

## MEDICAL EDUCATION.\*

By E. W. C. BRADFIELD, M.S., F.R.C.S.,

LIEUT.-COL., I.M.S.,

*Professor of Surgery, Madras.*

THE problems of medical education are too extensive for a short paper, but in recent years so many changes have taken place, even altering the whole outlook of the medical profession, that an attempt to consider its position in this country and to define our aim and ideals is fully justified. The best methods of instruction in medicine have been the subject for consideration by a Royal Commission in England, and we ourselves have only just received a report on Indian medical colleges, which has severely condemned our shortcomings and drawn attention to the inefficiency of many of our methods. Numerous articles and papers too have appeared in medical journals, and the writings of Sir George Newman(1) and Mr. Abraham Flexner(2) are specially valuable to those who would study the subject. The true aim of a medical education, the need for training a doctor with a really scientific outlook and for the close co-operation of teaching with research, are not sufficiently realised in this country, where well-informed doctors are necessary for so many of the reforms which are now demanded. "Such public questions" says Sir George Newman "as the care of maternity, infant and child welfare, healthy adolescence, industrial hygiene, national physical efficiency and capacity and the avoidance of disease and premature death, find their answer ultimately in the progress and science of medicine, in the extension of its healing art, and in the soundness and completeness of the equipment of its practitioners."

Although the Madras Medical College was established in 1835 and a medical faculty created in 1857, the desire for cheap doctors has always influenced our educational policy. In this Presidency to-day, while there are 600 students receiving a university education at two medical colleges, 690 men and 134 women are taking at 7 medical schools the short four-year course to qualify themselves for the Government diploma. Last year 47 students qualified for the M.B., B.S. degree, 54 students for the L.M.S. degree, and 174 obtained the L.M.P. qualification. The inferior trained doctors have always outnumbered the university graduates and a reference to the Medical Register will show that the last twenty years' over-production of L.M.P.'s has resulted in a general overcrowding in the towns. It has not provided doctors for the village population. There are to-day 629 doctors practising in Madras town or roughly one doctor for every 840 people, a higher proportion than in the British Isles, where there is one doctor to 920. Other towns, e.g., Vizagapatam 68, Tanjore 43, also show large numbers of doctors and these figures take no account of the many practitioners of other systems of medicine. The majority of these registered practitioners have only the L.M.P. qualification and it is especially important that they should have had an efficient education and be able to sustain the ideals of modern medical science.

I am not concerned here with the unequal distribution of doctors. My contention is that the policy of our medical schools, which were designed first to provide a superior grade of Hospital Assistant and then extended to provide a lower grade cheap practitioner for the scattered districts, has failed. Village practice exhibits peculiar disadvantages in India and is as unattractive to the L.M.P. as to the University graduate. Over-production of cheaply made doctors cannot force distribution of cheaply made doctors and both prefer to concentrate in the towns where financial prospects are brighter. Personality, however poorly equipped, can always satisfy a public who prefer a mixture to be given with due mystery and appropriate rite for

every ailment, but such service does not satisfy the ideals of modern scientific medicine. I do not wish to depreciate at all what hospital assistants, sub-assistant surgeons and licensed medical practitioners have done as medical practitioners; their own Associations realise and are continually pointing out how handicapped they are by their inferior training. I know many who are the equals of our university graduates, but their success has been in spite of their medical school education and not as a result of it. What is called for is one standard of medical education to which all must attain. "Doubtless some will subsequently proceed to more numerous degrees and qualifications than others, and with greater gifts will produce greater results; but all doctors should be given a minimum comprehensive training based on scientific inspiration."

If we accept this finding and are prepared to advocate improvements in our system, we must have a clear vision of what we are leading to, because medical education is a serious and costly venture, and those who finance our educational schemes must be convinced that our ideals are right and the results to be attained worth the price that must be paid. In discussing therefore the problem of medical education I would first attempt to define our aim, then to discuss the basis of preliminary education on which we must work and finally to review the methods which characterise instruction in this and other countries.

*The Aim of Medical Education.*

In order to define our aims it is necessary that we should understand what manner of thing modern medicine is and the responsibilities which are to-day undertaken by the modern practitioner. Few of us can deny that at times our thoughts and actions yield to the spell of mysticism, perhaps the guiding principle in Chinese and certain indigenous systems. Superstition, however, has no place in modern medicine, while empiricism, an art which taught our forefathers the value of certain remedies and laid down rules of treatment, has yielded to scientific observation which has defined its limits.

If strictly defined as knowledge capable of quantitative expression, science would begin and end with mathematical physics, and most of our systems of knowledge would cease to be so called. Flexner, taking a historical and broader view, defines science as "the persistent efforts of men to purify, extend and organise their knowledge of the world in which they live. In this sense we are entitled to assume not only the science of mathematics and the science of physics, but also the science of biology, the science of agriculture and the science of medicine." The prevalent idea that a scientific education and outlook is dependent upon the part played by the laboratory is quite wrong. Science is essentially a state of the mind, a matter of observation, inference, verification, generalisation. The mind of the physician or surgeon occupied with a sick patient does not operate in any way differently from that of another scientist occupied with the results of an experiment in a laboratory. Both are using their power of observation, aided or not by special or delicate apparatus, both are assembling facts, interpreting and drawing conclusions. The main difference is that exact laboratory work is much simpler than ward work of anything like equal precision, but both the clinician and the laboratory worker are essentially scientific. "The clinic is not saved to science by laboratory methods; it includes them as simply additional weapons with which to do better, what scientific clinicians have always done, namely observe, explore, unravel."

Agreeing with this definition of medicine, what manner of man do we expect in the present-day doctor, who is a very different being from the private practitioner of pre-Lister days? The overwhelming importance of public health has added responsibilities in connection with the prevention of disease which are the inspiration of our profession. They have entirely changed the scope of the modern doctor, so that to-day the public and the State, which need competent

\* A paper read before the South Indian Branch of the British Medical Association.

medical guidance, are deeply concerned with medical education and require that it should be free from quackery and incompetence. Sir George Newman in his note on medical education in England says, we require "a man of learning and knowledge in his vocation, with technical skill and medical experience; but above all a practical man with ideas and application, with a forward looking mind, able to participate in the growth and development of medical science, trained in the scientific method and inspired by the scientific spirit; in other words a man of accurate observation, of ability in experimentation and of sound judgment and interpretation." What kind of education will produce such a practitioner? "The answer to the question is complex, in a word it is university education in medicine, and the foundation of such an education is science."

Such is our aim in medical education, remembering that the function of a university education is not only to provide special technical instruction, but also to so expand the mind of the student that it may become a more perfect instrument of knowledge and progress. He must not only acquire a knowledge of those numerous facts which are necessary for the practice of his profession but his mind must be so trained that it can expand beyond the boundaries of old knowledge."

#### *The Preliminary Sciences.*

The basis or foundation of our education is science, considered as the preliminary scientific studies, chemistry, physics, and biology followed by the fundamental medical sciences, anatomy, physiology and pharmacology. The preliminary sciences are important. They afford an early discipline, the teaching of the scientific method, and they provide also the elementary data upon which the fundamental medical sciences are constructed. It is important that they should always be taught by experts, men who devote their whole time to teaching and research in these subjects, for it is here that the student is brought in contact with pure science and should learn that medicine is not a subject apart but is closely connected with advances in pure scientific knowledge. As is perhaps only natural, the expert often forgets that the medical student does not intend to become a botanist, a zoologist or a chemist and can only acquire knowledge of a small part of these vast subjects. It should be possible however to limit instruction and at the same time to give the insight into these subjects which is so necessary. The demands of the chemist especially appear to be growing more and more burdensome to the medical student, while instruction in biology is so often dominated by the type system that the student may learn little of the principles of comparative anatomy and of the laws of this important subject.

#### *Medical College Organisation.*

Medical colleges in India have grown up out of our hospitals, which originally undertook to train assistants for the medical services of the Government. The college itself at first granted diplomas, and it was not until some years later that a medical faculty of the university was formed. In this way we followed the British tradition, an example of Flexner's clinical type of medical school, as distinct from the university type which originated and grew up as part of the university in Germany, Scandinavia, Holland and many other European countries.

The clinical type of medical education, concerned mainly with the training of practical doctors, has grown up in England and France. You are probably familiar with the old British apprentice system. The young apprentice learnt his anatomy, the only exact subject of his curriculum in one of the special dissecting schools, and spent the rest of his training following his master from patient to patient. In course of time doctors in the various hospitals amalgamated and formed schools which undertook the training of students. At first and mainly from lack of funds, the

preliminary sciences were taught by clinicians, generally the juniors waiting for promotion. Later, with increased development of these fundamental sciences, came amalgamation with the university and this part of medical education was put on a sounder footing, the most important consideration being provision of whole-time teachers devoted to and experts in their subjects. Of recent years, the British Government has shown its concern in the maintenance of the quality of the profession and the Research Council, working under the Privy Council, has helped to support research workers and laboratories. There has been in fact a great movement towards a more scientific conception of medicine, and perhaps the greatest advance has been to place the clinical subjects on the same footing as the fundamental medical sciences.

The university type of medical education has been evolved in countries like Germany, Holland, Scandinavia, Denmark and others. The German university of the early 19th century emphasised research as well as teaching. The Professor of Medicine was in an exactly similar position to the Professor of Theology or of Greek, "not simply a teacher communicating a technique to successive groups of students, who in due course become practitioners of medicine. He was a master impregnated with scientific ideals, who surrounded himself with devoted disciples, serving long years as students or assistants on incomes hardly enough to sustain life." The whole system with its fully equipped institutions, clinical or laboratory, has always been well organised. The Professor is the pensionable servant of a State which controls education, while his assistants generally wait years for promotion, which results largely from original work in one of the medical sciences.

The clinical system has been essentially suitable for the British race and has produced a type of doctors second to none in the world. It has produced famous individual research workers such as Harvey, Hunter, and Lister in England. Claude-Bernard and others in France, but the outlook of the general practitioner in these countries has probably not been sufficiently scientific. The forward-looking mind demanded by Newman has often been absent, while the amount of research work turned out by their schools has been in no way equal to that of the better organised continental university systems.

These two systems have been very carefully analysed by Americans with their peculiar genius for organisation. Realising the value of the clinical system, which was the type of education originally prevalent in the New World, they have in many ways either completely changed the system or grafted on to it the better elements of the university organisation. One of the main stumbling blocks to better medical education has been the policy of honorary or unpaid clinicians, which to any degree has only existed in England and America.

It is difficult to convert honorary appointments, which are necessary in philanthropic institutions on account of expense, into paid university professorships, but this is now being done in all the more important centres in America, while in England the problem has been solved by the special institution of clinical units, in which clinical professorships are paid hospital appointments controlled by the university. In some American universities professors who draw their salaries from the university see private patients in order to gain requisite experience, but all fees are paid to the hospital and not to the professor. In other universities, where it has been difficult to institute rigid rules, various expedients have been designed and the whole situation is well worth consideration and study at a time when there is a political demand in this country for the appointment of honorary doctors to the hospitals.

#### *Methods of Teaching.*

A medical school cannot be expected to produce fully trained doctors. It can at the most only hope to equip students with a limited amount of knowledge and

endeavour to train them in the methods and spirit of scientific medicine, so that "they may be launched from the college with a momentum, which will make them active learners and thinkers for years to come." It is well to remember that medical education at the best can only be fragmentary, and that it is far better that the student should be given a full knowledge in a few subjects than an elementary or superficial knowledge of many. There is a great danger at the present time of over-loading the curriculum with too many specialities, undoubtedly necessary for the purpose of research and possibly also for the treatment of patients, but it must be insisted upon that the medical curriculum is not the place for the finished training of otologists, laryngologists and ophthalmologists. It is well also to remember that students should come to college to learn and not to be taught. Good teaching is not over-elaboration but guidance, while "a medical student who requires to be controlled from day to day or hour to hour has probably mistaken his calling."

The guiding principle of British medical education is what is known as "the block system" which insists that a student must complete his training in the preliminary and fundamental sciences before proceeding to the clinical part of his curriculum. It is desired that the student should first have a clear conception of the body in health, before any study of disease is undertaken. Perhaps it is a weak point that there is little or no special provision for honours students in most of the schools, the aim of all being to train a man as a practical doctor and after that permit him to become an expert or a specialist. In some continental schools, in France especially, there is a good deal of over-lapping of the clinics and sciences, while in others, although students are allowed very considerable freedom in the choice of classes which they can attend, their time is perhaps too much occupied with listening to and watching their teachers. They often do very little assisting and have little or no responsibility given to them. Active participation in the work of the clinic or laboratory is the strong point of British medical education.

In general it can be said there are three methods of teaching, the systematic lecture, the demonstration, and practical exercises. The systematic lecture varies enormously with the teacher and its success depends largely on his personality. The minds of students who attend too many lectures soon reach a saturation point and the modern tendency is more and more to limit this kind of instruction. No student can be really taught by continuous repetition, and the Tamil proverb, which states that "if you continually beat a stone, it will eventually move" is in no sense applicable to a scientific education. Those who befriend the dull student I would refer to another Indian proverb: "You may put a dog's tail in splints for 20 years but it will not grow straight." Demonstration is a far better method, especially when it is given to small groups of students. The tendency closely connected with our high admission rates to hold classes for a very large number of students is entirely to be condemned. Active participation of the student in practical exercises should be the main instrument in our scheme of teaching, and one in which we should encourage initiative and not over-do supervision. At some of our Indian institutions the student takes part in very few practical classes and it is quite possible at a final examination to find candidates able to recognise a slide under the microscope, without knowing how the slide was prepared and how to adjust the instrument.

The hospital ward is the laboratory of the clinical teacher who should be guided by the same scientific principles as his colleagues in the preliminary and fundamental sciences. In England the foundation of clinical units has introduced a special organisation intended to provide education of a university standard and to facilitate research in the clinical subjects. It

has acknowledged the failure of the honorary medical officer as a teacher, and has recognised the necessity of providing paid teachers in all the medical sciences, clinical as well as pre-clinical, men who can devote all their energies to the training of medical students and the advancement of clinical medicine. The student during his clinical course holds various appointments as clerk or dresser, where he becomes part of the hospital machine. He is an intelligent apprentice and is given definite responsibilities. The value of this part of his course lies in his own study of individual patients under guidance and control rather than in listening to the explanations of his teacher, while all the time he should be made conscious of the scientific efforts going on around him. Discussion and demonstrations are valuable adjuncts, but the systematic lecture is becoming less popular, and at most institutions attendance at such classes is voluntary.

Indian education as a whole, both school and college, is too much dominated by examinations. No other satisfactory system has, it is true, yet been invented which can replace this method of testing a student's knowledge, but its importance should not be over-emphasised. Examinations should be subsidiary to education and should not attempt to lead it. It is a well-known fact that the sudden announcement of an examination is the surest way of clearing our hospital and laboratories of students, whose minds are obsessed by the coming test and with whom the latest cram book or synopsis is far too popular. Most examinations are unsatisfactory, but probably the majority of examiners are reasonable sensible beings whose purpose it is to find out how much a student knows, and endeavour to put questions which will discover the extent of a student's knowledge. There are examinations, however, within our knowledge in which far too large a percentage of failure occurs and to which we ought to pay very careful attention. The fault probably lies with the size of our classes, for to inspire a class of 100 students—an average number—with scientific ideals and at the same time supervise their practical teaching is beyond the powers of our limited teaching staffs.

#### *Research and Education.*

Research to-day is an important part of medical education. The Royal Commission on University Education in London in 1913 reported "It is a necessary condition of the work of university teachers that they should be systematically engaged in research work." The spirit of investigation has always been vigorous in Western medicine; at first it was able to utilise methods of observation only, then with the invention of instruments of precision experimentation was added, and during the past decade the laboratory has so rapidly increased our knowledge that clinical research has often found it difficult to keep pace with its discoveries. In Germany and many other continental schools, research has for many years been accepted as one of the essential duties of the medical teacher, while in Britain this principle has been acknowledged in all recent university legislation. In India education and research have generally been kept apart, out of touch with each other, and their separation into separate departments has been unfortunate for both. On the one hand the research worker, often segregated on a hill-top, has been out of touch with disease, and except when engaged in a very special investigation, too academic in his ideas, which require co-ordinating with those of the clinician. The educationist on the other hand has too often passively allowed research to remain in a water-tight compartment, while his own teaching has been without imagination and his subject presented to the student as a mass of dry facts. I would again urge that there is "no greater mistake than the assumption that research spells only labour with test tubes, Petri dishes, serums and guinea-pigs." The ideals and methods of both the clinician and the laboratory worker are essentially the same; both are

continually using their powers of observation, analysis, deduction and description. Your true doctor spends his life in pursuing methods of experimentation, increasing his own store of knowledge, and sometimes adding to that of others. The only difference between the two workers is that exact laboratory work is much simpler than ward work of anything like equal precision, so that the latter often fails to keep pace with the advanced ideas of the laboratory worker. Both are inspired by the spirit of discovery and the "scientist at work in his laboratory can never reap the full reward of his lonely researches without close and loyal collaboration with the clinicians." I would here protest against the practice, which appears to be growing in India, of calling institutes, generally privately owned, whose only function appears to be the carrying out of routine tests on blood, urine and other pathological fluids for busy medical practitioners—"research institutes." They undoubtedly supply a want and are in many ways valuable, but they do no original work and that they should be allowed to make such a misuse of the word "research" is deplorable.

It was a little disappointing on reading the long report of the General Medical Council's commission to find that so little has been said on the subject of research, though perhaps it was right to concentrate on many shortcomings in the way of buildings, supply of teachers and other matters, which are so obvious and yet so difficult to convince a Government of. In India the student suffers from many disadvantages, and his early training at home, at school, and at an Arts college is all against the development of scientific thought. Surely if we are to produce the forward-looking medical practitioner it is necessary that the medical student from his earliest days should be steeped in a method of critical investigation. He should not be taught a mass of hard facts, but rather be made to realise the amount of investigation that is going on and to see these methods daily being undertaken by his teachers. Until the necessity for research is put in the forefront of our scheme of medical education, we can never hope that Indian practitioners will attain a high place in the medical world.

In conclusion I would again emphasise that, revived by the work of Pasteur and Lister and influenced by the responsibilities in public health which the profession has freely undertaken, medicine has during the life-time of some of us obtained a new outlook—"A new birth." (3) The President of the Royal College of Surgeons has delightfully summed up the position as the new approach to surgery. (4) "But all my life," he says, "I have wished that my training had been different. Were my days to come again I should, after leaving examinations behind, spend the time necessary to make an adequate knowledge of human anatomy my permanent possession, and should then escape to experimental research and, in a community of like-minded people endeavour to train myself for the high destiny of a surgeon, the one man who may engage in direct research. My time would be spent in the laboratory, where a youth of plastic mind may learn the methods of approach to new problems or to new extensions of old problems; where old knowledge is merely an impulse to the search for new; where intellectual dissatisfaction is victor over narrow complacencies; where the religion of research inspires him and equips him for his work in days to come. If surgery is to be something more than a wonderful craft, if it is to be the instrument of research which I believe it to have been, and to be destined to be in the future, those who practise it must have their minds shaped and strengthened by conflict with unsettled problems, not cramped and sterilised by monotonous exercise within a narrow province of static knowledge. Their minds must be trained in the laboratory and in analogical research, so that they may be more effectively exercised both in the operation theatre and in the wards upon direct research. . . . The training of the surgeon must not only allow, it must urge his mind

to stray beyond the hard boundaries of old knowledge, over the edge of firm beliefs, into wide territories as yet unexplored and even undivided. In this way only is there escape from the danger which besets the surgeon in the future, the peril of a facile automatism."

## REFERENCES.

1. *Some notes on Medical Education in England; Recent advances in Medical Education in England* by Sir George Newman.
2. *Medical Education* by Abraham Flexner.
3. Sir Clifford Allbut, *British Med. Journ.*, April, 1919.
4. Sir Berkeley Moyinham, *British Med. Journ.*, October, 1927.

## Current Topics.

### India and the League of Nations.

AN interesting and novel departure is the study tour interchange of public health officers, which is at present touring India under the auspices of the League of Nations. The purpose of these study tours or "interchanges," which were first started in 1922 with the help of a grant from the Rockefeller Foundation, is not only to enable the medical officers taking part in the tours to benefit by the technical knowledge gained, but also to establish personal contact and understanding between public health workers in different countries. The objects of the present tour are "to study the organisation of the medical services in India, its statistical services and medical institutes; the work done for the control of epidemic diseases, notably malaria, plague, cholera, small-pox, kala-azar, rural sanitation and drinking water supplies, public health measures at fairs, etc.; medical research work, the army health service, and the diseases which are special to India." The members participating in the tour are as follows:—

*Australia.*—Dr. A. H. Baldwin, Australian Institute of Tropical Medicine.

*Ceylon.*—Dr. Chellappah, Colombo.

*Dutch Indies.*—Dr. Ch. Winckel, Weltevreden.

*Federated Malay States.*—Dr. A. R. Wellington, Chief Health Officer, Kuala Lumpur.

*Indo-China.*—Dr. P. Hermant (Annam) and Dr. E. Jourdran (Tonkin).

*Japan.*—Dr. Tsunetare Fukuda (Kanagawa) and Dr. S. Nishiki (Korea).

*New Zealand.*—Dr. T. Hughes (Auckland).

*Philippine Islands.*—Surgeon C. R. Eskey (Manila).

*Siam.*—Dr. Luang Chedt (Bangkok).

*Straits Settlements.*—Dr. A. L. Hoops, Principal Civil Medical Officer, Singapore.

The "interchange" met first at Delhi on January 1st in order to hear a general account of the problems which are to be studied, and to be given an insight into the working of the Indian medical services from headquarters; also to be shown the work of the Central Malaria Organisation. The further programme is as follows:—

Jan. 3rd to 9th. Lahore.

Jan. 10th to 16th. Lucknow and the United Provinces.