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REFORM IN MEDICAL EDUCATION*

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The last quarter-century has seen three notable publications concerned with this subject. First, the excellent report of Dr. Abraham Flexner (1925) on his comparative study of medical education in Europe and America undertaken under the auspices of the Division of Medical Education of the Rockefeller Foundation; secondly, the Report of the Interdepartmental Committee on Medical Schools (1944), under the chairmanship of Sir William Goodenough; and last, but by no means least, *The Training of a Doctor*, by Sir Henry Cohen and his colleagues of the Special Committee of the British Medical Association (1948).

A brief consideration leads inevitably to the conclusion that education in medicine has developed more according to the dictates of expediency and tradition than as the result of integrative development based on continuity of principle. I shall therefore attempt to outline certain appropriate principles and objectives, beginning with the assertion that medicine is essentially a science in that it deals with phenomena and is based on observation, experiment, and deduction, and is an art only in so far as the term means human skill, both definitions being derived from the *Concise Oxford Dictionary*. Popular perversion of these terms imputes to them the qualities of opposites, science being regarded as meaning preoccupation with essentially laboratory aspects of disease, while the latter has come to imply mystic qualities of insight which transcend logic and defy definition.

Enlightened promotion of health and care of the sick must be based on scientific method which compels thorough observation, leading to recognition of causal factors and to interference in natural processes only when there is good evidence that such interference is likely to diminish the disrupting effect of disease on the community or the individual. The clinician who makes his diagnosis from the patient's history and the presence or absence of physical abnormality and applies treatment which favourably alters the disease is practising the scientific method just as much as the experimental biologist who observes the behaviour of a cell in tissue culture, deduces a particular force determining that behaviour, and tests his hypothesis by observing the effect of calculated interference. It makes no difference to the quality of the science if in a particular case the clinician can carry out this process with his unaided senses while in another case he has to extend his sen-

sory appreciation by microscopy, radiography, or chemical analysis. Science is just as much disgraced by the over-zealous application of elaborate technical investigation regardless of the patient's emotional state as it is by indiscriminate blunderbuss therapy with a superficial diagnosis or perhaps no diagnosis at all.

The Scientific Method in Medicine

Despite the fact that scientific method was appreciated by Hippocrates and Galen, its substantial application to medical practice is a comparatively modern development; indeed, it is probably incorrect to assume that it is at all widespread even to-day. The reasons for this are to be found, first, in the developmental history of medicine in its relation to mankind, and, secondly, in the prevailing emotional pattern of man himself. Fear is one of the dominant human emotions, and bodily and mental disorder is a potent source of fear both to the sufferer and to his dependants largely because ill-health is a constant reminder of insecurity and mortality. When confronted with illness and the threat of illness the sufferer casts around for help, and the more omniscience and omnipotence he imputes to his helper the greater surcease does he gain from fear.

In the early river-valley civilizations of Babylonia and Egypt medicine was practised by the priesthood, who, greedy for power, relied mainly on mysticism and empiricism for their influence. Throughout the ages the practice of Medicine has been a compound of superstition, empiricism, and scientific method; the last in but small proportion. It is still very true that in order to give patients comfort from their fears it is often necessary for the physician to pretend to a degree of insight and confidence he sadly lacks. Small wonder is it that in these circumstances the systematic practice of scientific method tends to languish. It is but a small step from the physician deceiving the patient to deceiving himself. It is only by thorough grounding in scientific method that the medical practitioner can hope to retain a foundation of intellectual honesty in the shifting sands of emotional prejudice.

The attitude of the public to medicine is, of course, not fixed; indeed, it is changing with astonishing rapidity. One is frequently delighted to find how much intelligent insight laymen have in medical matters. People are beginning to distrust the doctor who goes on treating them for chest disease without an x-ray examination, who doses them for anaemia without a blood test, or who tells them

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that their febrile attack is a "touch of malaria" without finding parasites. An increasing number of patients are beginning to suspect that the vast majority of illnesses recover spontaneously and not as the result of the "doctor's medicine." Patients not infrequently come to the doctor saying that no doubt their complaint will right itself, but they would like to know how long it will last and whether anything will hasten recovery.

If scientific method be the most desirable quality in medical practice its inculcation should be the chief endeavour of medical education. The first and main step in its application is the collection and evaluation of evidence directed towards establishing the best possible diagnosis—that is, a diagnosis based on aetiology. In the case of an infective disease this implies the recognition of the causal organism, its source, the mode of infection, and an assessment of factors, intrinsic and extrinsic, which have determined the susceptibility of the patient to attack. In many diseases one has, in the present state of knowledge, to be content with an inferior brand of diagnosis which goes no further than recognizing the probable type of the disease on the basis of similarity to some general qualitative concept. For instance, the diagnosis of effort syndrome is based on an aggregate of disturbances not due to any clearly defined organic or psychological defect in a person whose personality is of the type generally known to be liable to such reactions. The recognition of such inferiority of diagnosis is a constant reminder of the limited horizon, and should act as a spur to the enlargement of knowledge. Scientific method is critical of the quality of evidence and tries always to measure. A complaint of pain is not regarded as of much value until it has been defined in terms of its severity, location, duration, and quality. The statement that tubercle bacilli are not present in the sputum is regarded as of little value without knowing how often the examination has been performed and whether concentration methods have been used and cultures made. A common example of neglect of scientific method is the tendency to embark on a range of laboratory tests without a thorough history. The most important step in the elucidation of an obscure disorder may be the obtaining from another hospital of a report of some antecedent illness or operation.

The scientific study of disease recognizes no limitation of methods of observation. The pencil and notebook can be as effective an instrument of investigation as the electron microscope—indeed, often more so. The only purpose in employing the inferior clinical methods of physical examination of the chest when a radiograph is available is to keep in practice these methods against the time when radiology is not available. It is just as important to appreciate the limitations of a method as to know its possibilities. The good physician appreciates that he deals in probabilities and not certainties. There is no such thing as the "cast-iron" diagnosis. It is a commonplace in medicine to see individuals, condemned to death on the basis of a well-supported diagnosis of fatal disease, gain a reprieve either because of the remote chance of error or the rare regression of the process.

Faults of Educational Practice

An important characteristic of scientific method is that it strives always to be quantitative. The transition from the qualitative to the quantitative marks the adolescence of a branch of science, and the conviction that if a phenomenon exists it can be measured is a sign of scientific sophistication. It is one of the serious faults of current

educational practice that it allows people to obtain the hallmarks of higher education without any training in size language. Much effort is expended in developing facility in two or more descriptive languages, living or dead, in history, in formal mathematics, etc., to the complete neglect of training in elementary statistical methods. In my opinion some appreciation of how to assess significance in numerical data, the normal distribution, and the theory of probability is just as important in the educated person—particularly if he aims at being a useful physician—as being able to preserve the integrity of his infinitives and the purity of his tenses. Mathematics to a higher standard, including elementary statistical methods and an introduction to the calculus—most important in biological science because of its preoccupation with rates of change—should be an essential requirement for admission to a medical school. In exchange for this educational benefit I would willingly give the dead tongues, solid geometry, and much else besides.

Another characteristic of scientific procedure is a keen appreciation of the limitations of knowledge. It has been said, whimsically, that one of the functions of a university is to teach what is not known, partly in order to throw into greater prominence the little that is known and partly to stimulate inquiry so as to reduce, however slightly, the seemingly infinite content of the unknown. Progress in medicine has often been retarded by established authority. There is in human nature a deep-rooted fear of the unknown which tends constantly to seek solace in belief in the authority of the elder and to look for inspiration to the didactic rather than the appeal to reason. What in the light of present knowledge looks logical is likely to be quite absurd in the light of future discovery; expressed epigrammatically, the dogma of to-day is the doubt of to-morrow. It was Willard J. Stone (1936) who, in his monograph on Bright's disease, headed a chapter on classification with this apt quotation from Bacon: "The first distemper of learning is when men study words and not matter." It should be the constant endeavour of the teacher in any branch of knowledge—and the principles of science are applicable to all knowledge—to be constantly on the watch to prevent the student believing rather than comprehending. It is the inevitable fate of the teacher endowed with superior intelligence, wide knowledge, and an attractive personality that his followers tend to accept his pronouncements because they are his and not because they represent reasonable deduction from inevitably meagre data. The intellectual vigour and scientific quality of a medical school can be gauged by the quality of the teacher-pupil relationship. An outstanding flaw in this respect is any element of the pompous or pontifical; a sign of grace is an atmosphere in which no student is ever afraid to question or to express doubt and in so doing is assured of kindly and appreciative consideration.

Much misconception has arisen with regard to that curious attribute which is called "clinical instinct," the possession of which confers the power to arrive at a correct diagnosis, more or less, at a glance. By many it is regarded almost with awe as evidence that its owner has capabilities which transcend scientific procedure—something akin to second sight. "He took one look at the patient and said he's a case of acute Hodgkin's"—how often have we heard that sort of story? Such a *tour de force* is a compound of acute observation, extensive experience, and rapid deduction—all perfectly proper—coupled with a large slice of luck. If a clinical teacher indulges in such a diagnostic gymnastic he should take great pains to analyse the processes by which he arrives at the conclusion and

to emphasize that it is no substitute for thorough verification.

Another much more mischievous slur that is often cast on scientific method in clinical practice is the implication that it is in some way antagonistic to the humanity which should characterize the physician in his attitude to suffering. In that the object of the scientific approach is to influence favourably the state of the patient, any lack of sympathy or neglect of the patient's emotional state is just as much a crime against science as it is against humanity.

The distinction between scientific method and empiricism, although very important, is rather subtle, in that the relationship is rather that of the part to the whole. While the scientist is always endeavouring to verify and to extend knowledge the empiric recognizes no such responsibility, but is perfectly content to work within the bounds of current belief. I fully recognize that for those but moderately endowed with intellectual ability a sort of conditioned empiricism is the only possible *modus operandi*, but this should always be recognized as an inferior substitute.

Selection of Teachers

It is clear that no educational system, however perfectly it be designed, can produce good results if it be applied to indifferent students by dull teachers. It is appropriate, therefore, to consider next the selection of the teachers and the taught.

In the past the system of training and selection of the academic staffs of the non-clinical departments of medical schools has been on a very much more satisfactory footing than in the clinical departments. The main reason for this is the circumstance that these men have been "whole-time" university or medical school teachers and have therefore been free to move from school to school, thereby acquiring a valuable breadth of outlook and experience. Furthermore, their advancement has depended very much more on their status in the national or international association of their colleagues than on their local status among those most of whom are unable to assess them as critically as their peers. For instance, the career of a physiologist depends primarily on the opinion that other physiologists hold of him. In my opinion that is the biggest single factor which has promoted the undoubted scientific ascendancy of the so-called laboratory sciences over the clinical departments. In my own alma mater this point is well illustrated in a non-clinical department which in virtue of its whole-time status has been able to maintain in its direction an unbroken dynasty of illustrious scientists.

Promotion to academic posts in the clinical subjects has been handicapped by the fact that until the comparatively recent introduction of whole-time units the field of those eligible has been almost entirely limited to those who had already sunk economic roots in the locality. This has resulted in a great variation of standards and quality from place to place and from time to time in the same place. It is not so much that those responsible have frequently made errors in selection as that sometimes they could have done much better if the field of candidates had been nationwide instead of parish-wide. The other side of this picture is that many individuals of the highest ability and promise must have been denied opportunity because they had the misfortune to be contemporary with a surplus of quality in their own school and the system denied them the chance to move elsewhere. Previously academic clinical appointments, with the exception of a few whole-time posts, had to be filled from "local talent," and the almost invariable

practice was for recognition as clinical teachers to be accorded to those who had been elected to the staff of the teaching hospital, in many places without prior reference to the University, which therefore had little if any direct influence on the appointment.

The position is very much better under the new Act. The substantial payment now given to all clinical staffs should make it easy for a specialist to accept an appointment away from his own school. Whereas previously his survival in a new milieu was dependent upon his gaining in a short time a consulting practice or upon the possession of private means, he now, even on a part-time basis, has enough to keep him going until additional connexions are established.

This severance of geographical economic bonds can confidently be expected to have a great vitalizing effect on the teaching of clinical subjects. It has been clear that many medical schools were decadent from inbreeding. The extent to which this had gone was shown by the fact that, far from deploring and seeking to circumvent the economic factors which limited their choice of recruits to their own school, they had come to invest this practice with a peculiar intrinsic merit of its own, or, as Chaucer expressed it, "to maken vertue of necessity." It seems likely that in the New Order there will be little if any difference in standards of remuneration between academic centres; this circumstance, coupled with migratory facilities, will mean that a medical school will have to compete for its staff, using for inducement opportunity for research, adequacy of clinical opportunity, a restricted quota of general administrative duties, and, above all, an atmosphere charged with a love of learning, a search for truth, and a tradition of discovery. A free migration of staff was probably one of the main factors contributing to the great efflorescence of scientific medicine which occurred in Germany from about 1850 to the first world war.

Let us try to analyse the qualities which should characterize the medical teacher and, in particular, the clinical teacher. The most fundamental attribute must be a thorough training in the method of science. It is this, and this alone, which will mean that his efforts will be characterized by thorough observation, critical evaluation, and intolerance of the specious and meretricious. He should be, or have been, engaged in the active prosecution of research, because the procedure of science cannot be learnt from the grand-stand. It must not be expected, however, that he should always, or indeed often, have been responsible for outstanding advances in knowledge—such achievement comes only to the few. Another quality of equal importance is the possession in outstanding degree of clinical ability with all its implications of experience of humanity in health and sickness, coupled with qualities of compassion and insight without which the successful care of patients is impossible.

Lastly, there is an aggregate of attributes essential in any person whose duties entail human contact and leadership—i.e., the capacity to inspire others, to get the best out of them, and to create an atmosphere of happy endeavour. Although it is hard to put into words, we all know what is meant when it is said of someone that he is "difficult." There are many ways in which this unhappy effect originates, but a common basis of it is intellectual arrogance; contrariwise, one of the most endearing of human traits is humility. However it may come about, it is an unhappy fact that some people possessed of intellectual ability are denied academic advancement solely because of their inability to create happy relations. On the other hand,

outstanding qualities of rapport may more than compensate for shortcomings in other directions, in that they create an environment which enables others to attain a pinnacle of achievement which would otherwise be denied to them.

Selection of Students

Here one enters a highly controversial field. One of the fundamental aspects of this problem is the question whether or not there are enough individuals of sufficient intelligence to meet the demands of the community. The increasing complexity of community organization and the development of technology are steadily shifting the emphasis from brawn to brain, and there is hardly a trade or profession which is not bent on imposing ever higher educational standards on its entrants. Each profession is bent on carving for itself the largest possible slice of the cake of intelligence. This is all very right and proper, but current belief regards the distribution of intelligence in the community as a relatively fixed characteristic susceptible only to slow change over many generations. Intelligence so far as it is understood—and its definition and measurement are relatively rudimentary—is probably not susceptible to any great improvement in any one individual. The *British Medical Journal* in a leading article and in a paper by Smyth (1946), and the similar number of the *Lancet* in 1948, dealt with the subject of selection of medical students. It was made clear that the problem was complex and was fundamentally hampered by ignorance of the qualities necessary for success in medicine. However, a systematic effort is now being made to determine by organized investigation the correlation between various grades of achievement and different combinations of intellectual and personality attributes. It will obviously take years to reach any definite conclusions. In the meantime it is clear that the more effort medical schools take to find out about their applicants the less likely are they to acquire gross misfits. An interview conducted by a small committee is essential. Students who show an outstandingly poor performance during the earlier years of the course should be discouraged from continuing. Britain is no longer wealthy in terms either of man-power or of treasure, and she can no longer afford the luxury of square pegs in round holes.

Integration of the Curriculum

Although my qualifications allow me to speak with any measure of authority only in the department of medicine, I venture to offer some comments on education in the earlier years. Following a good grounding, preferably at the university standard, in physics, chemistry, and biology, the student passes to the study of anatomy and physiology. In this direction the most notable advance of recent years has been made at Birmingham, where under the leadership of Professors Zuckerman, Gilding, and Smout there has been effected a fusion of the normally isolated disciplines of anatomy and physiology. Zuckerman (1947) has pointed out that this separation is a temporary phenomenon which has prevailed for only some 60 years.

In 1845 William Bowman, in conjunction with Robert Todd, produced a great textbook, entitled *The Physiological Anatomy and Physiology of Man*, which made no distinction in its presentation between structure and function. Apparently the separation was in large measure due to the influence of Sharpey, followed by Schaefer, who, while contributing much to knowledge of structure particularly in the histological field, so developed the experimental approach as to establish this tradition as an entity separate from those who concerned themselves more or less exclu-

sively with the direct observation of tissue structure. The same influence led to the curious anomaly that, while macroscopic structure became the domain of the anatomist, microscopical anatomy remained in general within the province of the physiologist. The last two decades have seen anatomists adopting more and more the experimental method so as to restore the former unity of approach. Parallel with this, another and philosophically not dissimilar trend can be discerned in that the physiologist or anatomist—it matters little what you call him—is probing ever deeper into the dynamics of molecular behaviour, making use of the modes of thought and techniques which traditionally have belonged to the chemist and physicist. These developments emphasize that the scientific study of phenomena, particularly biological, knows no narrow traditional boundaries. The approach to a problem may at one time be mainly structural, at another functional. Function may imply the methods of organic chemistry, the techniques of nuclear physics, or the refinements of electrical engineering. The researcher must be a jack-of-all-trades and a master of many, or at least capable of working in fruitful harmony with many masters.

Widening Horizons

The influence of this widening of horizons goes far beyond the most successful fusion of instruction in anatomy and physiology effected at Birmingham. We are now engaged in studying how best to apply this scientific "holism" throughout the whole of the curriculum. The first step in this direction is to make the student's transition from the preclinical to the clinical as smooth as possible and to impress on him that the knowledge and modes of thought he has already acquired form the only secure basis of clinical practice, and that the good clinician shares with the good physiologist devotion to the same scientific procedure. There used to be a time when, the second M.B. hurdle surmounted, the student proceeded to a bookseller to sell his physiology books; he usually retained his anatomy works, because the surgeon has always placed great emphasis on a good knowledge of macroscopic morphology. With few exceptions teachers of medicine and surgery who qualified more than a generation ago have not attempted to base their clinical teaching on physiological knowledge, and therefore the student has not appreciated the concept of a body of knowledge one and indivisible.

This appreciation of the unity of knowledge extends beyond the transition from preclinical to clinical, and we intend to make of it a guiding principle in the reorganization of the curriculum of the clinical years. It is our intention that pathology be the central discipline around which is built the study of medicine and surgery, and at appropriate stages pharmacology and all the other subjects which constitute the traditional more or less independent content of the conventional curriculum.

An essential corollary to pathology occupying the central place in co-ordinated teaching is that it should be one of the subjects of the Final Examination and should be taken within a few months of the examinations in medicine and surgery. It is quite illogical that it should be otherwise, and in this school steps are being taken to effect such an association. It may even be desirable to go further and have written papers and viva-voce examinations conducted jointly by pathologist, pharmacologist, physician, and surgeon. This would serve more than anything else to emphasize to the student the essential unity of these subjects.

The Place of Surgery

In such co-ordinated teaching the place of surgery requires close examination. Traditionally surgery has tended to be taught and practised as a discipline separate from that of medicine. There are obvious though not particularly sound reasons for this dichotomy. The surgeon has in the past had more to offer suffering humanity than the physician, and the rapid development of surgical techniques has in itself been a complex process of immense practical significance. Furthermore the surgeon enjoys a position in public esteem far transcending that of the physician—in some measure due to the inherent drama of the surgical operation and the strong appeal it makes to primitive emotional characteristics. However, in my opinion the time has come for a real *rapprochement* between surgery and medicine. The community of work and interest is far greater than the divergence. The physician need not be a surgeon, but the surgeon must be a physician. They are both engaged primarily in the recognition and study of disease processes, using the same methods of thought and similar diagnostic aids. The difference comes when the surgeon steps into his operating theatre and carries out surgical therapy.

Speaking as a spectator, I would say that the difference between a good surgeon and a bad surgeon is much more often to be found in his ability as a physician than in his purely operative technique. The closest harmony has a beneficial effect on both, particularly on the physician, who comes to appreciate the great opportunities and inevitable limitations of surgery and to realize the utter futility of treating the surgeon as a person whom he directs to do a specific operation. It is essential that the physician call in the surgeon in consultation, not so much to have an operation performed as to get another opinion on the problem in its entirety. In my opinion a very practical method of emphasizing the unity of outlook is to avoid, except for very special purposes, the rigid hospital segregation of medical and surgical cases. I have the inestimable benefit of working with surgical colleagues who permit cases on which they have operated to remain in the medical ward. Witnessing the post-operative course and surgical after-care has an excellent influence on staff and students, and emphasizes that there is no fundamental distinction between diseases treated surgically and those treated medically. I look forward to the day when clerking and dressing as separate disciplines are abolished and students will serve their clinical apprenticeship in hospital units where cases are treated some by surgical methods and some without, and where the surgeon shares with the physician the clinical teaching irrespective of whether operative therapy is applicable.

Lightening the Burden

As regards theoretical teaching in these subjects, close integration will lighten the burden for both teacher and taught. The cry of "Pity the poor student" is often raised these days. It is stated that there is so much more to learn, professors of this specialty and that subject all clamouring for more hours in which to profess their branch of knowledge, with the result that the student is in danger of being utterly overwhelmed by a flood of facts. That this tendency exists I do not deny, but I believe it is due not so much to the acquisition of new knowledge as to failure to discard the old. Viewed rationally, I am convinced that the presentation of a well-balanced curriculum within the compass of the intelligent student—and there is no place in medicine for the dullard—is easier to-day than it has ever been. There are numerous instances of where increasing know-

ledge has replaced a welter of irrational conjecture by a relatively concise body of knowledge. A very obvious example is drug therapy, in which a small number of potent agents have entirely replaced a wide range of products at best inactive or at worst harmful. Furthermore, the increasing emphasis on scientific procedure with its insistence on the critical evaluation of evidence has made the mere acquisition of facts of less importance. It is futile to attempt to show the student even a majority of the almost infinite varieties of human ailment. The careful study and critical evaluation of a relatively small number of diseases in all their facets constitute a better preparation for medical practice than a motley of fleeting impressions. An essential feature should be emphasis on where to find information rather than on any attempt to overburden the memory.

Clinical teaching to be of real value must be conducted with a small group: it is earnestly to be hoped that the increased number of students will not result in large ward classes. With a small group it is possible to make of each member an active participant in the work of the class. The student is much more likely to carry away a vivid impression of a case which has been demonstrated by a fellow student under the guidance of the teacher than if all the interrogation and demonstration has been done by the physician. We all know the form of teaching in which the lecturer talks the whole of the time, relates the patient's history—or what he thinks ought to be the history—rapidly demonstrates selected physical signs, answers his own questions to his own complete satisfaction, and relegates the students to the role of passive spectators.

Probably as the result of the morbid-anatomical era in medical development with its preoccupation with structure rather than function, there has tended to be undue emphasis placed on physical signs and insufficient attention paid to disordered function as revealed by the history of the illness. Platt (1947) studied the value of the patient's history apart from physical examination as a guide to diagnosis, and came to the conclusion that in 68% of cases an accurate diagnosis—as confirmed subsequently—was made on the basis of the history, while in only 6% was it found either impossible to reach a diagnosis by this means or such diagnosis was completely wrong. This is most important, and cannot be over-emphasized in clinical training. How often one sees clinicians embarking on this or that laboratory investigation or listening intently at a stethoscope or peering into a fundus when all these investigations would have some meaning and coherence if a little time were spent on the history. Much of the trouble lies in the character of the clinical part of final and higher examinations, which places an undue premium on the "physical sign" and makes little if any attempt to assess the candidate's interrogatory ability.

A Welcome Development

A very welcome recent development in clinical teaching has been the enlargement of the scope of social medicine. Previously this subject, or public health as it was called, was more or less limited to State medicine and sanitary science, and was exclusively non-clinical. Although in every group there were notable exceptions, it was on the whole true that conventional clinical medicine concerned itself exclusively with the organic aspects of disease and gave but scant attention to the patient as an individual, the influence of his social environment on the origin, development, and prognosis of his illness, and the effect of this illness on the prosperity and health of the other members of the family. Up till the last few years there was

an excellent reason for this omission in that the contemplation of the social and economic causes and consequences of illness brought inevitable frustration, because the aid and resources necessary to mitigate these influences were either totally absent or were provided by some charity usually gravely hampered by lack of funds. There has grown up under the new social Acts a wide range of assistance which can be brought to the aid of the victims of illness and accident, not as an act of charity but as an expression of the prudence of a community which has elected to insure itself against the malevolence of chance.

Although the general principles and the social biology of social medicine are a matter for a non-clinical department, their application to individual cases of illness is of the very stuff of clinical medicine and constitutes a matter for the clinician. It is in my opinion quite wrong for the physician to limit his view of the case to the details of the disease process and to leave the assessment of the social factors to another person, such as an almoner. The help of the trained social worker is of the greatest possible value, but it achieves its maximum value only in close co-operation with the physician. This emphasis is particularly valuable in teaching, because the general practitioner has rarely got the help of an almoner and he must be quick himself to perceive and alleviate the social stresses of illness.

Conclusion

I can do no better than conclude with a quotation from the evidence that Sir Thomas Lewis presented to the Good-enough Committee; he said of medical teaching that it should "aim at sending the student forth with a well-trained mind, familiar with and critical of sources of information, possessed of a sound knowledge and experience of all common disease, and of disease and manifestation of disease—whether common or rare—that is clearly understood. Thus a substantial foundation will be laid upon which, by building as he has been taught, his mind can become well stocked."

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THE TEACHING OF PHYSIOLOGY

BY

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"The true aim of the teacher must be to impart an appreciation of method and not a knowledge of facts."

KARL PEARSON (1900).

Medical education, said Abraham Flexner, is a problem not of medicine but of education. That statement is as true to-day as when it was made. If we are to judge rightly of what should be sought in teaching physiology we must begin by examining the aims and methods of education and the difficulties of realizing them in the medical course. For one of the major criticisms of medical education is that the elementary principles of education have been forgotten.

Education and Instruction

In the older universities a sharp distinction was drawn between education and instruction. The *Oxford English Dictionary* defines "educate" as follows: "To bring up from childhood, so as to form habits, manners, mental and physical aptitudes."

The essence of education is that the student does the work. He is guided and stimulated by his teachers, and his teachers appraise and criticize his efforts. Set classes occupy but a fraction of the student's time-table; most of his time is spent working on his own in the library, the study, or the laboratory. To carry out this system effectively the pupil must have learned how to work and classes must be small, which requires a high teacher/student ratio. The system still operates in sixth-form work in schools and in the older universities, particularly in languages and humanities.

The *Oxford English Dictionary* defines "instruct" as follows: "To furnish with knowledge or information." The teaching is didactic. The student learns by memorizing material which he receives in lectures or from textbooks. His own mental contribution, apart from a feat of memory, is small. This system requires only a small teacher/student ratio. It operates in elementary schools and in trade and technical schools.

The object of education is to train the student's mind, to train it to seek its material from original sources, to manipulate ideas, and to weigh the evidence which bears on these ideas. The well-educated man is not merely a man of superior knowledge; he is also a man of method, a man whose mind is so trained that it can deal adequately with a problem presented to it for the first time. He can clearly define the problem, collect the relevant facts, evaluate what may seem to be contradictory evidence, and arrive at a judgment on the problem. These steps are common to most of the higher intellectual processes that make up the life of a civilized community.

In the case of science the same steps are taken, the facts being first won by simple observation. Then follows a further process which is the most important, and is the peculiar contribution of natural science. This is the method of experiment, which is the essence of the scientific method. Here the observations are made under a variety of conditions, in which one or more variables are controlled, kept constant, or eliminated. It is by the method of experiment that conflicting hypotheses are tested and a decision finally

In a pamphlet entitled "Hospital Reform in New Zealand" Drs. Selwyn Morris and Douglas Robb advocate a complete survey of hospital resources in the country, with the idea of grouping them ultimately under six regional hospital boards. They say that there are now too many small and unrelated administrative units. The general medical services overlap the hospital work, little attention is given to the care of the aged, and there is an undesirable division of authority between the local hospital boards and the Government department. The regional hospital boards would each serve about 300,000 people, and would have their base hospitals at Auckland, Hamilton, Palmerston North, Wellington, Christchurch, and Dunedin. There should also be an investigation into the nursing services. The existing shortage of nurses has necessitated curtailment of hospital work on more than one occasion.