MAY, 1949

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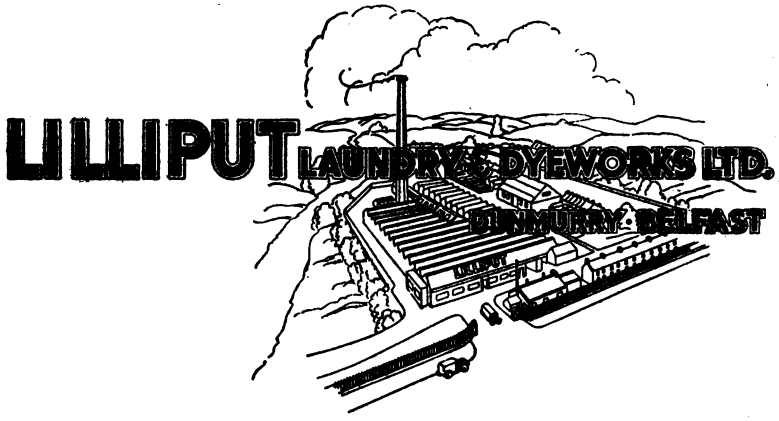

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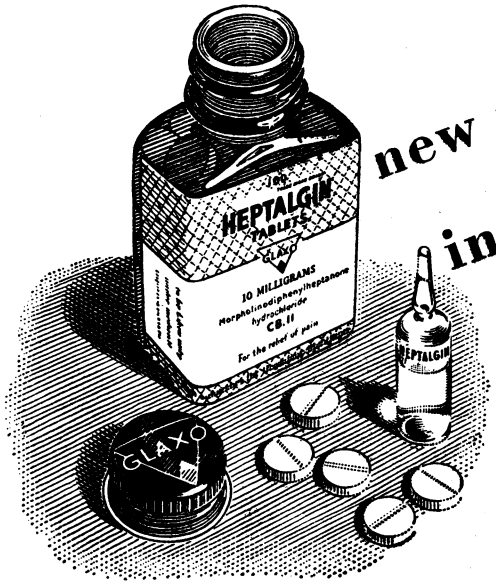

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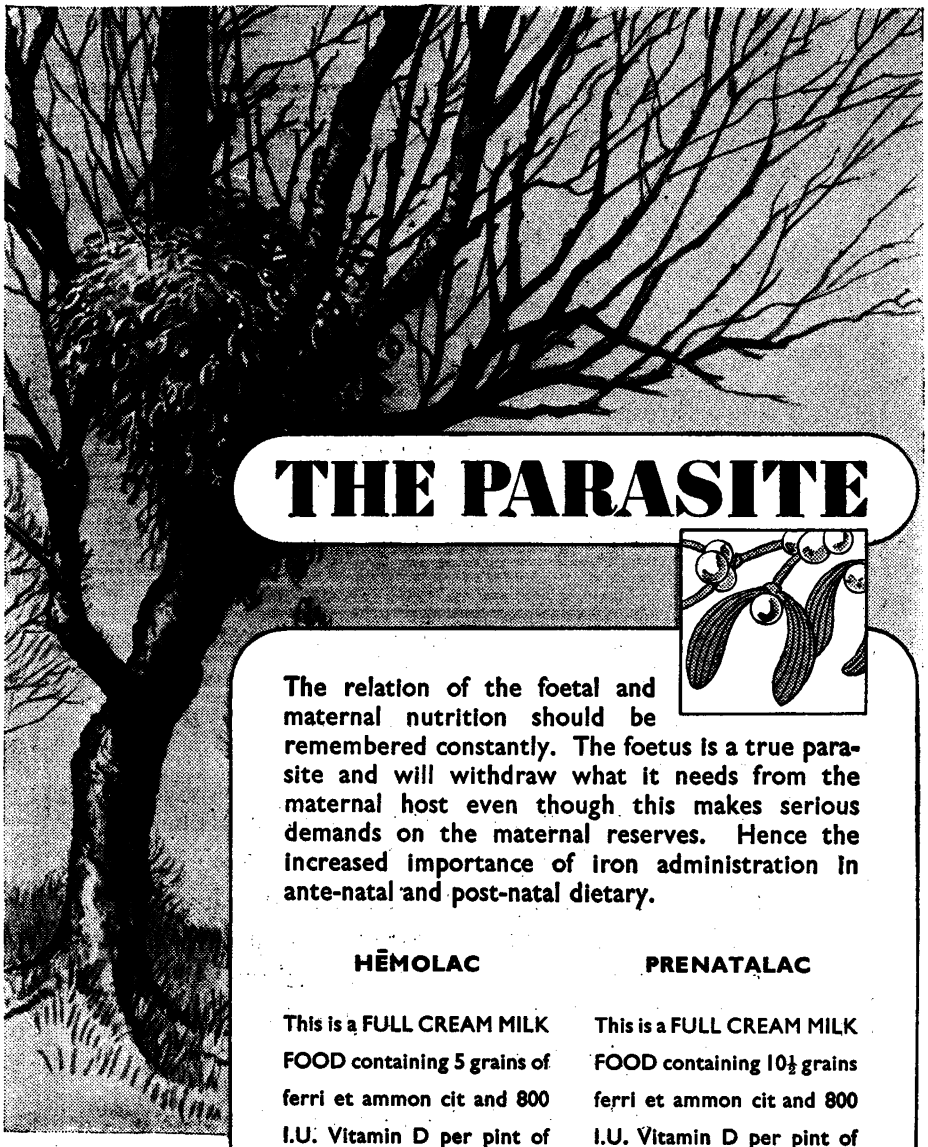

THE PARASITE

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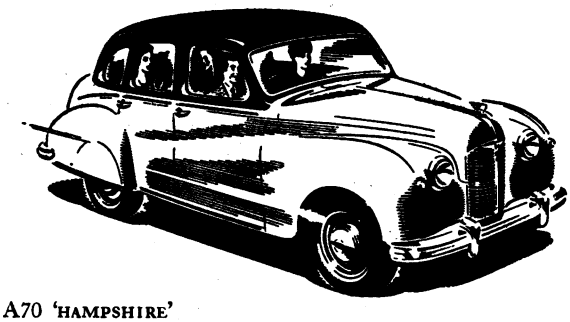

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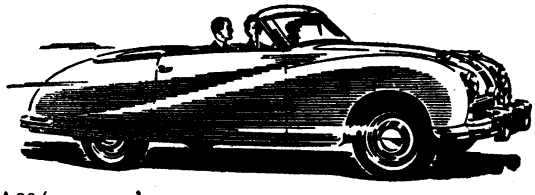

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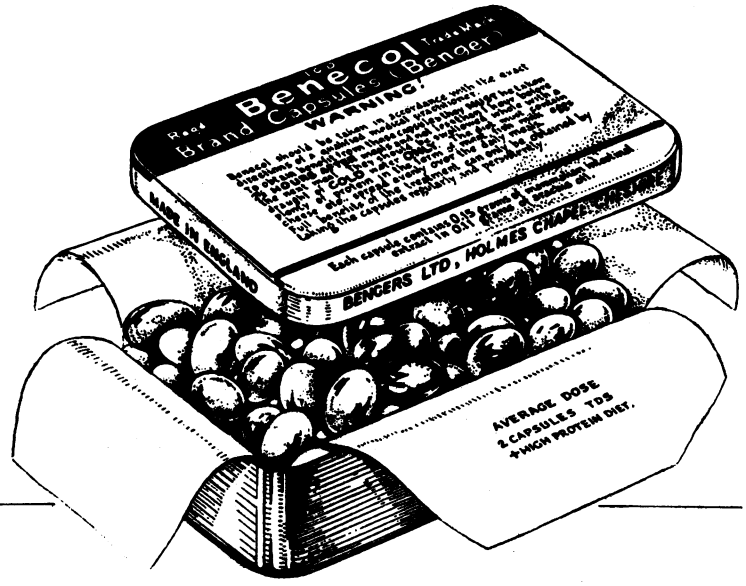

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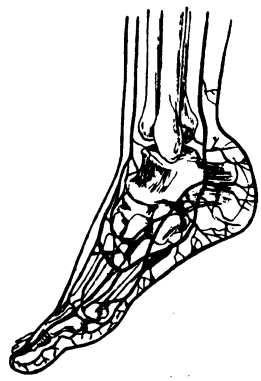

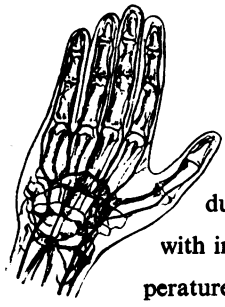

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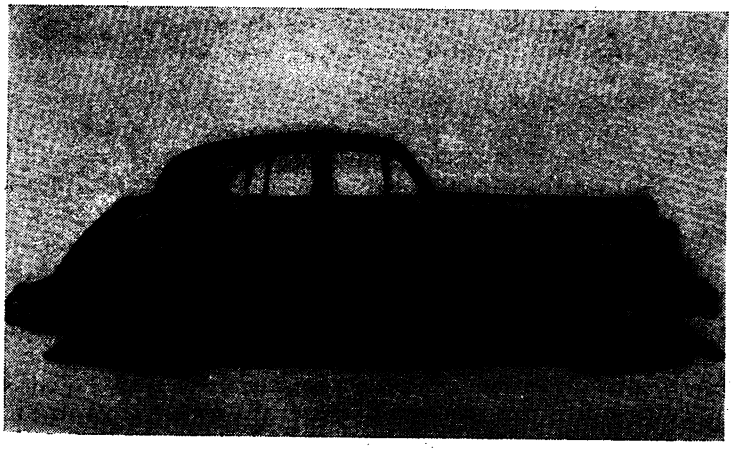

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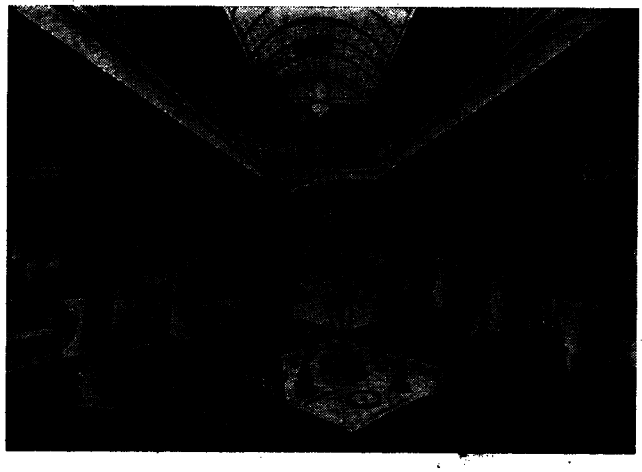

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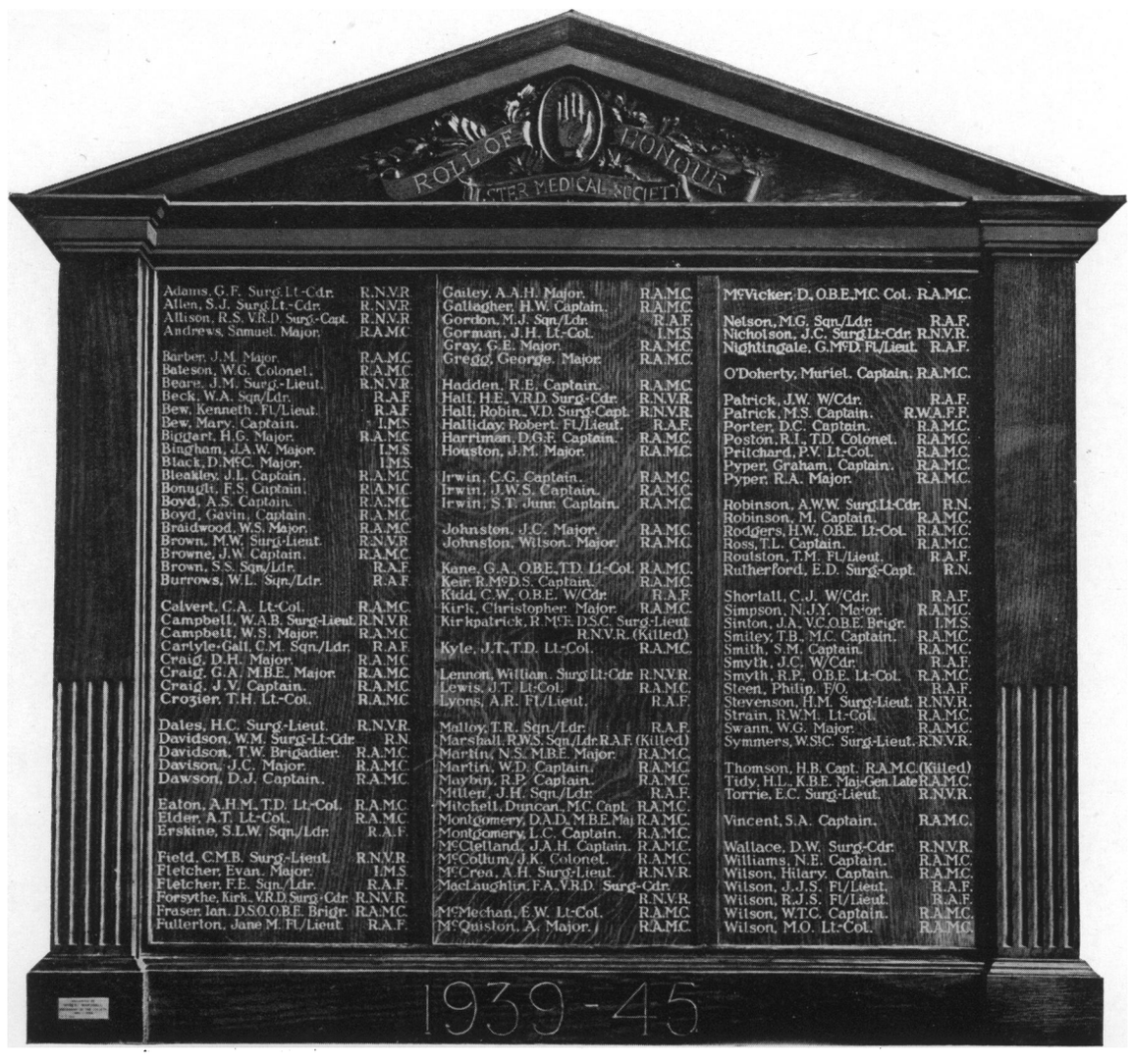
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Millen, J.H., Sqn./Ldr., R.A.F.
Mitchell, Duncan, M.C., Capt., R.A.M.C.
Montgomery, D.A.D., M.B.E., Maj., R.A.M.C.
Montgomery, L.C., Captain, R.A.M.C.
McClelland, J.A.H., Captain, R.A.M.C.
McCollum, J.K., Colonel, R.A.M.C.
McCrea, A.H., Surg-Lieut., R.N.V.R.
MacLaughlin, F.A., V.R.D., Surg-Cdr., R.N.V.R.
McMechan, E.W., Lt-Col., R.A.M.C.
McQuiston, A., Major, R.A.M.C.
McVicker, D., O.B.E., M.C., Col., R.A.M.C.
Nelson, M.G., Sqn./Ldr., R.A.F.
Nicholson, J.C., Surg.Lt-Cdr., R.N.V.R.
Nightingale, G.McD., Fl./Lieut., R.A.F.
O'Doherty, Muriel, Captain, R.A.M.C.
Patrick, J.W., W/Cdr., R.A.F.
Patrick, M.S., Captain, R.W.A.F.F.
Porter, D.C., Captain, R.A.M.C.
Poston, R.I., T.D., Colonel, R.A.M.C.
Pritchard, P.V., Lt-Col., R.A.M.C.
Pyper, Graham, Captain, R.A.M.C.
Pyper, R.A., Major, R.A.M.C.
Robinson, A.W.W., Surg.Lt-Cdr., R.N.
Robinson, M., Captain, R.A.M.C.
Rodgers, H.W., O.B.E., Lt-Col., R.A.M.C.
Ross, T.L., Captain, R.A.M.C.
Roulston, T.M., Fl./Lieut., R.A.F.
Rutherford, E.D., Surg-Capt., R.N.
Shortall, C.J., W/Cdr., R.A.F.
Simpson, N.J.Y., Major, R.A.M.C.
Sinton, J.A., V.C., O.B.E., Brigr., I.M.S.
Smiley, T.B., M.C., Captain, R.A.M.C.
Smith, S.M., Captain, R.A.M.C.
Smyth, J.C., W/Cdr., R.A.F.
Smyth, R.P., O.B.E., Lt-Col., R.A.M.C.
Steen, Philip, F/O., R.A.F.
Stevenson, H.M., Surg-Lieut., R.N.V.R.
Strain, R.W.M., Lt-Col., R.A.M.C.
Swann, W.G., Major, R.A.M.C.
Symmers, W.St.C., Surg-Lieut., R.N.V.R.
Thomson, H.B., Capt., R.A.M.C. (Killed)
Tidy, H.L., K.B.E., Maj-Gen., Late R.A.M.C.
Torrie, E.C., Surg-Lieut., R.N.V.R.
Vincent, S.A., Captain, R.A.M.C.
Wallace, D.W., Surg-Cdr., R.N.V.R.
Williams, N.E., Captain, R.A.M.C.
Wilson, Hilary, Captain, R.A.M.C.
Wilson, J.J.S., Fl/Lieut., R.A.F.
Wilson, R.J.S., Fl/Lieut., R.A.F.
Wilson, W.T.C., Captain, R.A.M.C.
Wilson, M.O., Lt-Col., R.A.M.C.
1939-45

THE ULSTER MEDICAL SOCIETY

THE MEDICAL INSTITUTE,

COLLEGE SQUARE NORTH, BELFAST.

Dear Sir (or Madam),

If you are not a member of the Ulster Medical Society, we would appeal to you to give the question of joining your consideration. The Society has been in existence since 1862, and has always been active in keeping its members interested in the advances in medical science as well as in current professional affairs. The Medical Institute, situated in College Square North, belongs to the Society (through the generosity of Sir William Whitla), and is ideally adapted for meetings, committee meetings, and recreation. There is a library with current medical periodicals, and facilities for reference to medical literature are available in conjunction with the library at the Queen's University. There is also a billiards-room available to members, and lighter periodicals are also provided. Meetings are held at intervals of a fortnight during the winter months, and papers are contributed by members. Distinguished visitors are occasionally asked to contribute papers on subjects upon which they are specially qualified to speak. **The Ulster Medical Journal, the official organ of the Society, is issued to all Fellows and Members free of charge.**

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

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

We remain,

Yours faithfully,

SAMUEL BARRON, *President.*
J. A. PRICE, *Hon. Secretary.*
J. C. C. CRAWFORD, *Hon. Treasurer.*

FELLOWS.—All persons registered for seven years as medical practitioners under the Medical Acts shall be eligible for election as Fellows. The annual subscription shall be two guineas for those practising or residing within a radius of ten miles from the centre of the city of Belfast, they shall be known as Town Fellows; one guinea for those practising or residing outside this radius, they shall be known as Country Fellows.

LIFE FELLOWS.—Any duly elected Fellow or Member shall, subject to the approval of the Council, be entitled to a life-fellowship on payment of a single subscription of twenty guineas for a Town Fellow, or ten guineas for a Country Fellow. All Fellows or Members of the Society who have paid subscriptions for forty years or more shall be exempted from any further subscription.

MEMBERS.—All persons registered as medical practitioners under the Medical Acts shall be eligible for election as members of the Society on an annual subscription of one guinea. Such membership shall terminate at the end of the seventh year after the date of medical registration. Members shall then become Fellows.

.....19.....

To DR. J. C. C. CRAWFORD,
438 LISBURN ROAD,
BELFAST.

Dear Sir,

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

Name of Candidate .....

Postal Address .....

Year of Qualification and Degrees.....

.....

Signature of Proposer.....

Signature of Seconder.....

BANKER'S ORDER
(Ulster Medical Journal)

.....19.....

Name of Bank .....

Address of Bank or Branch .....

Please pay to the account of the Ulster Medical Society (Northern Bank, Shaftesbury Square, Belfast), ULSTER MEDICAL JOURNAL *Account, the sum of five shillings, and continue to pay this amount on the 1st November each year until further notice.*

Signature.....

Address .....

2d.
STAMP

.....

.....

This should be sent to the Honorary Treasurer, DR. J. C. C. CRAWFORD,
438 Lisburn Road, Belfast, for registration.

THE
ULSTER MEDICAL JOURNAL

PUBLISHED ON BEHALF OF THE ULSTER MEDICAL SOCIETY

Vol. XVIII 1st MAY, 1949 No. 1

War and Peace

MONTHS and years have passed since the last shot was fired and the last all-clear sounded at the conclusion of a war that for long imperilled our very existence. Let us ask ourselves if we are not already beginning to forget the debt we owe to those who made this victory possible. Are we, the many, as clear in our memories as we should be, of the Churchillian few? The medical profession in Ulster has had several recent reminders of this deliverance, and it is timely to reflect for a moment on the special service rendered by the people of this Province to the care of the sick and wounded.

The War Record of the Queen's University of Belfast, recently published by the authority of the Senate and ably edited by Professor M. J. Boyd, is one of which the academic community may well be proud. Among the names on this list will be found those of 729 medical graduates, including Fellows and Members of the Ulster Medical Society.

Striking as this figure is, it by no means represents the total contribution of the University to the medical services of the armed forces. The list of 2,335 names includes not only doctors and dentists, but nurses, V.A.D.'s, and many others with specialist qualification who were not medical, such as bio-chemists and analysts. There is also that stout-hearted group who gave up their medical studies to serve with combatant arms. Not least among these many must be included the padres, who served with medical units.

Nor is it from the University alone that Ulster's contribution to war medicine comes. Ulster nurses played a distinguished part, as their awards testify. Men and women, in numbers which no one has attempted to compute, served in many capacities: as dispensers, physiotherapists, radiographers, and in other technical branches, and still more volunteered for the even more arduous, but no less honoured, task of nursing the sick and wounded.

This great band, could it be numbered, is the real total of Northern Ireland's part in war medicine.

The names of the Fellows and Members of the Ulster Medical Society who served in the war are commemorated in a memorial tablet unveiled in the Whitla

Medical Institute on 24th March. It is the gift of Dr. Robert Marshall, who was President of the Society in 1942-43, and as our President, Dr. Barron, said on the occasion of the unveiling, the gift is both valuable and timely. It is the counterpart of the 1914-1918 Roll of Honour presented in similar circumstances by the late Dr. H. L. McKisack. Both are now in position on the stairway of the Institute. The names inscribed on it are those of Fellows or Members who joined the Society not later than May, 1948.

126 of our colleagues served. Of these, three did not return :

Ross McFaul Kirkpatrick was a Surgeon-Lieutenant in the Royal Navy. He was awarded the Distinguished Service Cross for conspicuous gallantry, leadership, and devotion to duty in a naval engagement off Tobruk, and afterwards was reported missing, believed killed, in 1944.

Humphrey Barron Thomson, a Captain in the Royal Army Medical Corps, was reported missing, believed killed, after the fall of Singapore, and it was after many months of anxiety that his parents, Professor and Mrs. W. W. D. Thomson, learned that he had been killed when attending to the wounded men under his care.

Robert William Stanley Marshall, a Squadron-Leader of the Royal Air Force Medical Service was missing while flying in Burma in June, 1945, and was reported believed killed a year later. He was the only son of Dr. and Mrs. Robert Marshall.

These young men maintained in life and death the highest traditions of our race and of our profession. Their names are written in letters of gold; let us remember them with pride and gratitude.

BACK NUMBERS

From time to time the editors are asked for back numbers of this Journal to complete files in university and hospital libraries, or to provide copies of articles not available as reprints.

We would be grateful, therefore, if any Fellow or Member of the Society who has back numbers of the Journal which he no longer requires would leave them in the Institute, care of the editors.

An Address

By Sir Henry Dale, O.M., G.B.E., M.A., M.D., LL.D., F.R.C.P., F.R.S.

Delivered at the opening of the Sir William Whitla Assembly Hall, Queen's University, Belfast, Saturday, 19th February, 1949

Vice-Chancellor, Pro-Chancellor, My Lord Mayor, Members of the University, Ladies and Gentlemen :

Let me first give expression to my very deep sense of the honour you have done me, in making me a Doctor of Laws of this great University, now in the hundredth year of its activity for higher education and research in Northern Ireland. You may be assured that I value very highly indeed the distinction which you have thus conferred.

You have honoured me further by asking me, as my first act as honorary graduate, to perform a simple but significant ceremony. It is my privilege now to declare this fine Assembly Hall open, and to offer it for acceptance by the University, of which you have given me the right proudly to call myself a graduate member.

As all present will know, the building and equipment of this Hall have been made possible by one of the generous provisions made under the Will of the late Sir William Whitla, one of this University's most widely distinguished sons, and one of its greatest and most consistent benefactors. This building will most fittingly bear his name, so that all the members of the university, who enjoy its provision for their corporate activities, will be regularly reminded of one, who, throughout the whole of a full life and an active career, gave to the advancement of the University's interests, in all directions, a central place in his thoughts and his endeavours. He had a more complete and life-long association than is usual in an academic career, or in his own chosen profession of a physician, with this one School and University. Here he entered as a student in 1871, graduated M.D. in 1877, and became Professor of Materia Medica and Pharmacology in 1890, retiring from the Chair in 1920, but giving the University still his full service as its Parliamentary Representative at Westminster; here he remained till he died, full of years and honours, in 1933; and, in addition to his provision for the Hall, which we are here to dedicate to the uses which he designed, he bequeathed his residuary estate to the University, and his own beautiful house and garden in Lennoxvale as a lodge of residence for its Vice-Chancellors.

I myself had only once the opportunity to meet Sir William Whitla, at the meeting of the British Medical Association here in 1909, when he was its President. I think that, even from that friendly and encouraging, though brief, encounter, I must have received some impression of what he was and what he had accomplished; but it has been deepened into an almost incredulous admiration by all that I have since learned of him and his career. For it seems to me that any one of his several

major activities would be to-day thought enough, by itself, to fill the working life of a man, even of exceptional powers. The duties of teaching and research, which belong to a Chair of a subject so wide in scope as Materia Medica and Pharmacology; the writing of several important and highly successful text-books for students and practitioners of medicine, and the keeping of these abreast of the advances of knowledge by frequent revision; or, again, the diligent service of the sick, and clinical teaching therewith, in the Royal Victoria and other Belfast hospitals, and the successful conduct of a very large practice as one of Northern Ireland's great consulting physicians; any one of these, I feel, might now be regarded as constituting, by itself, a full contribution by one man to the activities of a university and to the life of a community, and as leaving him no more than a necessary margin of leisure. Yet the records leave no room for doubt that William Whitla, at the height of his powers and his reputation, carried them all with ease, taking them in his masterful stride.

And it is certainly not possible to suspect him of a merely perfunctory pluralism. His lectures won a high reputation, and we are told that they were enlightened by characteristic flashes of genuine eloquence—an achievement indeed, if one considers what openings for rhetoric would be offered to an ordinary exponent by the Materia Medica; while the resounding success of his text-books carried them far across the world, calling for no less than twelve successive editions of one and for translations of another into nearly all the languages of civilization, including Chinese. And these ever-growing claims never made him a slave to his professional and academic duties, or narrowed the range of his interests. He kept throughout life a close connexion with and a generous interest in the Methodist community in which he had been born and reared.* And, with this evangelical faith of his fathers, he kept a habit of Bible study, finding, as Isaac Newton had done in his day, a special interest in the prophetic chapters of the Book of Daniel; he published indeed, a full translation, from their original Latin, of Newton's almost-forgotten writings on the subject, with his own introduction and commentary. His colleagues and friends have remembered him, by way of contrast, as an incomparable raconteur; they have recalled his general grasp of English literature as "amazing," and his knowledge of the works of Shakespeare, in particular, as quite remarkable. Each year, when the late Sir Frank Benson and his Shakespeare company visited Belfast, William Whitla used to entertain them at well-remembered supper-parties with his friends. Yet he still found time to travel; and his colleagues remember the vivid accounts which he gave of his experiences in Russia, Palestine, Italy, and other parts of the world.

We are left with the impression of a generous amplitude of culture and achievement, for which it would be diffiuclt, I think, to find parallels to-day. William Whitla was undoubtedly a man of unusual and individual distinction; but his career belongs in many of its aspects to the tradition of the great Victorian era,

* After I had made this statement, my attention was drawn to an item in the Commemorative Exhibition showing that, on his form of entry to the University, William Whitla had described himself as "Presbyterian." It must be presumed that he joined later the Methodist community, possibly on his marriage.

though his life extended, in fact, through the reign of Edward VII, and most of that of George V. He was born in 1851, a year rendered almost symbolic by the first Great International Exhibition, in London; and in 1890, when he was elected to his Chair and entered upon the main phase of his academic and professional career, Victorian standards of success and Victorian ideals of conduct and culture had, in general, not yet encountered any strong challenge. We can find then, I think, a special fitness in his lifelong association with a University which, founded as a constituent college of a wider "Queen's University" for Ireland, when Victoria and her reign were still young, to-day, with its independent University status, still commemorates the great Queen in its title.

Those who, like myself, belong to the generation which followed his, will not, I think, even now condemn the impulse which, in England at least, led us who were still young in the "nineties" to seek to break out of the Victorian tradition into what seemed to us a freer air. It is the eternal right and privilege of youth thus to challenge the credentials of its parents' beliefs, standards, and conventions. But we ought to be ready to confess that we may have shown too great an eagerness to discard a core of ripened wisdom, together with a rind of what seemed to us a smug convention. In the homely figure of an old-fashioned German saying, we were too ready, in our haste, to throw the baby away with the bath-water. It may be that the world is even now paying a penalty for this excess of our eagerness, as well as for all the mistakes of the generations which have followed ours.

There is truth in the suggestion, I think, that, just as the great civilizations of ancient times had a substratum of slavery, our parents of the Victorian era had shown a blind spot, or at least a too easy tolerance, for gross contrasts between the luxury of mounting wealth and the squalor of grinding poverty. But they did believe in individual ability, industry, and courage; and I think that we should credit them with having set themselves with determination to give increasing scope to these, wherever they could be found, and steadily to eliminate such inequalities as were due only to historical accident and social inertia. They were busily building more and wider educational ladders, but they were to be ladders—not lifts or escalators. I think that they still regarded mere jealousy as the meanest of human motives, and would not have allowed it ever to masquerade as a virtue. While they so readily imposed upon themselves, as individuals, embargoes and restrictions which their descendants may have found tiresome, or even ludicrous, they cherished, and advocated with passionate conviction, an ideal of individual freedom for all mankind—an ideal which, in spite of all the tragic sacrifice made so recently in its defence, has been roughly blown upon from different quarters in these latter years by partisans of political dogmas, which, in spite of their shouts of enmity to one another have shown a remarkable concurrence of contempt for individual freedom. And, with all their timid reluctance to recognise some of the discoveries of their own greatest men, our Victorian predecessors had firmly accepted, and were ready fiercely to defend, the most sacred of all rights to a university—the right of a man's mind to seek the truth and to proclaim what it finds, in complete freedom from any pressure of politics, prejudice, or preconception.

You will agree, I think, that the great problem for a university to-day is to

provide for the students, who, in such rapidly swelling numbers, already throng its precincts, an education which will open to them this full freedom of the book of knowledge, and encourage in them the spirit of free enquiry; and which, at the same time, will give them an anchorage in essential truths and tested principles, enable them to use that freedom wisely, arm them against the plausibilities of propaganda, and fit them to play their due part in to-day's tremendous task of shaping world opinion and determining world policy.

And where shall the basis of such an education be found? Where shall we seek this true humanism to-day? The times are long behind us when one mind could expect to comprehend, or even to make useful contact with the whole extent of human knowledge and achievement. Even within that rapidly widening range which comprises the natural sciences, the mere segment even, of one of its main divisions, of which any one man can hope to maintain an expert knowledge and intimate understanding, becomes smaller year by year. If William Whitla could return to-day, he would find that his own subject of medicinal treatment had swung already into a new orbit of achievement, in which it can now deal directly with the causes of disease and not merely, as in the so recent times of his own full activity, with the relief of its symptoms. How shall a university prepare its students to play their proper part of trained and intelligent leadership and active contribution by research, in a civilization so dominated by physical science, for immeasurable good, or, if man's folly so determine, for irreparable disaster? And how shall it give them, at the same time, an enlightened understanding of all the great past, as well as of the present and the potential future, of man's creative activities in literature, philosophy, and all the liberal arts?

There would, I expect, be no approach to unanimity among us on a solution of the problem. Many still hold, I believe, with fervour and sincerity, that a study of the history of man, and of what human hands and brains have made, must always, and for all of us, provide the basis of a finer educational discipline, and open the door to a wider culture, than any which the study of nature's works can offer. I myself am frankly doubtful of the claim of such a belief to stand on firmer ground than that of tradition. Some of William Whitla's teachers here, in days when the building of scientific foundations for medicine had hardly yet begun, were, indeed, ripe classical scholars before they became learned physicians by long experience; but William Whitla himself, starting from school with a few years' apprenticeship in pharmacy, and trained only in medical subjects in his later student years, achieved a culture, it would seem, as liberal as any of theirs. And, when I hear claims for the incomparable breadth of a culture based on classical scholarship, even in this scientific age, I find myself puzzled by the contrast between scientific colleagues, with their shamefast reluctance to let gaps appear in their literary or artistic equipment, and eminent scholars among my friends, who still seem to find in their ignorance of modern science a matter even for pride—of modern science which, even though we resent it, will inevitably contribute in increasing measure, not only to the material framework of our daily life, but to the very texture of our thoughts.

Each of us, I do not doubt, will find that his own answer to this educational

conundrum differs, at least in detail, from that of all the others. For my own part, I pin my faith to the power of a university to give to the student of any subject in its curriculum, if rightly presented, a feeling for precision in knowledge and thoroughness in its mastery, for the adventure of exploration beyond the boundaries of the known, for victory over intellectual difficulties, and for the passionate pursuit of truth as something to be supremely valued for its own sake, not to be misused as a mere expedient, or as a crutch for some dogma. I believe that either the data of science, or those of literary or historical scholarship, can be made intellectually deadening if they are indifferently presented; but that either can be made the means of awakening the mind to the joy of knowledge and of intellectual triumph, and of creating therewith a fertile soil in which sound judgment can grow with the ripening years.

Believing then, in depth, even though circumscribed, rather than shallow breadth, as the proper aim of a direct and deliberate culture, I am the more convinced of the need, in this scientific age, to maintain in any university an adequate balance between studies of all the different aspects of man's intellectual activities and adventures. True width of culture cannot be given in these days by any attempt to make students what Isaac Newton would have called "little smatterers," over the whole range of science and scholarship. But I believe that it can and will come, in a university, from the free converse and daily association of those who teach and those who learn in all its faculties, however special and restricted the formal studies of any group may perforce become, as the sum of tested knowledge mounts and accumulates.

It is just those opportunities of multilateral contact and exchange that a university can offer, as a principal factor of its educational opportunity. Looking back over the years to my own experience as a student of Natural Science in a university, I believe that the daily encounters and nightly talks with fellow students reading the classics, history, or moral philosophy, were as important a factor in my education, at least in my earlier college years, as any formal tuition in my own subject. And this splendid Hall, now opened for the use of all the members of this University, will stand as a permanent symbol, and offer continuous opportunity, for those corporate and social activities on which the character of university education so intimately depends; and, in doing so, it will perpetually commemorate to the University that famous man among her sons, Sir William Whitla, whose generous filial piety bequeathed it to the University in which so much of his life was passed, and on which so much of his thoughts and his affections was centred.

The Role of a Geriatric Unit in a General Hospital

By Dr. Marjory W. Warren

Physician-in-Charge Geriatric Unit, Deputy Medical Director,
West Middlesex Hospital, Isleworth.

POPULATION OF GREAT BRITAIN

Year			Total
1901	...	...	37,000,000
1944	...	...	47,628,000

In 1901 to every 19 of the population there was ONE over 60 years.

In 1944 to every 8 of the population there was ONE over 60 years.

The following table shows the increasing numbers of men and women alive at the age of 60 years and over.

GREAT BRITAIN

Year		Men		Women		Total
1901	...	1,071,519	...	1,336,907	...	2,408,426
1939	...	2,511,200	...	3,197,400	...	5,708,600
1944	...	2,737,000	...	3,590,000	...	6,327,000
1947	...	3,189,000	...	4,243,000	...	7,432,000

U.S.A.

The following figures show the same increased tendency in the numbers of men and women alive over 65 years, and those which it is statistically anticipated will be living in 1980.

Year		Men and Women		Number
1940	...	Alive over 65 years	...	9,000,000
1980	...	Alive over 65 years	...	22,000,000

The main factor affecting the increased numbers of men and women over 60 years of age is the greater expectation of life. This affects both Great Britain and the United States of America.

EXPECTATION OF LIFE

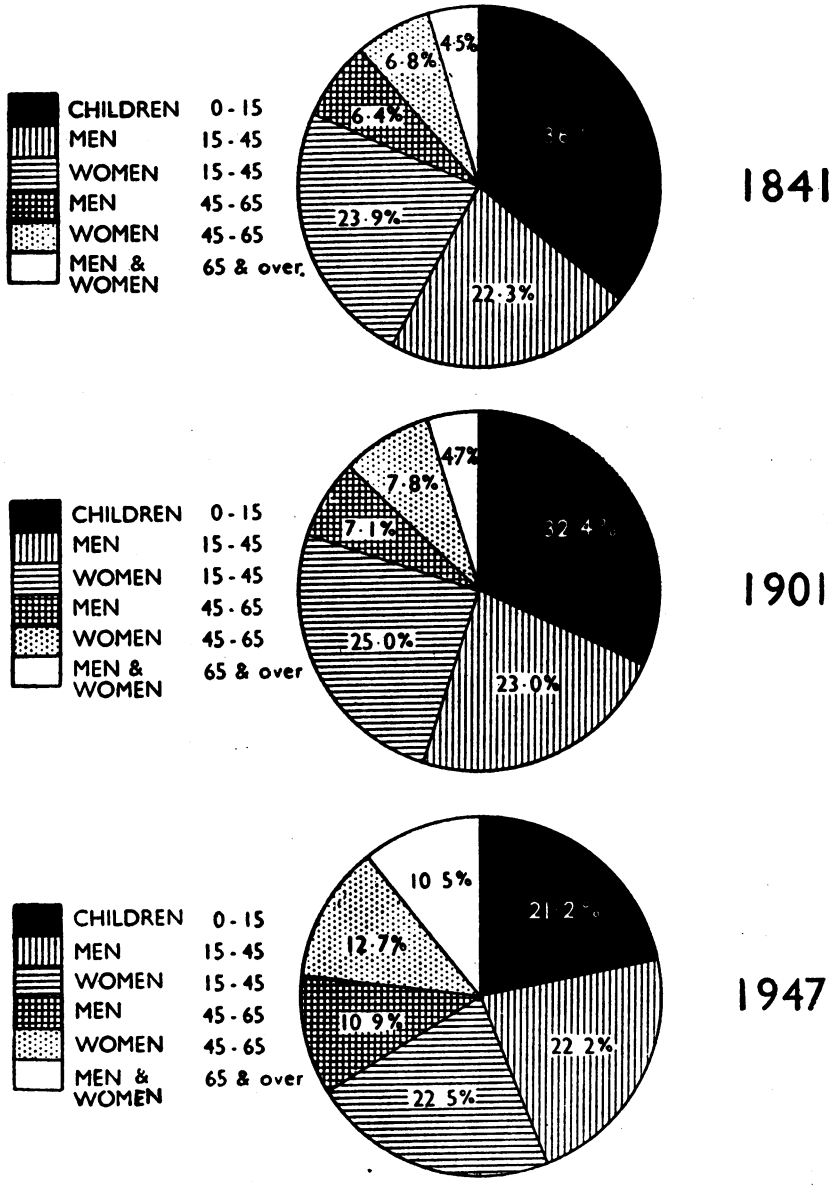
(A) In Great Britain

Year		Men		Women
1891/1900	...	44.1	...	47.8
1901/1910	...	48.5	...	52.4
1942	...	61.7	...	67.4

(B) In U.S.A.

Year		Men		Women
1900/1902	...	48.23	...	51.08
1940	...	62.94	...	67.31

AGE PROPORTION OF POPULATION OF ENGLAND AND WALES, 1841, 1901, and 1947



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Introduction

The care and welfare of the chronic or long-term sick is a problem affecting all sections of the community, and should have priority attention at the present time. Lack of essential needs for these patients to-day is responsible for much suffering, misery, frustration, and hardship for the afflicted and their relatives and friends—and inevitably results in a great waste of bed accommodation, of hospital and home facilities, and of nursing and other personnel, causing serious economic loss to the country as a whole.

The long-term sick are found in all types of medical and surgical conditions, and in all age groups from infants to the very old. It is impossible to ascertain with any degree of accuracy the numbers of such patients in any group, as there is no register or record of them, and they are to be found in their own homes, in nursing homes (profit-making and others), in hospitals, and in institutions of all kinds. Only an accurately carried out survey could give the numbers and proportions of different groups.

It is well known to medical and to social workers who are interested in this subject that there are enormous numbers of patients in their own homes who need and would benefit from admission to a hospital in the first instance. Such patients are known to be living—or existing—in conditions which are totally inadequate for their comfort or happiness, and in circumstances where a remediable condition is rapidly deteriorating into one which is irremediable.

Such conditions ultimately call for admission for a much longer period of time than would have been needed if treatment had been implemented earlier—or need for permanent care may even result.

The needs of the long-term sick fall under two headings:—

(1) Medical;
(2) Social;

and these are often intimately related one with the other.

In the past there has been too little interest in, or industry with, these patients, and now that the pattern of our social life has changed, it is absolutely essential that there should be radical reform—if the burden to the community is not to become intolerable, or the total sum of misery unbearable.

With the smaller families and the greater migration of members of the family unit from the home, with the shortage of domestic housing accommodation and the improved scales of domestic workers which prohibits private hire on the scale which existed at the beginning of the century, more and more of such persons come to demand and need care and treatment in hospital or institution.

With the advance of medical science, including the discovery of insulin, chemotherapy and penicillin, and of preventive medicine during the last fifty years, there has been a steady decline in the numbers suffering from acute illness of the infective types, from industrial diseases and of accidents among the younger age groups. During this period there has been a steady increase in the number of elderly persons (60 years +) and it is well known that morbidity increases with advancing years. These factors have brought about a higher proportion of long-term sick to "acute" sick. Thus the problem of the medical care and social welfare of the long-term sick

has greatly increased, and now offers a challenge to medicine and to all those social workers and agencies who are interested in maintaining health and happiness.

At present there is no real co-ordination between the various workers and no means by which patients can be afforded the right type of accommodation, e.g., many patients who no longer need hospital accommodation cannot get a suitable vacancy when it is needed, such as a sanatorium bed, or a bed in a hostel for an elderly person whose condition renders it necessary on medical and/or social grounds. Equally, there are patients whose deterioration at home while awaiting admission ultimately necessitates a much longer stay in hospital. Lastly, it is not uncommon to find elderly persons with treatable conditions admitted to homes without investigation, owing to the lack of hospital beds, and the urgent need of removal from home.

It is suggested that the responsibility and care for these long-term sick should be shared, and in the interest of patients there should be medical *continuity*.

As these long-term sick include patients of all ages and with every type of disease, they should be classified and shared by the medical profession as follows :—

1. Pædiatric service, supervising the needs of long-term sick children.
2. General physicians, arranging for the care of long-term sick adults in the younger age groups.
3. Geriatric service, accepting responsibility for the elderly long-term sick.
4. T.B. service, providing for the long-term tuberculous patients because of the problem of infection and regardless of age.
5. Psychiatric service, making provision for all certifiable persons because of their special needs, apart from others, and in varied accommodation.

As the whole subject of gerontology is comparatively new, and as there exists still in the minds of many medical as well as lay persons a good deal of confusion as to the difference between geriatrics and chronic sick, I should like to make one or two definitions before I proceed.

Definitions

Geriatrics, derived from the Greek words "geros"—old age, and "iatrikos"—pertaining to a physician, comes to signify the medical treatment of elderly people, and is, therefore, not confined to the care of long-term illness, although, admittedly, a considerable number of such patients will be included in the group.

Gerontology, a less familiar term, with a wider connotation, includes the study of all problems of ageing—medical, psychological, social, economic, or of any other kind.

Chronic Sick, is a term which should be abandoned in favour of the phrase Long-Term Sick.

General Principles

If this nomenclature is adopted and these principles of responsibility accepted, we can think quite clearly about the definitions of and differentiations between "geriatric" and "chronic," because the former has been defined and the latter ceases to exist. Secondly, patients in the geriatric section, by definition, will include the short-term or acute sick and the long-term sick appropriate to its group.

By this definition, new patients from outside the hospital (either from their own

homes or from *homes*) will be admitted, and some transfers from other departments *after consultation* will be accepted into the geriatric unit. These transfers will probably be mainly from the surgical units, as after the geriatric service has been established it is to be presumed that generally those patients eligible for, but not admitted into, the geriatric department in the first instance will have been admitted elsewhere by request of another unit, who will wish to see the patient through his illness.

Admittedly the geriatricians will have to gather in a rather larger number of long-term sick than other units will, and will have to arrange accordingly, but chiefs of other units will no longer expect them to accept all long-term sick, and particularly those whom they want to pass on. Only by such clearly defined ideas can a geriatric department build up a really good and well-integrated medical and social service for those who fall within its scope.

Large institutions or hospitals for chronic sick should be replaced as soon as possible by more modern arrangements. Such hospitals isolate both patients and staff, make easy specialist opinion difficult to obtain, and are seldom, if ever, likely to be equipped with really first-class equipment. All these disadvantages militate against really good investigation and so against first-class treatment.

The best place for such investigation and treatment is a general hospital, and so, in selected places, a geriatric unit should be based on a general hospital, where it can call upon the services of all specialists when necessary and share, with other departments, the amenities of all ancillary services. Such a department should be of equal standing to other departments and should plan a definite service and a precise rôle in the hospital practice.

The advantages of treating the elderly sick in such a unit are :—

(i) That the patients more often make congenial contacts with each other, and do definitely stimulate each other in a healthy spirit of rivalry, helpful to their rehabilitation, and in a way which they do not do when scattered in other wards.

(ii) That staff can be trained in the best methods of caring for and treating elderly patients.

(iii) That the wards can be equipped to their special needs.

(iv) That study of reactions and comparison of methods can be undertaken for the mutual benefit of patients and staff.

(v) That such a field offers the best opportunities for research.

Service of Gerontology

The medical care and social needs of the elderly will require three types of accommodation :—

1. The Geriatric Unit—part of the general hospital.
2. Long-Stay Annexes—associated with the general hospital.
3. Residential Homes.

The Geriatric Unit—comprising wards in a general hospital reserved exclusively for elderly patients, all of whom are undergoing investigation or active treatment

and rehabilitation, so that in due course they may be discharged from such wards either to their own homes, or, after classification, to other appropriate accommodation.

Long-Stay Annexes—providing, under the medical supervision of the geriatric department, accommodation and nursing care for really irremediable elderly patients, who, after full investigation and treatment in the geriatric department, show no promise of further improvement. These annexes may be either within the curtilage of the hospital or outside it, but wherever situated, should remain directly under the medical supervision of the geriatric department.

Resident Homes—providing accommodation for elderly persons in need of reception, but not of nursing care. The residents in these homes should advisedly be supervised as to their medical needs, when necessary, by the staff of the geriatric department.

The Geriatric Unit

In order to keep the geriatric unit working as efficiently as possible, it is obvious that there must be adequate opportunity for discharge, either to the patient's home or elsewhere.

Regular consultations with the almoner are essential in fostering home conditions and helping in cases where social aid is needed. Such help may be a building up of the patients' home conditions, by the addition of domestic and/or district nursing service and by sundry help from the voluntary services—or it may be in finding or choosing a *home* when the social conditions demand this. Thus adequate home vacancies are needed.

Likewise, there must be a sufficiency of beds in the long-stay annexe, but a careful watch must be kept on this type of accommodation to ensure that only those who are really suitable for such long-stay annexe are transferred there. It is obvious that abuse of such accommodation, which might at times be a temptation, would lead to a repetition of to-day's unsatisfactory conditions.

Into the geriatric unit will be admitted, not only new patients, but all transfers to the geriatric service, as all must be fully screened, medically and socially, before treatment (medical and/or social) can be correctly worked out.

Within the service there must be classification and continuity of treatment.

Classification can be brought about by wards set aside for different purposes :—

1. Cot-Bed Wards—for those who need or will benefit by such beds.
2. Open-Bed Wards—with a section for incontinent patients.
3. Wards with low beds and a day room for ambulant patients awaiting discharge or transfer to a resident home.

Continuity is essential for good treatment. In the past, much of the failure to treat these long-term sick patients has been due to lack of continuity and therefore to lessening of responsibility for their care.

The medical treatment and social care of the elderly sick should be undertaken by a team of workers if the best results are to be obtained. Such a team should consist of :—

1. Medical staff.
2. Nursing staff of various grades and nursing orderlies.

3. The Almoner, a fully-trained medico-social worker, using all agencies, voluntary and statutory as occasion demands.
4. Physiotherapists.
5. Occupational and diversional therapists.
6. Services of a dietician and chiropodist.

Functions of a Geriatric Unit

1. To accept new geriatric patients, whether short-term or long-term, and selected patients transferred from other wards.
2. To provide facilities for the investigation and treatment of geriatric patients.
3. To provide observation wards for the primary investigation and medical treatment of all elderly psychiatric patients, except those obviously needing admission to a mental hospital.
4. To afford earlier rehabilitation of the elderly by more adequate and prolonged use of physiotherapy.
5. To discharge all rehabilitated patients from its wards, and to resettle them where necessary, in resident homes.
6. To arrange the prompt transfer to long-stay annexes of all really irremediable patients.

This concept does not, of course, postulate the pre-emption of all patients to the geriatric wards, but does pre-suppose the setting aside of certain wards where such patients may enjoy continuity of treatment and be able to be grouped for rehabilitation. Special emphasis is laid on the role of psysiotherapy, both in preventing chronicity, and as the outstanding factor in the rehabilitation of elderly patients.

Co-ordinated Service

Experience during the last thirteen years in establishing a pioneer unit leads me to believe that in addition to being the most economic method (with the minimum waste of staff or accommodation), such a service gives the best results to patients. It also provides the most interesting and satisfying conditions to members of the therapeutic team, and at the same time offers the widest experience, both educational and clinical, and the best opportunities for research into the disease, habits, behaviour, and medical and social care of the elderly.

In order to create and maintain such a well-integrated service it is necessary to have very close liaison between the statutory bodies concerned, i.e., the Regional Hospital Board and the Local Authorities. Such a liaison should take the form of a committee with executive powers, comprising personnel who are interested and knowledgeable in the needs of the elderly sick and infirm.

At the present time it is advisable to utilise all the services and resources of both voluntary and statutory bodies. Both should set up experimental homes and units so that all methods can be given a full trial before there is any attempt to standardise.

Common Diseases Affecting the Elderly

Over eighty per cent. of the admissions of geriatric patients are admitted suffering from one of the following groups of pathological, physiological, or psychological conditions.

1. Degenerative arterial disease, including cerebral arteries, and causing mental deterioration—gangrenes—paralyses.
2. Degenerative heart disease, including cardiac failure, coronory occlusion, etc.
3. Arthritis of all kinds — osteo arthritis, rheumatoid arthritis, and peri-arthritis.
4. Malignant diseases.
5. Chronic progressive neurological diseases.
6. Lack of social care—

(i) Lack of hygiene—Feet—corns, toe nails.
Washing—hair, skin.

(ii) Lack of help— Tiredness and self neglect.

(iii) Lack of food— (not £.s.d.) Rations and queues, with inadequate cooking, resulting in loss of weight, anæmia, vitamin deficiency, etc.

(iv) Lack of company—Apathy, neuroses, psychoses.

It is obvious that this list of diseases commonly affecting old or ageing people falls under two headings :—

Those due to Social Conditions.
Those due to Medical Conditions.

Goal

Full investigation under suitable conditions—accurate diagnosis.

Diagnosis—Medical
Social Treatment.

Patients must be hopeful, co-operative, to derive the maximum benefit from treatment.

Discharged—1. To own home
2. To hostel accommodation } 40 per cent.
3. To L.S.A.—15 per cent.

Results—Turn over is quickened with interest to staff.
Most economical bed is used.
No wastage of trained nursing staff.
Greater economy to the community.
Greater happiness of the patient.

Principles of Treatment

It would be impossible and unprofitable to attempt, even briefly, to outline the various forms of treatment required for the different diseases already mentioned, but it may be useful to summarise the principles of treatment as they affect this category of patients.

1. Complete investigation—Medical.
Social.
2. Full over-all treatment—Medical (physical and psychological).
Social.

(a) Active treatment of the disabilities with which the patient presents himself.

(b) Active treatment for the prevention of secondary conditions which, if they are allowed to develop, will cause not only additional pain and discomfort to the patient and much extra work for the staff, but will hinder progress and may prevent the degree of recovery which would otherwise have been possible and probable.

(c) Maintenance of the fullest possible independence of the patient.

(d) Recruitment of all members of the team in working towards recovery of the patient and his discharge from hospital.

(e) Careful and sparing use of sedatives and hypnotics.

3. Follow-up work as out-patients in a clinic attached to the geriatric unit.

It must be borne in mind that the majority of patients admitted to a geriatric unit suffer from a multiple pathology, and in order to assure as full recovery as possible and to establish the maximum rehabilitation, it is essential that the patient should be treated as a whole with meticulous care to review all lesions, e.g.,

(i) The patient whose major disability is bronchopneumonia may need an ophthalmic opinion and new glasses, advice and treatment by a chiropodist, and a new truss.

(ii) The patient whose main trouble is a cardiac failure, secondary to hypertension, may need dental advice, new dentures, and repair of an artificial limb.

(iii) A patient admitted with a pernicious anæmia may need social care of an elderly wife, if the home conditions are to be kept until he is fit to leave the hospital.

Summary

1. The problem of adequate care and treatment of the long-term elderly sick presents a major problem to health administrators to-day.
2. The conception of a fully co-ordinated medical and social service, including a geriatric unit based on a general hospital, offers a solution.
3. Such a service should be tried in special areas where staff trained in gerontology is available.
4. Such a service is based on :—
   Co-ordination of needs.
   Classification of patients.
   Continuity of medical care.
5. Such a service can undertake, in addition to medical treatment :—
   Rehabilitation and resettlement of the patient.
   Research into medical and social conditions of old age.
6. Such a service, working as a team with appropriate ancillary staff, can build up :—
   Efficiency of service for patients.
   Education of medical and nursing personnel.
   Experience of the subject as a whole.

7. For these reasons, it is claimed that such an integrated service must offer to patients a better service than that which can be given in a hospital for chronic diseases. In the hospital for the chronic sick both staff and patients are isolated from the more academic atmosphere of the general hospital. Under such conditions indolence is liable to develop from lack of facilities which exist in the general hospital, but which are too costly to justify duplication.
8. Finally, it is obvious that interest in and development of the L.S.A. is essential to the well-being of the geriatric unit. It is equally true that as the geriatric unit will inevitably need vacancies in the residential homes, it is important that the unit seeks a very close liaison with such homes.

REVIEW

AIDS TO ORTHOPÆDICS FOR NURSES. By Bertha E. Waller, S.R.N., S.C.M. Second Edition.

THE appearance of the second edition, written three years after the publication of the first edition, stresses the need for text-books on orthopædic nursing. The additional diagrams and photographs will be much appreciated by all who use the book. There are still some old-fashioned treatments described in detail, and in parts the actual wording of the sentence makes it very difficult to understand quite what the author means.

Sufficient stress is not laid on the care to be exercised in exposing patients suffering from tuberculosis to the sun; on the importance of seeing that the pelvis is level in the application of a frame for a T.B. spine or hip; on the routine "blocking" of all recumbent patients to assist drainage of the pelvis of the kidneys.

Splinting of cases of anterior poliomyelitis depends very much on the wishes of each individual surgeon. In a large series of cases during the summer and early autumn of 1947 I did not see one nursed in a plaster bed.

In describing the application of extensions a slight omission must have occurred, as the text reads that the cotton open-wove bandage, used to help to keep the extensions in position, is put on from within-out to prevent knock-knees. As it is merely around the limb and not around the frame as well, it cannot possibly do that. On the same page (p. 87) the head of the bed has been raised on blocks to provide counter-extension. It should, of course, be the foot.

The chapter on Deformities, with the very good photographs of the different types of plasters used in the treatment of congenital dislocation of the hip is particularly clear, and any student of orthopædic nursing should not have any doubts as to the treatments at the surgeon's disposal for the various types of deformity commony met.

The chapter on the treatment of fractures will be of special interest to the nurse in a purely orthopædic hospital, as she sees few fractures, but is very liable to be questioned about them in her orthopædic examination.

The chapter on physiotherapy will do much towards helping the nurse to understand the reasons for the treatments ordered, and actively to assist in restoring to full function by encouraging the patient to perform the exercises they have been taught by their physiotherapist.

The important points in plaster technique are well set out, and anyone reading the chapter will have little excuse for failing to look after a plaster properly. B. B.

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A B.M.S.A. Scrap-Book

By JAMES A. PRICE, M.B., F.R.C.S.EDIN.,

Presidential Address, Belfast Medical Students' Association

Session 1948-49

IT is customary on the occasion of his inauguration for your President to give you an address, and a wide variety of subjects has been chosen in previous years. Sometimes the speaker discussed some facets of his professional work, and at other times the address reflected his interest in matters not strictly medical, as in last year's memorable dissertation.

It was chance which suggested the subject of my address this evening, for there came into my hands an old minute book of the B.M.S.A., which I found very interesting reading, and I hope the items which I have chosen for my scrap-book will interest and entertain you.

My book of reference begins fifty years ago—in 1898—but the B.M.S.A. was already twelve years old then. It had been established in 1886 "to promote the interests of the Belfast Medical students as regards their professional training." As you will hear, every meeting was not devoted to "professional training."

In turning the leaves of the scrap-book one gets glimpses of the personalities of student life and contemporary medical training, as well as of the B.M.S.A. and its activities.

To get the background right we must first remember that Queen's was then Queen's *College,* and the medical degree was awarded by the Royal University of Ireland, the examinations being held in Dublin. The report of the President of the old Queen's College in 1883 referred to this as follows: "Parents were naturally reluctant to permit their sons, at the most critical period of their lives, to go far from home, and to remain for eight to ten days exposed to the temptations of a large city without proper oversight, and in most cases without oversight whatever." In 1898 we find a memorial to the Senate of the Royal University of Ireland complaining of the long periods of waiting undergone by candidates for oral examination, but the report reads, "not very successful as in recent examinations the state of affairs was as bad as ever, if not worse." I understand that the waiting-room was known as the "sweating-room," and in 1900 Mr. R. W. Fisher gave this society his experiences of a medical examination, which he described as "gruesome." No doubt every generation would give the same verdict of its own experiences, but from all I can gather this description was particularly apt. The examination which looms immediately ahead must always seem the most gruesome. I wonder was it Mr. Fisher, who, after an unsuccessful appearance, wired his parents, "Examiners enthusiastic—demand encore." The subject of medical examinations is an ever-green one. Professor J. A. Lindsay read a paper to this

Association on "Examinations from the point of view of an Examiner," which is reported as "thoroughly interesting and practical," but I doubt if his hearers really appreciated that examiners have a point of view, any more than do the candidates of to-day.

Professor Lindsay had been appointed to the Chair of Medicine in 1899 and it seems to have been a popular appointment, for in his Annual Report the Secretary of the B.M.S.A. records that "they had endeavoured to further the candidature of Dr. Lindsay, who had always taken a great interest in the Association." Part of your medical reading should be Professor Lindsay's little book "Medical Axioms, Aphorisms, and Clinical Memoranda." It was not my lot to sit under him, for he had just been replaced by his worthy successor, Professor Thomson, who, I believe, holds a record in this Association, having been President no less than three times. The runners-up are Mr. Holmes, Professors W. J. Wilson, McIlwaine, Fullerton, and Biggart, with two each.

The high light of this early period was a special meeting on 25th February, 1899, to consider a vexed question of the time—Balfour's proposal to establish a university in Belfast, and a second one in Dublin, for we must remember that the B.M.S.A. first saw the light in the Queen's *College* of Belfast; the examining body was the Royal University of Ireland.

One argument put forward against a Belfast *university* was that a degree from the R.U.I. in Dublin carried much more weight than would a degree from a *new* university. We can have no doubt that these views were sincerely held, but it is noteworthy that the high place which the M.B. of Queen's now holds is largely due to the work and teaching of these very men—Andrew Fullerton, Howard Stevenson, John MacIlwaine. Fullerton was later Professor of Surgery, and MacIlwaine Professor of Materia Medica, while Mr. Howard Stevenson is well known to you as a University Member of Parliament at Stormont.

There were debates on such subjects as "Should Ladies Study Medicine," and the answer was "No." It is recorded that Lowry and Holmes took part in the debate—even then they were on the side of the ladies! At this time women medicals were rarer than now, for it was only ten years earlier—in 1890—that women were first admitted to the Medical Faculty and they still had to put up with quite a lot of baiting. These pioneers must have felt the necessity for making a good impression, for the President of the College—the Rev. Dr. Hamilton—reported after that first momentous year: "It has been a matter of great satisfaction to me that these young ladies have applied themselves to their work with the most laudable assiduity and success, and that their admission to the medical classes was attended with good results in every way."

Mr. Steen's paper on "Alcohol" was said to have been "interesting and instructive," but whether his approach was academic or experimental and expert is not recorded. At one of these early meetings we find the chair taken by one whose name is familiar to all of us—young and old—Dr. Thomas Houston, now deservedly entitled Sir Thomas. He had been President in 1896 and in 1894 had taken an active part in the committee of the B.M.S.A. and its contribution to the great fair to raise money for the building of the Students' Union.

A favourite annual diversion was a Parliamentary Night, when representatives of the various parliamentary parties took the floor—foremost being the Irish Party, for those were some of the stormiest days of Irish politics. It is frequently noted that members were forcibly ejected by the Sergeant-at-Arms. At one meeting this post was filled—most ably, I am sure—by the future Air Vice-Marshal Sir William Tyrrell, a Rugby forward of no mean weight.

Another Parliamentary Night—in 1907—was interrupted by certain suffragettes who made a raid on the Speaker, being removed only with the greatest difficulty by the energetic Sergeants-at-Arms, who both showed, I am glad to say, "the greatest chivalry in the ejection of the fair invaders."

The impact of war on medicine was evident even in those days, for in 1901 the Society was addressed by J. E. MacIlwaine on the work of the Irish Hospital in the South African War. The journey to South Africa would have been a carefree trip compared with that in the recent conflict, and I am sure the speaker had enlivened the journey by his singing, which, a contemporary had told me, earned him many an invitation to guest nights in other messes during his service in the First World War. He was President of this Society in 1902-03. To my generation he was a well-loved teacher, always interested in student affairs and athletics—particularly rugby. I remember the Monday post-mortems on a Saturday match, and discussions with his class on ward rounds on the pitch and other musical qualities of the sounds heard with the stethoscope. From his great experience, S. T. Irwin addressed his contemporaries on "Exercise" and on another occasion on "Injuries of the Football Field." He had frequently represented Ireland at rugby, was President of the B.M.S.A. in 1901, and is still to be seen at representative rugby responding to the need of the injured player.

To those of you who daily labour in the various laboratories of the School, with one eye (and that often the blind one) glued to a microscope, it will seem odd that one event of the year was the purchase of a microscope by the B.M.S.A. for the use of members—a friend of the Association having given £10 to be used for the benefit of medical students. By this standard the student of to-day is spoiled when one sees the magnificent array of equipment available.

Clinical teaching seems to have been sketchy, and the students well aware of the dictum of Paracelsus, "The sick should be the doctor's books." A special meeting of the B.M.S.A. was held "to consider some suggestions as to how clinical teaching in the Belfast Royal Hospital might be improved. Attention was first roused on this subject by the extremely lax attendance of several members of the Visiting Staff to meet their classes each morning in the earlier part of the session, and also by the inadequate provision made for the teaching of senior students. A memorial was forwarded to the staff of the hospital, and as a result, there was a very appreciable and immediate improvement in the attendance of members of the Visiting Staff, and we also notice that Tuesday mornings will in some cases be devoted mainly to senior students and Saturday to junior students."

At this time—1899—the Royal was really the old General Hospital in Frederick Street, opened in 1817, and had only just received its new title of Royal Victoria

Hospital. The new hospital in Grosvenor Road was not opened till 1903. The old Royal was much smaller and did not present the variety of cases now to be seen, and successful efforts were made by the B.M.S.A. of that time to get the City Hospital, then the Belfast Union Infirmary, opened for clinical instruction. Many generations of students have since benefited from the practice they got there. Those were the days when A. B. Mitchell—President, 1891-92—was "mentioned in despatches," as it were, from the Royal for his successful operations for perforated gastric ulcer—still a dramatic emergency case, but not such a novel sight for the student of to-day. Abdominal surgery was still in its infancy, but a sturdy child.

Dublin had got a flying start in the teaching of medical students, but we can claim to have made up the leeway. Even twenty-five years ago it was the done thing to go from Belfast to the Rotunda for practical midwifery : now it is usual to stay here, though the Rotunda still holds an honoured place in obstetrics.

Resident pupilship is an old-established custom in our medical school, though it is only in recent times that it has become compulsory. I have found a reference to a discussion on the "Advantages of Residence in Hospital" in 1906—so the pupil system was in being then, at least. In my day it was voluntary, but so widely availed of that admission was by competitive examination, and I remember my surprise on hearing that in many other schools it was not the custom. I think they missed a lot, for there are useful lessons to be learned, not only in matters of technique, but in the human contacts of the job, which are so very important. In these days of mass production and materialistic outlook the "bedside manner" is often sneered at, but to the patient it may mean more than a scientific and coldly efficient investigation, though that may be required too.

The B.M.S.A. fought a long battle with the Guardians of the Belfast Union over the admission of *resident* pupils; even with the support of the medical officers of that institution it was some time before the slow-moving machinery of local government could be set in motion. Another great need of those days was suitable resident accommodation for maternity students, and the B.M.S.A. once again tackled the problem and approached the medical staff, and, later, the Governors of the Belfast Maternity Hospital, getting the reply that if the students found a house, the Governors would be agreeable to see to its furnishing. A house was found within five minutes of the hospital—possibly an easier task then than now—but, nevertheless, a great responsibility for the students to undertake. It was not easy to persuade the governing bodies of voluntary hospitals—often faced with financial difficulties—to provide for students as well as the sick, so all the more credit to those who did co-operate and who established a precedent for what is now common-place. In one of the earlier lodging houses where the students occupied the top room, they were summoned to the hospital by means of a bell actuated by a string hanging outside to street level. One can fancy the many false alarms given by the passers-by, who found the temptation too much for them.

The 1906 session wound up brightly with a paper on "Twentieth Century Clothing from a Hygienic Point-of-View." The minutes read : "The paper, which envinced a profound and exact knowledge of the mysteries of dress, both male and female,

and a witty and amusing power of expression on the part of its author, provoked a large amount of more or less expert criticism." The author was T. S. S. Holmes, and the minute recorded by Arthur Joy.

One feels sorry for the office-bearers of the Association in 1904, for a special meeting was called to declare void the proceedings of the Annual Meeting, on the grounds that there was not a quorum present when the office-bearers were elected. The point having been gained, *this* meeting proceeded to elect the same office-bearers, thus saving embarrassment all round. The President was Dr. Carnwath, later to be Deputy Chief Medical Officer of the Ministry of Health in London, and since his retirement an active member of the Senate of Queen's. I hope my election to office was in order!

The secretary of that day complained of lack of support for the meetings and lack of speakers from among the members—a complaint which crops up every now and then in all societies, and I have noticed several appeals for support in those years.

However, there was a revival, for a large attendance is recorded at the Presidential Address of Dr. C. G. Lowry in November, 1904, when he spoke on "The History of Medicine as Revealed in Literature." I need hardly remind you that he was the distinguished occupant of the Chair of Midwifery here for over twenty years. It is interesting to reflect that all Queen's men who are, or have been, medical professors at Queen's have also been presidents of this Society: so that another unsuspected function of the B.M.S.A. seems to be to "raise" professors. On the same evening Mr. Robert Campbell, F.R.C.S., spoke on "The Medical Student and His Teachers," and apparently made some comments on lectures which met with the approval of his audience. I am sure this was a worthwhile address, for Robert Campbell stood high in the regard of his colleagues, who have perpetuated his memory in the Robert Campbell Memorial Oration given every two years by some distinguished medical man.

Two addresses in one evening were not uncommon, and it seemed to be the rule at the inaugural meeting. If I had known of this sooner I might have suggested its revival this evening—to provide a supporting programme.

Every now and then the R.U.I. comes in for some criticism of the M.B. examination. At one time it is because there are no Belfast examiners; at another —unfair questions—and yet again the examiner who gave a private grind of six or eight classes on the questions actually set; the heat engendered over that penetrated from here to the Senate Room in Dublin—to good effect.

In 1905 Dr. John Rankin—a local pioneer in the subject—spoke on "Electricity and its Application to Medicine." This was only ten years after Roentgen had discovered a new kind of ray, which he later called the X-rays, and which was to bring great advance in diagnosis and in knowledge of body function and treatment. Dr. Rankin would remember the doubts and condemnations which greeted this discovery—the newspapers were full of it. The following satirical verse appeared in several newspapers:—

"I'm full of daze,
Shock and amaze,
For nowadays
I hear they'll gaze
Thro' cloak and gown—and even stays
Those naughty, naughty, Roentgen Rays."

One London firm even advertised "X-ray-proof underclothing for ladies." It would be interesting to hear Dr. Rankin speak on the same subject to-day, for he has seen many advances in the medical uses of electricity, and no doubt will see many more.

An outstanding event of the years I have had under review was an address by Professor E. A. Schafer, F.R.S., on "Resuscitation" in November, 1906, when there was an exceedingly large attendance. Distinguished guests included the President of Queen's, Sir Otto Jaffé—one of its great benefactors, Professors Symmers, Symington, and Milroy. He spoke of chloroform poisoning and the importance of pre-anæsthetic atropine, but the main part of his address was to describe and illustrate his method of artificial respiration of the apparently drowned—familiar to all who have studied first aid.

A name well known to all students of that day was that of Sir William Whitla, Professor of Materia Medica here, and author of several medical best-sellers. I cannot find evidence of his having held office in B.M.S.A., for in those days they caught their presidents younger, but his knighthood provided a reason for that popular event—a smoker—in his honour, which was a great success. Next month you will hear his name again, when the magnificent new hall bearing his name and commemorating his generosity to Queen's will be opened.

And so, with this link with the B.M.S.A. of fifty years ago, my scrap-book closes.

I hope this brief glance backwards over fifty years will have given you some sense of your heritage and the growth of the B.M.S.A. Tradition is an excellent thing to have behind one, but too much can be made of it. The story is told of a new American foundation, which, in announcing an innovation, finished with these words: "This tradition begins to-morrow." We may be surprised at what would seem to us a strange use of the term, but it is more true than it looks at first, for the traditions of fifty years hence are the activities of to-day.

Many will tell you the glory has departed: has departed from medicine: has departed from the students of to-day: but neither is true.

Your generation has opportunities as had that generation of whom I have spoken. Medicine still offers much to her followers—it will be given to few to become great, but all can contribute to the sum of human happiness. I have every confidence that the future of medicine is safe in your hands, and I should like to think that B.M.S.A. will have done something in helping to make you "beloved physicians."

A Physician's Viewpoint of Thoracic Surgery

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THIS paper consists of a review of modern thoracic surgery from the point of view of a physician. Few original observations will be made and it may be considered presumptuous for a physician to review the practice and progress of thoracic surgery. However, a close association with thoracic surgical units during the years of war and peace has been a constant reminder of the fact that the general physician, from lack of time and opportunity, is often necessarily out of touch with some of the viewpoints and activities of chest surgeons.

A physician's outlook will change and continue to change from the examination and interrogation of patients in a thoracic unit. More often than not one finds there has been undue delay in the patient coming under the care of a service which alone can provide the treatment necessary to restore health and activity. This is especially important when there is any possibility of carcinoma. There may be delay in the patient consulting his doctor. Possibly this will be remedied in some measure if a balance can be struck between regular medical examination of the population as a whole and the prevention of too much introspection. Often there is delay by the practitioner in referring his patient for X-ray or a specialist opinion. Often, too, there is delay in the physician referring him to the thoracic surgeon. The physician may ponder awhile, think deeply, perhaps, but procrastinate nevertheless. The recommendation may be to review the situation in a month, perhaps with a further X-ray, and again perhaps in a month; or equally disastrous, to defer another X-ray because symptoms and signs seem to be improving.

On the other hand, every thoracic unit would benefit by close co-operation with a physician interested in this branch of medicine. Otherwise there tends to be lack of balance and absence of that wider judgment in the assessment of individual patients which always comes from team work. Moreover, such co-operation might help to lower the reduceable mortality of certain major surgical procedures.

In this paper a broad field is covered because diseases of the œsophagus, cardia, and diaphragm are coming increasingly under the care of chest surgeons. This is as it should be, and an inevitable trend. All these conditions, as well as the surgery of the heart, are best dealt with by one who is thoroughly at home in the chest, skilled at bronchoscopy, and familiar with the complex problems of changing intra-pleural pressures associated with collapse, pneumothorax, and effusion. Moreover, if disasters are to be avoided, it is most important for the surgeon to have a specially-trained nursing staff and a resident surgical officer who can pass a bronchoscope at any time of day or night when there is need to combat the post-operative emergencies which inevitably, and not infrequently, occur.

All credit is due to the ear, nose, and throat surgeons for their part in introducing bronchoscopy and œsophagoscopy. However, no matter what degree of skill individuals have acquired, it is now inevitable that these procedures should largely pass into the hands of thoracic surgeons. They alone can have the requisite detailed knowledge of the bronchial tree and the applied anatomy of the thorax, and are acquainted with the problems associated with the subsequent operation on the respiratory or gastro-intestinal tract. Increased knowledge and maturity of judgment come from being able to follow patients through from their earliest symptoms until the opportunity arrives for the diagnosis to be confirmed or confounded by operation or autopsy. This surely will be largely conceded to-day. Again, and for much the same reasons, the radiologist is not in a position to make a diagnosis, and attempts to do so may be misleading or even disastrous. He can most usefully describe what he sees, and ensure technical perfection of films, but progress will chiefly depend on his becoming an active member of the thoracic team.

Bronchiectasis

Pathological changes in bronchiectasis are usually permanent, irreversible, and progressive. The time has come for physicians to review their attitude to treatment. The diagnosis should not only be established, but must be complete. Every patient should be assessed from the point of view of possible radical treatment. Admittedly, a more important problem is that of prevention. This can largely be achieved by better attention to the management of acute respiratory infections. It may well be that with the general use of penicillin and sulphonamides, the incidence of bronchiectasis will fall. Bronchopneumonia, following acute specific fevers, is a special source of danger. Collapse of lung, which occurs very easily in children, must be diagnosed early and treated vigorously. The dangers of "un-resolved" and "recurrent" pneumonia must be universally appreciated and a cause sought for every unexplained symptom, sign, or shadow. An empyema to-day may more often be related to some underlying condition, such as bronchiectasis, than to a primary pneumonia. Taking an over-all view, possibly as many as fifty per cent. of patients with bronchiectasis may be found suitable for surgical treatment, at least if under the age of forty years or so. Certainly, the disease may be too slight or too extensive, or there may be some complicating factor which makes the risk unreasonable, but there is no other cure for a condition which is often as distressing from the psychological as from the physical point of view. No adequate medical statistics can be consulted, largely because facilities for full investigation of potential cases are not even yet readily available outside the big centres. In the past, as commonly still to-day, more patients are seen in the out-patient department than in the wards. However, out-patient statistics are rarely available. In 1940, Perry and King studied and followed four hundred cases attending hospital. They found the age of onset was under ten years in 40 per cent. and under twenty years in 70 per cent.; that symptoms had been present for over five years in more than 50 per cent.; that within fifteen years 30-35 per cent. of the patients were dead; and that few who develop bronchiectasis before the age of

ten will live to be forty years of age. Others have published similar figures, though on rather small series.

Medical treatment may be improved with better care of the inevitable recurrent pulmonary infections, the use of penicillin by inhalation or injection, more attention to the details of postural drainage and improvement of general health. As with tuberculosis, economic status is often a factor of major importance. However, once considerable damage is done and symptoms are present, such measures are often disappointing.

Surgery, of course, should be as limited as possible. Resection of one or more lobes is usually carried out, but bronchiectasis tends to be segmental rather than lobar, and the aim of surgical treatment should be to remove all the involved segments without sacrificing any normal lung tissue. This is especially important when the disease is multi-lobular and the fact that segmental resection is technically possible is most encouraging. When necessary, it is often practicable and satisfactory to remove two of the four main lobes, together with the right middle lobe or lingula, if needs be. The younger the patient, the safer the operation, and operative deaths in children are now rare indeed and amount to no more than the occasional mishap which accompanies any surgical procedure. Clearly this means meticulously accurate pre-operative assessment, because all diseased segments must be removed. It is no longer reasonable to be satisfied with introducing some lipiodol into the lower lobes and taking a posterio-anterior view. All segments of all lobes must be delineated, if possible, even if several attempts are needed. This means that bronchography should only be undertaken by one thoroughly practised in the technique. The method chosen will depend on individual preference and experience. No thoracic surgeon will or should operate without seeing good bronchograms. Unless efficient films can be made with confidence by the physician or his staff, it may be wiser to leave the diagnosis of suspected cases to the chest unit in order to save repetition of the process for the patient.

This is not the place to discuss the problem of pathogenesis in any detail. Obstruction, infection, and collapse all play their part. Those especially interested should read Lisa and Rosenblatt's book, where the evidence is reviewed and stress laid on the importance of infection. It should be emphasised that it is damage to the lung parenchyma rather than the bronchi which matters most. The degree of dilatation per se is not so very important. Recurrent pulmonary infections are responsible for most of the symptoms and ill health and form the real basis of progression and a downward course. Abnormal physical signs are mainly due to changes in the lungs, such as exudation, collapse, emphysema, and fibrosis.

Bronchoscopy is probably advisable once in every case and especially if the disease is unilateral. Sometimes an unsuspected tumour or foreign body will be found, or possibly tuberculous granulation tissue or evidence of pressure from outside. Further information about the exudate may be obtained and prove helpful. It is a wise precaution always to have the sputum examined for tubercle bacilli, even though the presence of bronchiectasis has been demonstrated. Active tuberculosis is sometimes found in lobes removed for bronchiectasis, and these

cases tend to do badly and may, for example, develop tuberculous empyema. Lobectomy may still be the treatment of choice, but pre-operative recognition of its existence should demand streptomycin cover for the operation to reduce its risks.

Segmental resection has been well discussed by Bailey and by Overholt, and in the papers mentioned below various authors discuss their operative results in the the treatment of bronchiectasis. In children and young adults, resection of a single lobe is shown to be a remarkably safe procedure. Naturally, in older patients and where the disease is more extensive and where multiple resections are carried out, the risk is greater, but with properly selected cases, modern anæsthesia, and pre- and post-operative care, the death rate from operation seems generally to be less than five per cent. There must be many who would welcome the opportunity to be rid of so much unpleasantness and disability. The chances of cure are high.

Empyema

The treatment of empyema has been modified since the introduction of the sulphonamide drugs and penicillin. The present position has recently been reviewed by Barrett. Aspiration alone will seldom cure an empyema. Aspiration, together with sulphonamide therapy, may abort some cases in the formative stage, but these drugs are inactivated by pus and cannot cure an established empyema. Most empyemata are caused by organisms which are penicillin-sensitive. Penicillin remains active in pus, can be injected into the cavity, and when given by intramuscular or intravenous injection, diffuses into the empyema.

In North America, Brown and others claimed that fifty to sixty per cent. of cases due to pneumococci, hæmolytic streptococci, and staphlococci, but only twenty per cent. of mixed or putrid cases can be cured by aspiration and penicillin. Treatment in Great Britain on similar lines has not yet yielded comparable results and it is recommended that almost all cases should be treated by surgical drainage once pus is formed. Barrett considers that the chief uses of penicillin and repeated aspiration are to convert patients who are dangerously ill from a toxæmic condition to an improved state of general health, to reduce the risk of chronicity by minimising residual pleural thickening, to sterilise the pus and so allow early localisation and early drainage, to reduce the risk of cellulitis of the chest wall, and to reduce time spent in hospital. Brock has emphasised the importance of being careful about the definition of empyema, and considers that the confused thought and advice which has reappeared with the introduction of penicillin is based on failure to understand the pathology of pleural infection. This explains the differences of opinion expressed about treatment. Empyema is the end result of pus in the pleura, a mature abscess, the result of an acute suppurative process. The early formative stages should not be described as empyema any more than the early stages of acute cellulitis would be described as an abscess. No one doubts the value of penicillin, but it can only kill bacteria and the body resources are not always sufficient to cure the secondary mechanical effects of infection. This is why surgeons are still needed and the fundamentals of such treatment consist in proper

assessment of the correct time for drainage, provision of adequate drainage, institution of proper physical treatment, and estimation of the correct time to stop drainage. In an abscess elsewhere the walls usually fall together concentrically, but this must be avoided at all costs in empyema. The obliteration of the cavity should be achieved by expansion of the lung and not by falling in of the chest wall and displacement of the mediastinum and diaphragm. Hence the importance of physical treatment. This is also emphasised by Holmes Sellors. General exercises will improve general muscular tone and arm and shoulder movements prevent stiffness. Breathing exercises will prevent fixation of the ribs and diaphragm and ensure early and rapid expansion of the lungs. They are simple to carry out and cause little strain even to an ill patient immediately after operation. They must, however, be practised regularly throughout the day and not just when the masseuse comes. Unless there is some contra-indication on medical grounds, the patient should get up within a few days of operation.

Decortication of the lung may be required when gross pleural thickening has resulted, often from too long persistence with relatively conservative measures. In such cases simple drainage is not sufficient.

Lung Abscess

In a masterly series of articles, Brock has analysed his experience of more than four hundred cases of lung abscess seen over a period of twelve years. All interested are advised to read these papers. Even with the advent of penicillin lung abscess continues to be a potentially serious condition. This is not always realised, owing to the large number which respond to conservative measures. However, improvement is often only temporary, with serious or fatal consequences. He emphasises that lung abscess is not an entity, but a clinico-pathological state due to many conditions. A primary cause can be found in seventy-five per cent of cases.

Staphylococcal lung abscess is frequently primary in the lungs. The severe general infection suggests septicæmia or pyemia, and the X-ray shows characteristic multilobar consolidated areas with abscess cavities. Treatment should be conservative. Spontaneous pneumothorax may occur, especially in infants.

Foul sputum is by no means constant in lung abscess and in this series was present in fifty per cent. Fœtid and non-fœtid (ærobic) abscesses may be primary or secondary, segmental or non-segmental, and are only differentiated by the nature of the sputum. Most abscesses are, in fact, segmental, at least to begin with, and localisation is determined by posture and gravity. Localisation may, in fact, suggest the cause, e.g., in an obscure case an abscess in the middle lobe suggests enquiry for recent vomiting. Many similar examples could be quoted. Resolution largely depends on whether or not a slough is present. There is always considerable danger in the six weeks rule for medical treatment. Clinical improvement is not a sufficient guide; a persistent cavity is perilous and demands drainage. Initial improvement is frequently followed by exacerbations and remissions and the chronic stage should not be allowed to develop. Such an abscess will rarely

respond to external drainage and lobectomy or pneumonectomy is more satisfactory.

Ætiological factors naturally tend to vary with the age of the patient. In an infant or young child there is almost always a primary cause, e.g., staphylococcal pneumonia, tonsillectomy, cystic disease of the lung, or abscess secondary to bronchial obstruction due to pressure from caseous tuberculous glands. In young adults there may be a history of preceding dental extractions or tonsillectomy, upper or lower respiratory infections, such as tonsillitis, sinusitis, or bronchiectasis, or loss of consciousness from any cause with aspiration of infected material. Bronchoscopy may reveal a foreign body, benign stricture, or neoplasm.

In older patients gross dental sepsis is held to be responsible in about twenty per cent. and bronchial carcinoma must always be excluded. Otherwise a specific pneumonitis and the other causes mentioned above should be considered before concluding that the abscess is primary. The frequency of bronchial carcinoma warrants special mention, being the cause in fourteen per cent. of all cases, and thirty per cent. of those over forty-five years of age, in Brock's series.

In twenty-five per cent. of cases of lung abscess it will not be possible to find a cause. This is probably a measure of our ignorance. In passing, Brock reviews much of the literature. Clearly many cases are preventable and to-day many are presumably being prevented by early specific treatment of acute infections. Perhaps no surgeon will ever be able to report such a series again. The lessons, however, remain.

Recurrent and Chronic Spontaneous Pneumothorax

Much has been written on single attacks of benign pneumothorax and this problem was carefully studied and reported by Kjærgaard in 1932. Recurrent and chronic spontaneous pneumothorax is not so very uncommon, but has hardly received the attention it deserves. Brock, who has had an unusually large number of these patients referred for treatment, has recently analysed his experience in detail. Disability is usually considerable, but treatment is apt to be confined to conservative measures, often involving unnecessary restriction and periods of rest, when, in fact, cure can easily be ensured in most instances by active treatment. Moreover, there is always the danger of similar collapse of lung or of infection on the opposite healthy side. This condition is not an entity, but may be due to a number of different causes, the commonest being some form of emphysema, or else isolated bullæ due to old healed tuberculous scars in otherwise normal lung. Of great practical importance is the recognition of giant bullæ or cysts simulating pneumothorax, because here the correct treatment is excision or lobectomy. Otherwise the aim of treatment is pleurodesis, i.e., obliteration of the pleural space by some artificial means. Tomography may demonstrate small emphysematous bullæ or reveal unsuspected cystic disease. Bronchograms may reveal unsuspected bronchiectasis. In Brock's opinion, thoracoscopy is the most valuable and conclusive examination and should never be omitted. This is by no means the usual practice. By direct inspection of the pleura, the diagnosis can frequently be made at once and also the first step in treatment can be taken in suitable cases.

Pleurodesis has been achieved by injecting various irritating substances, such as talc, gomenol, etc., but Brock has found silver nitrate best and recommends the injection of 5-10 minims of a 10 per cent. solution into the pleural cavity, or direct application of a 20 per cent. solution to the area with a swab at thoracoscopy. The reaction may be painful and considerable and last a few days, and the injection may have to be repeated, but the treatment is usually successful and cure permanent.

Hawkins recently published two cases in which pleural synthesis was achieved by inserting a catheter into the pleural space and maintaining continuous suction. We had similar success in two patients who have since remained well for over eighteen months.

Carcinoma of the Lung

There is general agreement that the increased incidence of bronchial carcinoma is real and not merely apparent from better facilities for diagnosis. Although potentially curable, the death rate is still depressingly high and only a minority of patients are suitable for operation when first seen. Diagnosis is still not made sufficiently early. Since pneumonectomy is the only cure, there are few contra-indications to operation, except distant metastases and local spread to certain parts. It may not be possible to decide whether a particular growth is operable without thoracotomy. This is not a dangerous procedure as sometimes thought. The technique of pneumonectomy is now largely standardised, except for the tendency to become even more radical. It has been proved safe to open the pericardium and resect as much of it as is necessary to ensure removal of all the growth, regional glands, and associated connective tissue. The presence of Horner's syndrome or recurrent laryngeal nerve palsy almost always means the growth will be inoperable. A simple pleural effusion is not necessarily a contra-indication, but a hæmorrhagic effusion would mean certain recurrence. Hemiparesis of the diaphragm is no longer considered to be quite so serious, since the phrenic nerve may be involved where it lies on the pericardium, and hence can often be dealt with as indicated above. Rib involvement by direct spread is usually a contra-indication to thoracotomy, but occasionally, with peripheral tumours, the surgeon is able to resect part of the chest wall with the growth. An abnormal barium swallow is not necessarily a contra-indication. A filling defect, especially if smooth, may be due to a gland, malignant or not, but resectable, compressing, but not invading the œsophagus. Oesophagoscopy may help the surgeon to decide this point. Involvement of the brachial plexus precludes surgery.

Clearly we must concentrate on early diagnosis. This is chiefly the responsibility of the general practitioner and the general physician, to whom first the patient turns for advice. There are few, if any, pathognomic symptoms or signs of carcinoma of the lung which often masquerades as other simpler and more common conditions. Bronchoscopy should be requested more often and more readily than at present in the investigation of obscure chest symptoms or an unexplained X-ray shadow. It will enable a positive diagnosis to be made in some sixty to eighty per cent. of cases, and provide other useful information to the surgeon, especially if a biopsy can be made. Microscopical examination of the sputum, if properly carried

out, can be positive in about seventy per cent. of cases (and even more often if secretions obtained at bronchoscopy are examined). However, this does not remove the need for bronchoscopy. It must be emphasised that a negative bronchoscopy does not exclude carcinoma, and thoracotomy may be warranted to establish the diagnosis.

Bronchography is only required if the growth cannot be seen by bronchoscopy, e.g., if it is peripheral or perhaps in the upper lobe. Although of little value in the positive diagnosis of a growth, it does help to exclude primary bronchiectasis in doubtful cases.

A review of about four thousand cases, taken from the papers mentioned below, shows on the average :—

Operability Rate - - -	15—30—60 per cent.
Resectability Rate - - -	12—20—35 per cent.
Operative Mortality Rate - -	20—25 per cent.
Six-months Survival Rate - -	20—50 per cent.
Two-years Survival Rate - -	3—20 per cent.
Five-years Survival Rate - -	2—8 per cent.

The selection of cases varies so widely that it is quite impossible to deduce comparable statistics. Most of the figures are from surgical series, i.e., cases referred for an opinion and therefore presumably not obviously inoperable. The overall figures, i.e., unselected, would show fewer suitable for thoracotomy.

Arrythmias, following Pneumonectomy

Arrythmias after operation, especially if associated with tachycardia, may be a burden too great for the patient to tolerate even though the heart is otherwise healthy. Auricular fibrillation or flutter are the commonest forms. They should be treated promptly with intravenous digitalis, quinidine, or, as has been recently suggested, intravenous procaine. They are probably due to a combination of anoxæmia and vagal stimulation. It may be that there is a place for quinidine in prevention.

Cardiospasm

The treatment of cardiospasm is worthy of reconsideration, since more can be done for this troublesome complaint than the regular passage of bougies. Although some patients may get on reasonably well with this regime, others do not, and the condition often progresses and makes subsequent procedures more difficult. Wooller, from Leeds, has recently discussed the natural history of this disorder and its treatment. Screening with barium is important and informative. Great activity of the œsophagus trying to overcome the obstruction is seen, and this may continue for half an hour or more until it is empty. A hot drink often relaxes the cardia and empties the œsophagus quickly. In the next stage the œsophagus tires of its increased efforts and becomes dilated. This accounts for the progressive dysphagia. Oesophagoscopy may show inflammation with varying degrees of ulceration, and should always be carried out, because sometimes the diagnosis is at fault and there may be stenosis or, in later life, carcinoma. X-ray films may be misleading.

Von Mikulicz's operation of digital dilatation through the stomach gives results which are no better than the Negus hydrostatic dilator, which is a far simpler procedure. This is inserted over a stilet, preferably under direct vision, and the process can be repeated if necessary. Wooller reports good results in thirty-eight out of forty-seven cases. If this fails, something more radical is necessary. The operation which Heller introduced in 1913 is essentially similar to Rammstedt's operation for congenital pyloric stenosis, and is often satisfactory. In severe cases œsophago-gastrostomy may be necessary, but, naturally, there must be the risk of subsequent peptic ulceration of the œsophagus. Ochsner and De Bakey have devised various forms of cardio-plasty, and Sweet, of the Massachusetts General Hospital, favours making a longitudinal incision through all layers of the anterior wall of the cardia and closure in the opposite, or circumferential direction. These procedures seem rarely to be carried out in this country.

Diaphragmatic Hernia

Many papers on diaphragmatic hernia have been published, and serve to illustrate how rare diseases tend to become more common when their possibility is kept in mind. This is not the place to describe all the various forms of herniation through the diaphragm. It is now generally agreed that congenital short œsophagus with thoracic stomach is rare. In this instance there is no true hernia, because the stomach has never been below the diaphragm. The great majority of herniæ occur through the œsophageal hiatus. There may or may not be secondary shortening of the œsophagus, or the hernia may be paraœsophageal, in which case the œsophago-gastric junction remains below the diaphragm. All these various types give rise to similar, though rather complex, symptoms, which may suggest coronary disease, cardio-spasm, carcinoma, peptic ulcer, and other forms of dyspepsia. The commonest complaint is dysphagia. Symptoms are largely related to the amount of mechanical interference. Nausea, vomiting, belching, heartburn, and palpitation are frequent and usually progressive. Hæmorrhage occasionally occurs. Hiatus hernia has been well described as the masquerader of the upper abdomen. For these reasons, patients may be referred to a wide range of specialists for an opinion. The condition is much more likely to be demonstrated if the possibility is mentioned to the radiologist beforehand. It is important to identify the œsophago-gastric junction, which should be viewed from different angles. Actually, the right oblique is usually the best position. At operation it may be possible to stretch a shortened œsophagus, but it is impossible to determine radiologically whether the apparently shortened œsophagus is capable of being stretched or not; nor whether the œsophagus is inherently short or has become shortened. The barium stream is usually seen to be temporarily held up about the level of the diaphragm. Some degree of tortuosity, without dilatation, will be seen. In cases of doubt the patient should be examined lying down. Harrington examined the hiatus as a routine in one thousand consecutive abdominal operations. He found that in 55 per cent. of these cases the hiatus closely proximated the lower end of the œsophagus. In 35 per cent., one finger; in 8 per cent., two fingers; and

in 2 per cent, two to three fingers could be inserted between the œsophagus and the margins of the hiatus. Atrophy of the œsophago-gastric mucosa may result with age and produce a relative insufficiency of the hiatus. Most patients are over sixty years of age. Obesity and pregnancy may be predisposing factors by increasing intra-abdominal pressure.

The surgical treatment of diaphragmatic hernia has been particularly well described by Harrington. In a study of 320 cases he found an average of three previous erroneous diagnoses had been made.

Allison considers that the shortening, seen radiologically, is due to cicatricial contraction as a result of ulceration; Smithers, that it is due to spasm secondary to the inflammation; and Gilbert, that it is due to spasm from a vaso-vagal reflex. If due to a spasm, it would explain the discrepancy between the condition being so commonly seen by the radiologist, but rarely by the pathologist.

Peptic Ulceration of the Oesophagus

Interest in peptic ulceration of the œsophagus has revived with the development of a safe surgical approach to the cardia. It used to be thought that the œsophagus suffered acid digestion as the result of congenital shortening, with the fundus of the stomach above the diaphragm, and hence no barrier to the reflux of acid gastric juice. Peptic ulceration then leads to fibrosis and permanent shortening. Allison has discussed the matter fully and is convinced that short œsophagus is usually an acquired condition due to defects in the diaphragm, which allow a sliding hernia of the stomach. The œsophagus has no resistance to gastric juice, but is normally protected by the mechanism of the cardia. This mechanism is not fully understood, but is discussed in detail in this paper. Allison has studied seventy-four cases in Leeds. The sex incidence was equal and ninety per cent. of the patients were over fifty years of age (range, twenty-two to eighty years). Four stages can be observed in the natural history of the disease; œsophagitis, acute ulceration, chronic ulceration, and healed fibrous stenosis, though this last stage may never be reached. Dyspepsia in some form is present in seventy-five per cent. of the patients. It is usually described as a burning pain behind the sternum or high in the epigastrium. It may pass through to the back, between the shoulders, and be made worse by flexion of the spine. There is a varying relationship to food, but an attempt to analyse the types of dyspepsia is complicated by the frequent association of œsophageal ulcer with gastric or duodenal ulcer or gall bladder disease. Patients often complain of regurgitation of mucus, or food which is dependent on a patulous cardia. Dysphagia in varying degree occurred in ninety-two per cent. and was the symptom which brought most patients to the doctor. The radiological appearances have been fully described by Allison, Johnston, and Royce. Varying degrees of shortening, stenosis, and pouching may be seen, but an actual crater is relatively uncommon. Oesophagoscopy will demonstrate the inflammatory changes in the mucosa. The level of the œsophago-gastric junction must be identified. If there is stenosis, some mucus will be seen, but this is never gross, as in cardiospasm. If the œsophagus is shortened, no movement of the head may be required to pass the instrument into the stomach as is normally the case. The

rational treatment is to cure the deformity which allows acid to reach the œsophagus, and success largely depends on the œsophagus being elastic enough to reach below the diaphragm. The majority of patients do not have severe enough symptoms to justify operation and should be treated along medical lines with alkalis and a non-irritant diet. They should sleep propped up in bed to diminish the acid reflux during the night. Oesophagoscopic dilatation of strictures may be necessary and occasionally resection of the ulcerated and stenosed area with anastamosis to a loop of jejunum to exclude the stomach.

Carcinoma of the Oesophagus

The diagnosis of carcinoma of the œsophagus has always been particularly depressing. Pessimism over treatment has been based on late diagnosis of these very malignant growths and the fact that the condition is so often found to be incurable from local spread and early metastases. The general condition of the patient is usually poor and the operation itself is not a simple one. Oesophagoscopy has been too infrequently performed in the past, but should now be a routine diagnostic procedure in dysphagia. This would ensure earlier and more accurate diagnosis. During the past ten years the position has changed and interest rewakened because it has proved possible to resect the growth and restore continuity by direct œsophago-gastric anastamosis. The stomach is mobilised and drawn up into the thorax as high as needs be, and sometimes the anastamosis must be made above the arch of the aorta. The modern surgical approach to this problem has been well and thoroughly reviewed in a recent symposium from America and also by Mason and Sweet. Growths in the lower, mid-tharacic and cervical segments should be considered separately because the technical problems and risks vary considerably. To-day there is always the hope of cure, albeit, still a comparatively small one, and since the operation will relieve the most distressing symptom of dysphagia, the provision of relative comfort for a reasonable period, even two years or more, justifies a radical resection as a palliative measure alone. In cancer of the upper fourth or cervical segment it is not possible to perform a wide regional dissection and so the operation must often be purely palliative. Fortunately this site is relatively uncommon. In the middle half it is best to perform the anastamosis just below rather than above the aortic arch, if possible, because complications are fewer and the death rate lower. In the lower segment the technique is similar to that used for carcinoma of the cardia and a transthoracic partial gastrectomy and œsophagectomy, followed by intrathoracic œsophago-gastric anastamosis, are performed. The operative mortality is about twenty per cent. and the chances of five-year cure much the same as in bronchial carcinoma. A review of a number of papers shows, on the average :—

Operability Rate - - -	50—60 per cent.
Resectability Rate - -	30 per cent.
Operative Mortality Rate -	20 per cent.
Six-months Survival Rate - -	15—20 per cent.
Two-years Survival Rate - -	5—10 per cent.
Five-year Survival Rate - -	2— 5 per cent.

Lung Resection for Pulmonary Tuberculosis

The possibilities for surgery in pulmonary tuberculosis have recently been extended by the introduction of new methods. There may be a place for lobectomy or pneumonectomy in the treatment of severe cases. Little will be said on this subject because relative lack of personal experience naturally precludes a critical opinion. However, it may be of general interest to indicate the type of patient for whom such treatment is being recommended by various surgeons. These include failed pneumothorax for lower lobe cavities, failed thoracoplasty, bronchiectasis secondary to tuberculosis, severe bronchial stenosis, large, tension, or hilar cavities, and bronchopleural fistula, with mixed tuberculous empyema and destruction of the lung. The operative mortality would seem to be about twenty per cent., but in general these patients are those for whom little else can be done.

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Incentives

By James A. Smiley, M.D., D.I.H.

The subject of this short paper was chosen quite deliberately—not because one has any fresh contribution to make to it, nor because it can be summarised briefly, but because it gives me yet another opportunity of saying that the practice of Occupational Medicine is more than the provision of casualty services, the study of toxic hazards, and the diagnosis and prevention of industrial diseases.

Toxic hazards and industrial diseases are relatively rare (with a few obvious exceptions), but few will deny that in the industrial community boredom, vague ill health, and psychosomatic illnesses are not uncommon. Even if these problems were not presented to him in his study of absenteeism, in his scrutiny of accident rates, in his recognition of accident-prone individuals, in his perusal of medical certificates, and in his knowledge of persistent lateness in the morning occurring in certain groups, they would be thrust at the doctor in industry by the steady stream of men and women to his consulting-room, whose failure to achieve harmony in their industrial relationships is the greatest of their ills. The medical department of any factory is the place where the first signs of a breakdown in morale can be detected—long before industrial unrest (with consequent fall in production, and, in the end, strikes) develops. It behoves us therefore to try to understand what constitutes "Morale," and what factors can influence it.

The recognition that it can be influenced is acceptance of the fact that morale is a dynamic and not a static force. Just as it can deteriorate as a result of wrong actions and attitudes, so it can be made to improve, if we understand its nature and the kind of therapeutics to exhibit. Morale in the individual is a mental quality intimately bound up with mental health, efficiency at work, and happiness. Group morale differs from individual morale. It is not the sum nor the average of the morale of the individuals who make up the group—if one can speak of it in those terms. It is usually lower and much less mature—as I have seen many times amongst shop stewards, who, in the consulting-room are usually very reasonable fellows, but on the platform at a mass meeting, in the presence of their mates, may be hysterically unreasonable. The group, however, is much more susceptible of suggestion, and it is through the technique of suggestion, whether direct or indirect, whether blatant or insidious, that morale can be altered.

The industrial hygienists, especially in U.S.A., claim that the physical environment is the most potent factor and so they aim at providing well-lighted, well-ventilated, adequately-heated (or cooled), attractively-coloured workshops and factories. No one denies that these are important, but a heavy blow was struck at this thesis by the experiment carried out in the Westinghouse Electric and Manufacturing Co. during the late war. In one workshop lighting was improved as the result of representations made by workers. Output went up, and the manage-

ment became interested. Someone suggestd a change in the benches and seating accommodation. Output went up again. The general manager was greatly interested and began to bring visitors to seen what was happening. A change in the lay-out of the work was effected. This was followed by another rise in output. After every modification of the environment, production improved and the industrial hygienists felt that their case had been demonstrated. Then came the industrial psychologist, who said: "Let us complete the experiment—let us return step by step to the original conditions and see what happens." To the surprise of the management output was maintained and the environmental engineers were discomfited. In effect what had been the incentive to work was not improved environmental conditions, but the fact that important people were taking an obvious interest in what was going on in that workshop. The psychologists now say that physical conditions are much less important than what people think the physical conditions are. My own view is that environmental conditions are important, but that for the maintenance of morale, an active interest in workpeople as persons, as individuals, as sons of God, if you will, is more important. An illustration of this comes to mind. It is generally admitted that there has been a breakdown of morale in the coalfields. This failure is attributed by the men in the mines not only to the increasing hazards to life and limb in the pits, but to the fact that in the past they felt they were regarded as something less than human. At the Atomic Research Station at Harwell a different story is told. Here the hazards are as great and certainly more imminent. Radiation burns, leukæmias, and cancers have already been incurred, but morale is high. There is a long waiting-list of people from labourers to research workers anxious to find employment in the station—and there is neither the incentive of high wages nor of special rations. In the coalfields, whether rightly or wrongly I do not say, the men feel that they have in the past been treated as less than human by their employers, and that interest is being shown in them now because of the recognition, not that they are human beings, but that they are important economic units. In Harwell morale is high because the workpeople are assured that as individuals they are regarded as important by the extreme care devoted to their protection and welfare by doctors, engineers, and scientists.

I have spent too long on this point already, but I cannot emphasise too strongly the importance to the maintenance of group morale of the recognition of the supreme significance of the individual.

Time allows me only to indicate a few headings for aspects of our subject—any one of which would require a full-length paper for itself. At the head of the list I would place "Leadership." Much has been written and spoken on the subject of late, especially by some of our more successful war leaders, but leadership in battle is very different from leadership in the workshop. The man going into battle has a greater sense of his own inadequacy to meet the unknown, and is, therefore, not only more willing to accept leadership, he almost cries out for it. There is a great dearth of industrial leadership nowadays and this is, I believe, partly due to the perpetuation of the system of promoting the best workers in a shop from

the bench to the foreman's or manager's office at a time when pride in craftsmanship is rapidly dying, due to large-scale mechanisation and the relative impossibility of a workman seeing in the finished product, the labour of his own hands. If there is to be leadership there must be an emotional relation between the leader and the led, but so often the really good workman who becomes a foreman tends to be an individualist with an obsessional bias, and he tends to drive and to nag, and consequently to cause his workpeople to react away from his leadership rather than accept it. We have much to learn of the qualities necessary for industrial leadership and, having learnt them, we have still to develop techniques for the selection of group leaders. These leaders may not be permanently acceptable to the group, and this introduces the necessity for a far more elastic system of hierarchy in industry. Churchill was accepted as a great war leader, but when his task was accomplished he was, for a time at any rate, discarded.

Not very long ago I heard a distinguished member of this society say that morale in industry could not be improved until discipline was tightened up, and discipline could never be properly imposed until there were queues outside the labour exchanges. I agree that there is an element of truth in this remark, but if it is the whole truth, the outlook for this country is indeed dark. Comprehensive social insurance and full employment have greatly weakened the old drive "work or starve." Yet industry is still largely organised on the old lines, which assume that this economic drive is still there in its full force. This inappropriateness of our old system of incentives to the true position to-day is one of industry's major problems. The picture which comes to one's mind in thinking of this problem is "The donkey, the stick, and the carrot." Men cannot indefinitely be driven by fear or attracted by the hope of reward. It has been shown that if fear is the motive force, there is, for a time, increased production, followed by a steep fall due to the breakdown of the human element. Russell Fraser in the M.R.C. Report No. 90, "The Incidence of Neurosis Among Factory Workers," shows that in a sample of three thousand, 10 per cent. (9 per cent. men, 13 per cent. women) had suffered in the previous six months from definite disabling neurotic illness, and a further 20 per cent (19 per cent. men, 23 per cent. women) from minor neurosis. Not all of this was due to stresses inside the factory, but at any rate the figures suggest the magnitude of the problem.

If hope of reward is substituted as a motive force or incentive, there is again a rise in output, which is maintained for a longer time. But the difficulty here is twofold. Some workers will work to achieve the reward and break down in the process of doing so. Others will achieve it quite readily, but fall back, hoping for an even higher bonus. Financial incentives mean different things to different people—to some the opportunity to marry; to others more frequent visits to the pictures; for some better education for the children or increased social prestige; for others the opportunity of spending on holidays. The financial incentive is a "variable," depending on what it means to each individual, and the importance of that variable to him. As an incentive to work, the economic urge has an important place, but in modern industry not the foremost one.

A few other factors which promote morale and therefore act as incentives to work may be listed as worthy of study. *Security,* e.g., guaranteed employment, is promised by some managements. One firm in this town offers security of employment, except for gross breaches of discipline, e.g., assaulting a foreman. It is not generally accepted that this is good, but the absence of security is worse, as I saw in my monthly visits to Rochester in the eighteen months after the transfer of Short Bros. to Belfast became inevitable. Not only can men not give their best when the day-to-day threat of unemployment hangs over their heads, but large numbers actually break down. It is not easy in practice to find a formula which gives security and at the same time safeguards the preservation of some degree of competitive urge, but such a formula must be found.

Pride in Work.—There is in some industries still the possibility of experiencing this emotion, but the satisfaction is enhanced if it is appreciated by the supervisor. It is often difficult to experience another person's pride, but it is the essence of good management to attempt to enter into that other person's experience. I remember an old toolfitter showing me a little screw he had made to a specification for which the tools usually regarded as necessary were not available. He grew quite lyrical about it, but to me it was only another screw. On more than one occasion my gardener has brought me to admire a heap of manure which he had built into a neat rectangular pile—and that brings me to another point—the sense of order and routine. This sense of order and routine often is associated with low intelligence and initiative and for many people is satisfying. Monotony is not a common complaint. People who do monotonous jobs often get pleasure from day-dreaming. A girl in a local factory makes forty-seven thousand little metal tabs each day by pushing a metal strip into a guillotine with her left hand and depressing a lever with her right. I asked her the other day what she thought about while on the job. "Clark Gable," was the reply.

Another element in factory life which I must mention is the sense of being appreciated and accepted by the group. Adults generally never grow out of the schoolboy characteristic of enjoying membership of a gang. The sense of conforming to type, and thereby winning approval of people, is very strong—and so "blacklegs" are despised. You will know what happens on the long train journey —some stiff old gentlemen sitting in a carriage—each reserved, none having spoken to the others. A mother and her children get in with the usual fuss of arranging luggage. Each of the gentlemen gives a hand and, in doing so, each identifies himself as a member of a group willing to assist the mother. The atmosphere thaws and conversation soon becomes general. But this desire for appreciation is apt to lead to the well-meaning, but weak foreman, spending an undue part of his time patting backs. Appreciation by the leaders of a group should be spontaneous and genuine.

It is a matter of every-day experience that a sense of responsibility for somebody else is a most powerful incentive to increase effort. We all know the type of lad, apparently without a sense of social responsibility, who, when he gets married, settles down to be a useful citizen. Indeed, I believe that more frequently this

change takes places when the first child is born. I mention it in passing, just as I mention another obvious factor—the sense of self-expression. This may be direct or indirect, and it increases efficiency because of the better mental health of the individual. A tradesman can often find self-expression in his work. A mass producer may earn enough to spend on a hobby of some sort in which he can enjoy himself. The recognition of this has led many progressive companies to encourage dramatic societies, model-making clubs, stamp-collecting bureaux, etc., within their organisations. People who suffer from lack of expression may become apathetic—"browned off"—and eventually break down. But inside the workshop self expression may take odd forms—the practical joker who sends the young recruit for a soft-faced hammer. "Old Joe," who is the character about the place; "John," who is everybody's confidant, and so on.

This problem of the reaction of the individual within the group to that group is fascinating, and is one which is ripe for exploration. The man doing a job about home is different from the same individual working at the bench with mates in a workshop. He is a different man in the presence of his wife, his little son, or even his dog. What constitutes that difference? The full answer to that question would throw light on most of the problems of industrial psychology.

Finally, I also want to mention an impulse which can affect very large groups and which, for want of a better name, I call the Internal Obsessional Drive. We saw it in the fighter aircraft factories in the early stages of the war. We had it exemplified in the Hitler Youth—in their blind devotion and enthusiasm to a cause which we, but not they, believe was unworthy. There is not infrequently, under adequate leadership, a compelling conscientiousness which is a most powerful incentive. Whether it is normal or abnormal, I cannot say. Whether it should be exploited by managements depends to some extent on what we think of it, and on that I would like to hear the views of others.

I have skimmed over the surface of the problem of our present industrial malaise. A discussion of the fundamental issue would lead us into the realms of religion and philosophy in relation to the revolution which is taking place in society today, and although you may disagree with everything else I have said, you will, I think, agree that a short paper is not the vehicle for such an analysis.

REVIEW

TEXT-BOOK OF MEDICAL TREATMENT. Edited by D. M. Dunlop, L. S. P. Davidson, and J. W. McNee. 35s.

It would be difficult to speak too highly of this text-book of medical treatment. The fact that five editions and several reprints have appeared in ten years is sufficient evidence of its popularity.

The present edition is up to date and none of the newer drugs, of proven therapeutic value, appears to have been omitted.

The brief account of the salient points of each disease, which preceeds the description of treatment, is an attractive and useful feature of the book, and the section on technical procedures should prove of the greatest value.

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Some Aspects of Tropical Diseases as Seen at Home

By Evan Fletcher, M.D., M.R.C.P., D.T.M. and H.

Assistant Physician, Belfast City Hospital; Late Specialist in Malariology, Indian Medical Service.

Patients who return from the tropics may present a great variety of clinical syndromes. They may present themselves as a pyrexia of unknown origin, requiring special investigations for such conditions as malaria or visceral leishmaniasis, or with the dysenteric syndrome, requiring sigmoidoscopy and search for entamœba histolytica in scrapings from the bowel. There may be undue loss of weight when sprue may enter the picture, or there may be a typical distribution of phrenic nerve pain produced by a liver abscess. Then there are the great varieties of helminthic infestations. The patient with ankylostominosis may be profoundly anæmic, or he may have abdominal symptoms closely resembling those of duodenal ulcer. Cysticercosis must always be borne in mind in those who develop epilepsy; occasionally this condition may be caused by other infestations, such as cerebral schistosomiasis, especially in schistosoma japonicum infestations in people from the Far East. And so it is that tropical diseases can produce diverse symptoms and signs, from fever to sore tongue, abdominal tumours due to splenomegaly, general wasting, abdominal symptoms chiefly related to the large bowel, hæmaturia, and, more rarely, evidence of filarial infestation, such as lymph scrotum. Recognition of this wide variety of clinical evidence is important, for tropical infections can often be specifically diagnosed and specifically treated.

It is not possible in this paper to consider more than a very few points in relation to tropical diseases as seen at home, and so I propose to deal with the commonest condition, that is, malaria. This disease alone may present most varied clinical conditions, such as recurrent pyrexia, jaundice due to bilious remittent fever, or blackwater fever, coma, or mental symptoms due to cerebral involvement, or chronic ill health. In order to properly understand malaria as seen in the non-immune European, there are certainly fundamental facts first to be considered, for these are the basis of rational treatment with the various specific drugs, and especially paludrine.

Malaria infection is acquired under natural conditions in one way only, namely, by the bite of an infective female anopheline mosquito, i.e., the mosquito must have sporozoites in its salivary glands. Can naturally-acquired malaria occur at home? It is possible, for the local species of anopheles, anopheles maculipennis is an efficient vector, but the odds are against it, for the mosquito is cold-blooded, and development of the malaria parasite in the mosquito is very sensitive to the atmospheric temperature. However, mosquitoes lead a microclimatic life in relation to their immediate environment, which may by chance allow the full development of the parasite, and so transmission can occur, but it can only be sporadic. The disease

may be transmitted accidentally by inoculation if the needle is contaminated by the blood of a person harbouring the parasite. This probably accounts for the great majority of cases of home-made malaria. Blood transfusions from an infected donor may convey the disease; stored blood is safe if it is more than seven days old. Pregnant women who have a history of recurrent malaria should receive treatment with an anti-malaria drug, such as mepacrine or paludrine, for two weeks before and after delivery. This will prevent the accidental infection of the child during the process of birth (fœtal infection is accidentally due to injury to the placenta during delivery : malaria cannot be truly congenital). It will also prevent the outbreak of malarial fever in the mother early in the puerperium, which is otherwise very likely to occur.

Transmission of malaria is a biological phenomenon directly related to the bionomics of the vectar species of mosquito. After the female mosquito has been fertilised, she must have a blood meal before ovarian development can occur. If the species of anopheles has a desire only for human blood, then it is likely to be an efficient vector of malaria, e.g., anopheles minimus in Assam feeds almost entirely on human blood, which is one reason why that country is hyperendemic for malaria.

Some important points must now be considered concerning the behaviour of the malaria parasite when it gains entrance to the human body. When sporozoites are injected into an individual, the blood remains infective for a very short time only, possibly a few hours. It then remains sterile for seven to eight days until ring forms occur. This "negative blood phase" is important, for it is believed that the parasite during this time is lodged in the cells of the reticuloendothelial system. These exoerythroeytic forms have been demonstrated in avian malaria (plasmodiam gallinaceum). It is on these forms of the parasite, or "cryptozoites," that paludrine has a particularly lethal action. Paludrine is also powerfully schizontocidal, and it also acts on gametocytes in such a way that it prevents their development in the mosquito beyond the oöeyst stage. There are many strains of the various species of malaria parasite, e.g., the strains of plasmodium vivax in Africa is different from the strains in India, and the important point is this, that immunity in malaria is strain specific, except in the case of plasmodium ovale, which has only one strain. These different strains explain the different reports from various therapeutic measures in different areas. It is not possible to make general deductions about malaria from the study of the disease in one area only.

The drugs used in the treatment of malaria are quinine, mepacrine, pamaquin, and, more recently, paludrine. Quinine still maintans its place as an anti-malaria drug. It is schizontocidal, and in addition has an independent anti-pyretic action, which makes the patient more comfortable early in the disease. It should be given in an acid solution; pills should be avoided, as they are apt to pass through the intestine unchanged. It is certainly the drug of choice for parentral administration. The drug is rapidly excreted and the dose is gr. 10 thrice daily. If required to be given intravenously, the dose is gr. 5 in 10 c.c. water given very slowly, and it is useful to precede it by pituitrin to prevent fall in blood-pressure. Quinine should

never be given if there is any suggestion of blackwater fever. The toxic effects are deafness, tinnitus, and erythematous skin rashes. Mepacrine is a synthetic yellow dye which is given in tablet form. Its action is similar to that of quinine. The usual dose used is 0.1 gr. thrice daily. It stains the skin and urine yellow, but not the conjunctivæ. The chief value of pamaquine is in B.T. malaria to prevent relapses. It may cause abdominal pain and should be given after a meal. Occasionally hæmoglobinuria may occur. The usual dose is 0.01 gr. twice daily. The action of paludrine has already been considered. It has no toxic effects even in large doses. Myelocytes may appear in the peripheral blood during treatment. The best dosage is not yet decided, but 100 mg. twice daily should be adequate.

It will often have to be decided, in those who return from the tropics, how long can malaria infection persist. As a general rule benign tertian malaria will be spontaneously eradicated after three years, and malignant tertian malaria after eighteen months. The quartan parasite can probably persist for many years, probably up to seven years. Patients who have pyrexia after these periods should be carefully scrutinised for infections other than malaria, especially kala-azar or amoebiasis.

In conclusion, it may be said that tropical diseases, as seen at home, may present a great variety of clinical evidence. Malaria has been specially considered as it is the commonest disease imported from abroad, and because it is important to recognise the significance of the disease and give proper treatment and advice to the patient.

REVIEW

NOTES ON INFANT FEEDING. By G. B. Fleming, B.A., M.D., F.R.C.P. (Lond.), F.R.F.P.S., and Stanley Graham, M.D., F.R.C.P.(Ed.), F.R.F.P.S. Pp. 66. 3s.

In this small book of some sixty pages, compiled primarily for the use of medical students of Glasgow University, and now in its third edition, the authors have condensed all the essential principles of infant feeding.

The difficulties in the maintenance of breast feeding are rightly emphasised: the suggested management is practical and sound physiology.

In the chapter on artificial feeding the caloric requirements of the normal infant for basal metabolism, growth, loss in excreta, and muscular exertion are examined in some detail, and, based on these considerations, the authors present a method of calculating the requirements of under-nourished infants, allowing for the changes in these four processes in the various degrees of malnutrition. While this may at first tax the memory and mathematics of the student, once he has become familiar with the method he can prescribe with confidence for any infant, whatever the age, weight, or nutritional state. While the practitioner accustomed to prescribe in ounces of milk per pound body weight will no doubt continue to do so, it is salutory when feeding problems arise to reconsider the principles of caloric requirements as discussed here.

There are short chapters on the premature infant, failure to thrive, and the management of cases of gastroenteritis, and many useful facts on development are included in an appendix.

This book succeeds in its object of giving the undergraduate a brief, readable, but solid foundation from which to build up the wider knowledge he will acquire in practice. J. B. T. L.

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Infectious Lymphocytosis

By J. KINLOCH McCOLLUM, M.D., F.R.C.P.(I)., D.R.C.O.G., D.P.H.

SINCE the initial description of infectious mononucleosis in 1899 by Emil Pfeiffer,[1] various changes have been noted in the lymphatic system during infection. The paper by Sprunt and Evans[2] in 1920 and the subsequent discovery twelve years later of heterophile antibodies in the serum of patients with infectious mononucleosis[3] stimulated renewed interest in the problem. Data from most laboratories show that the leucocytes rarely pass a level of 20,000 and that there is an "increase of the mononuclear elements." The finding of an "increase of the mononuclear elements" has probably been responsible for the delay in separating cases of infectious mononucleosis from those considered to fall into the group "infectious lymphocytosis." The mononuclear cells involved in glandular fever are generally accepted to be either young or abnormal lymphocytes. They vary in size; the nuclei may be of different shapes; the cytoplasm is usually deeply basophilic. The Paul-Bunnell test is positive in from fifty to ninety per cent. of patients, depending to a large extent on the cases which the individual author chooses to include as infectious mononucleosis in his series. Carl H. Smith,[4] in 1941, separated from infectious mononucleosis a group of cases constituting a new disease entity which he called infectious lymphocytosis.

Early in 1941 Reyersbach and Lenert[5] reported sixteen cases of "atypical infectious mononeucleosis" which occurred over a period of six months in a convalescent home for children recovering from rheumatic fever. The authors discovered these cases while doing routine blood counts in 108 patients. There was complete absence of physical signs and symptoms. The leucocytes varied from 18,400 to 59,300. The lymphocytes ranged from 71 to 90 per cent. The lymphocytes were all mature and no abnormal forms were seen. Paul-Bunnell tests were negative in all cases. The injection into rabbits of washings from the throats of patients and of plasma of patients did not induce a monocytic response. Cultures from the throat of some of the children did not disclose listerella monocytogenes.

Another significant paper in the same year by Thelander and Shaw,[6] who presented the case reports of two sisters aged 2½ and 3½ years. The sisters became ill within four days of each other, with symptoms of fever, pain in the back of the neck, convulsions, and twitching of muscles. One of the children had a palpable cervical and shotty inguinal lymph nodes. The highest leucocyte count in the respective cases was 50,500, with 84 per cent. lymphocytes; and 45,700, with 86 per cent. lymphocytes. Heterophile antibody tests in both instances were negative. The cerebrospinal fluid of the children showed 40 and 70 cells respectively, all lymphocytes. The authors regarded these cases as infectious mononucleosis, with cerebral signs.

In the latter half of 1941 Smith[4] presented eleven cases of illness, two acute and nine chronic, having a syndrome which he called "infectious lymphocytosis." The patients with acute illness showed striking leucocytosis of shorter duration and greater lymphocytosis than did those with chronic illness. In neither of the two cases of acute illness were there subjective symptoms, fever, purpura, adenopathy, or splenomegaly.

The highest leucocyte count of the first patient was 44,300, with 79 per cent. lymphocytes. The count was done routinely prior to an elective operation. Aspiration of bone marrow showed 140,000 nucleated cells, of which 36 per cent. were lymphocytes. The blood picture was normal six weeks later. Cultures from the throat showed hæmolytic and non-hæmolytic staphlococci and pneumococci. The second patient with an acute illness had a history of an abnormal blood picture for five weeks before coming under Smith's observation. The child had a slight persistent fever which was explained by the presence of inflammation of the throat. The highest leucocyte count was 98,000, with 82 per cent. lymphocytes. The white count gradually fell and was normal in five weeks. The Paul-Bunnell test was negative. A bone marrow aspiration disclosed 110,000 nucleated cells, of which 30 per cent. were lymphocytes. Cultures of the nose and throat contained non-hæmolytic staphlococcus aureus and non-hæmolytic streptococci. In the nine cases falling into the chronic group the patients had a low-grade fever, which could generally be traced back to a recent upper respiratory infection. Usually there were present pallor, irritability, para-umbilical abdominal pain, and joint pains. There was no nausea or vomiting associated with the abdominal pain. On physical examination the children were pale, listless, and looked ill. The tonsils were injected. The cervical lymph nodes were slightly enlarged. The abdomen was soft and the liver and spleen were not palpable. The symptoms were more conspicuous in children under six years of age. The leucocyte counts never rose above 15,900 in any of the cases and the lymphocytes ranged from 60 to 85 per cent. A bone-marrow aspiration from one of the patients with chronic illness showed a total of 92,500 nucleated cells, of which 50 per cent. were lymphocytes. Smith carefully emphasised that in his cases all the lymphocytes were of the mature type, varying from small to intermediate size. The nuclei were made up of a coarse chromatic material and the cytoplasm was usually scant and basophilic. None of the cells generally regarded as significant of infectious mononucleosis were ever seen. The heterophile agglutination tests were consistently negative.

Duncan[7] (1943) reported a case exhibiting the variability of the clinical manifestations. His patient was acutely ill, presented mainly with abdominal symptoms and signs suggesting requirement of surgical intervention, temperature 101F, abdomen hard and rigid, shallow respirations. The neck and thighs were flexed. There were small cervical and inguinal nodes. A large firm and tender axillary node was found on one side. The initial blood count showed 45,000 leucocytes, with 65 per cent. lymphocytes. The temperature gradually returned to normal and the abdominal symptoms and signs disappeared. On the fourth day of illness there was a sudden rise of temperature to 103F and the abdominal pain returned. The

temperature again returned to normal and the abdominal pain disappeared. The patient was hospitalized for forty-nine days and enlarged nodes were still present one month after discharge. Frequent blood studies were made. The highest leucocyte count was 100,000, with 92 per cent. lymphocytes. A bone-marrow aspiration disclosed 86 per cent. lymphocytes. The blood count became normal thirty-five days after admission. The Paul-Bunnell test was negative. X-ray films of the chest were negative. Studies of the blood counts and pictures suggested that the abdominal pain was due to hyperplasia of the mesenteric nodes.

In 1944 Smith[8] reported four cases of acute infectious lymphocytes observed within a period of three weeks. Three of the patients were members of one family and the fourth patient became ill as a result of exposure to one of them in hospital. The first patient, aged 5, was admitted to hospital because of abdominal pain of twelve hours duration, vomiting, and a temperature of 103F. The tonsils were large and injected. The abdomen was resistant and tender in the right lower quadrant. Only a few small shotty cervical and inguinal lymph nodes were present. The leucocytes numbered 45,000, with 48 per cent. lymphocytes. The temperature became normal in one day, followed by a secondary rise to 100F two days later. The abdominal pain disappeared, but herpes of the face developed. Blood cultures and heterophile agglutination tests were negative. Cultures of the nose and throat showed non-hæmolytic staphlococcus aureus and non-hæmolytic streptococci. The examinations of the cerebral spinal fluid were negative. The highest white cell count was 55,400, of which 89 per cent. were lymphocytes. A sternal puncture revealed 152,000 nucleated cells, of which 43 per cent. were lymphocytes. The leucocytosis and lymphocytosis lasted about four weeks. Biopsy of an inguinal gland disclosed hyaline degeneration in the germinal centres of the follicles, with proliferation of the reticulo-endothelial cells of the intervening sinuses.

A 16-month-old brother of the patient was found to have a rhino-pharyngitis of two weeks duration. There was no elevation of the temperature and no enlarged glands were felt. The liver extended 3 cm. below the costal margin and the tip of the spleen was barely palpable. The initial blood count showed 10,400 leucocytes, of which 90 per cent. were lymphocytes. On the ninth day the white cells rose to 55,000, of which 88 per cent. were lymphocytes. This leucocytosis lasted about three weeks. The Paul-Bunnell test was negative. Cultures from the throat showed non-hæholytic staphlococci and streptococci, pneumococcus type 19, and hæmophilus influenzæ. At about the same time a sister, 8½ years old, was found to have a cold and sore throat of two weeks duration. She had no elevation of temperature, or palpable lymph nodes, or liver, or spleen. The initial leucocyte count was 15,000, with 87 per cent. lymphocytes. Fifteen days later the white cells were 18,000, of which 70 per cent. were lymphocytes. This leucocytosis lasted three weeks. The cultures from the throat showed the same organisms which were obtained from the throat of the 16-month-old baby. A fourth case occurred in a girl aged 9 years who was in hospital, in contact for fifteen days with the first child of this group. A routine blood count, which was done prior to an elective operation, disclosed 48,000 leucocytes, of which 68 per cent. were lymphocytes. The next day there

were 62,300 leucocytes, with 76 per cent. lymphocytes. Bone marrow, which was obtained on aspiration, contained 128,000 nucleated cells, with 42 per cent. lymphocytes present. The Paul-Bunnell test was negative. There was absence of fever, sore throat, and enlarged nodes. The liver and spleen could not be felt. Biopsy of a cervical node showed a histologic picture which was nearly identical with the node removed from the first patient. The serums of all four patients were found to have negative complement-fixation reactions for lymphocytic choriomeningitis. The serums were also found to have no antibodies against the influenza virus A or B. Intracebral and intraperitoneal injections of fresh serum into guinea-pigs provided negative results.

In the same year Finucane and Philips[9] reported twenty-one cases of infectious lymphocytosis occurring in a sanitorium for children during the winter of 1942-1943. The first case was accidentally discovered while routine blood counts were being done. The patient was found to have 87,400 leucocytes, of which 93 per cent. were lymphocytes. Routine blood counts were done on about one hundred children at intervals of five till fourteen days and a further twenty cases were discovered. The range of maximal leucocyte counts in this report was from 22,000 to 120,000, the lymphocytes varying from 62 to 97 per cent. Eosinophilia was present at the height of the lymphocytosis, or soon after the drop to normal. The heterophile agglutination was persistently negative. Blood examinations for viruses were negative, and no virus neutralizing antibodies against the agent, causing lymphocytic choriomeningitis, were present. The average duration of the leucocytosis and lymphocytosis was 4.7 weeks.

In 1942 Kilham and Steigman[10] described briefly lymphocytosis in three children in England, and Steigman, in 1946,[11] further describes the condition occurring as a small acute outbreak in six children in the south of England. The degree of cervical adenopathy was rather striking, but the benign course, protracted lymphocytosis, and the absence of significant bacteria, anæmia, thrombopenia, and heterophile antibodies were typical.

In 1945 Beloff and Gang[12] presented the case of a girl aged 6½ years, who gave a history of fever and headache of one day's duration. The child had been in a camp and exposed to an epidemic of diarrhœa three weeks previously; to two patients with mumps ten days previously; and to a patient with bulbar poliomyelitis, who became ill one week previously. During the week prior to admission to hospital the patient had symptoms of a mild upper respiratory infection, which was followed by headache, loss of appetite, vomiting, temperature up to 104F, loose bloody stools, and nuchal rigidity. On physical examination the patient was weak and showed definite stiffness of the neck. There was a slight right facial weakness. All reflexes were normal. The cerebrospinal fluid contained 50 cells per cu.mm., most of which were mononuclears. The maximal leucocyte count was 50,000, with 81 per cent. lymphocytes. The bone marrow was reported on as normal. The blood count came down on the twentieth day of illness to leucocytes 9,000, with 51 per cent. lymphocytes. The heterophile test was negative. No agglutinins were found in the blood for typhoid, paratyphoid, proteus X-19, B, abortus, or

10 strains of dysentery organisms. Complement-fixation tests and inoculation of the blood into the brain of mice and guinea-pigs showed no evidence of chorio-meningitis. The clinical course in hospital showed pain in the right calf on the thirteenth day of illness. The temperature was normal on the second day. At the same time that this patient was in camp a second child developed a similar clinical picture, with paralysis, suggestive of poliomyelitis, but showed a blood picture in which there was a marked leucocytosis and lymphocytosis. A third camper had previously developed an illness which was probably a mumps meningœncephalitis, with a blood picture that was not suggestive of infectious lymphocytosis. The authors suggest that were it not for the extremely high leucocyte count and lymphocytosis, the first case could have been diagnosed as one of non-paralytic poliomyelitis.

While most of the cases of infectious lymphocytosis have been recorded as occurring in children under the age of nine years, there have, in addition, been cases observed in adults. Duncan,[13] in 1945, presented two cases of infectious lymphocytosis occurring in young adults. In both these cases the blood picture was typical for this condition and the illness was associated with a respiratory infection of minor degree—sore throat, with injected tonsils, in one case the sub-maxillary lymph glands were enlarged and tender; no glands were palpable in the second case. The first case ran a low-grade protracted fever lasting over one month. Agglutination tests for typhoid, paratyphoid, and undulant fever were negative, as was the Felix-Weil reaction. The second case showed a normal blood picture two weeks from onset. The heterophile reaction in both cases was negative and the leucocyte count showed a maximum of 28,000, with 82 per cent. lymphocytes in first case, and 22,000, with 73 per cent. lymphocytes in second.

A morbilliform rash observed in the first case five days after entering hospital lasted four days.

In 1946 Yuskis[14] described a case of infectious lymphocytosis occurring in a naval recruit aged 29. The case presented with pains in the back, a mild cold, and a rash mainly concentrated round the hips, thighs, and legs, and consisted of a symmetric red maculopapular eruption. Full investigation of chest and blood revealed nothing other than a leucocytosis rising to 35,000, with lymphocytosis of 80 per cent. There was a low-grade fever. The rash disappeared two days after admission to hospital and the patient was returned to duty twenty-one days after the onset of his illness.

Case Reports

Case 1.—Denis C., aged 11; normal robust boy, took ill with sore throat, general aches and pains, cough, and minor malaise. Treated by his mother on simple principles for cold and sore throat. Some early response, but as the child appeared to be making no progress and as he was running a mild pyrexia, the doctor was called in.

The boy was in every way a normal child of his age; temperature 99F.; had no specific complaint, except that he felt weak and was unable to collect his strength; different from other illnesses that he had had by the persistence of asthenia. On

examination there were slightly enlarged palpable cervical glands in the posterior triangle of the neck on both sides; no other glands were discovered. The tonsils were injected, but not unduly enlarged or otherwise showing disease. The chest exhibited nothing abnormal other than a few rhonchi. Spleen not palpable, appetite precarious. Blood: the boy, when seen, had been ill or off colour for fourteen days.

TABLE 1

Date	H.B. per cent.	White Cell Count	Polymorpho-nuclear leucocytes per cent.	Monocytes per cent.	Eosinophils per cent.	Lymphocytes per cent.	Basophils per cent.
30/10/48	70	38,300	26	3	2	69	0
5/11/48	80	25,100	22	3	6	69	0
10/11/48	80	12,000	26	1	2	68	3
18/11/48	75	15,250	30	4	1	61	4
30/11/48	82	17,000	28	5	2	60	3
15/12/48	88	13,000	35	6	1	56	2
10/1/49	95	11,000	40	6	2	50	2

The white cell count, at the end of ten weeks, showed evidence of return to normal balance, but had not yet reached normal relationship in respect to cells.

The Paul-Bunnell test was carried out when first seen and at twentieth and fortieth day from onset; there was no significant rise in the titre, which varied from 1 : 10 to 1 : 20.

The sedementation rate (Westerghen) was 20 mm. in one hour at tenth day of illness, and 12 mm. in one hour at fortieth day of illness.

The erythrocytes showed slight departures from normal count, being 3.8 million on 30th November, and 5 million on 10th January.

The main features about the clinical condition in this case were:—

1. Onset with sore throat, some general malaise, a cough, and the fact that when he should have been quite over his illness he appeared far more exhausted and prostrated than the general appearance of illness seemed to warrant.
2. The presence of lymph nodes shotty and hard in both sides of his neck.
3. Mild anæmia and the lymphocytosis; the normal numerical relationship of the white cell count being grossly disturbed. The lymphocytes were for the most part of the mature, small, overripe variety.
4. The Wasserman and Kahn reactions were negative.
5. The Paul-Bunnell test was consistently negative.

Case 2.—Kathleen B., aged 8; seen first on 1st October, 1948. History of being off colour, slight running nose, and a pain in her throat for some four days. Vomiting occurred on third day and the mother considered this was acidosis, the child being prone to this disturbance. The fever increased, associated with para-umbilical abdominal pains and more vomiting, and the child became pretty ill.

On Examination : T. 101-5F. P. 100 : Flushed face, dry tongue, and a non-productive irritating cough. Tonsils injected and covered with simple exudate, easily removed. There were palpable glands both sides of the neck tender and situated anterior to sterno-mastoid and behind angle of lower jaw; abdomen was slightly distended; there was mild resistance to examining hand; the tenderness was para-umbilical and fairly diffuse; the spleen and liver were not clinically enlarged; the lungs exhibited a few rhonchi; percussion of the chest was normal; heart and central nervous system were normal.

Throat and nasal swabs were negative for C; diphtheriæ; a further throat swab revealed on culture streptococcus viridans.

Treatment at this stage consisted merely of citrates with aspirin in 2½ grain doses every four hours. The temperature came slowly down to normal and reached normal on 4th October. The abdomen became normal and the child said her

TABLE 2

Date	H.B. per cent.	White Cell Count	Polymorpho-nuclear leucocytes per cent.	Eosinophils per cent.	Monocytes per cent.	Basophils per cent.	Lymphocytes per cent.
5/10/48	80	30,800	20	1	2	0	77
10/10/48	70	52,000	25	3	2	0	70
14/10/48	65	84,000	12	2	1	0	85
21/10/48	68	80,100	15	1	2	0	82
28/10/48	72	50,225	12	2	1	0	85
10/11/48	85	44,000	10	3	1	0	86
20/11/48	88	30,000	23	1	2	1	83

Date	H.B. per cent.	Red Blood Corpuscles per C.MM.	White Cells	Polymorpho-nuclear leucocytes per cent.	Monocytes per cent.	Basophils per cent.	Lymphocytes per cent.
3/12/48	92	4.5 million	12,500	28	4	2	66

Date	H.B. per cent.	Red Blood Corpuscles per C.MM.	White Cells	Polymorpho-nuclear leucocytes per cent.	Eosinophils per cent.	Monocytes per cent.	Basophils per cent.	Lymphocytes per cent.
22/12/48	96	5.1 million	9,500	33	3	3	2	59

Date	H.B. per cent.	White Cells	Polymorpho-nuclear leucocytes per cent.	Eosinophils per cent.	Monocytes per cent.	Basophils per cent.	Lymphocytes per cent.
14/1/49	100	8,850	50	2	3	1	44

The Wasserman and Kahn tests were negative.

throat felt all right. The glands on both sides of neck were still tender. On 5th October temperature suddenly shot up to 102F; the patient complained of headache and became slightly drowsy. There was a slight neck stiffness. There were no other central nervous system signs discovered. Lungs showed nothing important. Blood was removed for culture and for count and study of film. Blood culture turned out to be sterile and the blood count and differential white cell count were as shown in Table 2.

Blood for widal, including B. abortus done on 10th October, 20th October, and 30th October, was on each occasion reported on as within normal titre range, nor was there any rise in the titre. The Paul-Bunnell heterophile agglutination test was negative, being 1 : 20 on each of two occasions. The Weil-Felix reaction was negative. The cerebrospinal fluid contained 50 cells per cubic mm., most of which were mononuclears, and was sterile bacteriologically. The protein was slightly raised, being 0.05 per cent.

This patient might have been diagnosed as one of non-paralytic poliomyelitis; the main features against such a diagnosis being the high leucocyte count, with lymphocytosis. The child made a rapid clinical return to normal after the secondary rise in temperature, and her fever and headache and acute symptoms had disappeared three days later. There was, however, a slower return of normal vitality, and the child was substantially debilitated and easily tired for some weeks afterwards.

Case 3.—Brian M., aged 5; seen on 1st February, 1949; pyrexia of 100F, cough, general aches and pains.

On examination, fauces and tonsils red and injected; discharge muco-purulent from his nose; lungs—a few high-pitched rhonchi; glands—both sides of neck palpable and hard; glands in axillæ felt; abdomen—spleen and liver not felt, some tenderness round the umbilicus, with sub-umbilical distension; central nervous system normal. Swabs from nasal discharge and throat were negative for C, diphtheria.

The child was treated by bed, light diet, expectorant cough mixture, sulphamerazine, 0.125 grm. combined with grains 2½ of sod. citrate four hourly, for three days, and sulphex nasal preparation dropped into his nose. Temperature was normal in thirty-six hours and the child appeared to be cured of his indisposition. One week later he suddenly took ill with fever, 103F, sore throat, cough much more harsh and exhausting, vomiting, and wheeze in the upper part of his chest.

On examination, tongue dry and furred; tonsils and pharynx red and injected; slight exudate on tonsils; cervical neck glands distinctly tender and enlarged more on right than left; lungs showed rales and rhonchi; liver and spleen not palpable. Treatment with sulphamerazine and citrates, combined with continuous penicillin chewing gum, 5,000 units per piece, was restarted and the mixture was changed to include some sedative syrups for his cough. He made a satisfactory response and, except for a hacking cough, appeared to be almost himself one week later. Swabs from his throat showed non-hæmoltytic streptococcus, and pneumoncoccus.

BLOOD AS IN TABLE 3

Date	White Blood Cells	Polymorpho-nuclear leucocytes per cent.	Eosinophils per cent.	Monocytes per cent.	Basophils per cent.	Lymphocytes per cent.
7/2/49	30,000	15	3	1	0	81
14/2/49	50,000	20	3	2	1	74
19/2/49	38,500	12	4	2	2	80
28/2/49	28,000	18	3	1	0	78
14/3/49	14,000	26	2	2	1	69
21/3/49	10,500	30	4	2	2	62

The Paul-Bunnell test in this case, on each of two occasions, was returned as negative.

SUMMARY

A clinical syndrome is described which has as its main features distinct hæmatological findings, namely, leucocytosis, with marked lymphocytosis of the small mature type, and distinct, though mild, eosinophilia, as an early finding. The blood picture is distinct from that found in infectious mononucleosis and the Paul-Bunnell test is negative. The relative lymphocytosis may be apparent for several weeks after the acute process has disappeared.

It is suggested the condition is due to a virus infection and that it is mildly infectious.

The usual clinical features include an upper respiratory infection, some degree of sore throat, and shotty cervical adenitis; the spleen is not usually palpable. There may be considerable variability of clinical symptoms and signs, including abdominal and central nervous system features.

The prognosis is good, but the patient, who is usually a child under eleven years of age, appears to require longer to regain normal vitality and strength than the apparent severity of the illness would seem to warrant.

This lymphocytic blood reaction is considered to be an entity of its own, to which the term infectious lymphocytosis has been applied.

The literature on the subject is reviewed.

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Rupture of the Posterior Papillary Muscle as a Cause of Sudden Death

By Florence McKeown
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Rupture of a papillary muscle is one of the rare complications of myocardial infarction, and as only some twenty-four cases have been described in the literature, it is felt that these two further cases might be of added interest.

Case I—Clinical Summary

The patient was a male aged 78 years. During the past year he had complained of occasional precordial discomfort during exercise. Six days before his death he was awakened from sleep by the sudden onset of severe pain in the chest, which was accompanied by vomiting, and followed by restlessness and great weakness. Four days later he was admitted to hospital.

On examination, he was found to be a healthy-looking elderly man. His pulse was regular, volume poor, artery wall palpable, and his blood pressure was 90/60; heart sounds were normal. E.C.G. was suggestive of multiple cardiac infarcts. On the next day he had a sudden severe crushing sensation in the precordium and sweated profusely. His pulse became impalpable, and the blood pressure could not be recorded. In spite of the usual measures of resuscitation, he died shortly after the onset of the attack.

Relevant Post-Mortem Findings

No external lesions of note are present, and the body cavities are normal.

Heart.—Weight 1 lb. The epicardial surface is smooth and there is palpable thickening of the coronary arteries. The right auricle is dilated, and the tricuspid valve admits three fingers. The wall of the right ventricle is 3 mm. in thickness. The left auricle is normal. The cusps of the mitral valve show slight atheromatous thickening. The posterior papillary muscle of the left ventricle has become detached from its base, and is seen projecting through the mitral orifice into the auricular cavity, forming a tangled, twisted mass enmeshed within the chordæ tendineæ. On the posterior wall of the left ventricle, at the normal site of attachment of the ruptured muscle, the myocardium is pale yellow in colour, with scattered areas of hæmorrhage. The whole thickness of the ventricular wall presents this appearance, and the muscle feels soft over a very large area. The coronary arteries show generalised atheromatous change with calcification, and a thrombus is found occluding the circumflex branch of the left coronary artery.

Lungs : show congestion and œdema.

Histological Findings

At the site of infarction the muscle fibres are swollen, eosinophilic, and anuclear, and an intense polymorph reaction is present in some areas. There is marked vascular dilatation around the margins of the infarct, and large numbers of large mononuclears are present in this zone. Some absorption of necrotic muscle has occurred, but there is little replacement fibrosis.

The circumflex coronary artery shows thickening of the intima by a hyaline plaque of fibrous tissue, which is partly calcified and contains cholesterol clefts and deposits of hæmosiderin. The lumen is greatly reduced in size and is occupied by a fibrin thrombus.

Anatomical Summary

Coronary atheroma,
Coronary occlusion circumflex branch,
Infarction left ventricle,
Rupture posterior papillary muscle,
Acute cardiac failure, with pulmonary congestion and œdema.

Case II—Clinical Summary

The patient was a male aged 48 years. Five years previously he consulted his doctor for indigestion, from which he has since frequently suffered. At this time his blood pressure was 160/90, and six months before death 180/100. One week before admission to hospital he complained of severe indigestion and feeling of giddiness. Again he consulted his doctor who advised him to come to hospital for examination. On arrival he died suddenly on the trolley on the way to the ward.

Relevant Post-Mortem Findings

The external apearance is normal.

Heart.—Weight 1¼ lb. The epicardial surface is smooth, presenting a hæmorrhagic appearance in the region of the obtuse margin. The coronary arteries are tortuous and calcified. The right side of the heart shows no abnormality. The left auricle is lined by smooth white endocardium. The mitral orifice admits two fingers, the cusps showing some slight increase in thickness. The whole of the obtuse margin of the left ventricle on section shows an inner yellow layer of necrotic muscle extending to the endocardium and surrounded peripherally by a zone of hæmorrhage. This area of necrosis involves the site of attachment of the posterior papillary muscle, which has ruptured from its base and has become retracted towards the mitral orifice and entangled in the chordæ tendineæ. The rest of the ventricular musculature is hypertrophied. The coronary arteries are thick-walled and partly calcified. There is an extensive occlusion of the circumflex branch.

Lungs : show œdema.

Histological Findings

At the site of infarction the muscle is entirely necrotic and free from cellular reaction in its most central portions. Around the margin removal of necrotic tissue has occurred, and there is a rich network of capillaries and granulation tissue.

The ruptured papillary muscle is completely necrotic, showing no viable muscle fibres. The occluded coronary artery shows advanced atheroma, with calcification of the intimal plaque. A thrombus fills the lumen, which at all levels of section appears to be recently formed, and shows only early organisation.

Kidneys : present a granular external surface and histologically show a well-developed arteriolosclerosis. Similar vascular change is present in the adrenals and pancreas.

Anatomical Summary

Arteriolosclerosis of viscera :
Hypertrophy left ventricle.
Coronary atheroma,
Occlusion circumflex branch,
Infarction left ventricle, and rupture posterior papillary muscle,
Acute congestion all viscera.

Comment

The most recent report in the literature of rupture of a papillary muscle is by Lowry and Burn (1941), who found that only twenty-three cases had been previously described. The condition, therefore, may be regarded as a relatively rare one. Only two cases were found in 6,000 autopsies at the Baltimore City Hospital, and none in 14,000 autopsies at the Johns Hopkins Hospital. The two cases presented in this paper occurred in 5,000 post-mortems, both within a very short period.

From a study of the earlier case reports it is seen that the muscle most commonly involved is the posterior papillary muscle of the left ventricle. However, the anterior muscle, or both, may undergo rupture. A similar condition has been described in the right ventricle, but here the ætiology is usually different. A variety of factors have been associated with papillary muscle rupture, such as tuberculosis, puerperal sepsis, syphilis, and trauma, but by far the most important single factor is myocardial infarction, consequent on occlusion of the coronary arteries. Here the site of infarction involves the base of the papillary muscles, which, when necrotic, may be torn from their attachment. In the two present cases this was the mechanism of rupture, each showing a recent thrombotic occlusion of the circumflex branch of the left coronary artery, and an area of infarction which affected a large portion of the left ventricle, including its posterior wall. If we accept the view that necrosis of the muscle is sufficient to allow of its rupture, then it is surprising that the condition does not occur more commonly. Extensive infarcts of the left ventricle are common, yet papillary muscle rupture is rare. Similarly, ventricular rupture following infarction is uncommon, so that in both circumstances there must be other contributory factors. In these two cases, and in most of the others recorded, there is a latent period of several days between infarction and papillary rupture. The muscle at this time is very soft, due to imbibition of fluid and the action of proteolytic enzymes. Whether abnormal strain or exercise, or the presence of hypertension are factors of importance in initiating rupture during this period, is unknown.

Edmondson and Hoxie (1942) believe that the factors responsible for cardiac rupture in an area of infarction are the degree of softening of the myocardium and the height of the intraventricular pressure. In considering hypertension in relation to papillary muscle rupture, Lowry and Burn (1941) mention that elevation of the blood pressure, together with thickening of the mitral valve and shortening of the chordæ tendineæ, are predisposing factors. In their opinion these would bring about excessive strain on the necrotic papillary muscle and so cause its rupture. In one of the present cases the left ventricle was moderately hypertrophied, but there was no lesion of the mitral valve.

Once rupture of the muscle has developed death usually follows almost immediately. Stevenson and Turner (1935) suggest that the diagnosis may be made clinically by the sudden onset of a loud whistling to-and-fro murmur occurring in association with the symptoms and signs of coronary occlusion and cardiac infarction. In the present two cases, however, death occurred so suddenly that there was no time for clinical investigation, and in spite of resuscitative measures, the patients succumbed almost immediately after the onset of the symptoms.

Summary

Two further cases of rupture of the posterior papillary muscle of the left ventricle are reported. In each case the circumflex branch of the left coronary artery was occluded, and there was a recent infarct in the left ventricle, which involved the base of the papillary muscle.

Thanks are due to Dr. R. Marshall, F.R.C.P., for allowing access to the clinical notes of the first case, and to Mr. D. Mehaffey, A.R.P.S., for the photography.

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REVIEW

THE SCOTSMAN'S FOOD: An Historical Introduction to Modern Food Administration. By A. H. Kitchin, M.B., and R. Passmore, M.A., D.M., F.R.S.E. Pp. 86. Edinburgh: E. & S. Livingstone Ltd. 3s. 6d.

This little book contains a pleasant, if somewhat curious, mixture of subjects. Social history, demography, and elementary instruction on the composition of common foodstuffs are used to introduce problems of scarcities in countries such as Scotland, which are over-populated or over-industralized in relation to their food production. The work of the pre-war "social-nutritionists," such as Corry Mann and Boyd Orr, is used as an introduction to the modern phenomena of rationing, black markets, food subsidies, and the like. In dealing with the difficult problems relating to the effects of rationing and subsidized foods, the authors art notably dispassionate and fair.

It is difficult to determine who would profitably read a book of this type. To the reviewer it would seem too dogmatic in its sections on nutrition to be recommended with confidence to non-medical readers, and it is too superficial to be recommended to doctors or medical students, except as pleasant reading. A. C. S.

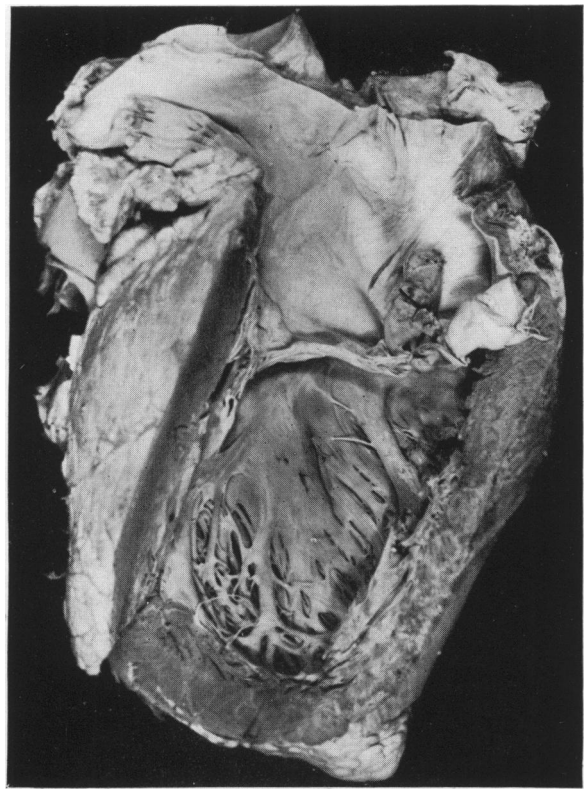

Fig. 1

Showing recent infarction of wall of left ventricle, and rupture of the papillary muscle (Case 1).

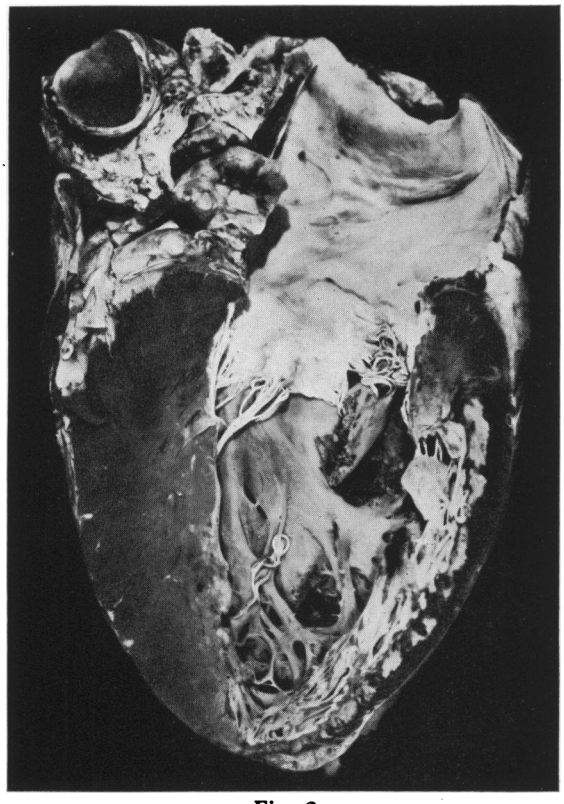

Fig. 2

Showing the ruptured posterior papillary muscle, and an extensive infarct of the obtuse margin (Case 2).

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A Case of Chorionepithelioma

By Florence McKeown

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Chorionepithelioma is a relatively rare neoplasm which shows some unusual characteristics. Whilst it is generally regarded as a highly malignant tumour, many cases are described in the literature in which the tumour has regressed spontaneously or following operation. This case is presented because it provides an opportunity for pathological study of the course of the disease in a patient who survived three years after hysterectomy had been performed.

Clinical History

The patient was a female aged 51 years. Five years previously she had a currettage for a hydaditiform mole. Since the operation there was a gradual loss of weight, and her periods became scanty. Two years later she was readmitted to hospital, and the uterus was found to be enlarged to the size of a three-months pregnancy. A preoperative diagnosis of degenerating fibroid was made, and a subtotal hysterectomy performed. The uterus was found to contain a hæmorrhagic and partly-necrotic tumour 6″ × 5″ in size. On histological examination it proved to be a chorionepithelioma. At this time there was extensive invasion of the blood vessels within the myometrium, and it was noted at operation that there was a great enlargement of the pelvic veins. Both ovaries contained large corpora lutea and lutein cysts.

Following the hysterectomy a course of deep X-ray therapy to the pelvis was given, but the patient never felt well, complaining of breathlessness and pain in the sacral region and epigastrium. For three years these symptoms persisted and became worse, though she tried to continue with her housework, in spite of recent severe and frequently recurring hæmoptyses.

From time to time she was treated for anæmia and investigated for the pain in her back. X-ray showed no evidence of any secondary deposits in bone, and the lungs, though showing fibrotic change, did not appear to be the seat of metastatic deposits. The hæmoptyses became so severe that she was confined to bed, and eventually admitted to the City Hospital.

On clinical examination in hospital she was found to be a rather thin middle-aged woman, with sallow complexion, pale conjunctivæ, and cyanosed lips. There was no lymph node enlargement, no engorged veins, and no œdema. Her blood pressure was 125/85, and heart sounds were normal. Examination of the respiratory system revealed harsh breath sounds in the left lung and diminished air entry in the right lung.

The liver was enlarged two finger breadths below the costal margin. X-ray of chest and spine showed no definite secondaries. The heart was seen to be enlarged

and the pulmonary conus was prominent. During the last week of life the patient's condition became weaker, signs of heart failure rapidly developed, and she died rather suddenly two weeks after admission to hospital.

Clinical Summary

Hydaditiform mole in 1944;
Operation for chorionepithelioma in 1946;
Recurrent hæmoptyses;
Death from right heart failure in 1949.

Relevant Post-Mortem Findings

The body is that of a poorly-nourished elderly female subject. Rigor mortis has set in. There is slight œdema of the left lower extremity.

Body Cavities.—There are dense adhesions in each pleural sac. The pericardial sac contains about six ounces of clear yellow fluid. The abdominal cavity shows no abnormality.

Heart.—Weight 510 grms. The right auricle is dilated, and the tricuspid valve admits four fingers. The wall of the right ventricle shows moderate hypertrophy. The pulmonary aorta and the main pulmonary arteries are filled with antemortem thrombus. The left auricle and mitral valve show no lesion. The wall of the left ventricle is thin and atrophic.

Lungs.—Show fibrous thickening of the pleura. On section, many of the pulmonary arteries and arterioles are filled with greyish-red laminated blood clot. A few small wedge-shaped areas of consolidation, dark red in colour and subpleural in position, are present in each lung. No secondary deposits can be detected in the blood vessels, parenchyma, or hilar lymph nodes.

Liver.—Weight 1 kg. 600 grms. The external surface is smooth. On section, the lobular pattern is accentuated, the appearance being consistent with venous congestion of some duration.

The other organs present a normal macroscopic apearance. The cervical stump appears healthy and free from tumour recurrence. The pelvic and peripheral veins show no recent thrombotic lesion. Some of the tributaries of the internal and external iliac veins on section present a 'honeycomb' appearance suggesting an oldstanding occlusion, with recanalisation.

Histological Examination

The main pulmonary arteries are filled with blood clot which shows varying stages of organization. In some vessels there is a mantle of tumour cells around the periphery of the clot. The cells show the characteristic structure of a chorionepithelioma, small polyhedral cells with darkly-staining nuclei, intermingling with large pink syncitial masses. Sometimes the tumour cells form a single layer, growing along the vascular endothelium. At other points they are observed in small groups within the walls of the blood vessels, where they are associated with necrosis of part of the media and with an intense polymorph reaction. In the media

of other vessels there is a fibroblastic reaction around partly necrotic tumour cells, but nowhere do the tumour cells appear to have penetrated into the perivascular tissues.

Whilst many vessels show such relatively acute lesions, there are equally extensive lesions of a more chronic nature. Arteries and arterioles of every calibre show evidence of recanalisation. The intima is thickened by fibrous tissue and the original lumen is converted into a cavernous structure by many newly-formed channels. By means of elastic tissue stains, in such vessels the media is seen to be the site of gross damage. There is an entire absence of elastic tissue from segments of the vascular wall. The elastic lamellæ are present in normal amount up to the edge of the defects, where there is a sharp transition to an area completely devoid of elastic elements and composed entirely of fibrous tissue. The pulmonary parenchyma shows old areas of scarring and infarcts of varying ages, but there are no tumour deposits. There is no evidence of metastases in the other organs, and, apart from the changes associated with right heart failure, there are no further histological findings of note.

Anatomical Summary

History of hydaditiform mole, 1944, and chorionepithelioma, 1946;

Old and recent tumour emboli in pulmonary vessels, destruction of arterial mediæ, pulmonary infarction, hypertrophy right ventricle, with terminal dilatation;

Subacute venous congestion liver;

Œdema left lower extremity.

Discussion

Chorionepithelioma may follow a full-term pregnancy, abortion, hydaditiform mole, or teratomatous growth. According to Mathieu (1939), forty per cent. of cases are the result of hydaditiform mole. The mole in this case was not available for histological examination, but it is probable that it was the source of the chorionepithelioma which developed two years later. Long latent periods of several years have been described in certain cases, but some of these are open to doubt, since an unsuspected intervening pregnancy may have occurred.

The first point of interest in this case is the long survival period of three years, following hysterectomy for chorionepithelioma. At operation the uterus contained a large tumour which appeared to have all the properties of rapid growth and invasiveness. There was widespread involvement of the sinuses in the myometrium by cells showing a highly malignant structure. The pelvic veins were tortuous and hypertrophied. Such factors would afford an opportunity for early dissemination of the growth, yet at post-mortem, three years later, the only evidence of persistence of the tumour is found in the lungs. The cervical stump which was left in situ was free from recurrence, though in chorionepithelioma extension to this site is very common. The findings, therefore, in this case confirm the belief that whilst chorionepithelioma generally behaves as a highly malignant tumour, it may

sometimes undergo complete regression or arrest of growth, especially after hysterectomy. The diagnosis in such circumstances has been questioned, but there are undoubtedly those cases, of which the one under consideration is an example, in which removal of the primary lesion had led to a temporary regression of metastatic foci.

Brew (1939) reports that pulmonary metastases occur in sixty-four per cent. of cases examined at post-mortem. In this site the metastases soon lead to hæmoptyses and this may even be the first symptom of the disease. The natural tendency of the tumour to invade blood vessels promotes rapid dissemination to the lungs. It is probable in this case that extra-uterine venous invasion had already occurred at the time of operation, and that embolism to the lungs was then under way. The presence of old recanalised lesions in the pelvic veins supports this view. If the pulmonary lesions are of more recent development, then it would be expected that recurrence of growth in the pelvis, with obvious venous involvement, would have been found at post-mortem. Furthermore, the long history of hæmoptysis and the presence of a well-established right heart hypertrophy suggest that the pulmonary lesions were of considerable duration.

These vascular lesions were unusual and of interest histologically, as it seemed possible, from a careful study of the post-mortem material, to reconstruct the various stages in their development. Many of the large vessels, including the main pulmonary artery, contained recently formed blood clot, which appeared in most instances to have been propagated from an older lesion at some other level within the vessel. Tumour cells were present in the clot and in some areas formed a layer adherent to the vascular endothelium. In other vessels actual invasion of the wall occurred, and groups of tumour cells were present within the media, causing necrosis and an inflammatory infiltration. The cells did not proliferate to any great extent within the walls of the blood vessels, but were observed to undergo necrosis and regression, and eventually the damaged portion of media was repaired by fibrous tissue. At the same time, the clot within the lumen was organised and recanalisation took place.

The final picture of healing was at first difficult to interpret, but could be elucidated after a study of the acute phases. In every section examined recanalised vessels abounded, and with special stains these showed elastic tissue defects in their walls. It seemed probable that at an earlier period such vessels contained tumour emboli and that penetration of the media had occurred. Arrest of tumour growth, followed by repair, would account for the complete destruction of elastic tissue in large segments of the medial coat.

If the emboli within the vessels were of the ordinary bland type organisation would have led to recanalisation with intimal fibrosis, but not to such gross scarring within the media. Septic embolism might have produced such a picture, but there is no reason to consider this condition in the present case.

It is well recognised that even in its metastases chorionepithelioma may show this tendency to vascular invasion. Teacher (1935), in describing embolization in the lung in this condition, states that, "the tumour emboli become impacted at

the branching of an artery, the walls of the invaded vessel degenerate and dilate into varices or little aneurysms, which may either undergo thrombosis or rupture and bleed profusely."

An almost identical case is reported by Manz (1937). A woman of 39 years, dying from pulmonary tuberculosis, had a hydaditiform mole removed four years previously, and two years later a hysterectomy for chorionepithelioma was performed. At post-mortem extensive tumour thrombi were observed in the lungs, involving the pulmonary artery and its branches. The walls of many small vessels were invaded by tumour. The thrombi to a great extent were formed of tumour tissue, which in many areas showed evidence of regression and organization, and replacement by hyaline fibrous tissue.

That regression of growth should occur is an unusual characteristic of an otherwise extremely malignant tumour, but, nevertheless, this is a phenomenon which has been noted not only in chorionepithelioma, but in all malignant neoplasms. Schmidt (1903) examined the lungs in forty-five cases of abdominal carcinoma and found that in fifteen intravascular pulmonary metastases were present, which showed inclusion of tumour cells within thrombi, and he noted their destruction during the process of organisation. He concluded that while abdominal cancers send emboli to the lungs in a high proportion of cases, only a small proportion yield metastases. This tendency for regression to occur was confirmed later by Iwasaki (1915-16) not only in a study of post-mortem material, but experimentally by intravenous inoculation of animals with tumour cells.

In more recent literature Saphir (1947) reports on the fate of carcinoma emboli in the lung. He traces the stages of degeneration of intravascular metastases, leading eventually to the formation of thickened intimal plaques of fibrous tissue in the pulmonary arteries, which often cannot be distinguished from arteriosclerosis. These he believes to be the result of organisation of tumour emboli within the blood vessels.

The vascular lesions, therefore, in the present case are not unique in their tendency to undergo spontaneous regression. Actual invasion of the vascular walls, however, by tumour cells has been less commonly observed, and its occurrence in this case is probably attributable to the nature of the tumour, whose outstanding characteristic is that of vascular invasion.

Finally, death occurred in this patient as a result of right heart failure. With progressive involvement of the pulmonary vascular bed, and retrograde propagation of thrombus till the main pulmonary arteries were affected, the heart was no longer able to maintain an adequate circulation, in spite of considerable hypertrophy of the right ventricle. Heart failure developed during the last week in hospital, with cardiac dilatation, venous engorgement of the liver, and œdema of the lower extremities.

Summary

A case of chorionepithelioma is presented. The patient had a hydaditiform mole removed five years before death, and a hysterectomy for chorionepithelioma two years earlier. She survived for three years after operation, and at post-mortem

extensive intravascular pulmonary metastases were present. These showed a peculiar tendency to regress, but with widespread involvement of the pulmonary vascular bed, right ventricular hypertrophy and ultimately right heart failure occurred.

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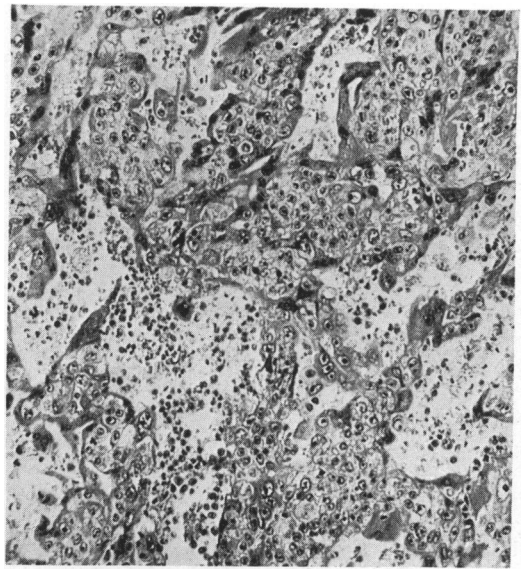

Fig. 1

Uterus: Chorionepithelioma, showing characteristic structure, large syncitial cells, with darkly staining nuclei, intermingling with round cells of Langhans type (H.E. X300).

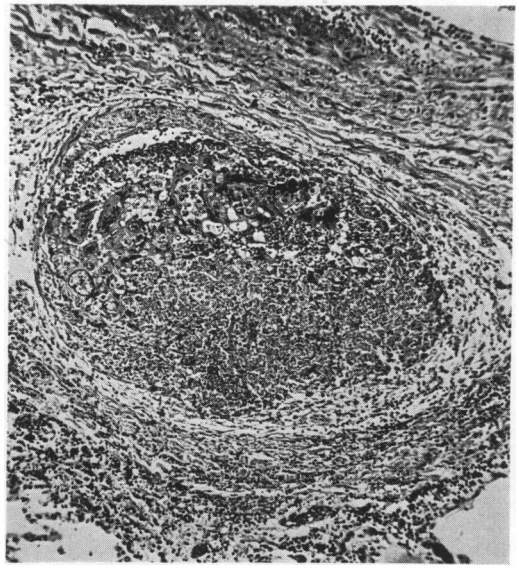

Fig. 2

Lung: Showing an artery filled with thrombus, in which are scattered groups of tumour cells (H.E. X200).

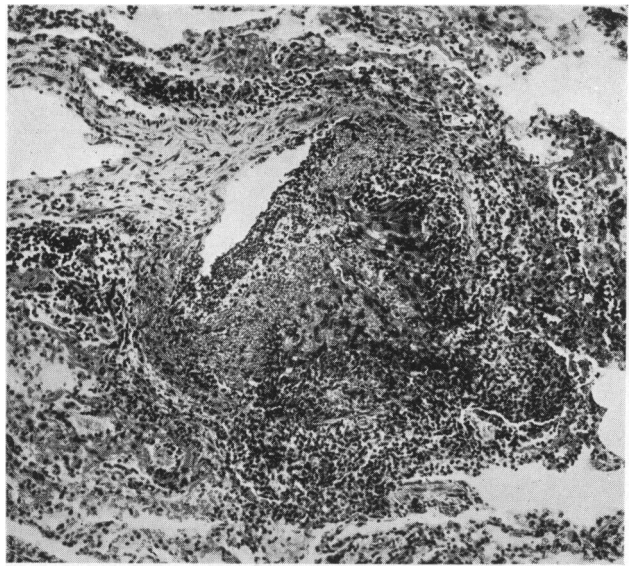

Fig. 3

Lung: A blood vessel, showing invasion and destruction of a segment of the media by tumour cells (H.E. X200).

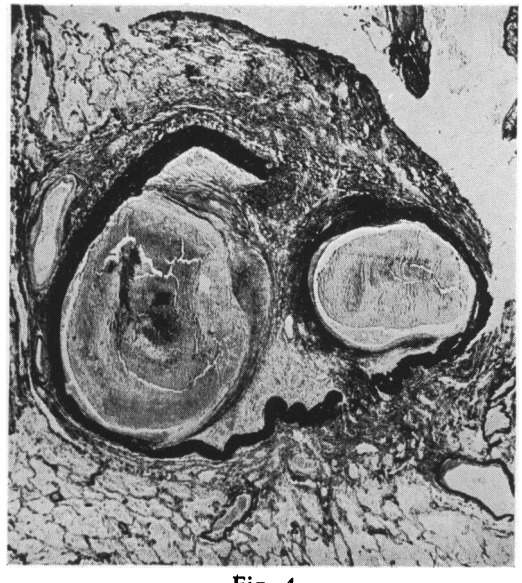

Fig. 4

Lung: A pulmonary artery, showing elastic tissue defects in the media, and recanalisation of the lumen (Elastin X50).

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Landry's Syndrome: Report of Two Cases

By DENIS G. F. HARRIMAN, M.D., M.R.C.P.(LOND.)

From the Department of Pathology, Queen's University, Belfast, and the Neurological Department, Royal Victoria Hospital, Belfast.

INTRODUCTION

THE literature which has grown around myelitis has reached large proportions, and many cases of varied causes have been described; nevertheless, recourse to present-day text-books, neurological and general, reveals many discrepancies and leaves the reader confused. The subject is very complex and a great deal remains to be learnt about the many causes and types of disease grouped under this name. "Myelitis" is used somewhat loosely to indicate any affection, partial or total, of the spinal cord. The disease processes may be inflammatory, toxi-degenerative, or vascular, and the term secondary myelitis has been used when the cord is affected by compression. No text-book fails to deprecate the use of the term in this way, yet confusion still abounds. It is the purpose of this paper to emphasise the difference in morbid appearance which may occur in apparently similar clinical conditions, with two illustrative cases. Perhaps no new light is thrown on the condition, but a useful purpose will have been served if at least the difficulties are brought into focus.

CASE I

History.—F. G., an apprentice draper aged 17. First complained of pain in the distribution of the sciatic nerves, onset in the middle of December, 1948. The pain was sharp and knife-like and intermittent, and was first felt down the left leg. It was not made worse by coughing or sneezing, but he had difficulty in sitting down properly on a chair. A week later he complained of similar pain down the right leg. His nose had bled occasionally.

Owing to the increasing severity of the pains he was admitted to hospital on 27/12/48. At this time there was no evidence of paralysis and the tendon reflexes were present. General medical examination showed no abnormal signs in the heart, lungs, or alimentary system. The total white cell count was 13,800; no differential count was made.

His condition deteriorated after admission and the severity of his pains was undiminished until shortly before he was seen by Dr. Allison on 31/12/48, when he suddenly developed a flaccid paraplegia, with absolute sensory loss up to the level of D6—D7. The tendon and superficial reflexes were absent. Above this level there was no evidence of any abnormality and it was noticeable that there was no stiffness of the neck. A striking feature was his inability to lie down. This caused great pain around his middle, and even when he was sitting up he was not comfortable. The cranial nerves were normal and there was no clouding of consciousness.

The absolute nature of the lesion and its localisation to D6—D7 suggested something at this level such as an epidural abscess or a tumour, but against an epidural abscess were the absence of any neck stiffness, leucocytosis, or tenderness locally over the spine in the appropriate region. There was no temperature. Against a tumour was the fact that the early signs had been in the sciatic roots and it was difficult to account for the progressive rise in the position of these signs in the neuraxis.

Lumbar puncture at this time showed 300 mg. protein, globulin greatly increased, and only 1 leucocyte. W.R. negative. It was observed that the patient was relieved considerably by the procedure, and did not subsequently complain to any extent of the pains in the back.

A day or so later the sensory loss had risen to D4; some days later the upper limbs were affected by paralysis and loss of sensation, and on 5/1/49 there was obvious evidence of paralysis and he was put in an artificial respirator. The following day there was disorientation and drowsy euphoria, and the temperature rose on succeeding days until it reached 105°F on the day of his death in coma (11/1/49).

The clinical diagnosis was one of an ascending myelitis—Landry's myelitis.

Case I—Necropsy

Necropsy.—The body is that of a very emaciated boy, with marked peripheral œdema.

Body Cavities reveal no noteworthy change.

Thoracic and Abdominal Viscera.—The only findings of note are in the lungs, which show massive œdema and terminal pneumonia; and in the spleen, which is enlarged to nine ounces.

Brain.—Œdema is suggested by coning of the cerebellum in the foramen magnum, and tentorial herniation of the uncus, equal on both sides.

Spinal Cord.—On removal of the vertebral laminæ, a small mass of peculiar yellowish-grey tissue becomes visible in the posterior epidural space, extending from D1 through D4 (spinal segments D3 through D6) (Fig. 1). The tissue is attached loosely to the periosteum of the laminæ, but not at all to the dura, and is of the consistency of boiled egg-white. Its colour is darkened in several small hæmorrhagic areas. It does not extend into the intervertebral formamina.

The spinal cord above the level of the epidural tissue is somewhat swollen, but remains white. At and below that level it is grossly discoloured.

Sections of the cord in the cervical segments reveal a curious central circular hæmorrhagic zone (Fig. 2). The remaining cord is œdematous and only in some sections can grey matter be distinguished from white. Where it is so distinguished, its form is distorted and compressed.

Sections of thoracic and lumbar cord at and below the level of the epidural tissue show it to be irregularly swollen and almost entirely hæmorrhagic, and again no architecture can be distinguished. In the lower lumbar and the sacral segments the hæmorrhagic appearance is most marked centrally.

Histology.—Thoracic and Abdominal cavities:

Lungs.—Massive œdema and terminal pneumonia are confirmed.

Spleen.—Early acute splenic tumour.

Other Viscera.—Essentially normal. It is noteworthy that the blood in all blood vessels contains a large number of leucocytes, and that most of these are myeloid in appearance. A few foci of such cells occur in the peri-renal and peri-pancreatic fatty tissues.

Brain.—Representative sections of cortex, basal ganglia, and brain stem confirm œdema. There are a few scattered petechial hæmorrhages.

Spinal Cord and Vertebral Canal.—The peculiar epidural tissue consists of a dense mass of myeloid cells (a chloroma) (Fig. 3). These have round or reniform nuclei, and some contain eosinophilic granules in their cytoplasm. There are numerous and large areas of necrosis and hæmorrhage. The peroxidase reaction is positive.

In the overlying laminæ the marrow is replaced by similar cells. There is no bone destruction, but Haversian canals are permeated by these cells and allow them to reach the periosteum and the posterior epidural space.

Spinal Cord.—In the cervical segments the greatest destruction is in a roughly circular area of the posterior columns, just behind the central canal (Fig. 4). Here the tissue is entirely disrupted; only a few nuclei remain, and blood vessels whose walls are hyaline, but not thickened, have exuded red cells and fibrin. More peripherally, grey matter can still be distinguished. Anterior horn cells are entirely chromatolytic or shrunken and deeply staining. The white matter of all columns is disturbed by large areas where myelin sheaths have become swollen, and a few mononuclear cell nuclei remain ("lacunar" degeneration).

Myelin stains confirm the gross patchy demyelination. The absence of inflammatory cells is striking.

Sections throughout the cord from the tumour level downwards reveal gross destruction, as if the central zone of destruction seen above this level had spread to involve the whole cord. Grey matter is only recognisable as a granular area bounded by the lacunar degeneration in the surrounding white matter. Blood vessels again have hyaline walls; there are large areas of hæmorrhage and only a few surviving nuclei, mononuclear and oligodendroglial in type, are seen throughout the tissue. The necrotic process again is not accompanied by any inflammatory reaction, and tends to stop suddenly in the most proximal portion of the anterior and posterior roots. But even in these there is patchy lacunar degeneration.

Case II

History.—M. B., male, aged 33.

While walking on 31/12/48 he noticed pain in the left foot and some awkwardness. This continued. Next day there was some pain in the back of the neck radiating into the left arm and shoulder with pins and needles, and later in the day he found that the left arm and leg were paralysed. The condition remained

static and there was no new development until 11/1/49, when he was unable to pass water.

He was admitted to the Belfast City Hospital under Dr. Kean on 13/1/49 and examined by Dr. Allison the same day. He was a stoutly-built male, without anæmia, jaundice, or superficial lymphadenopathy. Examination of cardiovascular and respiratory systems revealed no abnormal findings, but on palpation of the abdomen, the bladder was found to be grossly distended.

In the central nervous system he had an absolute left-sided flaccid hemiplegia, with slight involvement of the lower part of the face and maximal involvement of the arm and leg. The cranial nerves were not otherwise affected and the functions of 3, 4, and 6 especially were normal. Fundi clear. There was no hemianopsia and no evidence of any sensory loss. Flexor spasms were occurring in the left leg, and the left plantar was extensor. There was slight stiffness of the neck, but no clouding of consciousness, in fact the patient was remarkably clear and lucid. The right plantar reflex was also extensor and both abdominal reflexes were absent.

These features suggested that it was likely that the paralysis would spread from the left to the right side and grow progressively worse. The most likely diagnosis was considered to be an acute disseminated encephalomyelitis.

Investigations made included the blood W.R., which was negative. Lumbar puncture : fluid clear, no increase in pressure noted, contained 47 lymphocytes and 120 mg. protein, W.R. negative. X-ray cervical spine showed no bony lesion.

19/1/49 (twenty days after onset)—Paralysis of both lower extremities and of the left arm. Nystagmus present. Signs of pneumonia at right base.

20/1/49—Flaccid paralysis of all four limbs, with sensory loss. Tendon reflexes plus. Plantars extensor.

21/1/49—Death.

Case II—Necropsy

Necropsy.—The body is that of a well-developed male. There are no significant findings in the cavities or viscera of the thorax or abdomen, except for central zonal necrosis of the liver, acute cystitis, and tubular degeneration in the adrenal cortex.

Brain.—Appears swollen. A localised yellowish meningeal exudate over the vertex of both hemispheres extends slightly forwards over the frontal poles. Uncal herniation is present on the right side.

Spinal Cord.—The dura appears normal, but, on opening it, the cord which retains its white colour everywhere, shows two diffuse swellings. One of these is two inches long and is situated within spinal segments L4 through S3; the other is smaller and situated within segments D11 through L1. Both are fuseiform.

Multiple sections of the cord show that the white matter is everywhere swollen and the grey matter poorly delineated, although still distinguishable. There is no discolouration by hæmorrhage.

Histology.—Changes in the nervous system are striking. Representative sections of cerebral cortex show diffuse changes. The meninges are slightly thickened and

are infiltrated by numerous lymphocytes and large mononuclear cells. The infiltration is greatest around meningeal vessels.

Within the cortex a similar perivascular reaction is evident, but less gross. Small arteries contain a few cells in the perivascular space. Nerve cell change is minimal in the cortex, where occasional cells are chromatolytic, but much more striking in brain stem nuclei.

Mid-Brain.—The third nerve nucleus is particularly affected. Cells are swollen up and darkly staining, or else small and pyknotic. Perivascular cuffing with mononuclears is still evident, and the infiltration of these cells is most dense in the meninges (Fig. 5).

Pons.—Nuclear change is less intense and occasional collections of cells, microglial and astrocytic, are found. They resemble Babe's nodes (Fig. 6).

Spinal Cord.—Changes are similar in all segments studied. Meningeal and perivascular infiltration in the cord is more marked than in the brain (Figs. 7 and 8). Anterior horn cells are still visible, but markedly chromatolytic or are in advanced "chronic cell change." A few microglial nuclei are scattered throughout the white matter, and fat stains show that the myelin has been broken up with the liberation of stainable neutral fat, some of which is present in compound granular corpuscles.

Discussion

In Case I the onset was marked by pain of sciatic distribution, first on one side, then on the other. Some three weeks later the patient developed a sudden paraplegia, with motor and sensory loss up to D7, with loss of sphincter control. In the next week there was further ascent of motor and sensory loss until death occurred in hyperpyrexia. At autopsy there was a chloromatous mass in the epidural space, extending from 1st to 4th dorsal vertebræ. The spinal cord showed total necrosis at this level and a central necrosis above it. Below, the necrotic process was continued to the filum terminale.

The sequence of events in this case may be referred to the presence of the chloroma. Such tumours have been reported in this situation before and are not of extreme rarity (Critchley and Greenfield, 1930; Gauld, 1948). The paraplegia was of sudden onset and its level corresponded with the lower level of the chloroma, in which there were numerous and large areas of necrosis. It is not unreasonable to assume that the rapid development of necrosis in the tumour is the factor responsible for the production of a lesion of the cord at the same level; this probably involves not only direct compression of the cord, but also interference with the blood supply of the cord at that level. Venous channels, as well as arterial running through or near the tumour, would readily be compressed.

The curious ascent of the paralysis cannot be accounted for entirely in the same manner; the paralysis rose well above the highest level of the tumour and in fact to medullary levels. One of the three cases described by Critchley and Greenfield developed an ascending paralysis, which they ascribed briefly to further focal softenings, or an upward spread of the epidural masses. The appearance of the cord above the level of the tumour provides an explanation for the phenomenon

(figs. 2, 4). Here the necrosis is central, in a circular area just posterior to the central canal. May not the compression and necrosis occasioned in the spinal cord at the level of the tumour, producing as it does an increase in volume of tissue and fluid within an inelastic covering, the pia arachnoid, cause the relief of tension along the line of least resistance, which is upwards within the substance of the spinal cord? Another factor which may be of importance in localising the upward spread of the necrotic process to a central zone is the anatomical distribution of the blood supply of the cord. Reference to the meticulous work of Bolton (1939), who used injection techniques to study source and direction of arterial supply to the cord, reveals that the central area concerned is a sort of no-man's land supplied by the end-twigs of branches from the main arteries supplying the cord, the two posterior spinal arteries, and the anterior spinal artery. That this area is more liable to necrosis than the better supplied periphery is a not unreasonable assumption. The upward spread of the necrosis can thus be accounted for by mechanical and vascular factors.

To account for the initial sciatic root pains in this case is rather more difficult, and one must have recourse to even greater speculation. The sciatic nerves were examined and showed no abnormality which could form a basis for the symptom. It is difficult to see how the tumour could cause root pains before it caused the necrosis of the cord, and, histologically and macroscopically, the necrosis was of simultaneous onset at the level of the tumour and below it. It may be more than coincidence that the root pains were relieved by lumbar puncture, and the symptom then could be referable to increased cerebrospinal fluid pressure. Or, it might be explained on the basis of the great increase in protein in the cerebrospinal fluid. It is well known that blood in this fluid, e.g., from a leaking aneurysm of the circle of Willis, may fall to the lower levels of the subarachnoid space, and, by clotting, irritate sacral roots. In this case no blood was found in the C.S.F., but it is conceivable that plasma clotting could occur, by reason of its exudation from compressed veins in the neighbourhood of the tumour, with liberation of all the elements necessary to produce clotting. There is as yet no fully satisfactory explanation of the root pains which occur at the onset of many cases of myelitis.

The second case presented also as an ascending paralysis, although it did so in an irregular fashion, suggesting lesions at different levels of the cord, eventually becoming complete. Histologically, however, the picture was that of a diffuse meningo-encephalomyelitis, and resembled that seen in the virus encephalitides, such as St. Louis encephalitis, Japanese B. fever, Louping Ill. The emphasis is on meningeal mononuclear infiltration, with a diffuse and less intense perivascular infiltration throughout the neuraxis. The basal ganglia are not the main site of the infection as is seen in Von Economo's encephalitis, the type which is commonly followed by Parkinsonism. Olitsky and Casals (1948) give a good account of these diseases and emphasise their distinction from the encephalitides which may follow measles, smallpox, chicken-pox, and other virus diseases of man. The main pathological feature in these cases is a perivascular demyelinisation in white matter, although clinical distinction may be difficult or impossible. Acute

disseminated encephalomyelitis belongs pathologically to this group, which the authors conveniently name post-infection encephalitis. The second case is thus considered to be due to direct infection by a virus; not a sequel to a previous virus disease.

The two cases here recorded illustrate only two forms of myelitis. It is not easy to get a comprehensive view of the non-systemic affections of the spinal cord, but that proposed by Davison and Keschner (1933) is useful. In survey of the clinical and pathological aspects of forty-three cases of disease of the spinal cord, except disseminated sclerosis, they divided their cases as follows:—

A. Myelitis—Infectious.

B. Myelopathy— i. Toxic.

ii. Circulatory, due to compression, arteritis, or arteriosclerosis.

in Group A the evidence of infection is the presence of perivascular aggregrates of lymphocytes, plasma cells, and, in early cases, polymorphs. In Group B there is a necrotic process without such evidence of inflammation. If this occurs without a discoverable cause it is labelled toxic; otherwise it may be ascribed to compression, or to vascular disorders, such as arteriosclerosis or, more commonly, arteritis, usually syphilitic. The few arteriosclerosis cases recorded appear to correspond to those described by Greenfield and Turner (1939) as necrotic myelitis, and by Wyburn-Mason (1943) as angioma racemosum venosum of the spinal cord. It may well be that the arteriosclerotic process in some of these cases is secondary to a toxic agent and not a primary vascular disorder. Clinically, they may produce stationary paralysis referable to a definite level in the cord, but are often ascending. The differential diagnosis is discussed by Wyburn-Mason.

It would seem, therefore, that the distinction between the various forms of ascending paralysis may be difficult, if not impossible, on clinical grounds, and the two cases here reported illustrate this point. No mention has been made here of the ascending paralysis which may occur in the Guillain-Barré syndrome (infective polyneuronitis), where the lesion lies in posterior roots chiefly. Landry's paralysis is a term often used to mean any form of ascending paralysis, and thus has progressed far from the original description given by Landry. His was in essence that of a rapidly ascending paralysis, motor more than sensory, without involvement of the sphincters. Many writers (e.g. De Jong, 1940) have urged that this term be abandoned or at least retained only to indicate not a specific disease, but a syndrome. "Landry's syndrome" could include these two cases, and the term is useful to indicate the varied ætiology of the many diseases within the group. When the diagnosis of Landry's syndrome is applied to a case the implication is that it is not sufficient of itself; compression as a cause would have to be excluded by all possible means, even including laminectomy; leukæmia would have to be excluded, and efforts made to trace any infective or toxic agents.

SUMMARY

1. Two cases of "Landry's syndrome" are reported, the term being used to indicate an ascending paralysis of the spinal cord.
2. One case is due to compression by a chloroma, and the mechanism of ascent of the paralysis is discussed. The second case is due to a presumed infective agent.
3. The varied causes of the syndrome are emphasised, as well as the necessity to exclude compression as a cause by every possible means.

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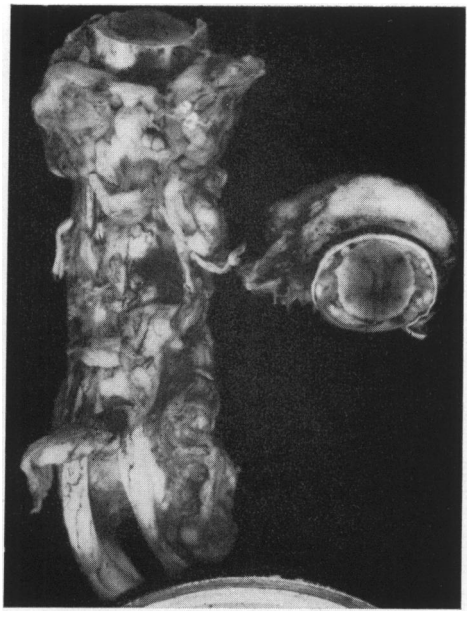
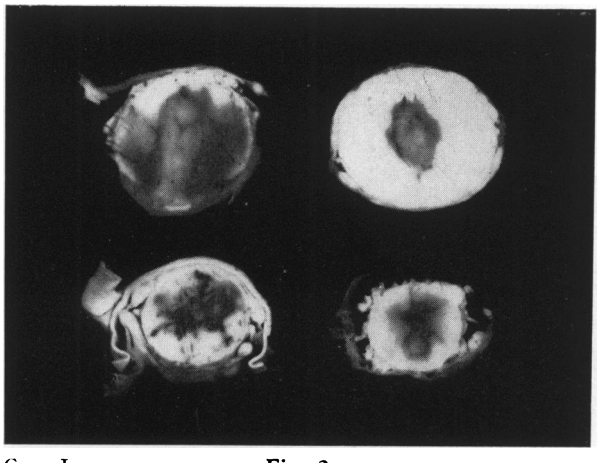


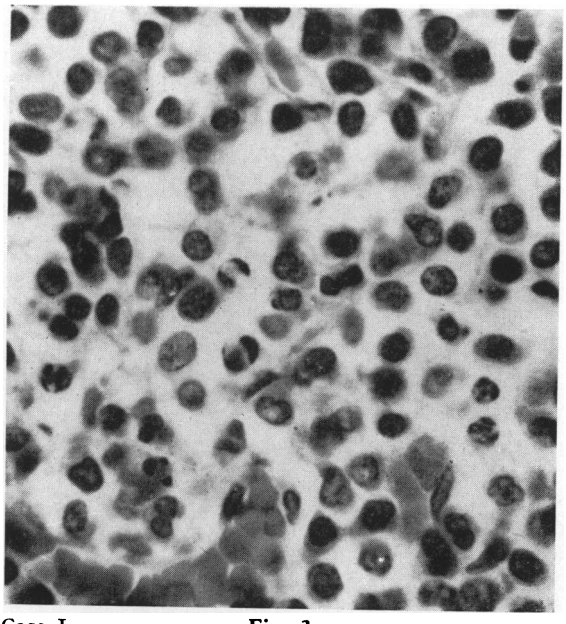
Case I. **Fig. 1**

To illustrate the mass of tissue present in the epidural space over spinal segments D.3 to D.6. (actual size)



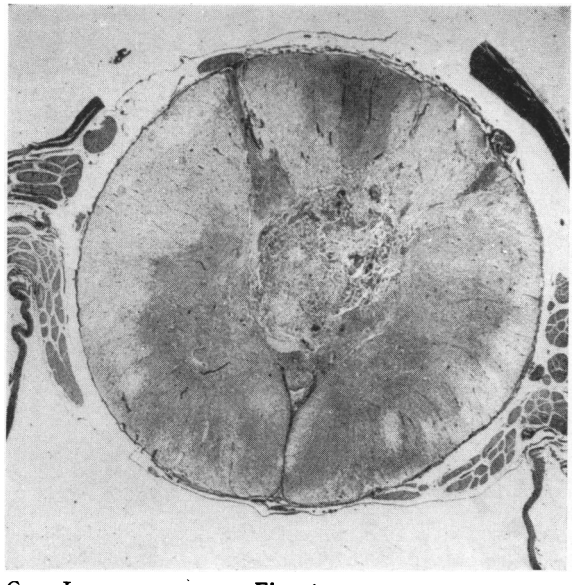
Case I. **Fig. 2**

This illustrates the œdema and hæmorrhage found in the affected segments of the cord. Note the tendency for the hæmorrhage to be central in distribution.
(actual size)



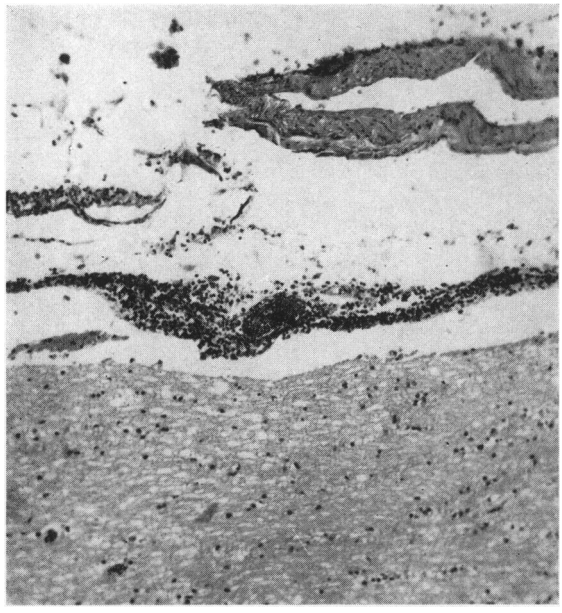
Case I. **Fig. 3**

To show the nature of the tumour tissue in the epidural space. It consists of myeloid cells, some of which contain eosinophil granules. x 475



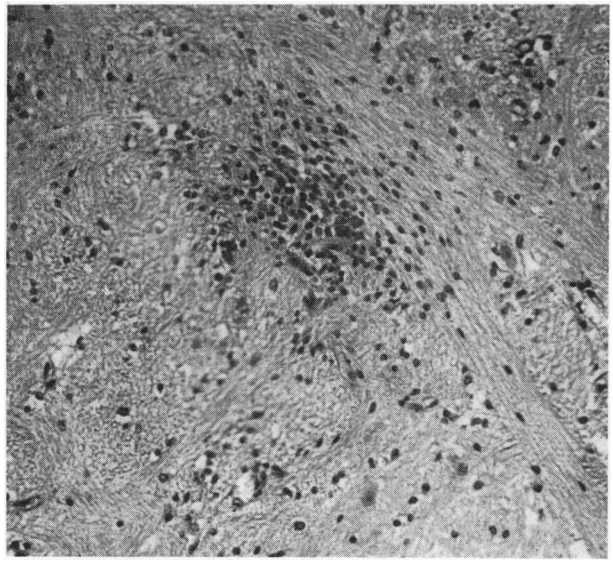
Case I. **Fig. 4**

To illustrate the central core of necrotic tissue which is present above the level of pressure in the cervical segments of the cord. x 8



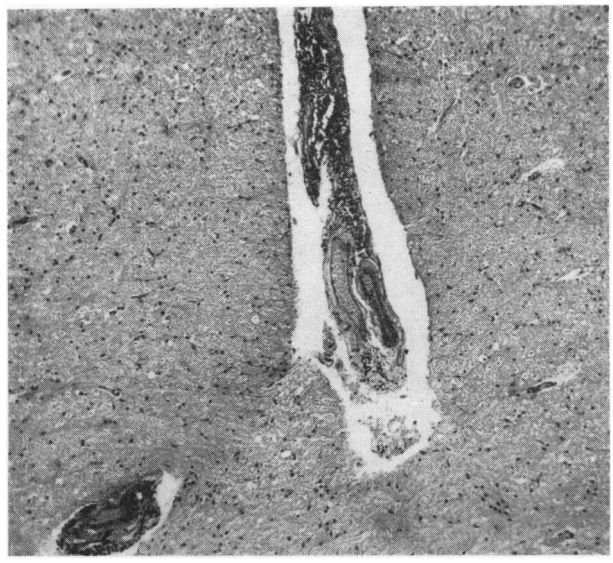
Case II. **Fig. 5**

To show the generalised meningeal infiltration by lymphocytes, which is present over the mid-brain. **x 120**



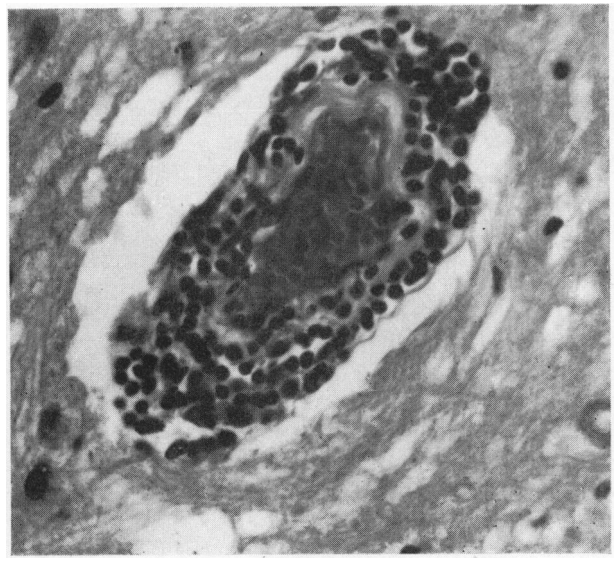
Case II. **Fig. 6**

To show a focus of glial reaction in the Pons. **x 180**



Case II. **Fig. 7**

Spinal cord, showing the meningeal infiltration in the anterior commissure, with extension along the perivascular space. x 100



Case II. **Fig. 8**

A perivascular space in the spinal cord, showing a marked infiltration with lymphocytes. **x 475**

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2. One case is due to compression by a chloroma, and the mechanism of ascent of the paralysis is discussed. The second case is due to a presumed infective agent.
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Pseudo-Leukæmic Lymphosarcoma

By Norman J. Ainley, m.b.

Institute of Pathology, Queen's University, Belfast.

It is over a century ago since Thomas Hodgkin described a condition characterised by "morbid appearances of the absorbent glands and spleen." Subsequently, it was found that Hodgkin had really grouped together a number of different diseases with similar gross appearances. From this group Kundrat separated off and defined the condition known as lymphosarcoma in 1893. Lymphosarcoma is a malignant tumour of the lymphoid tissues. It occurs chiefly in the middle age groups and appears more frequently in males than in females. It usually arises in one or other group of superficial lymph nodes and although it is claimed that the commonest site of origin is in the cervical lymph nodes, it is possible that enlargement of these nodes may be preceeded by an undetected enlargement of the thoracic or abdominal nodes (Willis, 1948). The tumour may occasionally arise from the abdominal or thoracic lymph nodes or sometimes from the lymphoid tissue of the tonsil, intestine, or from the spleen. Usually at autopsy most of the lymph nodes are enlarged and indications pointing to the site of the primary growth are only obtainable from the clinical history (Ehrlich and Gerber, 1935).

The tumour spreads to the uninvolved groups of lymph nodes and produces enlargement of these. It is possible that the tumour is of multicentric origin, that is, it arises simultaneously in several different groups of lymph nodes. The tumour also spread by the blood to the liver, spleen, heart, kidney, bone-marrow, etc. These metastases may only be detected on microscopic examination, but larger nodules of tumour tissue, visible to the naked eye, may be present. Microscopically, the tumour shows a very uniform cytological picture. It is composed of cells of the lymphoid series, both mature and immature forms of lymphocyte being present in varying proportions. These cells are small and have a narrow rim of cytoplasm surrounding a hyperchromatic nucleus. The more immature form show a vesicular arrangement of the nuclear chromatin, while the more mature forms present a darkly staining solid nucleus. Multinucleated cells and mitotic figures are very scarce in lymphosarcoma. These lymphoid cells do not produce any reticulum, and the silver impregnation technique shows only the normal reticulum of the tissue invaded by the tumour.

In the lymph nodes the proliferation of these tumour cells leads to a gradual loss of the normal nodal architecture. The tumour cells invade the capsule of the node and infiltrate the peri-nodal tissues. In the course of time the adjacent lymph nodes will become matted together into a larger mass of tumour tissue, which will be adherent to the surrounding structures. The tumour cells tend to invade the walls of the blood vessels and give rise to the leukæmic blood picture which is found in some cases of lymphosarcoma. However, it is not always possible to

predict a leukæmic blood picture from the presence of blood vessel invasion in an excised lymph node.

The above account is a description of the principal characteristics of the average case of lymphosarcoma, as quoted in most text-books. A case of lymphosarcoma will now be presented which shows several unusual features.

Case

The patient was a female aged 49, who was admitted to the medical wards on 13th May, 1948. Her complaint was that she had noticed a swelling under her right arm three weeks ago, and that one week ago she had noticed a similar swelling under her left arm. There was no pain or any other symptom. She gave no history of any previous serious illness and up to the onset of these swellings she had enjoyed good general health.

On examination, she was a healthy-looking, rather obese woman, showing no anæmia, jaundice, or œdema. In each axilla there was a firm, movable swelling about two inches in diameter. These swellings had the consistence of rubber. Similar swellings were present in both groins and in the right side of the neck. The liver and spleen were not palpable and the examination of the heart, lungs, and nervous system revealed no abnormal findings.

Blood Picture—Red cell count—4,800,000
Hb.—105 per cent. Sahli.
White cell count—5,900
Film—normal

Sternal Marrow—

Myeloblasts	0.5 per cent.
Myelocytes	11.5 per cent.
Neutrophils	24.0 per cent.
Eosinophils	1.5 per cent.
Lymphocytes	44.0 per cent.
Monocytes	1.5 per cent.
Immature Lymphocytes	3.0 per cent.
Pro-erythrocytes	14.0 per cent.

Axillary Lymph Node Biopsy—The glandular architecture was grossly altered by a proliferation of round cells, the appearance being that of a round-cell sarcoma of the lymphoid type.

On these findings the diagnosis of lymphosarcoma was made and radiotherapy was prescribed. This treatment began on 31st May, 1948. The enlargement of the lymph nodes almost completely disappeared after the first course of X-ray therapy, but subsequent courses failed to produce this beneficial result. On 17th January, 1949, the patient attended the X-ray department, complaining of breathlessness and abdominal enlargement. She was re-admitted.

On examination, she was very breathless and could only lie on her left side because of the dyspnœa. She was cyanosed and œdema of the ankles and sacrum was present. The abdomen was distended with fluid and the liver and spleen were enlarged. There were signs of bilateral pleural effusions. The axillary lymph

nodes were enlarged. A few hours after admission she became very dyspnœic and died.

Post-Mortem

18th January, 1949

The body was that of an obese, middle-aged female subject, showing œdema of the ankles. There were enlarged lymph nodes in the left axilla and groin. The abdomen contained several pints of hæmorrhagic fluid and there were over five pints of serous fluid in the left pleural cavity and one pint in the right. The heart and lungs showed no relevant abnormalities, apart from some pulmonary œdema. The liver weighed 4½ lb. The serous surface was smooth and the cut surface presented a normal liver pattern. The spleen was greatly enlarged and weighed over 4 lb. The serous surface had a coarsely granular appearance and the upper pole was adherent to the diaphragm. On section, the cut surface had a very striking appearance. The Malpighian bodies were enlarged and their bright yellow colour stood out in vivid contrast to the surrounding dark red splenic pulp (Fig. 1). The capsule and trabeculæ were not thickened and the splenic vessels were normal.

The alimentary tract, genito-urinary organs, endocrine organs, and the brain did not show any significant abnormalities.

There was some enlargement of the mediastinal lymph nodes. The peri-pancreatic lymph nodes were considerably enlarged and discrete. They had a pale fleshy appearance on section, and on palpation had a rubbery consistency. The para-aortic nodes together with the pelvic nodes formed a large mass surrounding the aorta and extending along the iliac vessels into the pelvis. These lymph nodes had a similar appearance to those around the pancreas (Fig. 2).

Histology

Lymph Nodes.—A low-power view showed that the node contained many follicle-like areas. These areas and the medulla of the node were composed mainly of cells larger than a lymphocyte. These cells had a large darkly staining nucleus which had a coarse chromatin network and was surrounded by a scanty cytoplasm. They were mixed with a few mature lymphocytes showing a more solid-looking nucleus. There was an occasional very large cell, with a very large nucleus showing a delicate web-like nuclear chromatin. These cells had invaded the capsule of the node and were spreading in the perinodal tissues. Multinucleated cells and mitotic figures were very scarce. The silver stain showed condensation of the normal nodal reticulum around the follicular areas, but failed to reveal any new formation of reticulum by the tumour cells (Fig. 3).

Liver.—Under the low power the liver presented many large follicular cellular areas. These were all related to the portal tracts and there was no destruction of liver tissue. They consisted of the same cells as those seen in the lymph nodes (Fig. 4). There was no new formation of reticulum. The liver cells showed some fatty change and the vessels and bile ducts appeared to be normal.

Spleen.—The Malpighian bodies were represented by large areas of cellular tissue which had a more or less uniform appearance and in which no definite

germinal centres could be distinguished. They were composed of the same cells as the lymph nodes, forming a mantle around the central arterioles. In these areas there was no new reticulum formation. The splenic pulp was engorged with blood and there were no foci of abnormal cells present.

The bone marrow and subpleural tissues were the site of similar lymphoid cell infiltration. The other organs did not present any relevant abnormal histological findings.

Summary of Post-Mortem Findings

Lymphosarcoma, with involvement of axillary, inguinal, mediastinal and abdominal nodes, also spleen, liver, marrow, and sub-pleural tissues.

Serous effusions in pleural and peritoneal and pericardial cavities.

Pulmonary œdema.

Discussion

This case is presented because it shows several most interesting and unusual features. The cut surface of the spleen with its large malpighian bodies bears a resemblance to the spleen illustrated in Ross's paper on the Follicular Reticuloses (1933). Follicular reticulosis or follicular lymphadenopathy is a condition of lymphoid tissue where there is an increase in the size and number of the lymph follicles. These cases of follicular reticulosis or follicular lymphadenopathy can undergo a malignant change and become what Symmers calls a polymorphous cell sarcoma (1938 and 1942). This lymphosarcoma differs from the present case in that it is composed of cells of a more primitive type. Pantridge (1947), in a study of the biopsy and autopsy material of this department during the years 1937 to 1946, found that twenty-seven per cent. of lymphosarcomata arise from a preceding follicular reticulosis.

These prominent malpighian bodies are an unusual finding in lymphosarcoma; the splenic metastases usually take the form of small foci of tumour cells and only in a few cases are the malpighian bodies replaced by tumour cells (Ehrlich and Gerber, 1935).

The chief interest of this case lies in the histological picture of the liver. As a rule the liver metastases assume the form of small, well-circumscribed nodules of tumour tissue which may be visible to the naked eye and which have a similar gross appearance to those of any other tumour, such as an abdominal carcinoma. The nodules compress and distort the surrounding liver tissue. They are distributed through the liver in an irregular fashion and bear no constant relation to the portal tracts or any other liver structure. In the present case the liver, on macroscopic examination, showed no evidence of tumour metastases. Microscopically, there was a most extensive and diffuse peri-portal infiltration by tumour cells. Every portal tract was involved, but there was no distortion of the surrounding liver tissue pattern. This liver showed a histological picture very like that associated with lymphatic leukæmia, and on account of this marked resemblance, the title "Pseudo-Leukæmic Lymphosarcoma" is suggested for this

condition. It will be noticed, however, that the histological picture of this liver does not exactly correspond to that of a leukæmia. In this liver there is a tendency towards follicle formation, as the more mature lymphocytes can be seen to occupy the peripheral zone of the portal tracts.

Some cases of lymphosarcoma show a leukæmic blood picture. In the present case, unfortunately, the results of any blood examination performed before death are not available. There was no evidence of blood vessel invasion in any of the lymph nodes examined. Gall and Mallory (1942) regard the presence of a leukæmic blood picture as a mere incident in the course of any lymphoid tissue tumour. In their study of 618 cases of lymphoid tissue tumours, leukæmia was found in 48 per cent. of "Lymphocytomata" and in 38 per cent. of cases of "Lymphoblastic Lymphoma." They selected fifty cases which showed at one time or another a leukæmic blood picture for careful study. In only ten of these cases was the leukæmia constantly present throughout the course of the disease. There was great difficulty in correlating the histological picture of the lymph nodes with the presence or absence of a leukæmic blood picture, and these authors emphasise the impossibility of predicting the presence of a leukæmic blood picture on the basis of any constant morphological criterion. Willis (1948) also regards the occurrence of a leukæmic blood picture as "merely a concomitant of some lymphatic tumours." He further states that it is impossible, from microscopic examination of an excised node, to distinguish between lymphosarcoma and lymphatic leukæmia.

Many attempts have been made to classify the lymphoid tissue tumours. This has led to the introduction of a very confusing nomenclature and the literature on these conditions is bristling with terms like lymphadenoma, lymphoma, lymphoblastoma, reticulœndothelioma, reticulum cell sarcoma, giant follicular lymphadenopathy, etc. These names were applied to the different types of tumour and were taken to represent single, well-defined and separate disease entities. Some of these attempts at classification have been made on a cytological basis by Robb-Smith (1938) and others. But this great group of lymphoid tissue diseases is a very labile one. The histological picture of each member varies considerably and many transitional forms are found. Furthermore, combinations of several of these diseases may be found in the same patient, and in one of Symmers cases the lesions of Hodgkin's disease, lymphosarcoma and follicular reticulosis, were present in different parts of the same lymph node. These variations in the histological picture provide interest to fascinate the student of the lymphoid tissue tumours and create difficulties to frustrate the pathologist who has to report on an excised lymph node.

The present-day view is that originally put forward by Warthin (1931) and supported by Willis (1948) and others. They regard these conditions not as separate and distinct diseases, but as variants of one disease. The names used for the chief variants have some value as clinical and descriptive terms, but should not be regarded as indicating separate pathological entities. In a recent paper Custer and Bernhard (1948) support this view, after a study of 1,300 cases of lymphoid

tissue tumour. They emphasise the striking fluidity of the histological picture in their cases and condemn any attempts at rigid classification.

This case of lymphosarcoma has been presented principally because of the curious form of the liver metastases, and without being too dogmatic, the title "Pseudo-Leukæmic Lymphosarcoma" is advanced for the condition.

Summary

1. The histological and general pathological features of lymphosarcoma are described.
2. A case of lymphosarcoma showing several unusual features is presented.
3. The unusual features of this case are mentioned and the lymphoid tissue tumours in general are discussed.

I wish to thank Professor J. H. Biggart and Dr. J. E. Morison for help in writing this paper.

Thanks are also due to Mr. D. McA. Mehaffey, A.R.P.S., for the photography, and to Mr. Robert Russell, A.I.M.L.T., for the histological preparations.

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REVIEW

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The fact that Dr. Bowley's book has run to three editions since its first appearance in 1942 is a measure of its usefulness. It is intended for the guidance of parents and teachers, but could well be included in the library of the general practitioner, who is constantly asked as to whether such and such a child's development is normal; in that of the pædiatrician; and more particularly in that of the psychiatrist, who will soon be at sea in dealing with the abnormal child if he does not have a clear idea of what is the normal development in children.

This latter the book provides in a clear, concise, and readable manner, together with a comprehensive bibliography on each stage of development, which will permit of more intensive study.

The enlargement of the chapter on Adolescence in this edition is an improvement, and, considering the times we live in, it is perhaps wise that the chapter on Children and the War remains.

Some of the definitions in the glossary might be improved. For instance, masochism is not "pleasure of inflicting pain on oneself," but pleasure obtained from pain inflicted on oneself," traumatic is not "liable to cause shock," but "resulting from injury," and metabolic is not "relating to digestion," but relating to the biochemical processes of nutrition and excretion."

D. B. M. L.

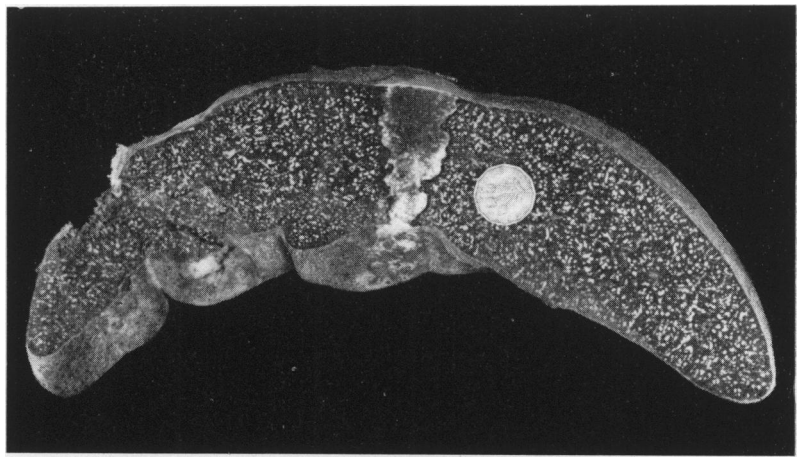

Fig. 1

Spleen: Pseudo-leukæmic lymphosarcoma. The large and prominent malpighian bodies are clearly shown. A small infarct is present.

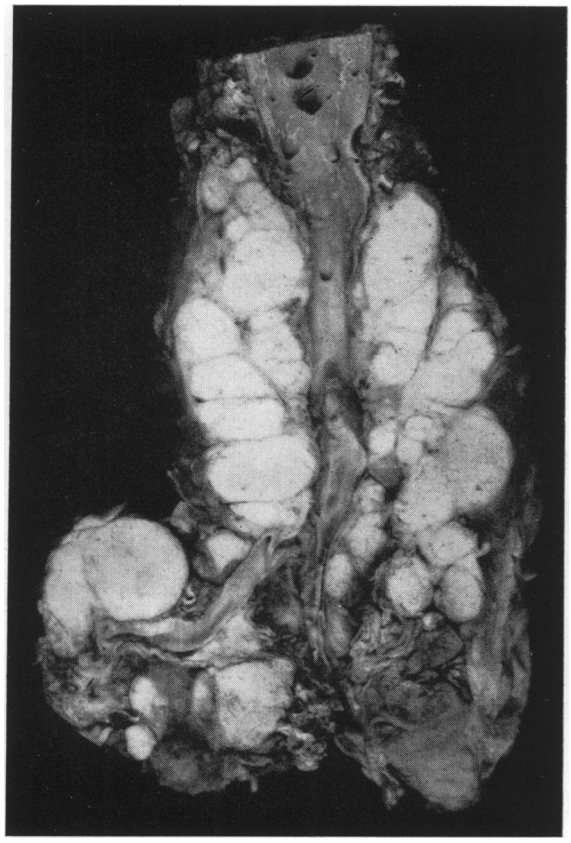

Fig. 2

Para-aortic lymph nodes, pseudo-leukæmic lymphosarcoma. These are greatly enlarged and present a pale, fleshy appearance on section.

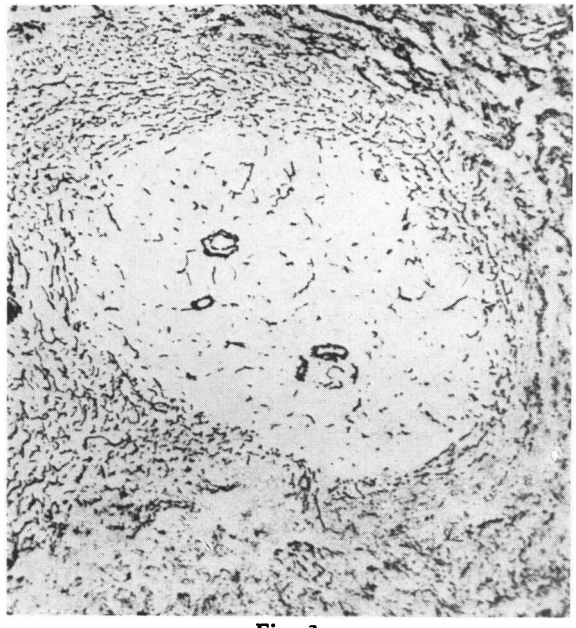

Fig. 3

Lymph node, pseudo-leukæmic lymphosarcoma. One of the follicular areas is shown. The normal nodal reticulum is condensed around this area, and there is no new formation of reticulum by the tumour cells in follicular area. Foote's silver x 70.

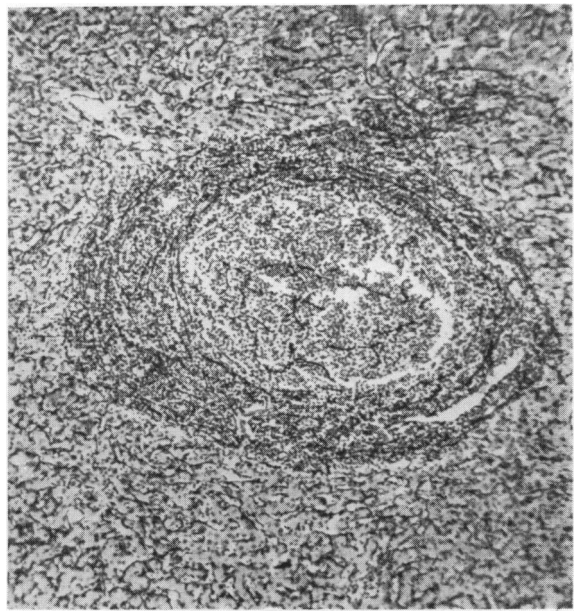

Fig. 4

Liver: Pseudo-leukæmic lymphosarcoma. A portal tract containing a follicle-like area of lymphoid cells. The normal liver reticulum is condensed around the area, and there is no new formation of reticulum by the tumour cells. Foote's silver x 70.

tissue tumour. They emphasise the striking fluidity of the histological picture in their cases and condemn any attempts at rigid classification.

This case of lymphosarcoma has been presented principally because of the curious form of the liver metastases, and without being too dogmatic, the title "Pseudo-Leukæmic Lymphosarcoma" is advanced for the condition.

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D. B. M. L.

Tuberculosis: The Chemotherapeutic Approaches

By GEORGE BROWNLEE, B.SC., PH.D.

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THE term, chemotherapy of tuberculosis, implies a simplified concept which may have been compromised in the reader's mind by the experience of successful chemotherapy in other fields. It is not a misplaced pedantry which leads clinicians to speak of the "management" of tuberculosis, but rather a work-a-day acquaintance and understanding of the many diverse pathological conditions involved. The mechanical changes have links in common with those found in typhoid fever, in schistosomiasis, in leprosy, and in syphilis. These basic facts were elicited fifty years or more ago by some of the most remarkable pathological studies ever reported, and there is a danger which some see lurking in a certain neglect of these lessons by those of us whose business it is to study the chemotherapy of tuberculosis, both experimentally and clinically. No other host-parasite relation has been the subject of such detailed enquiry at the hands of the pathologists (Rich, 1944), bacteriologists, chemists (Wells and Long, 1932; Anderson, 1932), and others. Appreciation of the unusual pathology of this normally self-limiting chronic disease has emphasised the desirability of approaching the problem of elimination of the parasite on a broad front. It will be convenient for our present purpose first, to point the nature of the biochemical lesions which the observed pathological changes indicate, and from this basis, to review the present advances.

Usually, by the time the disease is identified clinically it has established its characteristic pathology, the tubercle, and this is so even in tubercular meningitis (Rich and McCordock, 1933). The minimal clinical lesion visualised, for example, by X-ray shadows, represents destructive changes and reflects, as we shall see at least two 'biochemical lesions.'

THE ORIGIN OF THE TUBERCLE AND ITS ULTIMATE FATE

Many studies of all stages of the development of tubercles enable an unequivocal description to be given (Rich, ch. 18, 1944). Within a few minutes of an experimentally-induced infection a normal mononuclear phagocyte ingests a (single) invading tubercle bacillus. The cell increases in size, its nucleus enlarges, and it becomes an epithelioid cell (Sabin and Doan, 1927). Next, fusion of several epithelioid phagocytes takes place to give a Langhans giant cell, with its numerous nuclei arranged in a 'rosette,' or there may be formed the less frequent 'foreign-body giant cell' in which the nuclei are scattered. Within three or four days a small nodule is built up by clustering epithelioid cells, shown by Metchnikoff (Soper, 1917) to be simply altered monocytes. Since the nodule grows progressively after access to blood-borne phagocytes is cut off, it is believed (Rich, 1944) that multiplication of the phagocytes occurs *in situ*. Gradually the adjacent tissue cells are

pushed aside, dying from nutritional deficiencies due to pressure of the expanding tubercle. At this stage of development collagen fibres, demonstrated by suitable stains, are formed between the epithelioid cells. Should multiplication of the bacillus be held in check no necrosis is observed, and with the death of the tubercle bacilli, the transfer to collagen becomes progressive, the tubercle becoming fibrous, so that only a nodule of fibrous tissue finally remains. Complete resolution and disappearance of the tubercles has been frequently reported, and this is also true of large tubercles which had proceeded to central caseation in guinea-pigs (Gardner, 1922). Should multiplication proceed, the central portion dies and becomes necrotic.

Permeability of the Tubercle

Important from any consideration of chemotherapy is whether tubercles and associated caseous tissue are readily permeable. Rich (1944) points to the inherent evidence of viable tubercle bacilli and host cells dependent upon diffusible nutrilites for their continued survival, and to the frequency with which central foci become calcified. Much additional evidence is now available from chemotherapeutic studies with diaminodiphenylsulphone derivatives, such as promin (Feldman, Mann, and Hinshaw, 1942), and sulphetrone (Brownlee and Kennedy, 1948), and of the positive evidence of diffusibility derived from successful streptomycin therapy in miliary tuberculosis of man (Baggenstoss, Feldman, and Hinshaw, 1947). Brownlee (1948) has found sulphetrone to penetrate normal and caseous tissue of man with equal facility.

Hypersensitivity and Necrosis

Although the death of host cells appears to follow to some degree the lodgment of the foreign body which the tubercle bacillus also is, it is now known that the widespread tissue destruction, which characterises the disease, follows the conditioned hypersensitivity induced by the products of metabolism of virulent pathogens. The protein component is known to be responsible and appears to be identical with tuberculin, which is harmless to the normal nonsensitised animal, but is a deadly poison to the sensitised host. All that is known of this mechanism confirms the opinion that the clinical disease in all its manifestations follows from the phenomenon of hypersensitivity. Actively multiplying organisms appear to be essential, and virulence in this connection connotes a capacity to multiply.

Caseation

Liquefaction of body cells after their death is the normal prerequisite for disposal by phagocytes and is a function of proteolytic enzymes identified in both host cells and macrophages. In the characteristic tuberculous lesion partial autolysis only occurs, so that the necrotic cells lose structure, outline, and nuclei to become, together with their intercellular materials, a formless 'caseous' mass. Opinion is divided on the reason for incomplete digestion. Opie and Barker (1914) showed that active enzymic function could be identified with the onset of caseation, but subsequently ceased, whether due to absence or inactivation, was not proved. Jobling and Petersen (1914) found the soaps of unsaturated fatty acids extracted

from tubercle bacilli to inhibit *in vitro* the proteolytic activity of the leucocytic enzymes, and this inhibition was itself reversed by iodine. On the other hand, caseation is characteristically observed in man in infections with micro-organisms, which attract mononuclear phagocytes, for example, in typhoid fever, but not in the allied colon bacillus infections which attract *polymorphonuclear* phagocytes. It is of great interest that typical caseation follows the necrosis of "lipoid pneumonia," which results from the accidental introduction of, for example, liquid paraffin or cod-liver oil into the human lung. An outpouring of mononuclear phagocytes characterises these lesions also (Rich, ch. 18, 1944). The predominance of mononuclear phagocytes in caseous lesions induced the comparison of Weiss and Czarnetzky (1935) between the proteolythic enzyme activity of the two types of cells. The monocytes of rabbits contained one proteinase, pepsin, with an optimal activity at pH3, whereas the polymorphonuclears contained pepsin, cathepsin, and trypsin, with optima at pH3, 5.4, and 8 respectively.

Softening

The 'softening' of caseous lung substance allows imprisoned tubercle bacilli to be discharged into the air passages and thus to infect new sites. In contrast to caseous areas, a remarkable characteristic of softened areas is the large number of tubercle bacilli they contain. It seems logical to attribute the lysis of caseous material to enzymic action, but this is unproven. Tubercle bacilli are known to be poor in proteolytic enzyme content (Wells and Long, 1932), and the current view appears to attribute the renewed digestion to the activity of infiltrating polymorphonuclear leucocytes, which are commonly identified in freshly softening areas (Huebschmann, 1928; Rich, 1944).

Fate of the Caseous Lesion

Should the tubercle bacilli die the caseous area may become encapsulated by connective tissue, or it may be resolved. This surprising observation is now well documented (Burke, 1922; Willis, 1934; Oppenheimer, 1935).

Calcification

The calcium phosphate, which is deposited in caseous areas, has the same composition $Ca_3 (PO_4)_2$ as that of normal bone (Wells and Long, 1932) and, apart from the suggestive indications that high serum calcium and phosphorus concentrations influence calcium deposition (Bullock, 1930), as, for example, in children, generally, and that phosphatases (Bell, 1945) and Vitamins A. (Mellanby, 1944) and D play an important, but as yet undisclosed part, no final comment may be made on the conditions governing deposition of calcium in necrotic tissue.

Mode of Action of the Tubercle Bacillus

We are now in the position to examine three important biochemical reactions conditioned by the host-parasite relation, and to enquire further into the activity of the specific substances involved.

1. The bodies of infecting tubercle bacilli contain substances which resist degradation by the ordinary defensive mechanisms and which are treated by the host in an unusual way. Instead of being engulfed by polymorphonuclear leucocytes and carried to the lymph nodes for digestion and elimination, they are absorbed *in situ* by monocytes which may subsequently be converted into a tubercle. It is noteworthy that this is the beginning of a usually successful self-limiting process and it is tempting to regard it as a protective device on the part of the host. Numerous observers (Maximow, 1924; Rich, 1944) have been impressed enough by the non-toxicity of multiplying virulent tubercle bacilli for normal tissue, or in tissue culture preparations, to describe the association as symbiosis. Nevertheless, the immunity of the bacillus within the monocyte and, should multiplication ensue, the subsequent production of caseous tissue appear to indicate a common biochemical lesion associated with specific enzyme inhibition.

2. The tubercle bacillus produces no pharmacological poison, either of exotoxic origin excreted during the life of the bacillus, or of endotoxic nature liberated by lysis after its death. Should multiplication ensue, a product of metabolism induces hypersensitivity of adjacent host cells, with the result that an otherwise innocuous product becomes a poison responsible for the death of cells. This remarkable host parasite collaboration is responsible for the majority of the clinical manifestations of the disease.

3. During infection the host may develop a capacity to modify the course of the disease—an acquired resistance.

The Chemical Composition of Tubercle Bacilli and the Biological Activity of its Components

Subsequent to the admirable summary of Wells and Long (1932) on the chemical composition of tubercle bacilli, Sabin (1932) described the biological effects produced by the lipoids fractionated by Anderson (1932) and his colleagues from standard strains of acid-fast bacteria. These workers described three main fractions: a 'phosphatide,' extracted by alcohol-ether, an acetone-soluble 'fat,' and a chloroform-soluble 'wax.' The chloroform fraction is not a true wax, but is a complex phosphatide of unusual composition. It yields numerous glycerides of fatty acids of the phthioic acid series, together with phosphorus, glycerol, and a polysaccharide. The acetone-soluble 'fat' contains neither phosphorus nor nitrogen and yields a carbohydrate and numerous fatty-acids on hydrolysis. The acids present are butyric, palmitic, stearic, cerotic, linoleic, linolenic, tuberculostearic, and phthioic acids. The acetone fraction has proved to be the best source for the characteristic fatty acids of the tubercle bacillus (Table I).

From the acid hydrolysis of the phosphatide has been obtained an analogue of stearic acid $C_{18}H_{36}O_2$ named tuberculostearic acid, subsequently shown by Spielman to be 10-methylstearic acid, and was found by Sabin (1932) to be without biological activity. There were also separated d- and l- hexacosanic acids, $C_{26}H_{52}O_2$, named phthioic acid, of which only the d- acid had biological activity (Sabin, 1932). Analogous, but optically inactive, acids with biological activity (Sabin, 1932) were

extracted from the lipoids of avian, and bovine tubercle bacilli by Anderson (1932). It seems likely that Anderson's 'phthioic acid' is a mixture, and Polgar and Robinson (1945), after synthesising a number of methyl-substituted long-chain acids and reviewing the chemical, physical, and biological evidence, expressed a preference for 3 : 13 : 19—trimethyltricosanoic acid as 'phthioic acid.'

TABLE I

Cleavage products from bacterial phosphatides

(From Anderson, 1932)

	Human	Avian	Bovine	Timothy	Leprosy
	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Total ether soluble	66-67	55-56	57-58	60	62.2
Palmitic acid	30.5	18.4	27.0	20.0	18.6
Oleic acid after reduction to stearic acid	12.8	18.4	7.0	5.6	13.8
Liquid-saturated fatty acids, presumably mixtures of tuberculostearic and phthioic acids	20.9	14.1	16.0	18.0	13.5
Total fatty acids recovered	64.2	53.7	50.0	43.6	45.9
Water-soluble constituents	33-34	46-47	43-44	40.0	38.0
Mannose	9.2	13.3	6.7	9.5	5.2
Inosite (inositol)	8.9	3.0	3.5	2.2	0.6
Other Sugars	12.3	—	—	—	20.6
Glycerophosphoric acid	5.4	6.0	9.9	10.0	—

ACID-FASTNESS

A large group of organisms, of which the tubercle bacillus is one, resist decolourisation with acids after dying with aniline dyes. This property is retained by the 'waxy' phosphatide and of that complex by an acid of high molecular weight named 'mycolic acid' (Anderson, 1932; Stodola, Lesuk, and Anderson, 1938). Certain evidence points to the fact that the physio-chemical state of mycolic acid within the bacillus contributes to acid-fastness (Benians, 1912; Sherman, 1913).

BIOLOGICAL PROPERTIES OF THE ISOLATED LIPOIDS

In the hands of Sabin and her colleagues (Sabin, Doan, and Forkner, 1930; Sabin, Smithburn, and Thomas, 1935; Sabin, 1932) all three of Anderson's (1932) lipoid fractions, but no other fraction, protein, or carbohydrate, produced tubercles. Of these, phosphatide was most active in giving epithelioid, giant cells, and subsequent caseation, and this applied to phosphatide from human, avian, bovine, timothy grass, and lepra bacilli, in that order of biological activity (Sabin, 1932). The only other substance among the controls which 'acts just like the tuberculo-phosphatide' (Sabin, 1932) is lecithin. Tuberculostearic acid was found to be irritating, but did not produce tubercles. Dextrorotatory phthioic acid—but not levorotatory—produces typical tubercles. Sabin (1932) has refuted the suggestion of Boissevain and Ryder (1931) that bacillary debris accounted for the phosphatide activity. Still others (Bloch, 1936) are critical of the specific activity of the phosphatide being attributable to phthioic acid. Of more moment is the

criticism of Rich (1944), who points to the disproportionate amounts of phosphatide, and of phthioic acid needed to produce tubercles and caseation compared with the observable depredations of a single bacillus. For example, the phosphatide from 300 mg. of bacilli produced a little caseation in one of four guinea-pigs injected intraperitoneally and in each of two receiving the amount from 8.0 grm. of bacilli (Smithburn and Sabin, 1932). More recently Ungar, Coulthard, and Dickenson (1948) found the synthetic 3 : 13 : 19—trimethyltricosanoic acid of Polgar and Robinson (1945)—to be more active than crude d-rotatory phthioic acid from human tubercle bacilli in the production of tubercle-like granulomata, which 'corresponded in some respects to the description of Sabin, Doan, and Forkner.' Of fifteen synthetic acids tested, ten were as active as or more active than the natural product. The most active synthetic substance was 3 : 12 : 15—trimethyldocosanoic acid, which showed granulomata with as little as 10 to 25 mg. in a single intraperitoneal dose suspended in watery alcohol. The surface layer of precipitated phthioic acid analogues is no doubt very different from that of the continuous film of the intact bacillus. Realization of this fact prompted Ungar (1949) to observe the chemiotactic response of macrophages to agar blocks in which these acids were entrained and then subsequently implanted in the peritoneal cavity of guinea-pigs. The first cells to penetrate were polymorphonuclear leucocytes and lymphocytes; then came monocytes, which engulfed the particles and became typical epithelioid cells. The same worker has made some preliminary observations which, if confirmed, will shed light on the quantitative aspect of the responses of phthioic acid and its analogues. Ungar (1949) coated killed colon bacilli with 3 : 13 : 19—trimethyltricosanoic acid—and injected the suspension intraperitoneally into guinea-pigs; the subsequent granulomata of the omentum, and elsewhere, were indistinguishable from those of killed tubercle bacilli simultaneously injected into controls, and differed entirely from the minor reactions observed in control animals injected with suspensions of colon bacilli.

Biological Significance of the Carbohydrates

The tuberculocarbohydrates isolated by Johnson, Coghill, Brown, and Renfrew (from Sabin, 1932); the polysaccharides isolated from the lipoids by Anderson (1932); and the carbohydrate isolated from media by Long and Seibert were studied by Sabin (1932). Their biological activities appear to be restricted to a chemiotactic and damaging effect on leucocytes. They have no power to induce hypersensitivity (Sabin, Joyner, and Smithburn, 1938), but can act as haptens (Laidlaw and Dudley, 1925). That is to say, unlike the pneumococcus specific carbohydrate (Avery and Gobel (1933); Felton (1938)), the tuberculocarbohydrate does not stimulate antigen formation or induce protection, but is capable of reacting in precipitin tests with sera from infected hosts.

Biological Significance of the Proteins of the Tubercle Bacillus

A number of proteins have been extracted from the tubercle bacillus ond one from the medium in which it is grown (Wells and Long, 1932). In their most pure forms these proteins have practically no toxicity for the uninfected body (Seibert

and Munday, 1931), but are lethal as was first demonstrated by Koch (1891) for impure 'tuberculin' in extremely small doses for the tuberculous subject. The innocuous nature of purified tuberculoprotein for non-sensitised cells was demonstrated in an elegant way in tissue-culture preparations by Rich and Lewis (1932) and contrasted with its lethal effect on similar cells from tuberculous hypersensitive animals (Aronson, 1931; Moen and Swift, 1936). Thus, although innocuous for the normal, it is highly toxic for the tuberculous hypersensitive body, causing necrosis, fever, severe constitutional symptoms, and even death. These facts, first demonstrated by Koch, have been repeated many times (Long and Seibert, 1926) and have been redemonstrated in a most convincing fashion by Seibert (1941), using 'pure' tuberculin. Thus, while hypersensitivity is demonstrably a response to protein within the bacillus, no convincing evidence has been offered that this hypersensitivity can be induced in the *normal* animal with the protein itself. Only whole bacilli, living or dead, successfully initiate tuberculin hypersensitivity. The tuberculoproteins are antigenic (Seibert, 1941; Deinnes, 1929; Pinner, 1928), but they have no protective capacity.

Acquired Resistance

While infection with the tubercle bacillus does not confer the stable and solid protection acquired after diphtheria or smallpox, there is little doubt that a significant degree of protection is attained (Rich,1944). Although widespread agreement exists that the living attenuated bovine bacillus of Calmette (1924), BCG, confers recognisable acquired resistance in laboratory animals, there has been more reluctance to accept the claims for heat-killed tubercle vaccine. A meticulous and critical reviewer like Rich, writing in 1944, speaks of the established fact, doubted for years, and quotes numerous successful investigators (Boquet and Laporte, 1937; Pagel, 1937; Thomas, 1933; Lange, Freund, and Jochimsen,1927), yet Raffel (1946) is unable to satisfy himself that a heat-killed vaccine confers resistance. In the writer's laboratory Brownlee and Kennedy (1949) found the glycerol-killed vaccine of Griffith and Glover (1939) to be little less effective than a BCG living vaccine.

Elimination of the Parasite—Indirect Approach

Attempts to demonstrate acquired resistance with BCG and killed vaccine in the laboratory animal (Table 2) have probably also been successful for man (BCG, Irvine, 1934) (killed vaccine, Kayne, 1936). However, no recombination of the known chemical fragments has, as yet, proved successful. It appears that the antigenic complex which confers resistance is labile and readily destroyed by chemical manipulation. Renewed attempts, as, for example, by the extraction of living cells with urea solutions, probably at low temperatures, appears justified. The synthetic or semisynthetic approach may prove amenable, since the identification of the precise chemical causal agent associated with the biochemical lesion observed in the tubercle may have already occurred in the substance at present labelled 3 : 13 : 19—trimethyltricosanoic acid; but of greater significance is the uncovering of synthetic analogues of enhanced biological activity.

TABLE II

Immunological responses of guinea-pigs to an attenuated tubercle bacillus, a tubercle vaccine, and its chemical fragments

Preparations Injected	Acquired Resistance	Purified Tuberculin Responses	Biochemical Lesions Associated With
1. BCG - - -	+ ...	+ ...	Acquired resistance Chemiotaxis of monocytes Inhibition of proteases Hypersensitivity effect Skin allergy
2. Suitably prepared vaccine - -	+ ...	+ ...	as 1 above
3. 'Wax'† - -	— ...	+† ...	Chemiotaxis to monocytes Inhibition of proteases Skin allergy
4. Phosphatide - -	— ...	— ...	as 5 below
5. 'Phthioic acid' - -	— ..	— ...	Chemiotaxis to monocytes Inhibition of proteases
6. Crystalline Protein -	— ...	— ...	Hypersensitivity lethal collaboration
7. Polysaccharide - -	— ...	— ...	Chemiotaxis of leucocytes

† 'Wax' contains bound protein

ARTIFICIAL ANTIGENS

Not only may the specific acids, protein and carbohydrate, of the parasite be recombined, but they may be linked, individually or in combination, to antigenically significant proteins, with the object of improving upon the natural antigen which confers active resistance. In these reactions, not only the protein carrier, but the nature of the chemical linkage has proved significant.

In the writer's laboratory Brownlee and Friedmann (1949) prepared artificial antigens from oleic, palmitic, stearic, 'phthioic acid,' and 'total phthioic-like acids.' Well-defined crystalline azides were obtained with stearic and palmitic acids and these were coupled to horse-serum globulin and to the high-sugar fraction of albumen (Hewett, 1937), and, also for obsorption tests, to gelatine. While the complexes were antigenic they retained no hapten specificity. Oleic acid, 'phthioic acid' and 'total phthioic-like acids' did not give identifiable azides, but gave complexes by coupling their acid chlorides to the same protein carriers at an alkaline pH. Of these, probably only the 'total phthioic-like acids' and oleic acid retained hapten specificity and oleic acid was best.

Four of these antigens, BCG living vaccine, H37RV glycerol-killed vaccine, oleic acid-globulin, and 'total phthioic acid-like acids' formed the basis of a guinea-

pig protection comparison. The infecting strain was a virulent human tubercle bacillus, 'Carstars'—H37RV was deliberately avoided—which gave an average infected life of thirty weeks in the control animals. The final basis of comparison was a 'tuberculosis index' (Brownlee and Kennedy, 1948) based upon the distribution of the disease in affected organs, and its histological significance in addition to factors like duration of infected life. The artificial antigens were without protective action, while the BCG and the glycerol-killed H37RV vaccine conferred similar and significant resistance.

The possibility of interference with essential metabolites or growth factors on the basis of substrate competition is now well appreciated (Woods, 1940; Fildes, 1940), but the possible intervention of antibodies raised *in vivo* in response to artificial antigens containing the metabolite as hapten, is an alternative weapon.

With the starting point of phthiocol, the yellow pigment of human tubercle bacilli (Anderson and Newman, 1940); Brownlee and Friedmann (1947), prepared albumen, globulin, gelatine, and egg-albumen antigens to a series of twelve synthetic analogues of phthiocol. Hapten specificity was probably never encountered in this series and no compound was subjected to animal protection experiments.

'Protective Capsule'—Direct Approach

The slow growth of the tubercle bacillus, its marked hydrophobic properties, and its persistence in the host has raised a concept of a continuous protective lipoid capsule (Rich, 1944; Wells and Long, 1932). Yet, after a first isolation on an egg-enriched medium, freshly isolated tubercle bacilli grow on a simple medium containing glycerol as a carbon source, asparagine as a source of nitrogen, phosphates, and a magnesium salt. Inexacting in its nutritional requirements, the *adapted* organism appears to restrict its growth factors to magnesium and phosphorus, which, together with an alcohol and an aliphatic amino-acid (amide), water and oxygen, constitute its needs, all readily diffusible water-soluble substances of poor lipoid solubility. There is, however, little doubt that the lipoid-protein carbohydrate complex constituting the cytoplasmic matrix is capable of resisting the passage of quite simple ions into the cell, since the tubercle bacillus maintains its internal environment within a very broad range of acidity and basicity (Richardson, Shoor, and Loebel, 1931). Contact with 10 per cent. sulphuric acid for an indefinite period does not kill; 18 per cent. hydrochloride acid kills in five hours, and 1 per cent. in twenty-four hours; while 5 per cent. acetic acid kills in less than thirty minutes (Guss and Klœtzel, 1948). Equally impressive concentration of bases are required to kill; 32 per cent. Na OH in twenty-four hours, or 40 per cent. for four hours. Barium and calcium hydroxide similarly are non-lethal. Phospholipoids inhibit the toxic action of many antiseptics upon bacteria, for example, small amounts of cephalin protect Gram-positive bacteria against gramicidin *in vitro,* and *in vivo* also, histones or protamines are able to combine chemically with active groupings of the lipoid complex of Gram-negative bacilli and thus render them susceptible to tyrothricin or typical detergents, which are otherwise inactive in these conditions (Dubos, 1945).

Chemotherapeutic Screening

In 1932 Long and Wells assembled the existing knowledge of chemotherapy of tuberculosis and concluded that no known remedy modified the disease in the experimental animal or man. These authors concluded: "A specific chemotherapy of tuberculosis has not been found and it may be a long time in coming, because of the inherent difficulties of the problem, but it is not a closed chapter. We have some definite facts to go on, and some glimpses of light have been seen. Probably some new success with some other bacterial infection will be needed to stimulate a new attack on the more difficult problem offered by tuberculosis." Domagk's (1935) very great discovery of the chemotherapeutic activity of prontosil rubum against experimental infections due to virulent streptococci provided the new impetus. The discovery and evaluation of the chemotherapeutic activity of diaminodiphenylsulphone (Buttle, Stephenson, Smith, Dewing, and Foster, 1937) and the demonstration of its high antibacterial activity to tubercle bacilli by Rist (1939) provided the next step. The chronic toxicity of the parent substance (note, not its insolubility, for toxic blood levels are only too readily obtained) prompted the preparation of weighted derivatives. Promin, sodium p,p1—diaminodiphenyl-sulphone—N,N1-didextrose sulphonate gave more encouraging results in guinea-pigs than hitherto observed (Feldman, Hinshaw, and Moses, 1940), but clinical studies were disappointing. Of a series (Feldman and Hinshaw, 1943; Smith, Emmant, and Westfall, 1942), disodium formaldehyde sulphoxylate diaminodi-phenylsulphone, diazone (Calloman, 1943), and 4,21-diaminophenyl-5'-thiazole-sulphone, promizole (Feldman, Hinshaw, and Mann, 1944) were carried to clinical trial, and the latter is still under observation. Sulphetrone, 4,41-bis (γ-phenyl-n-propylamino) disphenylsulphone-tetrasodium sulphonate proved to be comparable in activity to promin in the guinea-pig (Brownlee and Kennedy, 1948), and remarkably free from chronic toxicity (Brownlee, Green, and Woodbine, 1948). Applied to man it may have a use in certain forms of exudative tuberculosis of the lungs (Anderson and Strachan, 1948; Madigan, 1948; Clay and Clay, 1948), but its final status is unknown. It is synergic in action with streptomycin (Brownlee and Kennedy, 1948), combined therapy, with which shows promise in miliary tuberculosis, and tubercular meningitis (Madigan, Swift, Brownlee, and Wright, 1947). Sulphretrone appears to be the most useful chemotherapeutic agent at present known in the allied acid-fast organism disease, leprosy (Muir, 1948).

The chemotherapeutic sulphones appear to owe their mode of action to substrate competition, since their activity is inhibited by p-aminobenzoic acid. Lehmann's introduction of 4-aminosalicylic acid to tuberculosis (Lehmann, 1946) deserves special attention, since it illustrates the successful use of a metabolic approach. He repeated the observation of Bernheim that benzoates and salicylates increased the oxygen uptake of tubercle bacilli and noted that this was a feature of pathogenic strains only. On the assumption that benzoates or salicylates might be active as essential metabolites, Lehmann sought for competitive inhibitors. Of fifty benzoic acid derivatives examined by microrespiration methods, 4-aminosalicylic acid (p-aminosalicylic acid, P.A.S.) proved the most effective in inhibiting catabolic oxygen utilization.

Antibiotics

Streptomycin is the most effective known chemotherapeutic agent for the control of experimental tuberculosis in the experimental animal, which infection it will almost completely suppress under favourable conditions (Feldman, Hinshaw, and Mann, 1945). Two biologically active streptomycins have been isolated from the product of active strains. The substance formerly known as streptomycin A, and representing the major constituent, is properly called streptomycin. It is N-methyl-L-glucosaminido-streptosido-streptidine. The minor component is mannosido-streptomycin, formerly called streptomycin B. It is represented as d-mannosido-N-methyl-L-glucosaminido-streptodido-streptidine; a 'streptomycin residue' is also recognised which has antibiotic and enhancement properties (Waksman, 1948). The exact structure of streptomycin, designated N-methyl-L-glucosaminido-streptosido-streptidine of molecular formula $C_{21}H_{39}N_7O_{12}$ is unknown. Hydrolysis yields biologically inactive streptidine $C_8H_{18}N_6O_4$ and streptobiosamine $C_{13}H_{23}NO_9$ Streptomycin has an established place in clinical tuberculosis.

Dihydrostreptomycin prepared by catalytic reduction of streptomycin has significantly less neurotoxicity (Donovick and Rake, 1947), is equally effective with streptomycin in experimental tuberculosis, is tolerated in patients hypersensitive to streptomycin, and causes neurotoxicity more slowly and with higher doses than does streptomycin; moreover it appears equally effective in man (Hobson, Tompsett, Musehenheim, and McDermott, 1948).

Inositol, Streptomycin, and Lipositol

Inositol occurs naturally in high concentration in brain and heart muscle of higher animals; it is an essential growth factor for a fungus, *Nematospora gossypii* (Buston and Pramanik, 1931), a metabolite associated with Bios I of yeasts (Eastcott, 1928), and a nutritional factor associated with alopecia in a strain of mice (Woolley, 1941), but it is not at present known as a nutritional requirement for any bacteria (Knight, 1945). A diverse range of bacteria synthesise inositol, including some associated with intestinal biosynthesis, as do also acid-fast organisms like the tubercle bacillus of human, bovine, and avian origin, the timothy grass bacillus, and the leprosy bacillus. There is an interesting difference between the inositol content of Gram-negative (and possibly Gram-positive) organisms which contain from 0.09 to 0.17 per cent., and the tubercle bacillus which synthesises from 3 to 9 per cent. of inositol. Anderson and his colleagues (Anderson, 1932) found inositol among the cleavage products of the phosphatides, in which it fulfilled the function of the nitrogen-containing complexes of the more usual phosphatides of higher plants and animals. By alkaline saponification of the phosphatide he isolated maninositose of which the cleavage products were mannose and inositol. A reference to the known cleavage products of streptomycin discussed earlier in this review shows that streptidine may be regarded as a substituted inositol linked, it is thought, through an ether linkage to a novel sugar. A third interesting finding which appears to relate the three observations is the demonstration that lipositol from brain and soya bean competitively inhibits the anti-

bacterial Gram-negative action of streptomycin. Lipositol from the latter source was very active, so that one part inhibited three hundred parts of streptomycin. In 1942 Folch and Woolley showed brain phosphatide to contain inositol, and subsequently the inositol-containing component, to which the name lipositol was given, was thought to have an inositol-galactose structure.

Calciferol and Lupus

It was first observed clinically that cutaneous tuberculosis responded to the oral administration of calciferol, vitamin D_2 (Dowling and Thomas, 1945; Charpy, 1945). A suppressive effect upon experimental tuberculosis in guinea-pigs is claimed (Raab, 1947), with an additional observation that 'inactivated' ergosterol, in larger doses, gave a superior effect. It is clearly desirable to attempt to identify the active substance in man and in the animal, and a study of excretory products might be expected to throw light on the problem. In another connection it has been found that feeding the allied molecule cholesterol to rats resulted in the excretion of fatty acids of empiric formula $C_{25}H_{50}O_2$ (Cook, Polgar, and Thompson, 1948) similar to the 'phthioic' acids already discussed.

Epilogue

The chemotherapeutic success in the field of allied diseases which Wells and Long prophetically expected to stimulate the more exacting attack on the tubercle bacillus has proved effective. Three, more or less, effective chemotherapeutic agents are in use, and an increasing number of effective antibiotics and synthetic chemotherapeutic drugs may confidently be expected.

The object of the direct approach to the chemotherapy of tuberculosis has been simply stated as 'the elimination of the parasite.' This simplification may falsify the clinical status by reason of the morbid anatomy of the disease. Stress has been laid, therefore, on those pathological conditions which make tuberculosis a special problem. In addition, the slow metabolism of the causal parasite endows it with a capacity to survive unfavourable environments. Viewed in this light the new effective chemotherapeutic agents may be expected to make a significant contribution to the *management* of the disease and to find an ordered place in the scheme of treatment.

The indirect approaches which have been indicated flow from the intensive studies of the biochemical lesions caused by the clinical components of the causal parasite, lipoids, carbohydrates, and proteins. It has been noted that the labile substance responsible for acquired resistance has not been isolated.

The protein component does not appear to have attracted the attention it may deserve, since the evidence appears complete that this substance is directly responsible for the host-parasite collaboration which results in hypersensitisation and death of the host's tissue. A chemical attack directed towards the pharmacological neutralization of this protein *in vivo* appears to offer a novel approach.

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Heart Disease in Pregnancy

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THE mutual influence of childbearing and disease of the heart has hitherto been a problem lying in the no-man's land between two specialities, subject to wide divergence of opinion customarily based on impressionistic or inadequate data. In recent years a revival of interest has become apparent, revealing many of the dogmas of the past to be without sound foundation, and raising a new and considerable optimism that many cardiac patients, even those with relatively extensive organic defects, may by adequate protection and medical care, complete pregnancy and bear children without evident permanent damage.

Rheumatism, in one or more of its manifestations, is common in Northern Ireland; it is therefore not surprising that a high percentage of pregnancies are complicated by organic heart disease of rheumatic origin. This paper embodies the results obtained in seventy cases of heart disease in pregnancy, personally observed and supervised. Thirty-one patients were primiparæ, thirty-nine were multiparæ, representing together an incidence of 2.72 per cent. of admissions. The reported incidence of heart disease in pregnancy varies between 1 and 9 per cent. Jensen (1938) suggests that such variation is due to geographical distribution of the ætiological factor, and on the assessment of the available data by anatomical means, by physical examination, or by statistical survey.

Richard Cabot (1926) stated that most heart disease is imaginary. It is necessary to decide whether the signs and symptoms in individual cases are due to organic heart disease, to neurocirculatory asthenia, or to the physiological reaction of the circulatory mechanism to pregnancy. Much of the symptomatology and clinical findings characteristic of heart disease may occur in the course of pregnancy when the heart is perfectly normal—systolic murmurs, cardiac enlargement, shortness of breath on exertion, and even a few rales at the lung bases. These changes may resemble organic heart disease so closely that a definite diagnosis is impossible and some authors employ the term "possible heart disease."

In general, a history of rheumatic infection probably implies a fifty per cent. chance that the patient has organic heart disease, and greatly enhances the value of other suggestive findings.

Modern concepts insist that the functional state of the heart is of greater prognostic import than the mere presence of organic defect. The diagnosis of specific lesions does not replace detailed consideration of the circulatory ability of the individual to compete with the demands of pregnancy and parturition. Accurate assessment of the functional state is, therefore, of primary importance, because on it rests the management of the case. Such assessment is notoriously difficult, excessive pessimism leads to the needless sacrifice of the pregnancy, undue optimism may result in a fatal maternal issue.

The New York Heart Association prepared a classification in which patients are placed in four groups, depending on their functional capacity. This classification, as modified in 1939, is as follows :—

Class 1.—Patients with organic heart disease who are able to carry on their ordinary physical activities without discomfort or limitation of activity.

Class 2.—Patients with organic heart disease with slight to moderate limitation of activity. They are comfortable at rest, but ordinary exertion causes undue fatigue, dyspnœa, palpitation, and anginal pain.

Class 3.—Patients with organic heart disease with moderate to great limitation of activity. They are comfortable at rest, but less than ordinary exertion causes undue fatigue, dyspnœa, palpitation, or pain.

Class 4.—Patients with organic heart disease unable to carry on any physical activity. Symptoms of cardiac distress are present, even at rest.

This classification has received almost universal acceptance both in America and in this country, and, in spite of its limitations, is regarded as the primary factor in assessing the prognosis of the pregnant cardiac. It may be necessary to transfer a patient from one group to another as pregnancy advances, for this reason it is misleading to classify patients on a functional basis at the time they first come under observation. Assessment should be made first, of their group prior to conception, and second, at the time of delivery or interruption of the pregnancy.

Table 1 indicates the composition of the group of patients under consideration according to this classification, as applied at the time of delivery or interruption of the pregnancy.

TABLE 1.—FUNCTIONAL CLASSIFICATION

Class	No. of Cases	Percentage of Total
1	22	31.43
2	42	60.00
3	4	5.72
4	2	2.85
Unclassified	—	—
TOTAL	70	100.00

Stromme and Kuder (1946), in an analysis of 720 cases of heart disease complicated by pregnancy, showed the following distribution. Class 1—38.48 per cent., Class 2—44.72 per cent., Class 3—10.69 per cent., Class 4—1.53 per cent.

As a prognostic aid, patients in Class 1 and 2 usually do well, whereas patients in Class 4 rarely survive. A guarded prognosis should be given Class 3 patients, whose condition so frequently deteriorates into congestive failure. In the present series one death occurred in Class 3, two deaths in Class 4. McClure (1932) showed a maternal mortality of over fifty per cent. in patients of Class 3 and 4 : Leyland Robinson (1927) reported eighteen cases of pregnancy complicated by auricular fibrillation, where compensation is minimal, and showed a maternal mortality of seventy-two per cent.

Table 2 records the various diseases apparent in the previous medical history of this series. A history of rheumatic infection in one or other of its forms was noted in 67.14 per cent. of cases. It is appropriate to emphasize the importance of recent reactivation of the lesion, prior to, or during pregnancy. Reactivation, which may be precipitated by a cold or chill, is of adverse prognostic significance.

TABLE 2—PREVIOUS DISEASES

Disease	No. of Cases	Percentage of Total
Rheumatic Fever	26	37.14
Rheumatic Fever and Chorea	6	8.57
Rheumatic Fever, Scarlet Fever, and Chorea	2	2.85
Rheumatic Fever, Rheumatism, and Scarlet Fever	1	1.42
Rheumatic Fever and Scarlet Fever	2	2.85
Chorea	4	5.72
Chorea and Scarlet Fever	1	1.42
Scarlet Fever	2	2.85
Growing Pains	3	4.28
Rheumatism and Scarlet Fever	2	2.85
Frequent Sore Throats	5	7.19
No Discoverable Cause	16	22.85
TOTAL	70	100.00

The mitral valve was implicated in all the cases under review; mitral stenosis alone presenting in eighty per cent. of the patients.

Table 3 lists the distribution of valvular lesions and the combinations found.

TABLE 3—DISTRIBUTION OF VALVULAR LESIONS

Heart Lesion	No. of Cases	Percentage of Total
Mitral Stenosis	55	79.57
Mitral Insufficiency	3	2.30
Mitral Stenosis and Aortic Regurgitation	11	16.21
Mitral Stenosis and Insufficiency	1	1.92
TOTAL	70	100.00

The prognostic significance of the valvular lesion has been much debated, aortic lesions being considered by some the more dangerous. Kenneth Harris (1937) found no difference in prognosis between cases with mitral stenosis or aortic regurgitation, or both lesions combined. Hunt (1926) stresses the size of the heart: "If the heart is enlarged the risk is increased, and it does not matter much whether the lesion is aortic regurgitation or mitral stenosis. The amount of extra risk depends on the degree of enlargement, and the treatment that can be adopted during pregnancy." Jensen has shown how difficult, and sometimes fallacious can

be the assessment, clinically or radiologically, of cardiac enlargement. He further points out that electrocardiography is unreliable in view of the irregularity of cardiac displacement, and the different degrees of axis deviation produced in normal pregnancy. Mackenzie (1921) lays particular emphasis on the capacity of the heart for increased effort. Present-day thought indicates that the response of the heart to effort—and therefore to pregnancy and parturition—as shown by the response of the pulse rate and blood pressure to exercise, constitutes a sign of greater prognostic import than the character of the lesion, heart sounds, or area of cardiac dullness.

It is a common impression that labour in cardiac patients is of shorter duration than in patients in whom the heart is normal. Explanations on which this belief is based are first, the unusual softening of the cervix uteri, due to pelvic engorgement, and second, an excess of carbon dioxide in the blood, increasing the strength and frequency of uterine contractions. Stander (1938) found the normal duration of labour in primiparæ and multiparæ to be eighteen hours and twelve hours respectively. In the series under review labour lasted an average of nineteen hours in the primipara, and six hours in the multipara, whilst in McClure's (1936) series, from the same hospital, the duration of labour, regardless of parity, was seven hours. Stromme and Kuder, in an analysis of 592 patients with heart disease, were unable to agree that labour was shortened, finding an average duration of labour of twenty hours in primiparæ, and eight hours in multiparæ.

Each patient must be carefully evaluated when first seen, this frequently necessitating hospital investigation of the case in consultation with a cardiologist. Such evaluation takes cognizance of the following factors :—

1. The functional classification of the case, indicating the degree of compensation.
2. The interval since the onset of the causal condition and the degree of compensation prior to pregnancy.
3. The age and parity of the patient.
4. The nature of previous confinements, and the interval since the last pregnancy.
5. The maturity of the pregnancy and the presence of obstetrical complications.

Those patients who may safely be permitted to continue their pregnancies are strictly supervised in the ante-natal period; others with more serious heart disease may remain in hospital the greater part of this time. It is generally agreed that hospitalisation and rest prior to delivery are major factors in achieving a low mortality rate in cardiac patients.

Table 4 indicates the average stay in hospital of the cases in this series.

TABLE 4—AVERAGE STAY IN HOSPITAL PRIOR TO DELIVERY

Class 1	8.2 days
Class 2	23 days
Class 3	95 days

Jensen states: "The indication for the interruption of a pregnancy is heart failure which does not respond to treatment." Whilst each case must be treated

on its merits, medical treatment often dispenses with the necessity for therapeutic abortion, and certainly improves the chances of the patient should interference ultimately become essential. Bramwell and Longson (1938) emphasize the importance of non-interference with pregnancy until heart failure has received adequate treatment. In early pregnancy, however, they advocate emptying the uterus before three months gestation in all cases of auricular fibrillation and recurrent heart failure. With these views, the majority of modern writers agree.

Many of the classical signs of cardiac decompensation appear as a physiological concomitant of normal pregnancy, but dyspnœa, tachycardia, cyanosis, and basal rales in the lungs, occurring in association with known heart disease, constitute a warning of cardiac embarrassment. In the treatment of such symptoms prolonged bed rest is of primary importance, a subsiduary role being played by anti-anæmic measures, dietary restrictions, and judicious digitalis therapy.

The outcome of pregnancy in the seventy patients under review is indicated in Table 5.

TABLE 5—METHOD OF TERMINATION OF PREGNANCY

	No. of Cases	Percentage of Total
Spontaneous delivery at term	38	54.29
Forceps delivery at Term	20	28.57
Cæsarean Section at Term—		
(a) Cardiac Indications	—	—
(b) Obstetric Indications	4	5.72
Spontaneous Premature Labour (34-40 weeks)	4	5.72
Therapeutic Abortion	1	1.42
Died Undelivered	2	2.86
Induction of Labour (Toxæmia)	1	1.42
TOTAL	70	100.00

Sixty-two cases were delivered at term; of these, fifty-eight were delivered vaginally, thirty-eight (54.29 per cent.) delivered themselves spontaneously, twenty (28.57 per cent.) requiring delivery by forceps. This record will receive further comment.

Each delivery was effected in hospital under close supervision. In the absence of cardiac distress labour was allowed to proceed in the ordinary way. Morphia was the usual sedative employed, but in many cases pethidine was used with satisfactory effect. The use of scopolamine was not found advisable owing to the dissociating effect and the production of what Jensen calls a "distressing tachycardia." The premature onset of labour was noted in almost 6 per cent. The cardiac patient is generally considered to be particularly prone to this complication, Harris quoting an incidence of 16.5 per cent.

If evidence of cardiac embarrassment appears, morphia is employed to allow the woman to rest. Mendelson and Pardee (1942) found a pulse rate over 110 per minute, and a respiratory rate over 24 per minute, an omen of intra or postpartum

heart failure, and recommend rapid digitalisation in such cases. Further treatment of impending heart failure in labour requires oxygen therapy, the upright position, and operative delivery as soon as cervical dilatation permits. The virtue of atropine should not be forgotten in the threat of pulmonary œdema.

Forceps delivery was affected in almost thirty per cent. of the series, a rate twice that of the clinic as a whole. Browne (1946) condemns the routine use of forceps in cardiac patients. Those who would limit their use do so on the grounds of the adverse effect of sudden changes of intra-abdominal pressure, and the anæsthetic agent required. Jensen suggests that there is no harm in supplementing the expulsive efforts of the cardiac patient in the second stage of labour, and Bramwell and Longson state, "the duration of the second stage of labour should be reduced to a minimum by forceps extraction."

Cæsarean section was performed four times in this series, three cases required section for cephalopelvic disproportion, the fourth case was sectioned for uterine inertia after a labour lasting eighteen hours. Cæsarean section is to-day seldom employed for heart disease alone. Greenhill (1946) states that common indications for section of the cardiac patent are the promise of a long and difficult labour, contracted pelvis, toxæmia, placenta prævia, and abnormal presentations. The former practice of submitting to section cases of cardiac decompensation without adequate trial of medical measures has fallen into disrepute in company with induction of labour and *accouchement forcé*.

There is considerable divergence of opinion on the most suitable anæsthetic agent in the operative delivery of these cases. Mendelson and Pardee, Stromme and Kuder, and other American authorities prefer local anæsthesia. Newman (1931), Greenhill, Bramwell and Longson prefer ether; Herrmann and King (1930) consider ether to predispose to pulmonary œdema in the presence of lung congestion. Gilchrist (1942) favours chloroform and oxygen, or spinal anæsthesia. In the series under review all operative deliveries were conducted under cyclopropane and oxygen, without untoward effect.

Three deaths occurred in this series :—

1. A primipara, aged 36, admitted as an emergency at thirty weeks gestation. Gross heart failure with auricular fibrillation was present, and death ensued in twenty-four hours. There had been no ante-natal supervision.
2. A para 2, aged 26, admitted as an emergency with congestive heart failure and a missed abortion at sixteen weeks. Medical treatment failed to prevent her death in four weeks.
3. A para 2, aged 36, suffering from mitral stenosis and diabetes. A class 3 patient, she completed pregnancy and parturition, and died four months after delivery of congestive heart failure.

The incidence of maternal death in the seventy cases cared for was thus 4.28 per cent. Statistics on mortality in pregnancy complicated by heart disease vary widely, but De Lee (1947) gives a fair average as 6.3 per cent., and it is generally considered to rank fourth in the present-day causes of maternal death. Stromme and Kuder draw attention to the high mortality among unregistered cases.

The seventy cases of this series had borne a total of 189 children. Table 6 shows the distribution of patients by their parity. As the cardiac lesion must have been present in some, if not all the pregnancies, the number of children that these women have successfully borne has an important bearing on prognosis. Comparable figures by McClure are given in brackets.

TABLE 6—PARITY OF THE PATIENTS

Number of Pregnancies	Number of Patients	Percentage
1	31 (18)	44.29 (26.09)
2	17 (9)	24.29 (11.60)
3	6 (12)	9.56 (17.39)
4	3 (7)	4.29 (10.14)
5	2 (5)	2.85 (7.25)
6	5 (6)	7.15 (8.9)
7	1 (2)	1.42 (2.89)
8	3 (3)	4.29 (4.33)
9	0 (4)	— —
10	0 (2)	— —
11	1 (1)	1.42 (1.47)
12	1 (1)	1.42 (1.4)

In the present pregnancies of this series two infants were lost and two women died undelivered, a fœtal wastage of 5.71 per cent.

Most observers agree that maternal heart disease has no effect on the infant mortality. Jensen states: "When born at term, babies of cardiac mothers are of normal weight, and tend to show a normal death rate." The average infant weight in this series was 7 lb. 13 ozs.

Breast feeding was established in all cases but three delivered of a live child. Peters (1925) said: "For the cardiac, no lactation." Most well-compensated mothers tolerate lactation well, it is only avoided when heart failure threatens, and all means must be employed to conserve cardiac strength.

In young and otherwise healthy mothers pregnancy does not seem to exert a harmful influence in mild heart disease. This is apparent from Tables 5 and 6, which show that 54 per cent. achieved a spontaneous delivery, a further 29 per cent. being delivered by forceps, and that many of these patients successfully complete further pregnancies in spite of the cardiac lesion. However, to reduce maternal mortality from this cause, all cases should be under the early supervision of both obstetrician and cardiologist. Adequate supervision demands the evaluation of the patient's condition and her suitability to proceed with the pregnancy. Such evaluation rests on the criteria laid down, and is best assessed finally in the New York Heart Association's classification. The previous performance of the patient is all important in the detection of progressive deterioration of the cardiac reserve. Sound treatment rests on the early supervision of such cases by trained personnel, the proper study and evaluation of the cardiac condition, facilities for rest and treatment in hospital prior to delivery, and special care during labour.

The additional strain of pregnancy throws a heavy load on a cardiac reserve already reduced by disease. Prognosis and treatment are best assessed in the type of the cardiac response to this strain. Pregnancy being a temporary strain, by rest and treatment the patient may be able to discount to some extent further inroads on the heart reserve, whilst recovery may be almost, if not entirely, complete after the incident of pregnancy. Repeated pregnancies, particularly if recurring at frequent intervals, may disastrously reduce the cardiac reserve and lead to a fatal issue. Consideration of these cases, however, suggests that with proper selection, supervision, and care by trained personnel, the wide employment of therapeutic abortion is unjustified and that many mothers may complete one or two pregnancies without permanent aggravation of the heart lesion. No statistical evidence is available which satisfactorily proves that such cases die at any earlier age than nulliparæ with equivalent heart lesions.

These cases were treated in the Royal Maternity Hospital under the direction of Mr. H. I. McClure, F.R.C.S., F.R.C.O.G., with the advice of Dr. Robert Marshall as cardiologist. My grateful thanks are due to them for permission to publish these results, and for help and criticism in the writing of this article.

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REVIEW

A HANDBOOK FOR THE ASSISTANT NURSE. By Mary E. Swire, S.R.N., S.C.M. Pp. 308. Illustrated. Baillière, Tindall & Cox. 10s. 6d.

An admirable text-book for the assistant nurse. There should be no difficulty in understanding what is in it, as Miss Swire has set it all down so simply, and every assistant nurse would be well advised to have this book. J. F. MacV.

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Monthly Obstetric Meetings

SINCE 1946 a meeting has been held monthly in the Royal Maternity Hospital, Belfast, during the months September to June. It has been attended by the staff of both maternity hospitals and by representatives from the Department of Pathology, the Ministry of Health, and the City Borough Health Department. At this meeting the monthly statistical reports for the Jubilee Maternity Hospital and the Royal Maternity Hospital have been presented and discussed. Maternal and fœtal mortality have been reviewed—an obstetric or pædiatric paper has been read and followed by a general discussion.

A meeting was held on Wednesday, 18th January, Mr. T. S. S. Holmes taking the chair.

Dr. A. T. Elder read a paper entitled "Preventive Medicine and the Practice of Obstetrics." He traced the history of preventive medicine in obstetrics, giving a detailed review of the literature and considered that the present favourable position was due to co-operation of obstetricians, bacteriologists, and the public health authorities. Ante-natal supervision should be performed by officers with resident obstetric experience and a senior consultant should be available at clinics for the examination of difficult cases. Bed spacing in maternity hospitals was of importance and isolation blocks must be available for infected cases. Dust-free ventilation was necessary and staff, patients, and equipment should be subjected to bacteriological control. Infection should be notified promptly to the health authorities, and the speaker emphasised the importance of co-operation in this respect.

A meeting was held on Wednesday, 19th February, Mr. T. S. S. Holmes taking the chair. Dr. T. M. Roulston read a paper entitled "Cæsarean Section."

He reviewed 646 cases of cæsarean section performed in the Royal Maternity Hospital, Belfast, in the years 1943-1947. The section rate was 8.9 per cent. This high figure was due to the number of abnormal cases referred to the hospital, the number of repeat sections, and the high incidence of primigravidæ treated. The indication in 67 per cent. of cases was cephalo-pelvic disproportion, and placenta prævia accounted for 8.5 per cent. Although vaginal delivery following a previous section was achieved now in an increasing number of cases, repeat sections accounted for 32 per cent. of series. Elective sections were performed in 28 per cent. cases, and the remainder (40 per cent.) were performed in patients in labour. The maternal mortality was 1.43 per cent. and the fœtal mortality 5.7 per cent. The speaker emphasised that all the deaths occurred in patients who had had a section performed in labour. He discussed possible ways in which both maternal and fœtal mortality could be reduced.

A meeting was held on Friday, 8th April, Mr. T. S. S. Holmes taking the chair. It was attended by the members of the Women's Gynæcological Visiting Club, this concluding their two-day visit to the Belfast hospitals.

Professor C. H. G. Macafee presented the latest figures for the treatment of placenta prævia in the Royal Maternity Hospital and in private practice. During the years 1937-1949 there were 275 cases. There were two maternal deaths, a mortality rate of 0.73 per cent. The fœtal mortality was 20.4 per cent., and, if deaths from fœtal abnormalities were excluded, the corrected figure was 17.1 per cent. These figures were compared with those of the Royal Maternity Hospital in 1932-1936. In these years there were seventy-six cases, with a maternal mortality of 2.6 per cent. and a fœtal mortality of 51.3 per cent. The speaker considered that the results vindicated the use of conservative treatment in placenta prævia. Prematurity, with its associated fœtal mortality, had been reduced without increasing the maternal risk. He emphasised, however, that conservative treatment must be employed intelligently and that each case required consideration by a senior obstetrician.

Dr. A. S. Majury read a paper entitled "Pregnancy Complicated by Diabetes Mellitus." He reviewed fifty-four pregnancies occurring in thirty-nine diabetic patients in the Royal Maternity Hospital during 1938-1948. This represented an incidence of 1 in 313 pregnancies. Hydramnios occurred in 26 per cent. of the cases, while pre-eclamptic toxæmia occurred in 52 per cent. Coma and eclampsia were the principal hazards for the diabetic mother and caused three deaths, a mortality of 5.5 per cent. In spite of insulin therapy, the fœtal mortality remained high, being 42.6 per cent. The speaker reviewed the possible causes, namely, ketosis and toxæmia in the mother, dystocia, with birth injury, and maternal hormonal imbalance. He considered that, as suggested by Priscilla White, œstrogen and progesterone deficiency might be the most important factor, although no patient in the series received œstrogen and progesterone therapy. He found that cæsarean section was performed nineteen times, resulting in a healthy child on eighteen occasions, and made a plea for more frequent use of this method of delivery in diabetic patients.

REVIEW

PSYCHOLOGICAL MEDICINE. By Curran and Guttman. Edinburgh: E. & S. Livingstone Ltd. 10s. 6d.

THE third edition of this book has retained the general characteristics of its predecessors. Despite the strong desire of the authors that this book should not grow in size, it has been necessary to expand it owing to the rapid advances made in psychiatry in the past few years.

The chapter on treatment has been re-written and brought up to date, but it has been confined wisely to a brief outline of the various methods in use, as detailed technique can be obtained from special articles devoted to these methods. More space has been allotted to obsessional states and hysterical reactions, with a fuller account of treatment of these difficult and refractory disorders. The chapter on Psychiatric Aspects of Head Injury is concise and clear, with a full understanding of the difficulties arising in the diagnosis and treatment of the various syndromes brought about by trauma.

Altogether, this book is an excellent introduction to psychological medicine, written from a clinical point of view, and is a most suitable text-book for medical students and for medical practitioners interested in psychiatry. C. B. R.

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REVIEWS

A METHOD OF ANATOMY. By J. C. Boileau Grant, M.C., M.B. Fourth Edition. Pp. XXIV + 852, with 800 figures. London: Baillière, Tindall & Cox. 1948. 38s. 6d.

THIS is the fourth edition of Professor Grant's well-known text-book to appear in eleven years. The aim of the author has been to correlate the subject matter in such a way that the underlying principles involved and the 'raison d'être' for the mutual relationships of structures may readily be apprehended by the student, and I think that this aim has largely been attained. A thorough revision of the book has been carried out, some new illustrations added and old ones improved, and increased emphasis being given to certain parts where this was considered necessary. The book starts with a short introduction outlining the different subdivisions of the vast subject known collectively as anatomy. Descriptive terms are illustrated by three dimensional diagrams, and some general directions are given to the student commencing dissection. The text proper commences with a section devoted to the general arrangement of the structures in the body. Sections on the upper limb, abdomen, pelvis, lower limb, thorax, head and neck, and miscellaneous items follow in that order. Beautifully clear line diagrams are built up around the dominant structure in each region and are an outstanding contribution to the book. They are, for the most part, executed with bold simple lines, which arrest the attention and invite reproduction by the reader. They are based on measurements and observations of a great mass of specially dissected material, and the freshness of the approach brings out the essential facts and correlations with a clarity often denied to the more elaborate illustrations of larger works. It is interesting to find an illustration based on one by Vesalius, which shows, in an unforgettable manner, the function of a retinaculum at the ankle joint. Some of the recently added illustrations suffer from over elaboration, and it would seem to the reviewer that this tendency must be strongly resisted in future editions if the drawings are to retain their original value in the book as a whole. Skeletal structures are dealt with as parts of the whole, and functional mechanisms, rather than isolated bones are described. The surface relations of the deeper structures are given regionally, so that the student is constantly reminded of this very necessary aspect of the subject. Comparative anatomy and embryology are occassionally referred to to elucidate the condition in the adult. The gross anatomy of the special senses is dealt with, but the finer details of the eyeball and inner ear, which are commonly given in English text-books, are omitted. The brain as a whole is not dealt with, nor are the microscopic appearances of organs discussed. This follows the usual trans-Atlantic method of having separate texts for these subjects, and has much to commend it in a work of this nature. Recent work on the foot and shoulder joints is incorporated and the part devoted to respiration is quite full. The nomenclature used to designate the various broncho-pulmonary segments differs from the current English one based on the work of Brock. It is based on the positions of the segments within the lobes, and not on their positions relative to the thoracic wall, so that "anterior" is preferred to "pectoral," and "lateral" to "axillary." It is simple and easy to remember, but it is perhaps unfortunate that the "cardiac," or "azygos" lobe, now becomes the "medial-basal" lobe, although confusion with the "lobe of the azygos vein" is thereby prevented. Some minor errors occur throughout the book, both in the text and in the illustrations. For example, the reprinted preface to the first edition refers to figures 132 and 577, whereas it would seem from a study of the first edition that figures 147 and 630 of the present edition are those intended. Figure 233 shows the anterior layer of the cut edge of the lesser omentum passing apparently posterior to the œsophagus instead of anterior to it, and in figure 238 the diagrams have been transposed. As a guide to the gross anatomy of the human body the book is excellent. It fills the gap between the large reference book, which by the very fullness of its information can be so overpowering to the student, and the dissecting manual. The constant reference to function keeps the aim of anatomical studies to the fore, and the well-illustrated text is stimulating to read. Provided its limitations are realised, it should be a useful and up-to-date addition to the library of human anatomy. W. R. M. M.

THE Rh. BLOOD GROUPS AND THEIR CLINICAL EFFECTS. By P. L. Mollison, A. E. Mourant, and R. R. Race. M.R.C. Memorandum No. 19. His Majesty's Stationery Office. 1948. 1s. 6d.

THIS memorandum on the Rh. factor deals with the theoretical aspects of the Rh. blood groups, the clinical effects produced by isoimmunisation, and the laboratory techniques which are employed in the recognition of the Rh. blood groups of the red cells and the Rh. antibodies in the serum. It is written by three of the most outstanding workers in this field in the world to-day.

It starts by giving a clear exposition of the Fisher-Race or CDE classification of the Rh. blood groups, with the genetic factors on which this classification is based. The subject is much clarified by the use of explanatory tables.

The section on the clinical aspects deals with the ways in which isoimmunisation can occur, and stresses the danger of isoimmunisation produced by transfusing Rh. positive blood in an Rh. negative recipient. This part of the memorandum, which is full of practical advice, will prove of particular value to all those who are concerned in the management of hæmolytic disease of the newborn.

The investigation and management of Rh. isoimmunisation requires the use of laboratory techniques which embrace the whole field of immuno-hæmatology. In this section Dr. Mourant describes in detail the technical methods which should be employed in CDE grouping of cells and in the measurement of serum Rh. antibodies. He describes the method used to detect cells sensitised with "incomplete" antibody by what has now come to be known as the Coomb's-Mourant or the direct anti-human-globulin test. This section is an invaluable laboratory guide.

This memorandum puts forward the British point of view with regard to the theory and practice of Rh. isoimmunisation with the clarity and precision one expects from those workers whose previous publications on this subject were each a valuable contribution to a rapidly advancing field. They have consolidated in one paper of seventy-four pages not only the fruits of their own experience and research, but also the gains made by other workers on the subject, and the whole bears in every line the hallmark of authority. M. G. N.

A TEXT-BOOK OF CLINICAL PATHOLOGY. Edited by F. Parker, M.D. Third Edition. Pp. xx + 1024. Illustrations 229. 50s.

THIS new edition, long delayed by the war, has been eagerly awaited. It appears, owing to the withdrawal of Dr. Kracke, due to pressure of work, under the editorship of the late Dr. Francis P. Parker, with a distinguished list of contributors. The book, familiarly known as "Kracke and Parker," may in the future have some new title, but the stamp of the original editors will long remain.

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This book in general is so good that it would appear ungracious to criticise any part of it, but on the section dealing with the Rh factor there is little reference to Fisher's CDE classification, which is not only internationally accepted, but so much easier to understand and explain, than Weiner's Rh classification.

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THE Rh. BLOOD GROUPS AND THEIR CLINICAL EFFECTS. By P. L. Mollison, A. E. Mourant, and R. R. Race. M.R.C. Memorandum No. 19. His Majesty's Stationery Office. 1948. 1s. 6d.

THIS memorandum on the Rh. factor deals with the theoretical aspects of the Rh. blood groups, the clinical effects produced by isoimmunisation, and the laboratory techniques which are employed in the recognition of the Rh. blood groups of the red cells and the Rh. antibodies in the serum. It is written by three of the most outstanding workers in this field in the world to-day.

It starts by giving a clear exposition of the Fisher-Race or CDE classification of the Rh. blood groups, with the genetic factors on which this classification is based. The subject is much clarified by the use of explanatory tables.

The section on the clinical aspects deals with the ways in which isoimmunisation can occur, and stresses the danger of isoimmunisation produced by transfusing Rh. positive blood in an Rh. negative recipient. This part of the memorandum, which is full of practical advice, will prove of particular value to all those who are concerned in the management of hæmolytic disease of the newborn.

The investigation and management of Rh. isoimmunisation requires the use of laboratory techniques which embrace the whole field of immuno-hæmatology. In this section Dr. Mourant describes in detail the technical methods which should be employed in CDE grouping of cells and in the measurement of serum Rh. antibodies. He describes the method used to detect cells sensitised with "incomplete" antibody by what has now come to be known as the Coomb's-Mourant or the direct anti-human-globulin test. This section is an invaluable laboratory guide.

This memorandum puts forward the British point of view with regard to the theory and practice of Rh. isoimmunisation with the clarity and precision one expects from those workers whose previous publications on this subject were each a valuable contribution to a rapidly advancing field. They have consolidated in one paper of seventy-four pages not only the fruits of their own experience and research, but also the gains made by other workers on the subject, and the whole bears in every line the hallmark of authority. M. G. N.

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"In accordance with established custom" an historical account of the efforts made in the past to solve this problem is then made. This achieves little more than conformity with custom, and the simple deduction that the problem is a very old one for which no one has ever found a satisfactory solution. The author then makes bold to say that "only now, after sixteen years of thought and experiment, she believes she has found the right solution."

Fundamental to this solution is the dispelling of three common misunderstandings: failure to grasp the difference between sexual response and sexual climax or orgasm in women; lack of understanding of the unique role played by the clitoris; and unconscious adherence to a pre-conceived mental picture of what a woman *ought* to feel during sexual intercourse.

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examination, as well as the relevant laboratory tests. As such cases are collected and compared with one another by a critical worker, such as Professor Russell, certain highly pertinent facts and generalisations emerge, especially when these observations are integrated with what is known of physiological function. These observations often appear to represent only a synthesis of existing information, with a consolidation of some theories and the rejection of others, and may seem to necessitate only a slight change in current beliefs. They rarely have the impact of originality of some experimental studies, but they often represent more definite advances in our understanding of disease processes.

This monograph does not represent any really new discoveries, but it does achieve a considerable clarification of a difficult subject without any unjustifiable over-simplification. Its approach is conventional. The author affirms that while the lesions themselves vary, the general rule holds, that, wherever they arise, dilation of the pathway of the cerebrospinal fluid proceeds in a retrograde fashion to the lateral ventricles. An obstruction always exists somewhere in this pathway and the term idiopathic should be avoided. The time-honoured categories of malformation, gliosis of the aqueduct, inflammations, tumours, and dural sinus thrombosis are discussed, and the lesions and their results illustrated by many brief, but pertinent, clinical and autopsy records. Malformations of the aqueduct must be considered by comparison with the normal structure of the aqueduct at the same level. Professor Russell shows that fixation of the spinal cord cannot be the basis of the Arnold-Chiari malformation, but she can offer no explanation. Many cases of gliosis of the aqueduct must still remain obscure as regards ætiology, though some appear to be part of a more widespread granular ependymitis. The importance of inflammation, with or without infection, and often not apparent clinically or dismissed as a trivial and obscure illness in early childhood or the first weeks of life, is discussed in connection with internal hydrocephalus. This may follow proven meningitis and leave no macroscopic lesions in the leptomeninges. This emphasises the need for early and really effective therapy of meningitis by properly selected chemotherapeutic or antibiotic substances. Syphilis is now considered to be a very rare cause of hydrocephalus. Perhaps the most unsatisfactory chapter is that concerned with dural sinus thrombosis and thrombophlebitis. Further understanding of this would appear to depend on an advance in our knowledge of the physiology of the absorption of the cerebrospinal fluid.

This monograph is well produced on art paper and its ninety illustrations are almost all excellent, well chosen, and clearly produced. Its paper covers are adequate for anything but library use, and it is interesting to speculate on what such a monograph would cost if published commercially, especially if produced in America and bound with unnecessary elegance. This monograph is, indeed, one to buy and keep rather than to borrow from a library. J. E. M.