	*Range*	*Mean*	*Range*	*Mean*	*Pre-term*	*Term*
20	8	21	7	33 to 41 wks.	38 wks.	1.7 to 4.0 kg	2.9 kg	9	19

Antenatal History

TABLE II

Pregnancy

Uneventful	13
*Potential Diabetes	6
Antepartum Haemorrhage	3
Urinary Infection	2
Pre-eclampsia, Anaemia, Infective Hepatitis, gunshot wound	1 each
Total	28

* 1. Frank diabetes in first degree relative.
2. Glycosuria on two or more occasions during pregnancy.
3. Unexplained perinatal death or severe fetal abnormality in any pregnancy.
4. Maternal weight > 90 kg.
5. Previous baby > 4.5 kg birth weight.
6. Random plasma glucose > 130 mg/100 ml.
7. Abnormal Glucose Tolerance Test.
8. Marked polyhydramnios.

TABLE III

Maternal Sedation

Excessive	13
General Anaesthetic	6
Unknown	5
No Excess	4
Total	28

The antenatal history and method of delivery are summarised in Tables II and IV. Twenty-one per cent of mothers fulfilled the criteria for potential diabetes though none had overt diabetes; and 25 per cent of deliveries were by Caesarean section.

Labour and Immediate Neonatal Period

Maternal sedation was considered excessive in 13 out of the 23 cases where maternal sedation was known accurately (Table III).

TABLE IV
Method of Delivery

Normal	17
Caesarian section	7
Breech	2
Forceps	1
Vacuum	1
Total	28

Eight infants had Apgar scores (AS) of less than 7 at 1 minute and five infants required endotracheal intubation because of birth asphyxia. In 10, the rectal temperature (T) on admission to the unit was 36°C or less.

Clinical Features

All the infants developed tachypnoea of 60/minute or more within 4 hours of birth. Some also showed slight grunting, minimal indrawing and mild cyanosis and these infants may truly mimic I.R.D.S. The onset of symptoms ranged from 20 minutes to 4 hours with a mean of 1 hour. The duration of the tachypnoea varied from 15 to 120 hours with a mean of 42 hours. The maximum respiratory rate ranged from 60 to 130 per minute with a mean of 74/minute. Preterm infants did not differ significantly from this pattern.

When two or more perinatal insults (AS$<$7, T$\leqslant$36°C, excess maternal sedation and general anaesthetic) occur in the same patient, as they did in 16 of this series the onset of the disorder is earlier, the duration is longer and the maximum respiratory rate is higher than in the other patients (Table V).

TABLE V
The Tachypoea

	Onset (Hours)		*Duration (Hours)*		*Max. Rate/Min.*	
	Range	*Mean*	*Range*	*Mean*	*Range*	*Mean*
All (28)	½–4	1	15–120	42	60–130	74
Pre-term (9)	½–3	1	15–72	37	60–100	75
Two or more *perinatal insults (16)	½–1½	½	24–120	55	60–130	83

* Perinatal insults : A.S.$<$7 at 1 minute
T$<$36° C on admission
Excessive maternal sedation
General Anaesthetic

Radiology

All the infants had at least one radiograph. The diagnosis was strongly suggested by the radiological findings in 23 but, in 5 no radiological change was detected.

Therapy and Outcome

Twenty-six infants required supplemental oxygen up to a maximum of 35 per cent. Only 6 infants required oxygen for longer than 4 days, no infant developed retrolental fibroplasia and all the infants survived.

Discussion

The incidence of 6 per 1,000 live births for R.M.H. is higher than all other reported series except for Malan who reported the astonishingly high incidence of 11.9%. We found that the incidence of T.T.N. was about half that of I.R.D.S. (20: 41 for R.M.H. infants in one year). The overall sex distribution of this series (21 male : 7 female) agrees with the findings of others (Swischuk, 1970 and Sundell et al, 1971). The disease process was similar for term and preterm infants.

The association between T.T.N. and perinatal asphyxia, maternal over-sedation and hypothermia has been observed by others (Sundell et al, 1971) and we note in our series that where two or more of these insults are combined the disease process is more severe and prolonged.

Twenty-one per cent of the mothers were 'potential diabetics' which is higher than the overall proportion in the R.M.H. (10 per cent). Similarly, the incidence of Caesarean section was higher than the hospital rate (25 per cent : 11 per cent). These findings are in agreement with the results of Swischuk 1969 and Sundell 1971 respectively.

At least two theories have been advanced to explain the cause of this condition—the aspiration theory of Prod'hom et al (1965) and the delayed resorption of alveolar fluid (Avery 1966). It is known that asphyxia predisposes to both these situations.

Asphyxia favours the development of lung oedema (Taylor et al, 1971) by increasing the volume and protein content of airway fluid, increasing the capillary permeability to plasma protein, increasing transmural pulmonary capillary pressure and increasing the pressure against which lung lymph drains. The first three of these factors will cause alveolar fluid content to be increased and the last will delay its resorption.

Asphyxia will also increase the risk of aspiration at birth causing lower airway obstruction and over-inflation of the lungs which can be demonstrated radiographically. Thus alveolar fluid that has accumulated from endogenous production by the fetal lung (Adams et al, 1963) and from an exogenous source after aspiration has to be removed into the pulmonary venous system by lung lymphatics (Aherne and Dawkins, 1964). Histologically in asphyxiated rabbits there is distension of the lung periarterial spaces (Aherne and Dawkins, 1964). This distension is thought to be due to fullness of the lymphatics, which will lead to a decrease in lung compliance and an increased respiratory rate (Cook et al, 1957) until the lung fluid has been removed into the circulation.

Radiological examination is necessary to exclude other causes of neonatal tachypnoea that may require more urgent or hazardous forms of therapy; for instance, I.R.D.S., pneumothorax, aspiration pneumonia and diaphragmatic hernia. Once these more serious respiratory disorders have been excluded however, the management of neonatal tachypnoea is simple and the prognosis good.

Summary

A series of 28 infants with T.T.N. is described. The overall incidence, sex distribution and association with perinatal insult, particularly birth asphyxia, are noted. The aetiology and management of the condition are discussed. The distinction of T.T.N. from I.R.D.S. and other respiratory diseases of the newborn, using radiographs is necessary so that appropriate therapy may be instituted at an early stage.

Acknowledgements

We wish to thank Professor I. J. Carré and Dr. W. A. B. Campbell for allowing us to study patients under their care.

References

1. Adams, F. H., Moss, A. J., and Fagan, L. (1963). *Biology of the Neonate*, 5:151.
2. Aherne, W. and Dawkins, M. J. R. (1964). *Biology of the Neonate*, 7:214.
3. Avery, M. E., Gatewood, O. B. and Brumley, G. (1966). *American Journal of Diseases* 111:380.
4. Cook, C. D., et al (1957). *Journal of Clinical Investigation*, 36:440.
5. Kuhn, J. P., Fletcher, B. D., De Lemos, R. A. (1969). *Radiology*, 92:751.
6. Malan, A. F. (1966). *Australian Paediatric Journal*, 3:159.
7. O'Connor, J. F., Shapiro, J. H., and Ingall, D. (1968). *Radiology*, 90:333.
8. Prod'hom, L. S., Levison, J., Cherry, R. B., and Smith, C. A. (1965). *Pediatrics*, 35:662.
9. Sundell, H., Garrott, J., Blankens:ip, W. J., Shepherd, F. M., Stohlman, M. T. (1971). *Journal of Pediatrics*, 78:754.
10. Swischuk, L. E. (1970). *American Journal of Roentgenology*, 108:557.
11. Taylor, P. M., Allen, A. C., Stinson, D. A. (1971). *Pediatric Clinics of North America*, 18:975.
12. Wesenberg, R. L., Graven, S. N., McCabe, E. B. (1971). *Radiology*, 98:69.

A PROGRAMME OF CARE FOR THE ELDERLY

by

C. BURNS, M.B., F.R.C.G.P., J.P.

Ballymoney Health Centre, Ballymoney

WITH the reorganisation of the various elements of the National Health Service under the Health and Personal Social Services (N.I.) Order (1972) there emerged in the succeeding structures the concept of programmes of care which was to deal with all aspects of the delivery of medical care. In Ballymoney, a small market town of 6,000 people, in the centre of a large agricultural area, there were various institutions and services provided for the care of the elderly but administered by different bodies. These have all now become the responsibility of the Northern Area Health and Social Services Board, and are administered by the District Team which consists of the District Administrative Medical Officer, District Administrative Officer, District Administrative Nursing Officer, District Social Services Officer and the Chairman of the District Medical Advisory Committee. Under this single unit of administration all the elements have been brought together, and a comprehensive programme of care for the elderly is now in operation.

Elements of Comprehensive Programme of Care for the Elderly

(1) *Family Practice*

This is in two parts, curative and preventive. There are two practices which are based in a comprehensive health centre (Burns, 1971) and which have a combined list of 11,872 patients. The practices are organised into two teams consisting of the family doctors, health visitors, district nurses and a social worker. The practice teams look after the elderly when they fall ill in their homes, and in this paper it will be shown that 93.19 per cent of all the patients over 65 years are cared for by this service. The family doctor also has on his visiting list the "chronics" who are analogous with the long stay patient in the hospital setting and need regular visiting even though not acutely ill; they number 157 or 15.05 per cent of the practice geriatric population.

Preventive geriatric care was established following the results of a study by Burns (1969) in which all patients when they reach 65 years of age are screened both medically and socially by the health visitors and any abnormality found is reported to the appropriate doctor. After the initial screening the practice of selective health visiting is used and thereby the geriatric population is under continuous review. This scheme has not usually found serious disease as Sheldon (1948), Hobson and Pemberton (1955), Anderson (1967), Irwin (1971) and others found, but it does discover a great number of degenerative conditions where help can be given and the process slowed down; and where social defects can be remedied and welfare aids provided. This has given a new dimension to Health Visiting and does not increase the work load unduly.

Table I gives a five year review.

TABLE I

Annual Geriatric Review 1969–73

	1969	1970	1971	1972	1973
Normal	12	33	58	52	32
Abnormal	16	25	18	21	39
Refused to co-operate	0	0	10	21	10
Total	28	58	86	94	81

(2) *Hospital Practice*

(i) *Robinson Cottage Hospital* (Acute, Short Stay Patients)

This is a small cottage hospital of 35 beds, of which 12 form a general practitioner obstetric unit. The remainder are controlled mainly by the general pracitioners, who use some of the beds for two categories of geriatric patient—(a) those suffering from acute illnesses and who are not likely to become "long stay patients", and (b) patients who are living with their families, and whose family wish to go for a two week holiday.

(ii) *Route Hospital* (Long Stay Patients)

The Route Hospital is a general hospital of 135 beds. The medical department admits long stay patients, but, like all other medical units, has to strive to preserve its acute medical beds. This is the dilemma which is common to all consultant physicians. To expect a consultant physician to have an enthusiastic medical interest in these patients is asking him to do something that he was not trained to do. Equally, it is wrong to expect the highly trained nursing staff to have this continuing interest. This is one of the most difficult areas of geriatric care, because when the crisis arises for the general practitioner and the family pressures have become unbearable, there is a natural resistance from the hospital staff to find a bed, and this produces friction between all branches of the health service. These frail old people who are called long stay patients do not need the highly developed skills of the consultant physician and nursing staff, but could be looked after and cared for equally well if they were taken out of the hospital setting and taken over by the social services section. This could be achieved if they were placed in a simple building and supervised by three (or multiples of three) nursing staff and a requisite number of welfare attendants; a general practitioner, with an interest in geriatric medicine, could be appointed on a sessional basis to give medical cover. The nursing staff would be able to give nursing advice and supervision, and call for medical help when required. This proposal would be infinitely less expensive than the present method, and, above all, it would remove all the emotional strains between the different branches of the profession to the great comfort of these old people, who would be given a renewed dignity.

(iii) *Acute Geriatric Unit* (Braid Valley Hospital, Ballymena)

This is a large geriatric unit of 190 beds situated at Ballymena, 18 miles away, with a consultant geriatrician. Patients from the Ballymoney area are sent here if

their condition is such that there is a reasonable hope of rehabilitation and recovery. These requests from the general practitioner are screened by the consultant geriatrician during a domiciliary visit; the object of this is to prevent long stay patients being admitted to active beds. Again, if the long stay patients were under the social services section, as suggested, this would free more beds for active rehabilitation and make the potential of the geriatrician and his unit so much greater.

(3) *Social Services*

(i) *The Roddens Welfare Home.* This is a recently built welfare home (Burns 1972) and it has accommodation for 44 residents. This home was built on a trunk route, is near to the library, shops and pubs. It is the experience of the home, which was opened in 1971 with a fairly active population, that this population has now become frail and that some are in the long stay hospital category. The average age is now 81.68 years with an age span of 68–90 years. It is staffed by a matron, assistant matron, nurse and twelve attendants, and a visiting medical officer (a general practitioner).

(ii) *Abbeyfield Home.* Some years ago a local Abbeyfield Society was formed and the Society asked the then Northern Ireland Housing Trust who were planning a housing estate if they would build an Abbeyfield Home. This they readily did, and it consists of six bed-sitters and is part of the estate overlooking a green common, near the library and near a busy thoroughfare. It has a common sitting-room and dining-room. The residents furnish their own rooms, and then keep them clean and tidy, and pay a weekly all-in rent. The key to the success and happiness of the home is the housekeeper.

(iii) *Evergreen Club.* This is a social club which meets weekly in the Social Centre, which was built ten years ago by partial Government grant and money raised locally. The club itself was started in 1949 and it caters for all people over 65 years of age, and residents from the welfare home mix with the local people, and people from the surrounding countryside who are brought in by two coaches which were generously donated. This is a very successful and cheerful side to local geriatric care.

(i) *Luncheon Club and Meals-on-Wheels.* This service was started by first setting up a local Community Committee and this Committee organises both the luncheon club and the meals-on-wheels. The local ladies and one man organised themselves on a rota basis and the club meets in the Social Centre.

(v) *Day Centre.* Work should be starting on this very vital part of caring for the elderly in 1975.

(vi) *Sheltered Housing.* In nearly all the housing estates there are small dwellings for old people, thus these old people are part of the community of the estate and are supported by the other residents. Health visitors, district nurses and social workers also call regularly, and the members of the practice team know where these old people live from the age/sex register.

(vii) *School Children Adoption.* The senior pupils of all the local schools are encouraged to adopt an old person and develop a relationship whereby they visit

them, read to them and do errands for them. This sort of "service" can be used by children working for the Queen's Guide Award, Queen's Scout Award and the Duke of Edinburgh Award. Some children take the old people out for motor car drives and into their homes.

(viii) *Pre-Retirement Lectures.* With the increasing number of very active and healthy people reaching the age of 65 it is very important and necessary that some help should be given to prepare them for retirement. People should begin to think and plan retirement about 5—7 years beforehand. With this in view the author organised a course of pre-retirement lectures which were delivered weekly in the Lecture Hall of the Ballymoney Health Centre. The topics were wide and varied and were as follows: —'Keeping physically fit' by the author; 'Keeping mentally fit' by the visiting psychiatrist; 'What your technical college can offer' by the principal; 'What your local library can offer' by the then county librarian; 'Budgeting on a lower income' by a retired bank manager; 'What benefits' by the manager of the local labour exchange; 'Eat well—keep well' by the health education officer; 'Safety in the home' by the Northern Ireland home safety officer; 'Social problems' by a social worker; 'Geriatric screening' by the health visitors, and 'The Evergreen Club' by the chairman of the club. In this small community it is hoped to repeat these lectures every three years.

Apart from having the various institutions, the success of the plan is dependent on good communications and good relationships between the many elements. This is achieved by having the structure of the general practitioner team which meets every day for consultation and discussion and each member of the team has a relationship with some elements of the plan. It is only on rare occasions that the plan does not work at local level, when the District Team have to be consulted to help solve some problem.

One Day Audit

In order to establish how well this programme of care for the elderly was used and what was the daily demand of this group of patients a one-day audit of the author's practice was carried out. The practice consists of 8,742 patients of which 1,043 were over the age of 65 years, giving a percentage of 11.9 per cent. This is lower than the prevailing, provincial and national figure. The following statistics show how many were being treated and taken care of on one day (24th October, 1974).

Route Hospital:	Medical	Total 11	4 Acute	7 Long Stay
	Surgical	Total 3	3 Acute	0 Long Stay
	Gynaecology	None		
	Outpatients	Total 2 (surgical)		
	X-Ray Dept.	1 Referred by G.P.		
Robinson Cottage Hospital		Total 6	5 Acute	1 Long Stay
Holywell Hospital		Total 0		
Braid Valley Hospital		Total 1		
Abbeyfield Home		Total 4		
Residential Accommodation:		Total 43—Roddens 38: Brookgreen 1 Runkerry 1: Metropole 3		

Health Centre:	Surgery Attendances 9: Treatment Room 10: Chiropody 8
General Practitioners' Visits:	Acute cases 7:
Health Visitors:	Acute cases 8:
District Nurses:	27 cases visited on 24/10/74
Luncheon Club:	6
Meals-on-Wheels:	23
Home Helps:	40

This information is summarised in Table II

TABLE II

Route Hospital	17	Health Visitors	8
Robinson Hospital	6	District Nurses	27
Braid Valley	1	Luncheon Club	6
Holywell Hospital	0	Meals-on-Wheels	23
Abbeyfield Home	4	Home Helps	40
Welfare Homes	43		
Family Doctors	16		
Treatment Room	10	TOTAL	209
Chiropody	8		

This means that on 24th October, 1974, 209 people out of 1,043 (20.03 per cent) were being cared for by all the branches of the National Health Service. Table III gives the percentage breakdown for each element of service to these 209 patients.

TABLE III

	Patients	*Percentage*
Family Practice	61	29.13
Hospitals	24	11.48
Residential Accommodation	47	22.48
Community Services	77	36.84

DISCUSSION

In 1901 there were about 1,500,000 people over 65 in Great Britain. In 1966 the figure was over 6,000,000 or 12 per cent of the population, and in 1974 it had risen to over 16 per cent and by 1990 it is estimated that there will be 10,000,000 (Harte, 1972). This, in statistical terms, is the extent of the problem of caring for the elderly that confronts the country today and till the end of this century. Therefore, it is very important that attempts should be made to plan for the needs of this increasing group of the population. The first priority is to prepare people for retirement and old age. Most people put off thinking about retirement, or else they look forward to it and the leisure hours that it brings, only to be quickly disillusioned by boredom and a feeling of not being wanted. This problem can be met

by education and this can be given in the form of a series of lectures. The next objective should be to keep the newly retired people healthy and active for as long as possible. This has been done in Ballymoney by setting up geriatric registers in the two practices, and by screening all the newly retired people. If there is an abnormality detected then action can be taken to correct it, or, at least slow down the process of degeneration. The health visitors, who do this work, then keep these people under supervision depending on the need, using the principle of selective health visiting. The day centre, Evergreen Club, luncheon club, meals-on-wheels, home helps, school children adoption scheme, all help to support and keep the elderly at home.

It should be the accepted principle that old people are best cared for, and are happier, in their home environment, and vigorous steps should be taken to try and keep them there. This has been achieved in large measure in Ballymoney, there being only eight long stay patients from the author's practice on the 24th October 1974.

By using this scheme of preventive geriatric care 93.19 per cent of the patients of this group in the practice were living at home, and because such a great number are at home the daily work load is considerable; that is, on 24th October 1974, 209 patients (20.03 per cent) were being cared for by members of the practice team or the community services.

When the small number 71 (6.80 per cent) can no longer be accommodated at home, they will either have to go to hospital or into residential accommodation. With good supervision by the practice team this change in status can be anticipated and, therefore, their removal can be planned, but in a few cases this is not so, and when it arises it is an emergency. This is the crisis that is so difficult for the relatives and for the general practitioner. To them the emergency is just as acute as any other emergency, but the process of getting the patient admittd is extremely difficult. This difficulty could be removed if the case of the long stay patient were taken out of the hospital and placed in a Social Service Unit, as earlier described. If this were done then there would be no area of caring for the elderly that would present difficulty.

The one day audit gives a picture of the care needed to be given for this group of patients. It is of interest that there were only eight long stay patients out of a group of 1,043, and this can be attributed to the effective and important role of the practice team in looking after such large numbers in their homes helped by the various elements of the community services. The figures of long stay patients would be higher if all these in this category were transferred from the welfare homes to hospital but the staff of these homes get very attached to the residents, are reluctant to agree to transfer, and cope very well indeed.

The place of a geriatric assessment unit has often been discussed, but with the setting up of the practice team and selective health visiting of the elderly, these patients are being continuously assessed and their needs planned. If doubt arises then assessment of the patients' needs should take place, preferably in the home with the geriatrician, general practitioner, health visitor, and the social worker all taking part.

The restructuring of the Health and Social Services has improved the delivery of care for the elderly because it has brought all elements under one organisational unit so that the needs of a community are assessed as a whole and solutions provided in terms of institutions and community services. General practitioners should develop and provide preventive geriatric care for their patients as a major contribution to keeping the geriatric patients at home, but the greatest problem facing family doctors today is finding accommodation for long stay patients when it is needed. The care of the elderly in all its facets is a most interesting and rewarding clinical interest, and the general practitioner team has a major role to play in it.

I wish to thank my partners, health visitors, district nurses, social worker and the staff in the various hospitals and institutions for so willingly helping me to conduct the one day audit.

References

1. Health and Personal Social Services (N.I.) Order 1972.
2. Burns, C. (1971). Ballymoney Health Centre. *Journal Royal College of General Practitioners*, **21**, 86.
3. Burns, C. (1969). Geriatric care in general practice. *Journal Royal College of General Practitioners*, **18**, 287.
4. Sheldon, J. H. (1948). *The Social Medicine of Old Age.* Oxford University Press, London.
5. Hobson, W., and Pemberton, J. (1955). *The Health of the Elderly at Home.* Butterworth, London.
6. Anderson, W. F. (1967). *Practical Management of the Elderly.* Blackwell Scientific Publications, Oxford and Edinburgh.
7. Irwin, W. G. (1971). *Preventive Geriatric Care.* Edited by Adams, G. F., McKnight, J. E. and Stewart, V. Northern Ireland Hospital Authority, Belfast.
8. Burns, C. (1972). Geriatric Care in a Welfare Home. *Ulster Medical Journal*, **41**, 149.
9. Harte, John D. (1972). Preparing for Retirement. *Journal Royal College General Practitioners*, **22**, 612.

MERCURY POISONING IN CHILDREN
A Report of Two Patients

by

ELEANOR A. MAGILL, M.B., D.R.C.O.G., D.C.H.
Department of Child Health, The Queen's University of Belfast, and
The Royal Belfast Hospital for Sick Children

THE SUGGESTION IN 1948 that mercury poisoning was the principal cause of pink disease (acrodynia) in children (Warkany and Hubbard, 1948; Fanconi and Botezn, 1948) resulted in the withdrawal from sale of all mercury containing teething powders in the United Kingdom. There followed a dramatic decline in the reported frequency of the disease (Dathan and Harvey, 1965) and during the past twenty years very few case reports have been published. This present report of two children with mercury poisoning, one of whom presented with a classical picture of pink disease, emphasises the risk of mercury absorption through the skin and highlights the dangers of folk lore medicine as a source of mercury poisoning.

Case History

Case 1. N.Y., a male child aged 20 months, was admitted to the Royal Belfast Hospital for Sick Children in November 1973 with a five week history of extreme irritability, anorexia and refusal to walk, although he had started to walk at one year. His parents also noticed that his hands and feet had become very red and that he sweated profusely. He had not appeared feverish and had not vomited. In his past medical history the child had had infantile eczema since he was three months old which had been treated intermittently with betamethasone valerate.

On clinical examination the child appeared ill and miserable. There was marked photophobia. The palms of his hands and the soles of his feet were red, mildly swollen, cold and moist. He was generally hypotonic and tendon reflexes were reduced. His cranial nerves and sensory system appeared to be intact. Examination of his cardiovascular, respiratory and alimentary systems revealed no abnormality. His skin was free from eczema.

Because the history and clinical findings suggested pink disease, a detailed environmental history was obtained to elicit the possible source of mercury. The family lived in Antrim and the father worked in a nearby factory with analine dyes but had no contact with mercury. Although they lived near Greenmount Agricultural College, there had been no spraying with mercury-containing compounds.

Two months before the child's admission his mother had sought advice from a person in Aghagallon, Co. Armagh, who was reputed to have a "cure" for eczema. This consisted of a belt of damp lint (cost 50p) which was wrapped round the child's waist and left on for one month. The belt had been removed about six weeks before his hospital admission and one week before the onset of symptoms.

The mother obtained a second belt at our request; when opened up it contained metallic mercury in a dispersing agent which could not be identified.

On investigation, urinalysis showed no proteinuria or haematuria. His haemoglobin was 13.9 g/100 ml, white cell count 8,800/c.cmm, 50% polymorphs, 1% eosinophils, 43% lymphocytes and 6% monocytes. Blood urea was 21 mg/100 ml.

	Mercury Estimations μg/100 ml			
	'Normal'	*At time of diagnosis*	*2 weeks*	*4 weeks*
Serum mercury	0.1	7.5	4.1	—
Urinary mercury excretion	10	50	50	8

No specific therapy was given initially but when the raised serum level of mercury was reported it was decided to treat the child with chelating agents. Therapy with oral D-penicillamine 250 mg daily was commenced. This was discontinued after one week because of frequent vomiting. No further chelating agents were given. The child's symptoms subsided gradually and he was discharged home after three weeks in hospital. He has remained well throughout a twelve month follow-up, except for his eczema which has continued to recur from time to time.

Case 2. G.F., a boy of 10 months, was transferred to the Royal Belfast Hospital for Sick Children in November 1972 from a peripheral hospital where he had been admitted two days previously with vomiting, pyrexia and marked irritability of four days duration.

The patient had previously been well except for severe infantile eczema which had been present from one month of age. This had been difficult to control and the child's mother volunteered the information that she had taken him to a person in Hilltown, Co. Down, who was reputed to have a "cure" for eczema. She was given a thick yellow ointment which had been liberally applied to the child's skin for five days prior to his original hospital admission. On subsequent analysis by the forensic laboratory this ointment was found to contain 2 per cent metallic mercury. He had not been immunized and smallpox vaccination had not been given. Both father and grandfather were atopic subjects but there was no other relevant family history. The family lived in Newry and father was unemployed.

On clinical examination he appeared pale and miserable with mild photophobia. His temperature was 39.5°C and he had a tachycardia of 160/min. He had generalised lymphadenopathy and splenomegaly. His eczematous skin was grossly infected and encrusted with many vesicles at the periphery of the lesions. His haemoglobin was 7.7 g/100 ml. White cell count 14,900/cu.mm, 43% polymorphs, 51% lymphocytes, 4% eosinophils, 8% monocytes. Platelets 276,000/cu.mm ESR 18 mm fall in first hour. Blood urea 35mg/100 ml Na=142 mEq/1, K=5.9 bEq/1, Cl=107 mEq/1. Total plasma proteins were 5.5 g/100 ml, albumin 2.3 g/100 ml, globulin 3.2 g/100 ml, α_1 globulin 0.6 g/100 ml, α_2 globulin 1.4 g/100 ml, β globulin 1.0 g/100 ml, θ globulin 0.2 g/100 ml.

	Immunoglobulins (results in mg per 100 ml)			
	On admission	*1 week later*	*2 weeks later*	*4 weeks later*
IgG	320	350	570	700
IgA	50	0	70	90
IgM	25	48	50	56

Multiple bacterial swabs from his skin and repeated blood cultures were sterile. Scrapings from the skin vesicles were examined under the electron microscope and found to contain particles of herpes simplex virus. The serum mercury level was 21 μg/100 ml. The urine contained 100 μg mercury/100 ml.

The child was treated with parenteral ampicillin and cloxacillin and a blood transfusion. He required sedation with diazepam and methdilazme (Dilosyn). His skin was treated locally with framycetin ointment and 0.5 per cent idoxuridine in a simple base. Chelating agents were not given.

His illness pursued a turbulent course with a spiking fever and marked irritability for seven days. Thereafter the fever subsided and the child improved. After one month's intensive local treatment his skin returned to normal. He was discharged after six weeks and has remained well at follow-up over eighteen months.

Discussion

Although the symptoms and signs of the condition had been recognised since the early years of this century, it was Swift (1914) writing from Australia who first gave a comprehensive description of pink disease in children. In 1948 Warkany and Hubbard in Cincinnati and Fanconi and Botezn in Switzerland drew attention to the close relationship of this disorder with elevated levels of mercury in the serum and urine of affected patients. Though now generally accepted that pink disease is a manifestation of mercury intoxication, the pathophysiology is still not fully understood. Many features are attributable to overaction of the sympathetic and parasympathetic nervous system, for example sweating, erythroedema, vomiting, tachycardia, photophobia and excessive salivation. Other symptoms, such as hypotonia, irritability and paresthesia, and in the long term, mental retardation, may be the result of heavy metal poisoning of enzyme systems concerned with ammonia, glutamine and pyruvate metabolism (Farber and Vawter, 1966). It is also known, however, that people can tolerate excessive quantities of mercury without evidence of intoxication, for example psoriatic patients (Inman, 1956) and it has been postulated that those who show clinical evidence of mercury intoxication may be demonstrating an idiosyncracy to the metal.

The first child illustrates the classical picture of pink disease with abject misery, marked hypotonia, photophobia, excessive sweating and erythroedema of the hands and feet. The symptomatology of the second child was more likely to be due to his systemic herpes infection (Kaposi's varicelliform eruption) than to mercury poisoning. The severity of this infection is shown by the depression of his immune system

with secondary hypogammaglobulinaemia which gradually returned to normal as he improved. However some of the findings of vomiting, fever, irritability and tachycardia are common to both conditions and the levels of serum and urinary mercury were certainly elevated.

Traditionally, the treatment of mercury poisoning has been with the chelating agents British anti-lewsite (BAL), edathamil calcium disodium (EDTA) or D-penicillamine. However, the efficacy of these drugs in pink disease has never been conclusively proven. In a controlled trial in Australia in which infants with pink disease were treated with edathamil calcium disodium no significant clinical improvement was recorded and there was no concomitant increase in mercury excretion (McCoy, Carré and Freeman, 1960). In the one patient here described who was treated with D-penicillamine recovery was almost certainly unrelated to therapy. Ganglion blocking drugs have also been used to control the autonomic disturbances. Bower (1954) found in a group of nine children that although symptoms caused by over-action of the autonomic system were ameliorated, the effect was of short duration as the children rapidly became tolerant of the drug.

During the past twenty years the few reported cases of pink disease have resulted from exposure to mercury-containing dusting powders or ointments (e.g. McGregor, 1964). Both children here described had metallic mercury applied to eczematous skin. While the eczema may have contributed to excessive absorption, it is known that absorption through the skin is related more to the type of mercury and the base in which it is carried than to the integrity of the skin surface (Wied, 1964). Very few skin preparations now used in paediatrics contain mercury and those which do, contain very low concentrations.

These two children illustrate again the potential danger of mercury absorption through the skin. While most doctors recognise this danger and no longer prescribe mercury-containing ointments for children, unfortunately the same cannot be said of unqualified people reputed to have the "cure" for eczema.

Summary

Two children aged 20 months and 10 months with mercury poisoning are described. One child wore a belt containing metallic mercury and the other child had two per cent mercury ointment applied liberally all over his body. Toxic effects can result from absorption of the heavy metal through the skin. Attention is drawn to the fact that mercury poisoning in children can still occur since preparations with a high mercury content are available from non-medical sources. In each of these patients the parents had sought a lay cure for eczema.

I wish to thank Professor I. J. Carré, Dr. A. O. B. Redmond and Dr. D. Burrows for permission to publish cases under their care, Dr. S. L. Campbell for helpful advice and Mrs. Marilyn McKee for typing the manuscript.

References

Bower, B. D. (1954). *Quarterly Journal of Medicine*, **23**, 215.
Dathan, J. G., and Harvey, C. C. (1965). *British Medical Journal*, **1**, 1181.
Fanconi, G., and Botezn, A. (1948). *Helvetica Paediatrica Acta*, **3**, 264.
Farber, S., and Vawter, G. F. (1966). *Journal of Pediatrics*, **68**, 480.
Inman, P. M., Gordon, B., and Trinder, P. (1956). *British Medical Journal*, **2**, 1202.
McCoy, J. E., Carre, I. J., and Freeman, M. (1960). *Pediatrics*, **25**, 304.
McGregor, M. E., and Rayner, P. H. W. (1964). *Lancet*, **2**, 1083.
Swift, H. (1914). *Australasian Medical Congress, 10th Session*, Auckland, New Zealand, p. 547.
Warkany, J., and Hubbard, D. M. (1953). *Journal of Pediatrics*, **42**, 239.
Wied, R. M., and Roberts, I. (1926). *British Medical Journal*, **1**, 1076.

BOOK REVIEWS

VENEREAL DISEASES. By Ambrose King and Claude Nicol. Third Edition. (Pp. 384, figures 180. £7.50). London: Baillière Tindall. 1975.

THIS attractively presented book which was written for both undergraduate and postgraduate students, is also suitable as a reference book for the general physician. It can be strongly recommended for anyone interested in the study of sexually transmitted infections.

There is not sufficient difference between the second and third editions to justify a further outlay for anyone who already possesses the second edition.

T.H.

CLINICS IN HAEMATOLOGY. Volume 4. No. 1. February 1975. Haemolytic Anaemias. Edited by T. A. J. Prankerd and A. J. Bellingham. (Pp. 260. Figs 36. 3 times yearly—£12.00). London and Philadelphia: W. B. Saunders. 1975.

THIS is the latest of a very well known and respected series which presents up-to-date accounts of selected subjects in haematology and the topic of this issue is the haemolytic anaemias. A varied and cosmopolitan flavour is given to the book as the contributors of its fourteen chapters represent seven different countries. Nevertheless, the presentation of the subject is orderly. The initial chapters deal with advances in knowledge of the physiochemical structure of the red cell, its metabolism and a discussion of red cell antigens and their interaction with antibodies. Following this review of basic matters the clinical states resulting from red cell enzyme deficiencies, hereditary spherocytosis, immune and drug-induced haemolytic anaemias are discussed. There are also chapters on paroxysmal nocturnal haemoglobinuria and an especially interesting one on the role of the spleen in haemolytic disorders.

This book is for the specialist in haematology who will find it a valuable review of recently gained knowledge on haemolytic anaemias.

J.H.R.

References

Bower, B. D. (1954). *Quarterly Journal of Medicine*, **23**, 215.
Dathan, J. G., and Harvey, C. C. (1965). *British Medical Journal*, **1**, 1181.
Fanconi, G., and Botezn, A. (1948). *Helvetica Paediatrica Acta*, **3**, 264.
Farber, S., and Vawter, G. F. (1966). *Journal of Pediatrics*, **68**, 480.
Inman, P. M., Gordon, B., and Trinder, P. (1956). *British Medical Journal*, **2**, 1202.
McCoy, J. E., Carre, I. J., and Freeman, M. (1960). *Pediatrics*, **25**, 304.
McGregor, M. E., and Rayner, P. H. W. (1964). *Lancet*, **2**, 1083.
Swift, H. (1914). *Australasian Medical Congress, 10th Session*, Auckland, New Zealand, p. 547.
Warkany, J., and Hubbard, D. M. (1953). *Journal of Pediatrics*, **42**, 239.
Wied, R. M., and Roberts, I. (1926). *British Medical Journal*, **1**, 1076.

BOOK REVIEWS

VENEREAL DISEASES. By Ambrose King and Claude Nicol. Third Edition. (Pp. 384, figures 180. £7.50). London: Baillière Tindall. 1975.

THIS attractively presented book which was written for both undergraduate and postgraduate students, is also suitable as a reference book for the general physician. It can be strongly recommended for anyone interested in the study of sexually transmitted infections.

There is not sufficient difference between the second and third editions to justify a further outlay for anyone who already possesses the second edition.

T.H.

CLINICS IN HAEMATOLOGY. Volume 4. No. 1. February 1975. Haemolytic Anaemias. Edited by T. A. J. Prankerd and A. J. Bellingham. (Pp. 260. Figs 36. 3 times yearly—£12.00). London and Philadelphia: W. B. Saunders. 1975.

THIS is the latest of a very well known and respected series which presents up-to-date accounts of selected subjects in haematology and the topic of this issue is the haemolytic anaemias. A varied and cosmopolitan flavour is given to the book as the contributors of its fourteen chapters represent seven different countries. Nevertheless, the presentation of the subject is orderly. The initial chapters deal with advances in knowledge of the physiochemical structure of the red cell, its metabolism and a discussion of red cell antigens and their interaction with antibodies. Following this review of basic matters the clinical states resulting from red cell enzyme deficiencies, hereditary spherocytosis, immune and drug-induced haemolytic anaemias are discussed. There are also chapters on paroxysmal nocturnal haemoglobinuria and an especially interesting one on the role of the spleen in haemolytic disorders.

This book is for the specialist in haematology who will find it a valuable review of recently gained knowledge on haemolytic anaemias.

J.H.R.

References

Bower, B. D. (1954). *Quarterly Journal of Medicine*, **23**, 215.
Dathan, J. G., and Harvey, C. C. (1965). *British Medical Journal*, **1**, 1181.
Fanconi, G., and Botezn, A. (1948). *Helvetica Paediatrica Acta*, **3**, 264.
Farber, S., and Vawter, G. F. (1966). *Journal of Pediatrics*, **68**, 480.
Inman, P. M., Gordon, B., and Trinder, P. (1956). *British Medical Journal*, **2**, 1202.
McCoy, J. E., Carre, I. J., and Freeman, M. (1960). *Pediatrics*, **25**, 304.
McGregor, M. E., and Rayner, P. H. W. (1964). *Lancet*, **2**, 1083.
Swift, H. (1914). *Australasian Medical Congress, 10th Session*, Auckland, New Zealand, p. 547.
Warkany, J., and Hubbard, D. M. (1953). *Journal of Pediatrics*, **42**, 239.
Wied, R. M., and Roberts, I. (1926). *British Medical Journal*, **1**, 1076.

BOOK REVIEWS

VENEREAL DISEASES. By Ambrose King and Claude Nicol. Third Edition. (Pp. 384, figures 180. £7.50). London: Baillière Tindall. 1975.

THIS attractively presented book which was written for both undergraduate and postgraduate students, is also suitable as a reference book for the general physician. It can be strongly recommended for anyone interested in the study of sexually transmitted infections.

There is not sufficient difference between the second and third editions to justify a further outlay for anyone who already possesses the second edition.

T.H.

CLINICS IN HAEMATOLOGY. Volume 4. No. 1. February 1975. Haemolytic Anaemias. Edited by T. A. J. Prankerd and A. J. Bellingham. (Pp. 260. Figs 36. 3 times yearly—£12.00). London and Philadelphia: W. B. Saunders. 1975.

THIS is the latest of a very well known and respected series which presents up-to-date accounts of selected subjects in haematology and the topic of this issue is the haemolytic anaemias. A varied and cosmopolitan flavour is given to the book as the contributors of its fourteen chapters represent seven different countries. Nevertheless, the presentation of the subject is orderly. The initial chapters deal with advances in knowledge of the physiochemical structure of the red cell, its metabolism and a discussion of red cell antigens and their interaction with antibodies. Following this review of basic matters the clinical states resulting from red cell enzyme deficiencies, hereditary spherocytosis, immune and drug-induced haemolytic anaemias are discussed. There are also chapters on paroxysmal nocturnal haemoglobinuria and an especially interesting one on the role of the spleen in haemolytic disorders.

This book is for the specialist in haematology who will find it a valuable review of recently gained knowledge on haemolytic anaemias.

J.H.R.

CLAYTON'S ELECTROTHERAPY AND ACTINOTHERAPY. By Pauline M. Scott. Seventh Edition. (Pp. 404. Figs 220. £4.50). London: Baillière Tindall. 1975.

THIS essential textbook for physiotherapy students covering all aspects of Electrotherapy is now in a very simple format. Important new chapters have been added on mechanotherapy, hydrotherapy and ultrasonic techniques, leaving out many of the more intricate wiring problems.

The whole book is very well laid out and it makes it easy and enjoyable to read.

G.G.

ANAESTHETIC EQUIPMENT. Physical Principles and Maintenance. By C. S. Ward. (Pp. 282. Figs 314. £8.50). London: Baillière Tindall. 1975.

THERE is no doubt that this book fills an empty slot in the library of anaesthesia. It enters, however timidly, the realm of the mechanical engineer, and in future editions this trend is to be encouraged, for example to include material on such topics as motors, gearboxes and even basic screwthread know-how rather than the brief mention of the B.S.P. thread (and its anomalous method of sizing according to the nominal bore of the tubing for which the fitting is intended). The writer shows an intimate knowledge of things mechanical, but, surprisingly avoids the electronic field with no descriptions of, for example, the C.R.T., pen-writer or digital displays. One would also have liked to see sections on metallurgy and the chemistry of plastics. Fluidic and mechanical bi-stable mechanisms are well explained. There is a good general review of relevant basic physics, not overburdened with mathematical theory. Electricity and magnetism are not covered.

Four chapters of the book are devoted to the common anaesthetic machine, which is described in great detail, assembling useful material and new "exploded" diagrams of for example flow meters and vapourizers. Mechanical details are presented in a lucid and concise manner, and where relevant, references are made to historic but obsolete apparatus to enable the reader to understand the evolution of modern equipment. A chapter on ventilators covers the common types, but does not go into detail on their methods of operation.

Monitoring received a whole chapter, but one is amazed to find so little space devoted to blood gas/pH measurement, arterial lines and the electrocardiograph. Perhaps the next edition will include these and extend to new developments such as the highly important "memoryscope" monitor with its special form of display.

Ancillary subjects such as humidification, suction and sterilization of equipment receive a chapter each and the book ends with an interesting chapter on "Hazards" containing the best description of the pathophysiology of electrocution which the reviewer has seen. An important omission however is the danger of surgical diathermy to the patient with Stokes-Adams disease who may be depending upon an implanted pacemaker.

Useful appendices cover data on the taper systems for tubing connectors, and a table of equivalent units.

SURGERY OF THE ANUS, RECTUM AND COLON. Third Edition. By J. C. Goligher (Pp. VIII + 1164, 608 figures, £21.00).

IT is a pleasure to review what must be the best reference volume in Surgery of the Large Bowel in the world literature. The first two Editions have proved to be highly successful and in the 3rd Edition the material has been revised and updated. In addition new material on topics such as fibro optic colonoscopy and continent ileostomy of Kock has been added. The book aims to be comprehensive and yet concise. Knowledge is presented in a lucid, systematic, balanced form, well-tempered with personal clinical experience as well as that of other

CLAYTON'S ELECTROTHERAPY AND ACTINOTHERAPY. By Pauline M. Scott. Seventh Edition. (Pp. 404. Figs 220. £4.50). London: Baillière Tindall. 1975.

THIS essential textbook for physiotherapy students covering all aspects of Electrotherapy is now in a very simple format. Important new chapters have been added on mechanotherapy, hydrotherapy and ultrasonic techniques, leaving out many of the more intricate wiring problems.

The whole book is very well laid out and it makes it easy and enjoyable to read.

G.G.

ANAESTHETIC EQUIPMENT. Physical Principles and Maintenance. By C. S. Ward. (Pp. 282. Figs 314. £8.50). London: Baillière Tindall. 1975.

THERE is no doubt that this book fills an empty slot in the library of anaesthesia. It enters, however timidly, the realm of the mechanical engineer, and in future editions this trend is to be encouraged, for example to include material on such topics as motors, gearboxes and even basic screwthread know-how rather than the brief mention of the B.S.P. thread (and its anomalous method of sizing according to the nominal bore of the tubing for which the fitting is intended). The writer shows an intimate knowledge of things mechanical, but, surprisingly avoids the electronic field with no descriptions of, for example, the C.R.T., pen-writer or digital displays. One would also have liked to see sections on metallurgy and the chemistry of plastics. Fluidic and mechanical bi-stable mechanisms are well explained. There is a good general review of relevant basic physics, not overburdened with mathematical theory. Electricity and magnetism are not covered.

Four chapters of the book are devoted to the common anaesthetic machine, which is described in great detail, assembling useful material and new "exploded" diagrams of for example flow meters and vapourizers. Mechanical details are presented in a lucid and concise manner, and where relevant, references are made to historic but obsolete apparatus to enable the reader to understand the evolution of modern equipment. A chapter on ventilators covers the common types, but does not go into detail on their methods of operation.

Monitoring received a whole chapter, but one is amazed to find so little space devoted to blood gas/pH measurement, arterial lines and the electrocardiograph. Perhaps the next edition will include these and extend to new developments such as the highly important "memoryscope" monitor with its special form of display.

Ancillary subjects such as humidification, suction and sterilization of equipment receive a chapter each and the book ends with an interesting chapter on "Hazards" containing the best description of the pathophysiology of electrocution which the reviewer has seen. An important omission however is the danger of surgical diathermy to the patient with Stokes-Adams disease who may be depending upon an implanted pacemaker.

Useful appendices cover data on the taper systems for tubing connectors, and a table of equivalent units.

SURGERY OF THE ANUS, RECTUM AND COLON. Third Edition. By J. C. Goligher (Pp. VIII + 1164, 608 figures, £21.00).

IT is a pleasure to review what must be the best reference volume in Surgery of the Large Bowel in the world literature. The first two Editions have proved to be highly successful and in the 3rd Edition the material has been revised and updated. In addition new material on topics such as fibro optic colonoscopy and continent ileostomy of Kock has been added. The book aims to be comprehensive and yet concise. Knowledge is presented in a lucid, systematic, balanced form, well-tempered with personal clinical experience as well as that of other

CLAYTON'S ELECTROTHERAPY AND ACTINOTHERAPY. By Pauline M. Scott. Seventh Edition. (Pp. 404. Figs 220. £4.50). London: Baillière Tindall. 1975.

THIS essential textbook for physiotherapy students covering all aspects of Electrotherapy is now in a very simple format. Important new chapters have been added on mechanotherapy, hydrotherapy and ultrasonic techniques, leaving out many of the more intricate wiring problems.

The whole book is very well laid out and it makes it easy and enjoyable to read.

G.G.

ANAESTHETIC EQUIPMENT. Physical Principles and Maintenance. By C. S. Ward. (Pp. 282. Figs 314. £8.50). London: Baillière Tindall. 1975.

THERE is no doubt that this book fills an empty slot in the library of anaesthesia. It enters, however timidly, the realm of the mechanical engineer, and in future editions this trend is to be encouraged, for example to include material on such topics as motors, gearboxes and even basic screwthread know-how rather than the brief mention of the B.S.P. thread (and its anomalous method of sizing according to the nominal bore of the tubing for which the fitting is intended). The writer shows an intimate knowledge of things mechanical, but, surprisingly avoids the electronic field with no descriptions of, for example, the C.R.T., pen-writer or digital displays. One would also have liked to see sections on metallurgy and the chemistry of plastics. Fluidic and mechanical bi-stable mechanisms are well explained. There is a good general review of relevant basic physics, not overburdened with mathematical theory. Electricity and magnetism are not covered.

Four chapters of the book are devoted to the common anaesthetic machine, which is described in great detail, assembling useful material and new "exploded" diagrams of for example flow meters and vapourizers. Mechanical details are presented in a lucid and concise manner, and where relevant, references are made to historic but obsolete apparatus to enable the reader to understand the evolution of modern equipment. A chapter on ventilators covers the common types, but does not go into detail on their methods of operation.

Monitoring received a whole chapter, but one is amazed to find so little space devoted to blood gas/pH measurement, arterial lines and the electrocardiograph. Perhaps the next edition will include these and extend to new developments such as the highly important "memoryscope" monitor with its special form of display.

Ancillary subjects such as humidification, suction and sterilization of equipment receive a chapter each and the book ends with an interesting chapter on "Hazards" containing the best description of the pathophysiology of electrocution which the reviewer has seen. An important omission however is the danger of surgical diathermy to the patient with Stokes-Adams disease who may be depending upon an implanted pacemaker.

Useful appendices cover data on the taper systems for tubing connectors, and a table of equivalent units.

SURGERY OF THE ANUS, RECTUM AND COLON. Third Edition. By J. C. Goligher (Pp. VIII + 1164, 608 figures, £21.00).

IT is a pleasure to review what must be the best reference volume in Surgery of the Large Bowel in the world literature. The first two Editions have proved to be highly successful and in the 3rd Edition the material has been revised and updated. In addition new material on topics such as fibro optic colonoscopy and continent ileostomy of Kock has been added. The book aims to be comprehensive and yet concise. Knowledge is presented in a lucid, systematic, balanced form, well-tempered with personal clinical experience as well as that of other

authors. Each chapter has its own extensive list of carefully selected references. Medical aspects as well as indications for surgery and operative techniques are adequately covered for a book of this nature. Controversial topics are dealt with in a competent manner and there is a stamp of authority on every page. The book is well produced, easy to read and has a good index.

This book can be highly recommended. It deserves a place in every Medical Library in the country and will prove a most valuable personal possession of any surgeon who is constantly dealing with disorders of the colon, rectum and anus.

PRACTICAL HUMAN CYTOGENETICS. By Angela I. Taylor (Pp. X + 179, Figs. 81. £3.00). London: Baillière Tindall. 1974.

ALTHOUGH attempts at establishing the human chromosome number dates from early in this century, it was not until 1957 when improvements in techniques became available that human cytogenetics became established as a laboratory discipline. Since 1959, many clinical disorders ranging from abnormalities of sexual, physical and intellectual development, pregnancy wastage, leukaemia and tumours, have been shown to be due to or to have an associated chromosomal abnormality. Indeed, it is now recognised that three to four per cent of conceptions have a chromosomal abnormality and that most of these end as spontaneous abortions early in pregnancy.

This short unpretentious but most useful little book is aimed at encouraging a practical approach to the patient so that the clinical features (the phenotype) is observed and related to the cytogenetic findings. The book contains 14 chapters covering such topics as the normal human karyotype, dermatoglyphs, sex chromosomal abnormalities, autosomal aneuploidy, structural abnormalities of groups B, D, E, and G chromosomes. The text is liberally illustrated with tables, line drawings, and photographs. A simplified account of cell division is given in an appendix.

With the growth of genetic counselling, there has been an increasing demand for antenatal diagnosis by transabdominal amniocentesis and examination of the fetal cells for specific genetic disorders. A chapter is devoted to cytogenetic studies on spontaneous abortions and chromosomal analysis of the living fetus. At 16 weeks gestation, the sex and the chromosome constitution of the fetus can be established, enabling a mother with an increased risk of having an infant with a chromosomal anomaly to be reassured if the karyotype is normal or to have the pregnancy terminated if the fetal chromosomal constitution is abnormal.

Recently cytogenetics has undergone a major transformation namely, the advent of banding of human chromosomes with fluorescence, Giemsa, reverse Giemsa and centromeric banding techniques. This has totally altered the subject of chromosome recognition and has led to a complete new nomenclature of human chromosomes and their aberrations. Dr. Taylor only alludes to this major advance.

This book provides a readable account of human cytogenetics and clearly will provide a useful guide to hospital laboratory technicians and medical undergraduates. Although unlikely to appeal to the specialist, paediatricians, obstetricians and nurses would benefit from having access to a copy.

N.C.

authors. Each chapter has its own extensive list of carefully selected references. Medical aspects as well as indications for surgery and operative techniques are adequately covered for a book of this nature. Controversial topics are dealt with in a competent manner and there is a stamp of authority on every page. The book is well produced, easy to read and has a good index.

This book can be highly recommended. It deserves a place in every Medical Library in the country and will prove a most valuable personal possession of any surgeon who is constantly dealing with disorders of the colon, rectum and anus.

PRACTICAL HUMAN CYTOGENETICS. By Angela I. Taylor (Pp. X + 179, Figs. 81. £3.00). London: Baillière Tindall. 1974.

ALTHOUGH attempts at establishing the human chromosome number dates from early in this century, it was not until 1957 when improvements in techniques became available that human cytogenetics became established as a laboratory discipline. Since 1959, many clinical disorders ranging from abnormalities of sexual, physical and intellectual development, pregnancy wastage, leukaemia and tumours, have been shown to be due to or to have an associated chromosomal abnormality. Indeed, it is now recognised that three to four per cent of conceptions have a chromosomal abnormality and that most of these end as spontaneous abortions early in pregnancy.

This short unpretentious but most useful little book is aimed at encouraging a practical approach to the patient so that the clinical features (the phenotype) is observed and related to the cytogenetic findings. The book contains 14 chapters covering such topics as the normal human karyotype, dermatoglyphs, sex chromosomal abnormalities, autosomal aneuploidy, structural abnormalities of groups B, D, E, and G chromosomes. The text is liberally illustrated with tables, line drawings, and photographs. A simplified account of cell division is given in an appendix.

With the growth of genetic counselling, there has been an increasing demand for antenatal diagnosis by transabdominal amniocentesis and examination of the fetal cells for specific genetic disorders. A chapter is devoted to cytogenetic studies on spontaneous abortions and chromosomal analysis of the living fetus. At 16 weeks gestation, the sex and the chromosome constitution of the fetus can be established, enabling a mother with an increased risk of having an infant with a chromosomal anomaly to be reassured if the karyotype is normal or to have the pregnancy terminated if the fetal chromosomal constitution is abnormal.

Recently cytogenetics has undergone a major transformation namely, the advent of banding of human chromosomes with fluorescence, Giemsa, reverse Giemsa and centromeric banding techniques. This has totally altered the subject of chromosome recognition and has led to a complete new nomenclature of human chromosomes and their aberrations. Dr. Taylor only alludes to this major advance.

This book provides a readable account of human cytogenetics and clearly will provide a useful guide to hospital laboratory technicians and medical undergraduates. Although unlikely to appeal to the specialist, paediatricians, obstetricians and nurses would benefit from having access to a copy.

N.C.