University College Hospital Medical School.

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By SIR JOHN TWEEDY.

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GENTLEMEN,

The thought which first seeks expression on this occasion is one of sorrow for the loss, through sudden death, of one who was many years a distinguished teacher in this School. At the end of last Summer Session the friends and colleagues of Dr. Radcliffe Crocker expected with a reasonable degree of confidence that he would be present with us to-day to take part in the inauguration of another Annus Medicus. It has been otherwise ordained. There remain with us the memory of an able and amiable fellow-worker and the grateful recollection of a long record of much good work well done.

The next sentiment is one of congratulation to those who have just received the tokens of their triumphs. May these rewards prove harbingers of future success in the sterner battle of professional life. I trust that I shall not be thought guilty of dropping into the cup of happiness *aliquid amari* if I venture to caution those who are the victors of to-day not to regard the distinctions which they have just attained as ends in themselves, but rather to consider them as incentives to a higher purpose. The successes which we now celebrate are indications of ability, of industry, and of steadfastness; but for complete success in life it is not enough

to be apt in acquiring knowledge or to possess a retentive memory, or to have facility in written or verbal expression. A man may possess these and yet lack many of those qualities which are requisite to ensure success in practical affairs. Mere cleverness is not enough, nor industry, nor zeal. Character is also needed, and all that this term connotes—thoughtfulness, sympathy, courtesy, and culture. And by culture I do not mean what has been scoffingly described as a smattering of Greek and Latin, but that higher discipline so finely described by Matthew Arnold as "a pursuit of our total perfection by means of getting to know, on all matters which most concern us, the best which has been thought and said in the world; and through this knowledge, turning a stream of fresh and free thought upon our stock notions and habits." The proverb runs "Knowledge is Power"; but this is not always or necessarily true. Knowledge is one of the elements and conditions of power: to be effective it must be directed and controlled by wisdom. There are many learned men in all professions who, for some reason or another, do not succeed in the practical departments of their calling. It is not easy—sometimes it is not possible—to say why this is so. Sometimes the fault is in external circumstances; more often, perhaps, it is some inherent personal failing or defect. Conspicuous inaptitude for practical art is scarcely possible nowadays. Every student, before obtaining a medical Degree

or Diploma, must go through a prescribed curriculum of study and practical training and must pass certain statutory examinations as to his knowledge and skill. This was not always so. Until the scientific awakening of the 16th century, thought was largely scholastic and trammelled by ecclesiasticism, and professional skill often manifested itself in dialectics rather than in action. Arnald of Villanova, one of the chief medical luminaries of the 13th Century, relates that he knew an excellent professor of natural science learned in medical theory who could not treat the simplest ailment. This is an extreme type, which is now extinct. As the antithesis of the learned but inexpert man there is in all professions the so-called "practical man," whose merits are generally overrated in popular estimation and whose lack of theoretical knowledge is often imputed to him for righteousness. Nor can it be denied that not infrequently he does attain a certain level of success, but he has narrow limitations. He deals in particulars, is often quick to observe similarities, and, in the treatment of disease concerns himself with symptoms without troubling to investigate the physical conditions upon which those symptoms may depend. Science arises from the discovery of Identity or Unity amid Diversity of Manifestation; and it is precisely here that the practical man so often fails. He appreciates agreements and similarities, but fails to discriminate differences. Such men are not altogether without illumination, but the

light within them is what Jowett has called "a luminous mist"; they see things at false distances and in erroneous proportions. In the long run, it will be found that the sanest and safest guide is one whose practical training is based upon sound and sufficient learning.

We are assembled to-day not merely to distribute prizes to those who have already made some progress in their medical study, but we are more particularly gathered together to welcome those who are now beginning the study of Medicine. I congratulate all such upon the choice they have made of a career. From the days of Homer to our own times much has been written in praise of the physician and of the profession of medicine, and not a little has been said in dispraise and disparagement. But, take it all in all, I maintain there is no secular calling so philanthropic in its aim, so refining in its influence, and so beneficent in its operation as the practice of medicine. Like Mercy it is twice blessed: it blesseth both patient and practitioner. Doubtless most of those who enter into the medical profession do so with the ultimate object of earning a livelihood, but in the study and pursuit of Medicine personal interests gradually become merged in an altruistic Hedonism—the good of others; and there is, I believe, no pursuit which so surely humanises a man and calls forth his better self, or one in which average ability and good character more certainly meet with reasonable recompense. But, paradoxical as the statement may

be, even worldly success is generally most assuredly attained when it is not pursued as the chief end and aim. Medicine is only worthily served when it is practised as a cult, in the devout spirit of worship. It must be served loyally and for itself.

It has been said that the criterion of the professional spirit, in contradistinction to the commercial and industrial spirit, is this:—the professional man thinks first and chiefly of the nature and the merit of his work, the commercial man thinks most of the amount of his wage. Nevertheless one must live, and most of those who enter the medical profession must live by what they can earn. Here, if anywhere, the labourer is worthy of his hire. For some of those who enter the medical profession, it may be well that they should possess financial resources sufficient to relieve them of the carking cares of earning their daily bread and of making provision for future contingencies when work is no longer possible. But for some, at least, it is better that they should lack these pecuniary aids and have to rely upon their own spiritual and intellectual resources. Thousands of medical men have lived happy, useful and honoured lives, and not a few have risen to great eminence and honour, who have had to start practice with no other equipment than their technical training and the prayers and good wishes of their friends.

Those who are now beginning medical study may, at the outset, be perplexed and discouraged, as I was myself, by the new method of study and by the new

order of ideas to which they are introduced. Heretofore the education of the student has been chiefly literary, based upon pedagogic authority and the dictatorship of books. Henceforth both the character and method of study will be altered. The influence of authority will still obtain ; much knowledge must be taken on trust, but it is a critical trust. Whatever is taught here is based upon a knowledge which may have been the accumulation of centuries, or it may be knowledge recently acquired, but it is knowledge which in due time and place is capable of verification and demonstration. While this knowledge is based upon authority, it is the authority of persons who have examined it with care and attention and who have been competent to form a sound opinion upon it. In later life most of us, as Cornewall Lewis has remarked in his Essay on Authority, must accept much of our knowledge on the trust of *our own authority*. We have gone through a process of thought and investigation and have arrived at a given conclusion, but the reasons of that conclusion have passed out of memory. We hold these opinions rather upon the recollection of having once ascertained them to be well-grounded than from a clear present perception of these grounds. If this were not so we should, as Locke observes, be perpetually floating about in doubt and be at the mercy of those who have a readier or more retentive memory, or who have happened to master the arguments on one side of the question only. Meanwhile, and throughout the

greater part of the time you spend here in pupilage, you must depend to a very large extent upon the authority of your teachers and of accredited text-books, but there will never be lacking means of testing the accuracy and scientific value of this teaching by appeals to the evidence of positive data.

The primary purpose of medicine is the relief of human suffering and the cure of disease, but it has a higher ulterior motive, inasmuch as it aspires to the more important office of endeavouring to *prevent* disease and to remove or antagonise the causes and conditions which induce disease either in the individual or in the community.

The growth of medical knowledge has been slow and subject to cyclical variations, sometimes to retrogression, sometimes almost to eclipse. But it *has* grown, "creeping on from point to point." The history of Medicine furnishes many illustrations of this. In Human Anatomy for example, it would at first sight seem to be easy, with due diligence, to ascertain and correctly describe the structure of the human frame, but it took many centuries of practical observation to reach even an approximate degree of accuracy. Aristotle, Hippocrates, Praxagoras, and other physicians of the Hellenic and the Alexandrian Schools, studied anatomy, and yet the records of their observations contain many errors both of observation and of reasoning. Even Galen, who was considered the infallible oracle for fourteen centuries and who was the first to seriously study the science of Anatomy

and made many discoveries therein, also promulgated many errors. And notwithstanding the impulse which Thaddeus and Mundinus gave to the study of Anatomy at the School of Bologna in the 13th Century, the authority of Galen was so firmly established that when Vesalius in the middle of the 16th Century published his famous work on Human Anatomy in which he corrected many of Galen's errors, there were not wanting anatomists who impeached the accuracy of Vesalius, or, when this was no longer possible, affirmed that the human organization had undergone structural change since Galen's time. Now there is not a first year's student who will not be able daily to verify every statement made by his teacher or contained in his text-book. The progress of Physiology has been even slower than that of Anatomy. Indeed, scientific physiology is almost entirely the work of our own time. Forty years ago physiology was taught in University College by the greatest exponent of the day, I mean the illustrious Sharpey, but the physiology which he taught was almost entirely didactic and expository. There was practically no experimentation and scarcely any attempt at practical demonstration. Now physiology is eminently experimental, and the splendid position to which it has attained amongst the Natural Sciences is the result of the employment of the experimental method.

The course of medical education is progressive in complexity. In the earlier studies the method is

authoritative and demonstrative, but in the final studies of medicine and surgery the method is more conjectural and ratiocinative. Here exact observation, well-trained senses and correct reasoning are the critical apparatus required. The problems to be solved are more complex and more obscure than those of anatomy and physiology. The difficulties of investigation are greater; the phenomena to be observed more difficult of interpretation, and the means of verification are fewer. "Art is long," says Hippocrates, "the occasion fleeting, judgment difficult." The investigation of disease involves the study of a compound and aggregate of many phenomena, some of which are common to many different physical states. A pathognomonic sign is often wanting. Moreover, some of the phenomena observed in a diseased state may be essential, some accidental, and some mere concomitants, and these must all be differentiated and their relative values separately determined. In clinical medicine it is rarely possible to conduct an exact experimental enquiry. As Mill has pointed out, there is this essential difference between Observation and Experiment: in observation we *find* our instance in Nature; in experiment we *make it* by an artificial arrangement of circumstances. In clinical medicine we can seldom isolate the phenomenon under observation by an artificial arrangement of circumstances. Hence the growth of medical knowledge has been slow and halting. Centuries of observation by experienced workers have been

needed to raise practical medicine to its present high level. But these observations have, for the most part, only improved the art of medicine and have done comparatively little for the advancement of its science. The Science of Medicine has been advanced mainly by the researches of those who have not been directly engaged in the treatment of disease. When new knowledge has been discovered by these means, it has been received by competent judges and, by the influence of their authority, it has been accredited and diffused. John Henry Newman, in his Discourse on the Idea of a University, has portrayed the qualifications which are required for the advancement of knowledge as distinguished from those which are needed in the dissemination of knowledge. "To discover," he says, "and to teach are distinct functions; they are also distinct gifts, and are not commonly united in the same persons. . . . . While teaching involves external engagements, the natural home for experiment and speculation is retirement."

Failure to appreciate the difference between the dissemination of knowledge and the advance of knowledge has given rise to much confusion of thought and not a little waste of endeavour. Perhaps the crudest manifestation of this confusion is the belief, real or feigned, by some persons, that inquisitorial experiments are performed in hospitals on men, or on animals, or both. Less crude,—nay, even creditable in a sense—is the notion that, by establishing sanatoria or endowing special hospitals

for the treatment of particular classes of general diseases, it is possible to solve the problem of the nature and origin of these diseases and to hasten the discovery of the means of prevention and cure. Logically, this assumption is false; economically, it is wasteful. It is based on a misapprehension of the function of hospitals and of the methods by which scientific discoveries are made. Far be it from me to discourage the most generous pecuniary support of hospitals. Money is greatly needed for their maintenance, and will be needed in increasing proportions if hospitals are to avail themselves of the resources which scientific research is continually placing at their disposal. The great desideratum of our day is adequate endowment of biological and pathological research as the surest and most humane way of discovering the nature and cause of disease and the means of its prevention. Clinical observation only deals with disease when and as it manifests itself in man and animals; it throws but little light upon the causes of disease or upon the intimate processes which constitute the pathological state. Supremely useful as hospitals are for the purpose of treating the sick by the help of the best skill and knowledge of the time, and as schools for the training of successive generations of medical practitioners for the service of the community, it is nevertheless true that most of the capital discoveries of scientific medicine have been made outside hospitals and very often apart from clinical observation altogether. Among the

most remarkable of these discoveries I may mention those relating to malaria, Malta fever, yellow fever, and I might add other diseases, which have baffled the best clinicians for centuries. In surgery, too, it may be said that the scientific basis of the modern aseptic method has been established not by clinical observation but by experimental research. Another simple but striking instance supporting my thesis is afforded by the history of the use of the ligature for the arrest of hæmorrhage from wounded arteries. Nothing, it might seem, can be more obvious than to tie a bleeding artery. The records of surgery inform us that the ligature has been so employed, more or less systematically, by surgeons for over two thousand years; but, simple as the procedure may seem, the true method of tying an artery was not established until the beginning of the last century. Ambroise Paré, about the year 1560, recommended tying bleeding arteries in primary amputation instead of applying the cauteries then in vogue, but his plan of securing the vessel was so difficult and was attended with so much subsequent risk that most surgeons condemned it. An English surgeon, Alexander Read, in Lectures which he delivered at the Barber-Surgeons' Hall about the year 1630, censured Paré's practice as "a troublesome and dangerous toy, as he shall finde, who shall go to make trial of it." For more than two centuries surgeons were divided in opinion as to the value of the ligature, and even those who did employ it were afraid of injuring the

arterial tunics by applying the ligature too tightly. Various contrivances were used to avoid damaging the coats of the vessel. Thick and broad threads, tapes, ribbons, cylinders of cork, wood or linen, reserved ligatures, and other expedients were employed to stop bleeding without injuring the walls of the vessel. Recurrent and secondary hæmorrhages were frequent. Dr. J. F. D. Jones at the beginning of last century, by a series of ingenious experiments, on dogs and horses, proved that the endeavour of surgeons to apply the ligature without injuring the arterial tunics was precisely the cause of the failure of the ligature to permanently arrest bleeding. Jones demonstrated that the true method was to employ a small, firm ligature drawn sufficiently tightly to cut through the inner and middle coats without rupturing the tougher and external coat. It is instructive, in view of the modern outcry against the experimental method, to read Jones's *Apologia*, bearing in mind that his experiments were performed before the days of anæsthetics and painless operations. "He regrets," he writes, "the necessity of obtaining even this important knowledge by the sacrifice of brutes. But when we remember the incessant scourge of war which has followed man through all the ages of his history, not to mention the consequences of accident and disease, it is not too much to assert, that thousands might have been, and may still be saved by a perfect knowledge of these subjects; which can only be directly obtained by experiments on brutes; indirectly,

and very slowly, by observations on the injured arteries of man; and even these cannot be made until he has fallen a sacrifice to the want of assistance, or to the imperfect knowledge of the surgeon." Every practical surgeon will bear testimony that as the result of Jones's experiments tens of thousands of lives have been saved.

I have lingered about this question because you, as future practitioners of medicine, will have to form an opinion on the justifiability of experiments upon living animals for the purposes of scientific research, and if you are satisfied that these experiments are justifiable with proper safeguards, you will be called upon to defend the practice and to justify your opinion. To do this intelligently it is necessary not only that you should be acquainted with the arguments for the defence, but that you should also make yourself master of the arguments on the other side. It is not enough to ascribe the opposition of the public to ignorance or fanaticism. There may be either or both, but objection can be only overcome and acquiescence gained by enlightening and educating the public mind. It should be remembered that the mass of a nation must be convinced of the value of a general principle which is being carried out, else what we might judge the most salutary change will be ineffectual. Ritchie, in discussing the Rights of Minorities, has remarked that on matters of public health only the scientific expert can, in the first instance, form a sound judgment. In democratic

societies there is often a distrust of scientific opinion. The remedy is not despotism but public enlightenment, and the scientific specialist is bound therefore by patriotism, as well as in the interests of his own science, to lend what aid he can to the popularisation of science from which he is too apt to recoil. It is the sole antidote to ignorance or pseudo-science. Those whom Science neglects, fanaticism and quackery will claim for their own.

Gentlemen, I have said nothing about your scheme of work or of the manner of your lives. These I confidently leave to the help and guidance of your teachers and to the moral and religious impulses which you bring with you. As touching Medical Ethics I believe the Law and the Prophets are summed up in the vow prescribed in the Hippocratic oath: "In purity and in holiness I will pass my life and practise my art." You are heirs to a great inheritance. Into your care and keeping will be entrusted the health, the happiness and the lives of many of your fellow creatures. So acquit yourselves that at the trial you may be found not unequal to your responsibilities.