BRIDGING THE GAP

REALISM AND HUMANISM IN MEDICAL TRAINING

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The most astonishing feature of the discussion raging on the medical curriculum is that the faults now so eloquently admitted are no new discoveries but have been well known for a considerable time. In 1932, to go back no further, the *Lancet* published a series of articles in which almost everything was said that is being said to-day. Deans of medical schools and others have uttered brave words which have been completely ineffective. Many of the medical members of the Goodenough Committee and of the witnesses whom they heard are those who, although occupying, or having occupied, influential positions, have failed to put their house in order. Two important groups of the profession the committee ignored: general practitioners, who are no mean judges of their training; and junior teachers, who are still young enough neither to have settled into an academic groove nor to have forgotten the difficulties which they experienced in their student days.

The Goodenough report must be judged not by the acclamation with which it has been greeted, particularly in the lay press, but by the answers which it gives to the following questions. Does it show a sufficiently fundamental insight into the problem? Does it take into account the inertia which is inherent in medical education? Has it succeeded in ascribing that inertia to human limitations, to the nature of medicine, to under-estimation of the difficulties of the problem, or to any other cause? Finally, do its proposals differ substantially from those which have been so frequently suggested, and have they any better prospect of attainment?

The chief problem is how to bring about a closer relationship, or, as the Goodenough Committee puts it, how to bridge the gap between the pre-clinical and clinical stages. Accepting this metaphor, we have to face the following facts. First, bridges already exist where the gap is narrowest. These are simple departures from the normal which can be adjusted physiologically, such as the treatment of myxoedema with thyroid extract. They, however, are exceptional; in general the gap is and must for long remain unbridgeable, though of course it is slowly being narrowed. Secondly, wherever a reliable bridge is built there is no delay in using it. The vitamins furnish the best example. Thirdly, bridges have long existed without their being recognized until formally opened and strengthened for heavy traffic by the scientists: the East India Company gave their sailors fresh fruit 300 years before vitamins were discovered. Fourthly, it is fatally easy to build bridges strong enough to the outward eye but incapable of bearing the strain of practical use. Facts incontrovertible in the laboratory are applied to clinical medicine in a manner quite unwarranted. The best examples are the indiscriminate use of the hormones and the ready acceptance of the biased blurbs of research propagated by commercial travellers.

Fifthly, bridges are imagined where they do not exist. The problem is over-simplified by the popular tendency to present medicine merely as the study of disordered function. Disease, it is said, is dis-ease. But medicine is concerned with the infinite variety in relationship between three factors: the causative agency such as infection, malignancy, or degeneration; the reaction of the body to that agency; and the efforts of the body to continue its functions under adverse conditions. A picture of life being carried on in a bombed town is but part of the whole scene of desolation, and neither explains the cause of the catastrophe nor suggests the remedy. In some conditions, such as carcinoma of the oesophagus, the disorder of function is very simple. In others, such as appendicitis, it does not exist, because we do not know the function of the organ concerned. In others it is too obscure to be tracked down to any particular organ. Every radiologist knows how often cases are referred to him with a provisional diagnosis—"stomach, colon, appendix, or gall-bladder." We may note also the wide difference in disorder of function shown by such closely allied conditions as intrinsic and extrinsic carcinoma of the larynx. Nor must we forget that preoccupation with disorder of function is the

commonest cause of failure to discover the true nature of the disease. The best answer, however, to those who believe that disease is mainly disorder of function is provided by the existence of what we call functional disease—one of the best jokes that Nature plays on Man or Man plays on himself.

In demanding that medicine must be taught "as a smooth and logical development" of the pre-clinical subjects the Goodenough Committee has formed a conception of medicine which bears little resemblance to reality. It presents Hygeia as a pin-up girl flamboyantly overdressed in scientific finery, and it remains to be seen whether she proves more inspiring in this glamorous guise. If the medical schools transfer their worship to this new deity one of two things is bound to happen. The first is that the cleavage between physiology and medicine may be healed, but only to be replaced by a more disastrous cleavage between an artificial form of medicine and medicine as it really exists. The second and more probable result will be that the attempt will prove abortive, because the true nature of medicine will assert itself.

The Mixture as Before

The Goodenough report hashes up the old catchwords: less factual knowledge, ruthless pruning, better co-operation between pre-clinical and clinical teachers, and more attention to principles. Factual knowledge must of course be curtailed, but let us not fall into the error of minimizing its importance. There is nothing inherently wrong with factual knowledge provided that the items are related to one another. Every subject is in substance a mass of facts, and the student who, having a well-ordered mind, can memorize them must progress faster than the student not so endowed. As for "ruthless pruning," no metaphor could be more inept, as will be obvious to anyone who considers the original horticultural connotation of the term. If the sequence of thought is not to be utterly destroyed the necessary curtailment of the curriculum must be carried out not with ruthlessness but with the utmost circumspection. With the need for co-operation between pre-clinical and clinical teachers I have previously dealt. Here I need only repeat that the sole obstacle is the will to achieve it. Pre-clinical teachers have always had free access to the wards and to clinical material; they have failed to make use of these facilities because their own inclinations and interests lie in a different direction.

As for principles, we may well ask what these are and where they are to be found. The term "principle" is simple enough when applied to human conduct. In the physical world the facts of observation and experiment lead to the formulation of principles (more accurately termed laws) from which further facts can be predicted. The law of Avogadro, the periodic law, the phase rule, and Le Chatelier's principle form the basis of physical chemistry. But in the textbooks of physiology principles or laws are few and far between. There are, to give only a few instances, no laws concerning the functions of the spleen, cerebral localization, fat absorption, pituitary function. Physiology is concerned not with *principles* but with *facts* which have been obtained by experiment and observation and from which *functions* are deduced. Only in exceptional instances has knowledge of these functions been integrated into principles. And this applies with even greater force to topographical anatomy, which by its very nature is totally devoid of principles. How wide of the mark, then, is the Goodenough report when it says that "in the pre-clinical period students . . . are concerned primarily with the principles of the normal structure and functions of the human body."

Experience

We therefore see how superficial are the remedies proposed for bridging the gap. Our planners having failed us, let us turn to the educationists, starting from their main principle—a principle known to Aristotle and thus enunciated by Sir Richard Livingstone: "That almost any subject is studied with much more interest and intelligence by those who know something of its subject-matter than by those who do not; and, conversely, that it is not profitable to study theory without some practical experience of the facts to which it relates."

How far is this principle applied in medical training? In the whole of physics and nearly the whole of chemistry every

proposition can be proved by class experiment. The same is true of biology and anatomy in so far as these concern structure. This, however, is not to say that the presentation of these subjects is ideal. There must be something seriously wrong with the teaching of physics to make it possible for the Medical Research Council to publish a lengthy report (No. 161, 1931) based on the fantastic notion that a liquid expands when the tension to which it is subjected is removed. But the fact remains that these subjects are taught vividly by direct experience.

On the death, in 1907, of Sir Michael Foster, the first professor of physiology at Cambridge, his successor, Prof. J. N. Langley, wrote: "The primary idea of Foster's teaching was that scientific instruction should be based upon first-hand knowledge, and that a student must see and do things for himself in order to gain a real and lasting hold on any scientific subject."

How has the teaching of physiology lived up to this ideal? Some of the facts can be demonstrated on the human body, others in the test-tube and on lower animals, but by far the greater part of the subject is learnt indirectly from books. The whole of metabolism, absorption of food, blood formation, and the functions of the brain, semi-circular canals, cochlea, and reproductive organs are learnt in this way. Even the teachers have little, if any, first-hand knowledge of them, for they themselves have only learnt them from the books, with the result that the information when it reaches the student is second-, third-, or *n*th-hand. Let us take a typical example from a current textbook.

"Suppose that a decerebrate cat be also deprived of its labyrinth. If the head be rotated about the long axis of the trunk so that the chin moves towards the left shoulder it will be found that the left fore limb extends and that the right fore limb suffers decreased extension. Experiment shows that it is the turning of the 'atlas' vertebra on the 'axis' which brings about this modification of postural tone. . . . Suppose in another experiment that the neck be bent so that the right ear approaches the right shoulder. It will be found that the extensor tonus in both left front and left hind limbs is diminished. . . ."

This passage is by no means exceptional. There are pages and pages of the same kind of thing. It is all remote from experience, and the student has to make a mental image of it as best he can for examination purposes. It is true, of course, that many of these experiments cannot be demonstrated to a class, but what a splendid field this is for the cinematograph! Not only the cinematograph but even simple direct methods of demonstration are woefully neglected. Few students are shown the movements of the human stomach radiologically. I doubt whether many pre-clinical teachers have seen them. This fascinating subject is too commonplace for them; they find it less trouble to teach it from the book descriptions of experiments on the cat. The first principle of every teacher should be to present every part of his subject as realistically as possible.

The Value of Unexperienced Facts

But even if this were done there would remain a hard core of undemonstrable facts which would still have to be learnt indirectly. What is the intellectual value of subjects remote from experience? Let us turn again to Livingstone:

"A schoolboy, who may know nothing of the realities which history or literature or politics or economics deal, can get this training from their study; their facts and theories are to him counters with which he learns to use his brain in these and related subjects; to argue a case and weigh evidence, to distinguish the relevant from the irrelevant, to seize the point at issue, to arrange his thoughts and marshal facts to support a theory, to discover when a statement is proved and when it is not, to reason logically and express himself clearly—in fact to play the great game of the intellect."

How do the pre-clinical subjects stand up to this test? As an example we may consider what the student learns about the cause of the bile-flow? In one book he reads, among other things, that "the contraction of the gall-bladder is brought about by the entrance of fatty foods into the duodenum. The contraction may be brought about by the hormone cholecystokinin, which passes via the blood stream from the duodenum to the gall-bladder."

There the fact stands in all its hideous nakedness and gloomy isolation, without any other reference to cholecystokinin, a fact to be learnt and memorized. And there are hundreds of facts stated just as baldly. In another book the subject of pancreatic and biliary secretion is described with a wealth of detail. Among the causes of bile secretion, we are told, is the injection of secretin. After describing the other causes the author sums up by saying "that the expulsion of bile promotes pancreatic secretion by aiding the transference of secretin into the blood, and it augments the flow of the bile itself." If the student were not exhausted by the morass of facts through which he had floundered he might have sufficient freshness to reflect that here is a double vicious circle. For if the excretion of bile from the liver stimulates the formation of secretin, and if the formation of secretin in turn stimulates the excretion of more bile, why does the excretion of bile once begun ever stop? Similarly, if the excretion of bile stimulates the excretion of more bile why does the process ever stop? The student is bludgeoned into passive acceptance of orthodox teaching. Where is any scope to argue a case—to weigh evidence and to reason logically? The truth is that the pre-clinical subjects are very far from providing that training in "scientific thought and criticism" which, according to the Goodenough report, should be carried into clinical medicine.

As facts have accumulated with the years, their presentation has degenerated. Langley wrote of Foster's *Textbook of Physiology* (1876 edition): "The distinguished characters of the work are its good literary style, and its suggestive and impartial manner of discussing physiological questions. . . . A host of medical practitioners, who could not bring themselves to study *arid physiological facts* [italics mine] read it with equal pleasure and profit." Of how many modern textbooks could this be said? It is significant that Foster spent two years in general practice. Perhaps the experience so gained at least contributed to his warm human outlook. The true remedy lies not in the ruthless pruning of facts but in a fundamental reform in their presentation.

The Introduction to Clinical Medicine

The Goodenough Committee stresses the bewilderment which students feel on entering the wards, but it has entirely missed the important point that this bewilderment is felt in the measure that they have been led to expect "an easy transition" between the pre-clinical subjects and medicine. In the pre-clinical lectures they have been led to believe that a cerebral tumour must present a pretty physiological exercise in location, but they are soon disillusioned, for they find people talking in quite a different language, about headache, vomiting, and optic neuritis, and they may find reliance being placed on radiological rather than on physiological evidence. It comes as a rude shock to them to learn that the cases which present the classical pictures so dear to those with little experience are the few which have been carefully selected in the textbooks for the teaching of physiology, not for the teaching of medicine. Similar instances could be given from other branches of medicine. The student soon learns to discard his previous theoretical instruction, and who can blame him? In preferring the real to the unreal, the direct to the indirect, is he not obeying a sound human instinct?

Since structure is taught more directly and more vividly than function, the student enters the wards with a bias towards a structural and against a functional interpretation of phenomena, a bias which he retains throughout life. He fails to appreciate what is almost the first principle of medicine—namely, that wherever anatomical and physiological criteria are in conflict the physiological criterion should nearly always be accepted. On the advent of the radiological investigation of the digestive system failure to observe this principle sent the profession hurtling down an abyss of error from which it is only now painfully emerging. The number of patients who are told that they have "dropped stomachs" and who are provided with quite useless belts shows how much we have to learn about the wide variation in the size, shape, and position of organs which is compatible with normal function.

Yet even the teaching of structure fails. The student spends an immense amount of time in dissection, but his fingers are completely insensitive to the feel of the abdomen, muscles, joints,

axillae, and groins. Nor is this failure rectified in the wards, for there he approaches the patient with a bias towards the abnormal. *Thanks to their training, there are many doctors who have a less intimate knowledge of the body than medical auxiliaries.* Masseuses often know better what they are feeling, and radiographers often know better from the clinical appearance of an injured arm whether the elbow, forearm, or wrist should be radiographed. The clinical acumen which these auxiliaries acquire is not surprising; it only shows how exuberant is the growth of curiosity when fertilized by opportunity and sheltered from the icy blast of pedagogy. I fear to pursue this line of thought lest it lead me to the conclusion that the whole of the student's curriculum can be debunked.

Intellectualism

We therefore see how fundamentally ill adapted, both culturally and vocationally, the pre-clinical course is for the training of doctors. The root-causes are three. First, promotion in the academic field is the reward of capacity for research rather than for the ability to teach ordinary minds. Research workers have so often said that students derive great benefit from contact with them that the plain man has not dared to question it. But while admitting that students should be taught by original minds we may very humbly question the doctrine that a man is a better teacher of things with which his students will come into daily contact *because* he is engaged in a research problem quite unrelated to their future work. Secondly, teachers are not taught how to teach. The Goodenough Committee recognizes this fact, but its remedy is singularly inept. The committee suggests the inspection of medical schools, but in a form foredoomed to failure so far as the quality of teaching is concerned, because the inspection is not to be carried out by a completely independent body. Thirdly, the evils of our methods of teaching and examination are such as automatically perpetuate themselves. The system to which students are subjected is the very system which produces the type of teacher by whom those students are taught. For by this system it is primarily the faculty for memorizing unexperienced facts which opens the doors to an academic career. Those who possess this faculty cannot put themselves in the place of those who are not so gifted, hence the neglect of the cinematograph and other simple means of demonstration. This too the Goodenough Committee has failed to understand. While it starts from the principle that the basic training should be the same for general practitioners and consultants, it abandons this excellent principle at the first opportunity, giving its warmest benediction to the establishment of an undergraduate school for "carefully selected students" who are to become "teachers, investigators, and consultants rather than general practitioners." Could any scheme be better devised for widening the gulf between the intellectuals and the rest of humanity?

The committee pays lip-service to the cause of humanism, but in reality comes down heavily on the side of intellectualism. It heartily endorses the self-satisfied words of one of its witnesses: "In the last limit [whatever that may mean] it is essential to place trust in those engaged in teaching and research." The tendency on the part of those whose interests lie mainly in research to enlarge and complicate their subjects regardless of their importance to students is apparently uncontrollable from within, and must therefore be controlled from without. It is precisely because no such control has been exercised that medical training has come to such a sorry pass. To the teacher-researcher the report promises an earthly paradise, but what does it do about the really simple things which affect the ordinary man? Are its proposals calculated to correct those faults which are so obvious to all who have eyes to see: the failure to arouse curiosity; the failure to teach observation and the memorizing of observations; the failure to teach students to marshal facts, to reason, and to use their common sense? The fundamental cause of the failure of the curriculum is the stranglehold by intellectualism on a subject which is essentially human and practical, a stranglehold which the Goodenough report is designed not to relieve but to intensify.

"... the art and practice part of life
Must be the mistress to this theoretic."

Reports of Societies

URINARY COMPLICATIONS OF PREGNANCY

A joint meeting of the Sections of Urology and of Obstetrics and Gynaecology of the Royal Society of Medicine was held on May 24 for a discussion on urinary complications of pregnancy. Mr. F. MCG. LOUGHNANE, president of the Section of Urology, was in the chair.

Mr. JOEL GABE first described the changes which occurred in the urinary tract during pregnancy. As early as the third month there were changes in the upper urinary tract. The anatomical changes most often seen were dilatation of the calices, the pelvis, and the ureter as far down as the pelvic brim. The abdominal ureter was often elongated and might become tortuous, kinked, and laterally displaced. Kinking usually affected the upper third of the ureter and might be so marked as to obstruct ureteric catheters. Even before the uterus was large enough to exert pressure certain physiological changes occurred—namely, atony, relaxation, and stasis. These were generally regarded as due to the action of hormones elaborated by the placenta. If the urine of pregnant women were injected into virgin rabbits changes were produced in the urinary tract of the rabbits like those observed in the pregnant animal. It had also been shown that the amount of prolactin B and oestrogen excreted in the urine increased during pregnancy.

The stasis and atony which occurred were the perfect prerequisites for infection, and it was remarkable that this did not happen more often. Stasis was found in 73% of primiparae and 45% of multiparae. When excessive it might cause temporary renal impairment, but normally the total renal function was unaffected and there were no changes in the blood chemistry. After normal pregnancy retrogressive changes occurred in 60% of women within two weeks of delivery, and intravenous pyelograms were usually normal by the tenth day of the puerperium. Ureteral atony might persist for a fortnight or longer.

Calculus

After discussing some bladder complications Mr. Gabe spoke at length on urinary calculus, which was not, he said, strictly speaking, a complication of pregnancy, but rather a complication which occurred during pregnancy. If a woman was known to harbour a calculus she should be advised to have it removed before embarking on any future pregnancy. Calculus in the urinary tract was commonest at the ages between 30 and 50, whereas the majority of pregnancies were before 30. During pregnancy calculi in the kidney and ureter were found in about equal proportions and very rarely in the bladder. The symptoms in the early months were the typical ones of pain and haematuria, but after the fourth month a calculus was more likely to give rise to infection than to pain, and the kidney might be found enlarged from pyonephrosis. During the period of general atony calculi seldom passed spontaneously. Caliceal calculi were less harmful as a rule than those in the pelvis.

Generally the policy of waiting until after the termination of pregnancy was justified if there were no symptoms, if renal function was good, if infection was minimal, and if the stone, because of its position, was unlikely to give rise to trouble; otherwise the procedure to be adopted depended upon the stage of pregnancy and the site of the stone. Serious complications, such as pyelonephritis, perinephric abscess, oliguria, anuria, and uraemia, required urgent treatment. An operation in the first four months was much easier to carry out than later on, particularly upon the ureter, and there was a longer period for the wound to heal soundly. For ureteral calculi cystoscopic methods of removal should, of course, be tried in all suitable cases, and if the calculus could not be removed by this means obstruction might be overcome by pushing it up into a more dilated part. Advanced pregnancy was no absolute contra-indication to operation if the patient's condition required it, but, generally speaking, a conservative attitude should be adopted.

Tuberculosis of the Urinary Tract

Tuberculosis of the urinary tract complicating pregnancy was infrequent and usually presented itself as a sterile pyuria. Although pregnancy was occasionally tolerated surprisingly