SOME OBSERVATIONS ON THE TEACHING OF PATHOLOGY IN THE U.S.A.

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The recent report of the B.M.A. Medical Curriculum Committee (*The Training of a Doctor*, 1948; Butterworth, London) has raised many controversial points which will be disturbing to some and welcome to others engaged in the teaching of medicine. It may be of interest at this time to study methods of teaching in other countries, and it is proposed, therefore, to comment on teaching in America, confining myself to one subject only, pathology. I recently spent a year in the pathology department of a well-known American teaching hospital, and during this time was able to visit and study methods at five other widely separated teaching institutions, two of them State university medical schools.*

At the outset it must be mentioned that in the U.S.A. medical students (excluding ex-Service men) are, on the average, three years older than their British counterparts. Most American students have taken a degree in arts or science (often including physics, chemistry, and biology) before entering medical school, which they do at the age of 21 or over. Probably as a consequence of being older and having had a university education, American students are more mature in outlook and have a more lively sense of the value of their studies in pathology and its application to medicine than English students. There was no evidence of previous cramming, and the scientific knowledge garnered in preceding years was often applied to the problems of pathology with an eagerness which led students into research projects as undergraduates.

Whether or not it is desirable to insist on a university degree as a necessary qualification before taking up a medical training is debatable. Although this is generally done in America, it is interesting to record the fact that wherever I went I found that the English medical student (and doctor) had a high reputation for general culture. The batch of undergraduates who were trained in the U.S.A. during the war enhanced the reputation of British students immeasurably. Further, one eminent pathologist and teacher told me that the English system of going straight from school to medical training was the best, as it enabled the student to get rid of his factual training quickly and then settle down to doing real useful thinking and worth-while work (e.g., research, postgraduate specialization) before the age of 30.

After entrance the general medical course consists of four years' graded instruction, at the end of which an examination for the M.D. degree is taken; then follows a year's internship. The four-years course is carefully integrated as a whole, and generally consists of: first year, anatomy and physiology; second year, pathology and associated subjects; third and fourth years, clinical subjects. During the preclinical and very often during the clinical period of training, instruction is carried on throughout the academic year of about eight months with very little break for vacation. Often the long vacation is filled in taking an extra elective course—e.g., obstetrics, pathology, or a research problem—but it also may be occupied in doing a job ("working one's way through college") or a military commitment.

Undergraduate Training in Pathology

Pathology is generally taught in the second year, and, though on paper it may be considered a preclinical subject, it is in practice never taught without the association of a hospital background, and the correlation between lesions and functional alterations is constantly stressed. Although the main course is in the second year, in many schools there is often systematic training also in the third year, and in all cases pathology is kept constantly in the students' minds during their clinical training by clinico-pathological conferences, pathology

staff conferences, special gynaecological pathology, surgical pathology, and "grand rounds."

Bacteriology, chemical pathology, haematology, and clinical biology (serology) are taught as separate subjects in their own departments and not, as a rule, with pathology. The main course in pathology may extend throughout the whole academic second year or may, as in some schools, be compressed into two terms.

In nearly all schools visited a systematic course of lectures was given. In one or two schools the lectures departed from the usual scheme and dealt only with recent theoretical or research aspects not yet appearing in the textbooks or aspects not generally emphasized by the textbooks—e.g., collagen vascular diseases, deficiency diseases, etc.

One eminent authority told me that systematic lectures were a waste of time and that their only use was to give practice to the junior members of the staff in preparing their subjects and in lecturing before an audience.

Besides lectures there were classes in morbid anatomy and histopathology. In conducting these a feature which was quite common was the effort to bring together teacher and student in close personal relationship. The classes were divided into small groups, comprising not more than a dozen students, and a large number of instructors ensured attention to the requirements of the individual student.

Specimens representing each disease or group of diseases were concentrated in separate rooms, where for about two weeks they were studied by a group of students in turn under their instructors. In some cases the instructors remained with their particular group of students throughout the academic year, circulating through the different rooms with them. In others, specialists in the branch of pathology represented by the specimens in the particular room dealt with each group of students as they came through.

The first method is much more personal—more akin to the "supervision" or "tutor system" that prevails in our older universities. It leads to a more intimate relationship, which helps to iron out the difficulties of the individual, and in practice particular groups put on a demonstration and discussion with their tutors which lasts into the late hours of the evening—often to finish up in the local beer-parlour! The advantage of the second method is that specialists are brought directly into contact with the student: neuropathology is taught by neuropathologists, gynaecological pathology by gynaecologists with an interest in the pathological side, and so on.

The specimens in the rooms were from necropsies going back many years, preserved in large jars of formalin. Thus in one room cases representing tuberculosis were collected, in another cardiovascular diseases, in a third genito-urinary diseases, and so on. The specimens were loose and were handled both by demonstrators and by students.

Mounted specimens were also used in these rooms for demonstration purposes. Some institutions had a museum of mounted specimens for teaching purposes, but I gained the impression that, generally, museums were for the housing of historical specimens and oddities rather than for teaching.

There was always an efficient filing system, so that reference could be made to the history and the microscope slides relating to the cases in the gross-specimen rooms. A very useful exercise within the groups was for one student to present a series of cases compiled from the files to illustrate a special feature of pathology.

Microscope slides and protocol files were never sacrosanct. I asked once if there was no concern over the loss of slides in this sort of system. I was told it was better to have the slides used and lost rather than never used at all, and so far as I could see there were comparatively few losses considering the amount of use the collections were given.

Concurrent with the study of gross specimens, histopathology relating to the group of diseases studied in each particular room was carried out. Nearly always a member of the staff was present, and the procedure was to alternate between gross-specimen rooms and microscopy rooms.

As a rule the student was given 200 to 400 representative slides portraying pathological processes, and histological

*I held a Rockefeller Fellowship at the Johns Hopkins Hospital, 1947-8, and visited the Universities of Chicago, Cornell, Harvard, Maryland, and Illinois.

patterns were stressed rather than detailed cytology. As a consequence of this the micro-projector could be used, and was used extensively (in the U.S.A. the micro-projector always seems to be efficient); this I found was a distinct advantage in indicating to the students the exact lesion under discussion. The micro-projector could be employed in this country much more extensively, not only by students but also for the purposes of illustrating lesions at clinical meetings.

Often the groups or the class as a whole had weekly recitations or "quiz" exercises similar to our "rags" or "bottle parties." They were a popular feature, and the students found them very instructive.

In all schools attendances at necropsies were given high importance. In schools using the group system of teaching, the group attended the necropsies performed by the group member of the staff. Embalming of bodies is often carried out in the United States, and as a consequence hospitals generally have a 24-hour necropsy service in order to accommodate the undertakers. It is not unusual, therefore, to see a group of students attending a necropsy into the small hours of the night with their staff member.

Generally the students assist the pathologist (doing the "dirty work," such as the opening of the gut), but in some hospitals students may carry out complete necropsies under supervision. In several schools it was the practice for a team of four to take over a case, and later one would present the history, another would demonstrate gross specimens, another the histology, and a fourth would give the final commentary. The whole team was often responsible for the histology blocks being embedded, cut, and stained.

Often the necropsies of one day were presented next day or on specified days during the week, when the whole class or smaller groups attended. In general, specimens are preserved in formalin, although the use of the deep-freeze for gross specimens is on the increase; this method has the advantage of preserving the natural appearances when thawed.

One university makes extensive use of colour photography of gross specimens and has collected a very complete library of lantern slides, so that any disease can be quickly illustrated on the screen. Excellent though this may be, it has the very obvious danger of being so easy to use that it may exclude the seeing and handling of the actual diseased organs, which, to my mind, is so important in the teaching of pathology.

In passing it might be noted that, although many necropsy theatres have special galleries for students to watch the performance of a necropsy, I never saw one in use.

During all this time it is possible for a student, or several students together, to carry out a research problem, and many do so. This may consist of a compilation of post-mortem reports and material or pure experimental work on animals. I remember well at one institution, when Trueta's book on the renal circulation became so much talked about, two students approaching the professor of urology and asking if they could repeat some aspects of Trueta's work. They were told, "There is the lab.; get on with it." I asked if these students would get anywhere with the problem, and was told, "Probably not, but they will learn something and think for themselves. That is why they are here." This typifies the attitude of the whole medical staff of these teaching institutions, and it is an attitude which is not confined only to the pathology department.

In most of these institutions much more stress is put on experimental work than in England. More and more it may be said that the pathology taught in the States is functional pathology rather than just the study of "dead issues"—although morbid anatomy as taught by the German and Scottish schools is not neglected. To this end functional alterations are emphasized as much as the lesions for which they are the cause or with which they may be associated. As an example of this method of teaching, one institution names the practical part of its course "pathological anatomy and physiology," and states that the course is "meant to present systematically the anatomical, chemical, and functional changes which occur in the commoner human diseases." As a result the medical student is much more experimentally and research minded than his British counterpart.

Perhaps an extreme example of this has been reached at one institution where for one term groups of students are given experimental problems on animals—e.g., vascular occlusions, diet experiments, and so on—for the study of various cause-and-effect processes in pathology. This method of teaching functional pathology is as yet in its experimental stage, and its results are still *sub judice*. Opportunity for research is arranged for by the fact that courses are so planned that students are left with a third to a quarter of their course as free time.

One interesting aspect of the medical training is the elective course, in which a student voluntarily chooses to do pathology or some other subject. If he takes pathology he functions as a junior member of the staff (even though he be only a second-year student), performs necropsies (under supervision), and presents his completed case with the histology to the chief of the department. I was most impressed with this aspect, for I heard second-year students present their cases with the aplomb of many an experienced pathologist.

Throughout the clinical years the pathology department constantly influences the student in training. At least once a week, and often many times more, the student will view histological patterns of diseases shown on the screen by the micro-projector, see gross specimens, and hear them discussed at various hospital conferences. Further, he will attend special pathology classes, either compulsory or elective, in surgery, gynaecology, ophthalmology, dermatology, and neuropathology. One good method which is often practised is to bring in the clinician at these classes. The clinician reads out the case history, shows lantern slides and radiographs of the patient, and discusses prognosis; the pathologist in his turn demonstrates the gross specimen (or shows a lantern slide of it) and then discusses the histological pattern. This adds interest to an otherwise often uninteresting subject.

It is my impression that throughout his course the American student is much more histologically minded than his English counterpart. Certainly he does not have to learn a word-picture of a histological appearance from Boyd's textbook before his examination. These remarks also apply to the postgraduate in subjects other than pathology.

Postgraduate Teaching of Pathology

It is a not uncommon practice in the States for a student, after passing his M.D., to do his internship in pathology. It should be noted that up to the time of taking his M.D. he has had only two academic years of clinical training. To those who have gone through the gamut of the longer British training this early specialization in pathology after such a brief clinical training sounds incredible. I asked the doyen of American pathologists whether he thought this system was a good one; he replied, "It is unnecessary for embryonic pathologists to waste time doing clinical jobs."

I formed the opinion that, in American teaching hospitals, once a specialist had completed his period of postgraduate training he tended to broaden his viewpoint by close association and frequent conferences with other departments. In England, on the other hand, although we insist on our specialists having a much wider background of initial training, perhaps they tend to tread the narrow path of their own specialty once they are established and the years roll on.

In my experience the training of pathologists was excellent. In the first place, juniors (or "residents") were accepted by the senior members of the staff as equals, although it was obvious that at first the senior members were talking right over their heads. This stimulus to, shall we say, self-respect and higher thinking paid dividends, and the progress of the trainee pathologists was phenomenal. Furthermore, the junior was straightway given a responsible job. For example, he would be sent to the surgical pathology department, for which he would be responsible for three months. His work was of course checked by a senior member of the department every day, but he was primarily responsible for the gross and microscopical descriptions of the specimens, and also did all the emergency frozen-section reports. A junior resident thus worked very hard, and during his tour of duty had almost a twenty-four hours day.

In the training of the pathologist necropsy work was all-important. The junior performed necropsies at first under supervision. A week after the necropsy he would present his report together with the gross specimens to a senior member of the staff, who in turn would dictate a further commentary. Some time later the junior would present the microscopical sections to this senior member of the staff; and, in passing, it may be noted that all special stains were done by the trainee pathologist himself. The senior member would write a final commentary or, if it was of particular interest, would put the case up for presentation at the weekly staff conference before the head of the department. At this conference the junior would present the case to the chief, who would write his final commentary. By this method of checking first at the gross-specimen stage, then at the microscopy stage, the facts were well inculcated; and when the chief discussed these facts and added his own observations emphasizing the importance of the pathological processes involved the case finally was nicely orientated within the resident's mind.

In addition to weekly conferences on necropsies there were intra- and inter-departmental conferences in which the junior members took part. One such conference was that of surgical pathology, at which the interesting histopathology of the preceding week was brought to the notice of the whole department. An excellent feature of this conference was the description of the patient given by a resident whose duty it was regularly to attend the tumour clinic where he had seen the patient. This resident at some other time would present the histopathology to the surgical staff of the tumour clinic.

The resident staff were also involved in the preparation and presentation of regular conferences held in conjunction with the paediatric and the obstetrical departments, at which infant and foetal deaths were reviewed respectively.

At one institution the pathology department would give a review of a particular disease or pathological process as it presented itself after examination of the hospital records. At the conference clinicians and pathologists would present their respective observations and conclusions (and these were often original) and a discussion would ensue. As the resident staff were often responsible for doing the "spade work" for such conferences they gained valuable experience in bringing together several aspects of pathology.

Within the pathology department one found, besides the trainee pathologists, trainee specialists from other departments, such as medicine, surgery, and radiology, who were there for instruction for one year. This added a leavening of clinical personnel which was very healthy and made liaison with other departments easier. At one institution the radiologists under training were utilized at all conferences to collect and interpret the radiographs, and I would strongly recommend this procedure.

Comments

The method of dividing pathology classes into small groups which, together with their tutors, circulate through special study rooms in which are concentrated specimens representing various diseases is recommended.

Pathology in America is taught with much more of a functional application than it is in this country. The importance of experimental pathology is stressed—in some cases perhaps too much, as students may occasionally think in terms of airy experimental theories rather than of the solid facts of morbid anatomy.

The micro-projector should be used much more in England, and, although one cannot teach detailed cytology by such methods, histological patterns of disease can be illustrated and be constantly put before the student of pathology as well as before clinical and postgraduate students. Pathology need not therefore be a watertight subject that too often is forgotten as soon as the pathology examination is past.

The American method of early specialization in pathology is open to criticism on the ground that students have had too brief a contact with the living patient (i.e., sometimes only two academic clinical years). In England the pathologist has had at least three full years' clinical experience before graduation, followed, very often, by a year or so of house jobs.

The graded checking of the work of the trainee pathologist in the States is excellent, as is the early assumption of responsibility. The constant use of clinico-pathological conferences brings all aspects of medicine and surgery to the pathologist's notice, thus broadening his vision.

NEW POISONS RULES

AMENDMENTS CONSOLIDATED

The Poisons Rules, 1949,* which were laid before Parliament on March 25, came into operation on April 11. This revision of the Poisons Rules (Statutory Instruments, 1949, No. 539) replaces the Poisons Rules of 1935 made under Section 23 of the Pharmacy and Poisons Act, 1933, and all the amendments to those rules which have been issued from time to time.

The Fourth Schedule again lists those substances required to be sold by retail "only upon a prescription given by a duly qualified medical practitioner, registered dentist, registered veterinary surgeon, or registered veterinary practitioner." Such substances will continue to be governed by the rule which lays down that a prescription shall:

(a) be in writing and be signed by the person giving it with his usual signature and be dated by him;

(b) except in the case of a health prescription, specify the address of the person giving it;

(c) specify the name and address of the person for whose treatment it is given or, if the prescription is given by a veterinary surgeon or practitioner, of the person to whom the medicine is to be delivered;

(d) have written thereon, if given by a dentist, the words "For dental treatment only" or, if given by a veterinary surgeon or practitioner, the words "For animal treatment only";

(e) indicate the total amount of the medicine to be supplied and, except in the case of a preparation which is to be used for external treatment only, the dose to be taken.

In an emergency an authorized seller of poisons may supply a doctor without a written order, say in response to a telephone request, if the practitioner gives an undertaking that such an order will be furnished within the next twenty-four hours.

The poisons listed in the Fourth Schedule are as follows:

Allylisopropylacetylurea

Amidopyrine; its salts

Barbituric acid; its salts; derivatives of barbituric acid; their salts; compounds of barbituric acid, its salts, its derivatives, their salts, with any other substance

Dinitrocresols except agricultural or horticultural insecticides or fungicides; dinitronaphthols; dinitrophenols; dinitrothymols

6-morpholino-4 : 4-diphenylheptane-3-one; its salts

Para-aminobenzenesulphonamide; its salts; derivatives of para-aminobenzenesulphonamide having any of the hydrogen atoms of the para-amino group or of the sulphonamide group substituted by another radical; their salts, except when contained in ointments and surgical dressings

Phenylcinchoninic acid; salicyl-cinchoninic acid; their salts; their esters

Sulphonals; alkyl sulphonals

Tridione (3 : 5 : 5-trimethyloxazolidine-2 : 4-dione)

Most of these substances are better known to practitioners under trade or other names.

A prescription which comes under the Fourth Schedule must not be dispensed more than once unless the prescriber directs that it may be dispensed a stated number of times or at stated intervals. There must be noted on the prescription the name and address of the seller and the date on which the prescription was dispensed. The prescription must also be retained and kept on the premises for two years so that it is readily available for inspection. This last provision does not apply to a "health prescription," which is defined as a prescription given by a doctor or a dentist in accordance with the National Health Service Act, 1946, or the National Health Service (Scotland) Act, 1947, or given by a doctor or dentist upon a form issued by a local authority for use in connexion with the health services of that authority.

*Poisons: The Poisons Rules, 1949, H.M.S.O., price 9d.