Trends in clinical pathologists¹

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I am deeply appreciative of the honour you have bestowed on me in asking me to deliver this Foundation Lecture which marks the 43rd year of the foundation of the Association of Clinical Pathologists. I am also taking this opportunity to thank the ACP publicly for the *Festschrift* which appeared in January to celebrate both my retirement from active practice in pathology and the 25th (or so) anniversary of the *Journal of Clinical Pathology*². I was so impressed by the contributors and their delineation of the trends in pathology that I thought I would address you today on the 'trends in pathologists' as a reciprocal essay to see whether we have matched up to the changes which have already occurred, and particularly whether we are prepared for or preparing for the inevitable changes and trends which are now taking place.

The View Behind Us

If you will forgive me for taking you a little earlier than the 25 years and nearer the 43 years of the life of the ACP I should like to recall my first introduction to pathology as a medical student. It was in the necropsy room where, strangely enough, a famous physician, John Ryle, was conducting a necropsy on one of his own patients who had died. This was the common practice at the hospital and the four assistant physicians each did the hospital necropsies on one day a week, leaving only one day for the Department of Pathology. I was very impressed by the technical skill of this physician and

particularly by the breadth of the teaching at the necropsy table. I was certainly not given to think that the teaching and practice on Fridays, when the pathologists took over, was in any sense superior. This was later changed when a young pathologist, newly appointed, began to draw the crowds with his splendid technique and teaching ability—young Keith Simpson produced then the remarkable technical skill that he still maintains today. This situation in morbid anatomy was in the accepted tradition of this hospital which had produced an astonishing series of physicians such as Addison, Bright, and Hodgkin, who had combined their clinical and pathological skills to elucidate so many clinical problems. Today the fall in the numbers of necropsies in so many hospitals reflects the lack of enthusiasm for this aspect of pathology both by pathologists and clinicians, apart from a handful of scientifically orientated physicians who are still anxious to see the lesions which they are treating and their end results from which so much can still be learnt.

Perhaps the greatest change which has produced real trends in pathology has been a transition from the anatomical approach, which was the dogma of all the earlier pathologists of the first third of this century, to the realization of the importance of the functional aspects of disease processes. Pathologists in the 1920s were beginning to show how laboratory tests could be used to demonstrate minor changes attributable to the effects of early lesions and how these could be used for diagnostic purposes. These trends were certainly most noticeable in Great Britain and North America but in Europe and South America pathologists lagged behind. Perhaps this was due to the fact that in this country there would usually be only a single 'department' of pathology, and frequently there was one head of department even in a teaching hospital, and certainly in a non-teaching hospital. In Europe the Germanic tradition of separating morbid anatomy and

¹A shortened version of the Foundation Lecture given at the Annual Meeting of the Association of Clinical Pathologists on 24 September 1970.

²Trends in Clinical Pathology (£3 from the British Medical Association, Tavistock Square, London, WC1H 9JR.)

histopathology was rigidly maintained and clinical pathology was, and has remained, an entirely separate discipline. These laboratory doctors were generally regarded as renegades from true pathology. However, departments of bacteriology with university chairs were already becoming respectable, and eminent scientists saw in this new subject opportunities both for research and for the application of these sciences to the clinical fields. Such then was the situation in the 1920s when Dyke and others, trained as doctors and pathologists, felt the need to maintain an interest in the patient as a whole and not only in his secretions, excretions, and severed parts. They started this society deliberately in 1927 as a positive manifestation of the new trend for pathologists. Clinical chemistry, which had its birth amongst the physiologists of the day, was emerging with great rapidity and promise, albeit with very limited effectiveness because techniques were slow and cumbersome, using great volumes of blood, and not rapid enough to produce results which could be of immediate value in therapy, although already useful in diagnosis. Some teachers of physiology began to use their departments not only to teach clinical chemistry as a subject applied to clinical medicine, using patients on whom to demonstrate the effects of the changes caused by disease even before the students had been attached to a medical unit, but also as diagnostic departments; today we would call this a new integrated method of teaching! Haematology had not yet emerged as a separate subject for study and practice. The few blood counts which were done were mostly performed by medical students straight from their physiological laboratories. Sir Arthur Hurst, a man of no mean repute as a haematologist, was exceptional in that he would only allow two selected senior students to perform his haematological investigations. Perhaps this was because the differentiation between primary and secondary anaemia depended almost entirely on the colour index, and it was astonishing how often all the other students contrived to make this come out to exactly 1, so that the onus of diagnosis was put back to the physician and not to the student who did the count. The horizons in haematology were on the whole limited to these primary and secondary anaemias and the leukaemias, and their diagnosis was entirely in the hands of physicians and their students who used side room laboratories.

The purely morphological aspects of the blood disorders, which had begun to show diminishing returns, led to a shift to other aspects and to dramatic advances in the subject. The discovery of the blood groups and the immediate application to safe blood transfusions started the great advances in immunohaematology, a subject now of such depth and of enormous interest to haematologists, geneticists, immunologists, anthropologists, and forensic scientists.

The Impact of World War II on Pathology

The impact of World War II on pathology was tremendous in many parts of the world. In Britain much could be attributed to a combination of the statesmanship of Sir Philip Panton, who had so much to do with the design of the pathological services of the Emergency Medical Services, the energy of Sir Graham Wilson, who brought bacteriology to the masses under the guise of possible enemy bacteriological warfare, and the three heads of the separate armed forces pathological services which had to expand so very rapidly. Suddenly an organization of pathology and pathologists took shape. Not only were pathologists to become part of a country-wide national service in one form or another, but now young doctors were being specifically recruited for training in the four branches of pathology. These trainees were given a two-year rotational training in selected laboratories, their training period more or less evenly divided into the four subjects, and were thus being prepared to take over small Service laboratories abroad or similar posts in the EMS at home. There was no way of assessing the value of this training, but the calibre of the trainee and the sort of advancement he was worthy of were quickly noted. Certainly this scheme, together with the Services schemes, helped to prepare for the explosion in pathology that was inevitably to follow the end of the war. And pathologists, many of them perhaps only partly trained or of only limited specialized experience, were nevertheless available to take over the new laboratories which were now needed. Physicians and surgeons had become used to many more investigations being done on their patients and were beginning to demand a variety of tests. The final push came with the start of the National Health Service. The rate of growth was startling, even phenomenal. Where facilities already existed, increases of 15 to 40% in workload per annum were being recorded, and all sorts of buildings were being converted to laboratory use. Biochemistry led, and haematology with its serological impetus, and microbiology with the introduction of antibiotics, virology, and electron microscopy as the stimulus following closely behind, but histopathology lagged somewhat and was only much later stimulated by the introduction of the new techniques of fluorescent microscopy, electron microscopy, tissue culture, genetics, and exfoliative cytology. Because of this growth the concept of a central laboratory was an inevitable consequence. The London County Council, having taken over the old hospitals of London in 1929, provided six laboratories to do the work of all the hospitals, each central or group laboratory serving up to a dozen or more quite large hospital units. This was a remarkable achievement although it only scratched at the surface of the appalling lack of facilities for pathology in London. At this time too pathol-

ogists were feeling that some form of qualification in pathology of a standard equal to those of other royal colleges was needed to put the specialty on a proper senior footing. The final phase of respectability was thus achieved by the movement initiated by this Association for the formation of our College. The impact this made on pathology cannot even now be fully appreciated, but after such a short life the College achieved its Royal Charter. We have arrived!

Halcyon Days

The last 10 years were halcyon days for the hospital pathologist. Now he and his discipline had reached a peak. He prospered and multiplied. His departments mushroomed and spread throughout every available corner of a hospital, including houses taken over in the immediate vicinity, and he accrued to himself an army of helpers who were put to work turning out the increasing number of tests and examinations that, stimulated by the pathologist, the clinician was demanding. In some parts of our present practice we have achieved an ominous legal implication. In the same way that you would no longer choose to treat or dismiss a possible fracture without an x-ray examination, it may go hard with a doctor who diagnoses or treats a number of conditions without proper laboratory investigation, confirmation, and control. The pathologist's standing in the profession is now at its zenith. Amongst our colleagues we have had a President and Vice-President of the Royal Society, Fellows of the Royal Society, and even a President of the Royal College of Physicians.

Paths to Disintegration?

But pathologists, having at last achieved some sort of unity, provided an examination qualification of a good standard, are now about to destroy the concept of pathology as a scientific subject by having our four limbs torn apart by the same expansionist ideals that founded the Association and the College. There are many senior and very serious-minded colleagues who no longer see any connexion between the four branches of pathology, and their reasoning has some substance. They see no purpose whatsoever in their juniors undergoing a training or being examined in anything but their own disciplines. They feel that early specialization is essential nowadays, and budding biochemists, for example, would be wasting their time and talents doing necropsies or emergency cross-matching during their training. Many colleagues are even agreed in fact that a medical qualification is an unnecessary luxury and that again more specific specialist

training should start as early as possible and bring increasing benefit to their particular branch of pathology. Sectional interests within pathology are already served by their own societies. The Association of Clinical Biochemists, the Pathological Society, the Society of Medical Microbiology, the Society for Haematology, and the Cytology Society, all contain ACP members, and most of their members could qualify for membership of the College. If any such pathologist feels that he is adequately represented scientifically and politically by his specialized association or society, this will be the death knell of the ACP and, I fear, eventually perhaps of the College. We are the only two bodies in which all branches of pathology have an equal representation and in which the branch of biochemistry, for example, can have direct influence on another branch, for instance on the practice of histopathology. I have usually found that biochemists do not mind wielding this influence, but resent being influenced in return. This common ground is the basis of the unity that has provided us with the powerful voice with which the profession speaks most effectively to the Department of Health. If the Department has to deal with each separate society, we will have achieved a 'divide and rule' situation which I doubt would benefit the progress of pathology in this country. After all, the College as an organization only reflects the conditions of our better organized laboratories where members of each section have an opportunity to discuss matters amongst colleagues before the laboratory as a unit, speaking with one powerful voice, can submit proposals more effectively to its authority. If feeling in the ACP and/or College is strong enough then perhaps the difficulties could be improved by forming sections with their own officers, who could make up the main body of the Council, with a smaller number of directly elected members.

It is not at all surprising that the demand for trained pathologists has overtaken the supply, and we are now facing a shortage of trained pathologists. The attractions at the top of the clinical branches of medicine are very great and the reasons for a young man entering pathology are often obscure, even to himself. The vast expansions in laboratory medicine have created an embarrassing situation for laboratories which cannot attract enough doctors. We are not clear how many pathologists are practising and how many are in training, but the ACP has produced evidence which suggests that the number of pathologists in training is falling far short of national requirements. The increasing load of laboratory work is therefore falling more and more on graduates and technical staff aided by mechanization and automation. The whole apparatus of clinical pathology will have to be studied afresh and eventually the position of the pathologist may be called into question. After all, if laboratory examinations can be performed and

the answers produced by graduates, technological personnel, or even by unskilled labour attending and feeding machines, what is the function of the pathologist, that expensively trained doctor, in the laboratory? Will pathologists really have to compete for the same opportunities as their colleagues in the laboratories? Shall we be able to afford trained doctors, who will inevitably demand a higher status and salary compared with colleagues in the laboratory because of the increased length of training, with the corollary that clinical salaries must be higher than others even in the universities? How does this trend affect the present and immediate future of pathologists? Our chemical colleagues, who inevitably lead in this matter, have themselves been divided, and do not speak with one voice. A past President of the Association stoutly maintains that the functions of the chemical pathologist and the biochemist are quite different, though overlapping and complementary. Others of equal distinction see little or no difference, and hospital and university posts are being advertised as being available equally to a medical or non-medical graduate. This, to me, is an objectionable compromise as it means that the authorities do not know what they want and that professional men in charge of similar departments will be paid at different rates for the same job. This is untenable. The Zuckerman Committee Report does nothing to clarify the situation, and I believe that if the trend continues the chemical pathologist will quickly disappear—after all, why indeed have a medical qualification which takes all of seven years when the same level in a profession can be reached without? It may even be a disadvantage in the long run because of the age at which seniority is reached. The Royal College of Pathologists, by a considerable majority, at its foundation agreed to non-medical membership and has facilitated the entry by examination of scientists in various fields of pathology. Again, naturally, the options have been taken up first by chemists and the College has many non-medical biochemical members. The ACP has always recognized the situation by inviting senior scientists to extraordinary membership. We should remember that the open-ended structure of training for technologists, which many of us have strongly supported, will shortly enable them to advance their status by means of a graduate fellowship, which will mean that the gifted technician will be given the opportunity later to sit for the MCB and then to become a Member by Examination of the Royal College. I am certainly in favour of this, and in our membership of the Association we have many very distinguished pathologists who started their careers as young men working as technicians in laboratories. What is now a rarity might become a positive trend in the future.

What I regard as imminent in chemical pathology merely points to the way which other

subjects may well follow. Certainly the trend is already evident in microbiology and in haematology where science graduates have been encouraged to take postgraduate training in these subjects and posts in routine and/or in research departments, and no doubt in the future they will fully man these departments too. In immunology and in cytology the highest status has already been achieved in these relatively newer spheres by distinguished non-medical scientists, and in fact it has probably been easier in these newer disciplines to integrate the medical and non-medical scientists. This leaves, as far as I can see, untouched and I may say sometimes unmoved, the fairly entrenched histopathologist who sees little or no threat to his branch of pathology. Is it so unthinkable that necropsies could be done by non-medical staff (I could quote in fact many instances of this in forensic pathology) or that the preparation of histological sections will be fully automated and that machines will even be able to distinguish the main patterns of histology? Perhaps this trend is too far ahead to matter, but the problem will, without doubt, emerge in one form or another in histopathology. It will be no defence to say that such positive diagnoses, as for example in the malignant conditions, are so important that these must be made by a doctor. We already see in cytology malignancy and its grading being determined by highly skilled technologists, and the medical cytologist often acts only in confirmation and as the intermediary with the clinical staff, but even that intervention may be superfluous.

Forensic pathologists have improved their academic status by an increase in the number of university chairs in the subject. However, the bulk of the necropsies being routine work, are still done by morbid anatomists (and sometimes other pathologists) who are primarily hospital pathologists. Criticism of this state of affairs is continually heard, but mostly concerns the occasional abuse by individuals and the failure to fulfil their commitments to their hospitals. The trends in this subject are no less confusing. We now have forensic scientists who specialize in a wide range of detailed scientific investigations which will and must affect the status and authority of the forensic pathologist. In a recent radio broadcast Professor Camps was making the case for the pathologist, who said—'Forensic pathologists of the Spilsbury type are passing—these times are finished—we must now work as a team. The forensic scientist will come up with the results of tests but a doctor must be the one to provide the materials for the scientist in the first place and with his knowledge of medicine to interpret the results'. I thought this sounded a rather weak reason for maintaining the status quo. I can see here again only a short step to the scientist taking over all but what is regarded as the chore of the necropsy itself.

Do we see in all this rather confused and

disturbing situation any real threat to the status of the pathologist, a status so recently achieved in so many parts of this country and of the world, and to the ACP and the College, so newly formed and honoured?

Let me turn to a slightly different problem. An increasing number of doctors in the whole field of medicine are involved in some form of scientific research. This is being done in departments of medicine, surgery, and gynaecology, and has meant that these departments have had to be provided with laboratories and graduate and technical help, and in fact such research has turned them into specialized departments of pathology and pathophysiology in the widest sense. They have, inevitably, been placed in an invidious position of competition for laboratory space, technical staff, and even money with the 'routine' laboratories, sometimes to the disadvantage of the latter. Some pathology laboratories have thus inevitably been slowly relegated solely to the provision of a routine service, and they have met this particular challenge by improved methodology. Much energy has inevitably gone into the methods of performing accurately large numbers of tests with the maximum efficiency, speed, and accuracy. Mechanization, automation, and data processing with computer aid have produced whole areas of new thinking in our laboratories. First having set up the machinery, we must feed it and it is then found to be easier to centralize the workshop and so more effectively use the machine. Therefore the tendency is to have huge, accessible laboratories doing hundreds of tests a day, excellently controlled as to quality and, as is often quoted, it is then easier to do all the 12 or 15 or 25 tests that the machine is capable of performing. Therefore we are now amassing a huge volume of data which may or may not ever be used. This tendency *must* shift the accent away from the bedside, and chemical pathologists are already becoming aware that they must at all cost maintain contact with patients and their doctors, and a swing back to clinical chemistry and metabolic medicine is urgent. In the United States the situation is taking a curious direction where commercial firms are moving into the field which once belonged exclusively to pathologists. Not only are chemicals and reagents packaged and apparatus automated and data processed, but in one part of America a commercial firm has a clinical laboratory staffed by four pathologists and servicing 31 hospitals.

On the other side of the coin, some clinical departments with small technical staffs have sometimes produced results which do not stand up to scrutiny because of lack of quality control which would have been mandatory had the work been carried out in the adjacent department. Certainly in some surveys results from different laboratories, even in one hospital, seem to bear no relation to each other. The idea that all laboratories in one hospital should be centrally

housed is a concept which we should encourage so that men and ideas should constantly be interchanged. The old side room and small isolated converted attic lab should disappear. There is also a growing movement towards the concept of the 'common user' section in large laboratories.

Today we must accept the situation that pathology and pathologists are in a sense the meat of a sandwich, which is being squeezed by the pressures on the one side by science graduates, who are taking more and more responsibility first in areas of shortage but now in full competition, and on the other by clinicians who a few years ago might have had little or no training in scientific method, but are now in charge of growing departments with more and more scientific output. Our founder and his contemporaries had little doubt where they stood and where they were going and for 40 years made a huge impact on the practice of medicine, particularly in Britain and the USA and the English-speaking countries. But I am convinced that we cannot remain in this static position. I think that there are three choices before us.

Three Choices Before Us

First, the move by the Royal College of Physicians in recognizing the specialty of clinical haematology has highlighted the problem in this branch of pathology. Many young, aspiring haematologists have probably by now opted to take the MRCP and specialize in haematology that way. According to an agreement between the Colleges, they would not normally expect to take charge of the haematology laboratory which would be reserved for holders of the MRCP Path. This agreement puts the question: Will our future pathologists revert once more to being physicians who, not by accident of appointment or later inclinations but by design and intention and training, will be physicians in charge of patients with blood diseases, metabolic diseases, infectious diseases, and immunological disorders, and will be associated with the laboratory aspects of the work as were the early scientifically minded physicians. This pathologist-physician would have a place in the department in which to carry out any laboratory investigations he might wish but would not be in charge of the laboratory unless he qualified so to be by means of the MRCP Path. Otherwise the laboratory would be run by a non-medical scientist qualified to do so. This is quite a common pattern now in the USA and in European countries.

The second choice is to forget about a medical heritage and join in the scientific service of the NHS and other medical services. We have outstanding scientists who are fulfilling just such functions now and we could throw our lot in

with them and make no pretence that we are different.

Thirdly we can maintain the status quo, with some modifications, and practise what we call 'laboratory' medicine.

First we must decide whether we continue to stand together united in one common purpose (which is clear enough) as one profession, as specialists in laboratory medicine (I hope we will do this), and second, we must see exactly the role of the pathologist and try to define it broadly.

In the USA non-medical scientists had begun to open and run their own clinical laboratories a few years ago, and the American Society of Clinical Pathologists took legal advice and action with equivocal results in different States. The matter was later referred to the Monopolies Commission who ruled against the pathologists. The matter came to a head with the advent of Medicare and Medicaid, which provided an opportunity to obtain a Federal decision as to whether pathology was a clinical and therefore medical discipline. The decision is a compromise one and non-medical scientists are now allowed to run their own laboratories, to investigate patients, and report upon certain clearly defined investigational areas. The Past President of their College in a recent article told his members that they must now return (if they had ever left) to the clinical and applied aspects of pathology. This I am sure is what we will do. It is at the bedside and with the patient and physicians and surgeons that we can be most effective. Advice on diagnosis and control of therapy has always been the forte of the pathologist. In the past we had to master techniques too. Many will still with pride continue to use their hands to much advantage. But we now have scientists and technologists who undertake these duties more effectively and only rarely will pathologists be expected to carry this heavy burden alone. Of course any pathologist who is content to interpret without detailed knowledge and experience of techniques will inevitably fail in the sight of his colleagues, both scientific and medical. The College examinations, I believe, take care of this aspect. The standard of the theoretical and practical examinations is high enough and should remain so to ensure the highest level of competence in every aspect of laboratory medicine.

One Profession within Medicine

I think we are now bound to pose again the question as to whether we are in fact one profession. If we are, and I think at this moment we are still united enough and can all be called pathologists, then if we are to stay thus we have to define common backgrounds of training and practice. Otherwise we must confess that we are a mixture of four or six professions within medicine, linked

only by the accident that we work mainly in laboratories which are usually, and certainly will be in the future, housed within one complex.

Whichever stand we take on this point, the next question is how much are we and the medical profession as a whole willing to tolerate or encourage dilution? I use the term 'dilution' deliberately, but I know you will understand that I do *not* use it provocatively. We are facing the dilemma earlier than other sections of medicine, but I have seen medicine broken down in an emergency situation whereby young volunteers can be trained to vaccinate, to deal with certain aspects of hygiene, to become specialists in one narrowly defined disease, for example, the treatment of trachoma (and it can work), but this is surely a retrograde step only acceptable in situations of extreme necessity.

I believe that if we accept this trend without comment we will be the first to start the process of the disruption of the unity of medicine. We will no longer produce men of sufficient breadth of vision able to view the whole vista of pathology, let alone the broad sweep of medicine. I believe firmly in a unifying concept of medicine and the functioning within medicine of teams of people who must be able to see and understand and contribute to the patient as a whole. I doubt therefore whether the 'single line' trained pathologist will really provide the answer to our problems, although we may be driven to encouraging the technologist trained in a single subject.

If this unifying concept in pathology is to flourish, I would like to see the entry to all branches of pathology through one primary examination which would cover all the scientific bases of our subject. Without going into great detail I should like to see our young trainees given a thorough grounding in cell biology, cell pathology, biochemistry, physiological measurements, isotope techniques, microscopic techniques, and so on, which would provide a common basic training and examination and enable the candidate to proceed to the final of his choice after adequate laboratory experience covering the overlapping areas of four or five disciplines. I am not worried about the final examinations which, I believe, are excellent.

Finally, I would speak briefly on the ultra-specialist, that is, the man who eventually concentrates on one organ or one disease. The day of the 'generalist' seems to be rapidly passing and not only in pathology. The *Times* Cricket Correspondent, analysing the end of the season's figures, laments the passing of the great all-rounders and points out that this year no one had achieved the coveted double (for our Scottish friends 1,000 runs and 100 wickets). More and more pathologists are finding great academic and professional success and satisfaction in limiting their life's work to a narrower specialization within pathology. Great reputations have thus been made in neuropathology and neurochem-

istry, bone pathology and bone chemistry, gynaecological pathology and related hormone chemistry, paediatric pathology and chemistry, or disease of the thyroid, the adrenals, or within haematology in clotting disorders, immunohaematology, or haemolytic disorders, and it may well be that the pattern in pathology of the future will follow, as medicine itself might do, the study of an organ in depth, covering all aspects of labora-

tory medicine in relation to a specific organ.

If, as I hope, the future trends follow the directions I have indicated, then I see a bright enough future (which will attract young men) for pathology and for pathologists who, having long ago discarded their image as backroom boys and boffins, are now in a position once more to cement their efforts and continue to hold together the scientific bases of medicine.