THE

British Medical Journal.

THE JOURNAL OF THE BRITISH MEDICAL ASSOCIATION.

LONDON: SATURDAY, SEPTEMBER 1st, 1928.

EDUCATIONAL NUMBER. SESSION 1928-29.

THE ART AND SCIENCE OF MEDICINE IN RELATION TO PROFESSIONAL TRAINING.

BY

J. A. NIXON, C.M.G., M.D., F.R.C.P.,

PROFESSOR OF MEDICINE, UNIVERSITY OF BRISTOL; PHYSICIAN AND DEAN OF FACULTY, BRISTOL ROYAL INFIRMARY.

THE late Professor Kanthack, in an address delivered thirty years ago before the Abernethian Society of St. Bartholomew's Hospital, spoke of the coveted goal of medicine as being its establishment as an exact biological science. Medicine might, perhaps, be easier to teach if it ever became an exact biological science; it would certainly be easier to practise if a doctor's duty were performed according to the ascertained rules and laws of an exact science, as an astronomer applies known rules and laws. The lawyer is judged by the virtue of his pleading, not by the issue of the cause; he may gain success where he fails to gain a verdict; but the physician, as Bacon said, "hath no particular acts demonstrative of his ability, but is judged most by the event" (or result). Dr. Pusey, in his presidential address read before the Institute of Medicine of Chicago in December, 1927, summed up the competent physician as "a man who, with a background of science, practises an art that he has gotten through technical training."

RESEARCH AND PRACTICE.

The doctor differs from most other craftsmen because he is expected to discover the scientific laws underlying his craft as well as to apply them in practice. Discoveries in the science as well as in the art of medicine are commonly made by men who have been trained for the practical craft of medicine. There have been conspicuous exceptions, notably Christopher Wren, who, becoming interested in medical problems through his connexion with the Royal Society, made the first intravenous injections of drugs in animals for the purpose of observing their effects, and also performed in a dog the first splenectomy. Pasteur came almost accidentally to human diseases from his researches into brewing and wine-making; Jesty, the Dorset farmer, noticing how milkers were rendered immune from small-pox, practised systematic inoculation with cow-pox with such success, that Jenner was led thereby to the introduction of vaccination.

The advancement of medical knowledge cannot, however, depend solely upon such windfalls from outside the ranks of the profession; therefore medical education must be planned on broad enough lines to give a common starting-point for the researcher as well as for the practitioner. Nor is the role of the practitioner at any time so completely separated that he may not, whilst engaged in practice, make discoveries that place him among the researchers. The converse unfortunately is less likely to happen; laboratory research may so engross the attention that the research worker may seek no further experience in the

practice of medicine. On the whole, the advantage lies with the practitioner, for he can never abandon wholly the experimental method, nor need he cease to enlarge the boundaries of his own knowledge because he is observing the responses of human beings rather than those of guinea-pigs.

THE PURPOSE OF A MEDICAL TRAINING.

When a medical student is first qualified he has to recall what he has learnt of the experience of others, but presently he must rely on his own, and he soon finds that experience must be actively earned; it does not fall into the lap unsought. The policy of "wait and see" does not succeed so well as that of "look and see." The purpose and design of the medical curriculum is to train the student partly in the science of "looking and seeing" and partly in the craft or technique of "doing." Or should one say the *art* of looking and seeing? For surely it is in a manner an artist's gift to be able to see clearly: or as Dr. John Brown expressed it, "all primary discoveries are made by men who are artists in the sciences in which they work."

It is a defect in our whole education that the artist sense is deliberately repressed; the prizes tend to go to possessors of superior memories rather than to those who can observe and reason best. Matters are perhaps not quite so bad as when Swift could write

"Our knowledge is but mere remembrance all;
Remembrance is our treasure and our food."

And Dugald Stewart had the courage to speak even plainer: "Those men," he wrote, "who are possessed of a memory for detached and insulated facts are very seldom distinguished by the higher gifts of mind. . . . Men of little ingenuity seldom forget the ideas they acquire, because they know when an occasion occurs for applying their knowledge to use they must trust to memory and not to invention."

PRELIMINARY STUDIES.

Modern education, and even medical education, is beginning to set less value upon overloading the memory with unrelated and undigested facts than formerly. Epictetus long ago compared the memorizing system to the behaviour of sheep who, after they had been feeding, should present their shepherds with the very grass itself which they had cropped and swallowed instead of concocting it into wool and milk. The elementary sciences, the pre-medical subjects of chemistry, physics, biology, and botany, are in the curriculum to familiarize the student with the structure

and behaviour of the materials with which, and upon which, he will have to work, also with the instruments that will aid him in his task. The student passes from generalized studies to a particularized study of human structure and function in anatomy and physiology, together with the chemistry and physics of living tissues. The main object of these studies is to train the eye to observe, the mind to reason, and the hand to act, though there is a danger that the intervention of examinations may obscure this object. Anatomy, above all other subjects in the curriculum, may be so taught as to become a matter of memory and nothing else. It is possible for a student with a retentive memory to gain the approbation of teachers and examiners by the very methods that would have caused the shepherds to slaughter Epictetus's sheep out of hand.

CLINICAL EDUCATION.

The clinical portion of medical education embraces a somewhat different plan. The problems are the diagnosis of diseases, their prognosis, and treatment, or, better still, their prevention. An entirely new factor comes into play. Hitherto the student has been set the task of investigating the behaviour of materials by observing objective signs; his studies of human patients must include the interpretation of symptoms—that is, of discomforts and pains experienced and complained of by the patient. The interpretation of signs might conceivably become an exact biological science, but any scientist would justifiably reject the results of an experiment which involved so large a contribution of personal error as the description of symptoms given by an average patient. The marvel is not that doctors sometimes misinterpret symptoms, but that they ever learn enough of the art of happy guessing to come to any correct conclusions. Sometimes the symptoms or sensations of the patient are so unequivocal as to leave scarcely any margin of doubt. Sometimes there are objective signs which, taken in conjunction with the symptoms, lead to a correct conclusion.

In the interpretation of symptoms collective experience of the past, and especially records of *post-mortem* examinations, have their greatest value. In the interpretation of signs every artificial means of improving the instruments of observation must be welcomed. It is not so very long since the methods of diagnosis consisted in listening to the patient's account of his symptoms, looking at his tongue, feeling his pulse, and perhaps inspecting his urine. Slowly new methods forced their way in, each in turn meeting with some opposition. Auscultation and percussion have been in use for little more than a hundred years, the use of the clinical thermometer is not so old; all that is embraced in clinical pathology dates back at most some fifty years.

MEMORY, OBSERVATION, AND REASONING.

Nowadays to probe deeper into Nature's mysteries of health and sickness the student must spend many hours, not in memorizing all the wisdom of the ancients, but in learning to use the tools of a calling in which every craftsman must observe for himself. Still there hangs over him the threatening storm-cloud of examinations. Tradition adds to the terror by persisting that examiners in clinical subjects prefer feats of memory to proofs of ability to observe accurately and reason clearly. Any accurate observer can be trusted to amass a useful store of experience; no store of remembered facts can come to the rescue of inaccurate observation. It is of little use knowing how to perform a given operation if the skill to perceive the need for the operation is lacking.

Medical education seems to the beginner to waste a great deal of time in the preliminary sciences, but their study involves the use of a large variety of instruments of precision, it imparts accuracy to the organs of perception, and trains the mind to logical reasoning. Clinical medicine demands the use of many instrumental aids to the organs of perception. The extremest and simplest illustration of their use lies in *x* rays, without which the eye of the keenest observer would be blind. The medical student, then, must learn by constant practice the operations of surgery, how to employ the stethoscope, laryngoscope, ophthalmoscope, cystoscope, and any other instru-

ments which represent to the doctor the telescope of the astronomer. Moreover, he must, in addition, use the microscope and the test tube.

BEDSIDE AND LABORATORY.

At present there is a passing struggle over the place of laboratory work in the clinical curriculum. The struggle will pass as all previous ones have done, and the student of two generations hence will marvel to hear that the laboratory was ever kept at arm's length from the bedside. But the discoveries of one generation are the common-places of the next, so that, as Condorcet phrased it, "two years employed under an able teacher carry the student beyond those conclusions which limited the inquiries of Leibnitz and of Newton," a truth which the teacher of clinical subjects occasionally overlooks. The student grows impatient of the "barrack square" drill which the time-honoured methods of inspection, palpation, percussion, and auscultation embody; he asks whether the *x* rays have not superseded this hod-carrying labour. The teacher who insists on the old methods must be sure of his reasons for preserving the handicraft after the introduction of machinery.

After obtaining a qualification the newly fledged doctor makes his choice of practising his profession directly upon the actual patient or more indirectly by studying the general problems of the healing art without reference to individuals. In common parlance he must become a practitioner or a laboratory worker—although the distinction is inaccurate. Yet some such distinction is dictated by purely economic considerations. Mere lack of time is one great economic force which separates the bedside worker from the laboratory worker. The former must listen to the patient's talk, and while the patient is talking the worker in the laboratory can go on unhindered thereby. It is not so much a difference in scientific method that distinguishes them as a different distribution in their fields of endurance. The laboratory worker is a patient watcher of tubes and Petri dishes, the physician a patient listener to the human voice; the surgeon adds thereto a patience in handiwork, and the obstetrician a mighty patience with the works of Nature.

The branch of medicine which the doctor decides to follow is often dictated by opportunity. Sometimes the decision is due to an evaluation of talents made by the individual or the teacher, sometimes it is arrived at by exhaustion of a particular field or fields of patience. Beyond and above these there exists in some natures a strong urge towards personal service, which seems to make direct contact with the patient imperative. Such natures are not inspired so keenly by the spirit of serving humanity in the abstract as by the sight of the individual imploring their aid.

THE VALUE OF A COMMON CURRICULUM.

But for all these ultimate destinations the medical curriculum starts on the same lines and continues on the same lines up to the point of qualification. It is better that it should be so than that choice of divers roads should be offered too soon to the undergraduate student. If the choice could be made too early the danger might arise that some part of medical practice would be relegated to an inferior caste of craftsmen with a shortened course of training.

Economic pressure occasionally brings out complaints that doctors ask too high wages; sometimes there seems a risk that "approved societies" might be content with, or even demand, something less than a full training for "panel practitioners." The like has happened before in the history of medicine when the monkish physicians, despising the chirographical handicraft, made over the surgical part of medicine almost entirely to the barbers. Fortunately the jettison was never complete; Henry of Mondeville, Guy of Chauliac, and John of Arderne helped to keep human surgery from falling to the level of sow-gelding. It will be a sorry day if the education of the medical student divides too soon, so that the training for general practice becomes divorced from the training for research work.

This strange medley of a curriculum is worth retaining if it can give in our own time a Lister, a Hughlings Jackson, a Michael Foster, and a James Mackenzie.