"THE STUDENT IN IRONS" THE CURRICULUM

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It is nowhere denied that we ask impossible tasks of students, who are bewildered by hours of listening, and that we stamp out the habit of reflection by a ceaseless drill. And this is done in the name of education; it is the soil which we deliberately design as the happy breeding ground of a scientific way of thought that can thrive only on faithful and accurate and patient observation, and has its roots in meditation, the loneliest habit of man.

So strange an anomaly may set us thinking how we are come to such a pass. The blunt truth would appear to be that the handling and revision of the curriculum are based on a misconception of what we can and ought to attempt in a medical school. The one purpose of the student's years is, it seems, not to train and test habits of thought, but to collect and store a set of facts, as squirrels hoard the nuts on which they hibernate. These facts are his capital, and he must perforce live on it throughout his working life, for he has not been put in the way of adding to his possessions as time passes. Presently it shrinks, and he must needs replace it by a stock of worldly wisdom built upon a growing discernment of the ways of human nature, so that soon he is as cunning in the management of men as he is helpless in the control of their diseases. And this the end, for the system ensures that it often is the end, of that which should have no ending but death itself, of an education, we call it such, which comes to its grand climax in this manner at that time, commonly in the twenty-third year, when it should be but beginning. It may be conceded that such a policy was reasonable when medicine was a slowly progressing science that did not greatly alter in a man's lifetime. To-day it leaves him bankrupt when he has scarcely begun. The little he knows is soon antiquated, and he cannot keep up with a rapidly changing science, for we have so contrived to educate him that he cannot educate himself.

The English student, it is said, is safer, more responsible, more practical at the time of graduation, more accustomed to handling patients, than the graduate in other lands at the same stage. But it is also said that he has little power of growth: ten years later he stands much where he did, while his contemporary abroad is forging ahead, because those who taught him had never for one moment forgotten that one day he must reason for himself. They knew that without the perpetual activity of a disciplined mind he must fall a victim to every passing fashion and live among the credulous. The student with a disposition to think for himself, caught in the clinical years in a blind rush to meet the tyranny of signing up, is hurried out of thought. We trust neither his industry nor his capacity. He must be driven into different pens for every hour of the day, along with a drifting flock that presses now this way and now that. And this, if I may be allowed a change of metaphor, in the hope that he may one day recognize a disease because he has seen it before, as a sleepy traveller marks his destination at night.

If this is right, if this is the true gospel of education, the problem of the curriculum is not only insoluble, it must quickly gather confusion. New departures are incorporated with bewildering haste while we remain reluctant to sweep away much that has slowly fallen into discredit. There is an obvious limit to a steady growth

of that kind. Even as far back as 1906 more than half the medical students in England required seven years or more in which to qualify. If we allow the curriculum to go on growing it will soon be no longer necessary to argue that it is educationally unsound because as a physical feat it will have become impossible.

THE WAY OF SALVATION

There is no way of escape from our present distresses that will or can be found until we recognize in theory, and in practice admit, that the making of a physician is primarily an educational and not a professional question. What do we ask of him? Is it not that he be trained not only in the observation of facts but also in the habit of handling them—in a word, in methods of reasoning which alone supply any solution to the problems of professional life? We can, in any event, teach but a fraction of what is known, and it is not possible to foresee all the situations that the student will meet hereafter, to arm him with facts proof against any and every emergency. When we think of all the mistakes we have made, and of those we have seen others make, when we remember that these were made, not often from faulty observation of facts, but more from errors in deduction from those facts, in short, from defective reasoning, we shall have to admit that a certain activity of mind is as helpful in protecting the public from errors in diagnosis as the mastery of physical signs. Certainly we may not meddle with the admirable manner in which these physical signs are taught in English schools of medicine, for they are admittedly the alphabet of our art. But it is another matter with the glut of talk that is grafted on to that practical basis.

Facts the student must have—they are the food on which he must live; but a system which has become concerned too narrowly, too exclusively, with their mechanical acquisition is as surely a misconception. It is a pitiable substitute for a living policy, only recalling those pathetic figures who are to be seen immersed in their books between the morning and afternoon papers of an examination. They think it shall profit them more to goad their poor weary memories to one final effort than to enter upon their ordeal with a clear head and a cool judgement.

Custom is the principal magistrate of a man's life, and education is in effect but an early custom. We seek to establish habits, to test and form ways of thought. If we ask of the student that he learn everything, he may in the issue learn nothing, nothing of value. But if we frankly own the futility of such endeavour, then we as teachers freed from that bondage may discover that it is within our competence to foster his natural power of collecting such facts—a power that remains and abides long after the actual information we impart has been forgotten or has proved misleading. We shall be satisfied if he go away keen and curious and disposed to remedy his deficiencies. If he realizes those deficiencies and has learnt a sound method of remedying them we shall not anxiously measure how little he knows, but rather help him by drastically limiting what he must do, content to persuade him to push ahead in whatsoever direction he has a disposition to go. Let him do something thoroughly, and let that something be of his own choosing. If he does not want to do things we may be sure that the system has dried up and stifled the natural curiosity of his years. The student who is not curious is surely no student at all; he is already old, and his thoughts are borrowed thoughts, and his mind has taken on the passive acceptance of age.

If this is a faithful picture of conditions as they are we shall ask what has been done by way of amendment—what can be done.

ROADS TO FREEDOM

In England the various universities have not been blind to what is afoot. For at least a quarter of a century they have sought a way of escape and have found none. They have called to their help many a committee with its neat terms of reference, its patient industry, its committee habit, and it has availed them nothing. As often as they conclude that the overcrowding of the curriculum is foreign to the educational purposes that all men desire, and that a solution of a position so intolerable can be delayed no longer, so often their deliberations end in a capitulation to the clamour of sectional interests for the inclusion among compulsory subjects of the last addition to therapeutics and the like, which it is plain should be reserved for study after graduation.

Some years ago a determined effort was made to cut the Gordian knot. Committees met, much evidence was taken, and at last the results were published. A little later new regulations of the London University appeared.

"The practical teaching of therapeutics, including sero- and vaccine therapeutics, actino- and radio-therapeutics, mechano-therapeutics, and dietetics, should take place during the clinical period."

This was and is the final paragraph laying down the course in surgery, this the last bold bid for freedom. What is the problem that has defeated them? The past fifty years that have seen the development of the modern laboratory have multiplied the student's task. Much has been added, little taken away, and the situation that has arisen no nation has frankly faced. Our educational roads are blocked by cars and lorries and great motor buses, by victorias drawn by high-stepping horses, and tricycles and old high bicycles, with here and there a sedan-chair, all jumbled up anyhow and quite out of control. What is needed is not patchwork but something that smacks of revolution, something like a recasting of the whole of our studies that only such be kept as help towards broad educational ends. But who is to say what helps and what does not help? Can we look to any committee to show us a way out of the tangle?

In the political world a few years ago we saw an example of the comparative ineptitude of a strong Government to control the expenditure of the Departments of State. To put a term to the plausible arguments of the permanent officials it was necessary at last to bring in from outside men with big maps who determined what proportion each Department properly bore to the whole, and laid down what in it might stand and what must go. It may even be necessary to turn to some Geddes or Inchcape of science, that he may run amuck with shining axe among those articles of belief and hoary rites and too-fashionable cures which trip our feet like a thick undergrowth of weeds. He may not be found in the medical schools, for out of them came those committees which have failed; besides, if we who staff them can discriminate between what is valuable in developing the habit of thought and what is merely profitable in a narrow professional sense, we have still to rid ourselves of the absorbing zeal for our own subject, which makes us forgetful that the student's time is not unlimited.

If we find him at all, he need not—more, he cannot—know everything. This only must he know—what in the final resort is most worth while. His eye will wander over all the field of medical study, preserving only what fosters growth. It will not be left to an American novelist to play with the ideal of a scientific medical school that is precise and cautious, where "spectacle fitting and most of the surgery are omitted" and nothing is left but what is good reason and food for the mind. It is not that the reformer supposes that the needs of the student who is shortly to be at the beck and call of the public can ever

be reduced to that ideal. He is only mindful of what in the curriculum is most helpful in stirring up a man to think for himself, in exciting his curiosity and in persuading him to use such gifts as have been given him. Wherefore he will not need to waste his time with the business of technique, though it is an admirable and necessary accomplishment, for it is in no danger of neglect.

His attitude to surgery is expressive of all that he has come to think of what we require of him. He does not deny its practical benefits to humanity, only he is not concerned with them. But even within his own narrow terms of reference he is not so certain as the American writer that surgery will play this humble part in a school of to-morrow. He is interested in it just in so far as it brings into this most credulous world a cold douche of realism. He respects its craving for proof that alone entitles it to a place in his plan for the architecture of a liberal education, and it is from that angle that he sees the whole edifice that we have put up, and, watching, decides what must come down.

THE TYRANNY OF TALK

Such a body—if it is not left to an individual—when it comes into being may decide what pruning can be safely done, it will never endow us with the power of making the best use of what is left. There is something in anatomy, something more in surgery, for which there is no place in a system of education that has to do many things in a limited time without robbing the student of the opportunity of thinking for himself. The curriculum needs cutting, but when that is done not all that the knife spares will be of equal value. It is our function as teachers to point out what is worth while, saying, "Look here, and here, and there." We all too readily delude ourselves that the curriculum or examinations are responsible for the hours the student wastes in what is of no moment. The last thing that occurs to us is that we ourselves may be at fault.

Do we always recognize what is of moment, have we done all that is possible to sharpen and bring out the natural intelligence and youthful curiosity of students, or have we like a frost nipped these tender shoots when they appeared? Are we prepared to acknowledge that in science the art of teaching is as yet in its infancy? When we reflect on the contrast between the native curiosity of the ordinary child and the apathy and intellectual indifference of the average medical student in the final years—not a mere want of diligence, there is enough of that, but a dreadful mental indolence like a sickness—when we turn over in our hearts the disparity between what we have done and what we have left undone, we are driven back to the beginning, to question again where we are going.

We cannot take refuge behind the curriculum; it was our doing, we made it as a means of duress; and the criticism, responsible and universal, that it has provoked, should serve as a reminder that we have not always exercised that power with discretion. The student's liberty is not to be won by the acts of committees, but only by the education of his masters. Some there are who, weary of the present chaos, have turned away from such easy remedies as committees seem to offer to the building of machinery for raising the level of teaching and of examining. They have come to look to the unit system to train a body of men who shall be more sensitive to what is really helpful in moulding the fluid mind of youth, less obsessed with what is merely profitable in a narrow professional sense. And yet, in so doing, we need not exaggerate the part we can play in the development of the student mind. It is what he brings to his task and not what we lend him that counts. We cannot endow

a boy with the capacity for reflection, but if he has it we can do something to see that he makes use of it. No teacher shall ever persuade a man to think for himself if that gift was withheld from him in the hour of his birth, but a thoughtless teacher may bustle him away from any habits of reflection that are latent in him. In our fussy preoccupation with our pedagogic duties we have done grave hurt to those finer qualities that to a greater or a lesser degree are present in us all—the power to reason, the critical instinct, the overwhelming curiosity of all young things.

Writers on educational matters grow fond of words, they become the slaves of metaphor, and often lose themselves in a mist of speculation till we can no longer see which way they are taking us. The practical man, if he has read so far, may ask: "In concrete and in detail what do you suggest? Take this blue pencil, sit down, and mark in the curriculum what is necessary and what is unnecessary." I shall answer that I have tried to show why an attempt spread over a quarter of a century to obtain that information from committees of teachers and examiners has failed, and will always fail. I have even dared to suggest where that information might be sought. In the words of John Stuart Mill, "The initiation of all wise and noble things comes and must come from individuals: generally at first from some one individual."

The periodical survey of the curriculum by a luminous intelligence, watching the student's education from some point of detachment, must have a value because it will pull up the teacher and make him reflect on his methods. And that, after all, is what is wanted in the impasse into which we have drifted. The seniors of our calling have built up a method of bedside teaching, the means beautifully adapted to the end. Now the increase of knowledge and the growth of the laboratory demand something more; that something is the contribution which the next generation will make to medical education. It is no less than the discovery of a new technique in teaching.

MEDICAL RESEARCH COUNCIL

ANNUAL REPORT FOR 1930-31

Salient features of the seventeenth annual report¹ of the Medical Research Council, to which a preliminary reference was made last week (p. 439), are: new advances in nutritional science; the relation of vitamin D to dental decay; progress in the study of virus disease; pathological conditions associated with obstetrics and gynaecology; and the results of insulin treatment. A grant-in-aid of £148,000 was provided by Parliament for the year. This was allocated for research grants to scientific workers in different parts of the United Kingdom, and for the investigations of the Industrial Health Research Board (£86,000); for the expenses of the National Institute for Medical Research at Hampstead, and its farm laboratories at Mill Hill (£52,000); and for general administration (£10,000). Payments towards the cost of particular investigations were made by the Empire Marketing Board, the Dental Board of the United Kingdom (to which payment dental practitioners contribute), the British Empire Cancer Campaign, the Distemper Research Committee of the *Field* newspaper, and the Foot-and-Mouth Disease Research Committee. The great number of researches undertaken or assisted by the Medical Research Council has overtaxed its ordinary financial resources; in addition to effecting various economies in administration, money has been saved by all the workers in the

service of the Council submitting to a reduced remuneration for the duration of the present financial emergency. In this issue of the *Journal*, and the following one, an outline will be given of various scientific advances which have been made.

ACCESSORY FOOD FACTORS

Mention has been made in the *British Medical Journal* from time to time of the recent dramatic progress in the isolation and standardization of vitamin D, a substance which has a preventive and curative effect upon rickets. A group of workers at the National Institute at Hampstead have been continuously engaged in studying the process by which this vitamin is produced from ergosterol by the action of ultra-violet radiations of particular wave-lengths. The procedures used in purifying the ergosterol, irradiating it in solution in the complete absence of oxygen, and separating the antirachitic constituent from the mixed product, have required the regular and close co-operation of physicists, physical chemists, and organic chemists, in addition to other workers concerned with the breeding, dieting, and dosing of large numbers of rats for the estimation of the curative results produced by the different fractions. Dr. R. K. Callow isolated and purified ergosterol by special methods; a new type of photo-electric microphotometer was devised to speed up the very numerous measurements which the work on vitamin D demands; and a new and more satisfactory form of spectrograph has been constructed. As the result of these various measures, it appears that the isolation of vitamin D as a chemical entity has now been achieved.

A crystalline antirachitic substance was obtained by Dr. R. B. Bourdillon and his associates, by distilling fractionally in a high vacuum the mixture of products yielded by ergosterol on irradiation. They provisionally named this substance "calciferol," in view of its characteristic activity. From the distilled calciferol Dr. Callow has obtained two crystalline esters differing in shape and colour. One yielded a sterol having about twice the antirachitic activity of the most potent substance hitherto obtained, and to this, accordingly, the name "calciferol" has now been applied. This substance appears to be the true antirachitic vitamin in practically pure form. It has the same empirical formula as the parent ergosterol, but must differ from it, and from the various inactive concomitants which so readily crystallize out with it, in the details of molecular structure. A problem of much interest, though great difficulty, for future investigation has thus been laid bare.

Weight for weight, crystalline calciferol has 400,000 times the value of a good sample of cod-liver oil in preventing or curing rickets, and a single ounce dissolved in a suitable liquid would provide the necessary daily ration for more than one million children, making all the difference between crippling and disease on the one hand, and healthy life and development on the other. The obtaining of still more accurate knowledge of vitamin D in terms of its chemical structure and physical properties will afford an insight into the processes within the body by which this substance fits into the intimate biochemical machinery of the growing cell and the developing organs.

Reference was made last year (*Journal*, 1931, ii, 857) to the attainment of accurate standardization in respect of vitamins, and to the international agreement that was being reached. From the clinical standpoint the matter is of importance, since the medical practitioner will be enabled to control the dosage accurately, while those concerned with the manufacture of food substances will be able to have preparations standardized in respect of their effective vitamin D value. In view of the fact that the majority of the population living under urban conditions appear to be receiving only a minimum, or even less,

¹ Cmd. 4008. Report of the Medical Research Council for the year 1930-1931. H.M. Stationery Office. (2s. 6d. net.)