On the influence of the study of science upon the mind : being the introductory address delivered at St. George's Hospital on October 1st, 1879 / by W.B. Dalby.

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INFLUENCE OF THE STUDY OF SCIENCE UPON THE MIND.

BEING THE INTRODUCTORY ADDRESS DELIVERED AT ST. GEORGE'S HOSPITAL ON

OCTOBER 1*st*, 1879.

BY

W. B. DALBY, F.R.C.S., M.B. CANTAB.

AURAL SURGEON TO THE HOSPITAL.

[REPRINTED FROM 'THE LANCET,' OCTOBER 11TH, 1879.]

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INTRODUCTORY ADDRESS

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INFLUENCE OF THE STUDY OF SCIENCE UPON THE MIND.

Whilst I very gladly embrace the opportunity which is offered me of saying a few words to those who have to-day entered upon the studies of natural science, medicine, and surgery, my experience of St. George's Hospital makes me confident of a generous reception on the part of my respected seniors and colleagues, and of an indulgent hearing from the students whom I have the privilege of addressing. If I occupy the first half-hour or so of this winter session in speaking on matters connected with education, however indifferently the subject may be handled, it is one in which all who hear me are equally interested; for, in its widest sense, education embraces all those influences which affect the development and growth of the mind; and these processes, beginning with infancy, continue until the functions of the brain decline or are suspended by death. Our minds may be said to be developed and trained by objects around us, by what we are taught, and by what we teach ourselves; and thus the man becomes what he is made by circumstances, by the effect produced on him by others, and by his own acts. The circumstances under which you find yourselves to-day are all in your favour; the teachers are ready to do their best; the results will depend upon what use is made of these advantages.

I will here make no reference to the powerful influence of surroundings in early life, but may say at once that at the present time a good deal of attention is being directed to the question of how far the education of boys, as generally pursued at our schools, may be capable of improvement in regard to the subjects which have for many generations formed the chief elements in teaching. That those who pass creditably through our public schools have, as a rule, succeeded well in the professions and in political life, experience has hitherto proved; but at the same time it is quite possible that the discipline of the playground and the school may have had more to

do with this (and I for one think it has) than anything that is actually learned in the class-room. As to this latter part of it, if I understand rightly the object which is sought to be attained, it is to give such a training to the mind as will enable its possessor to acquire knowledge upon any matter with the greatest possible facility. What I mean by this is, that when a young man has worked well and successfully, whether it be at classics or mathematics or both, his mind will have undergone such a hardening (so to speak) that he will be in a position to master any subjects forming the basis upon which the work of his life is to rest. I do not think that what is generally learned at school or college does much more than this. It would be difficult to exaggerate the value of mathematics as a means of mental training; and when a fine classical scholar becomes in his turn an author, an orator, or even, what he cannot fail to be, a cultivated gentleman, the literature of the ancients will have effected all that could be desired, and what perhaps no other method of education could have done; but do not instances of this kind form the brilliant exceptions to the many upon whose thoughts and future the imperfect knowledge of Greek and Latin, discarded at once and for ever at the end of the school days, exerts no further influence of any sort or kind? Might it not in such cases be possible that some more useful subjects could take the place of the badly learned, and therefore unproductive classics, and be at the same time quite as effective as a mental exercise?

These questions were answered recently as well perhaps as they are capable of being answered,* when it was suggested that the fault exists partly in the way in which classics are taught; and that if Latin and Greek were taught in a scientific way—namely, in their relation to other languages, such as French, English, and German—they would become, in being so treated, rather the languages of the living than of the dead. Possibly, after all that can be said on this matter, the truth lies in the fact that, whatever knowledge is thorough, be the subject what it may, it will prove in the end useful; so that in boyhood it is not very important what is learned, so long as it is learned well, if habits of attention have been cultivated, and the art of acquiring information has been gained. Without pursuing this part of the subject any farther, I will presume that in the course of this preliminary education you have at least already found that industry and perseverance are the only necessaries to the thorough learning of anything, and you will by and by have it forced upon your minds that, generally speaking, a capacity for work is the true meaning of what is often, though incorrectly, called genius. Although a very few of the exceptionally successful men in all

* See the *Fortnightly Review* for Feb. 1879; article by Mr. E. A. Freeman.

professions will be found to possess a rare facility for their occupations, and a certain brilliancy pervading their deeds and writings, which in all probability would have been observable in whatever line of life they had adopted, this is not quite genius. True genius, as I understand it, is creative talent, and may especially be seen in painting, in the composition and execution of music, in literature, and in oratory, excellence in any of which can never be acquired without unusual aptitude; and even here to call forth the genius must still be the capacity for work. With this latter qualification, however, and with fairly good abilities, I think it must be allowed that there is no position in any of the liberal professions to which a young man may not attain.

In this lecture theatre the necessity for untiring industry has been often insisted upon, and, within my own comparatively short experience, the truth of such teaching has been amply verified. Examples for illustration taken from our great men have been drawn more ably than I can draw them, and I shall not therefore repeat an oft- though well-told tale. I will ask you to follow me for a few minutes in another direction, whilst I endeavour to show what influence the study of science may be expected to have on the mind.

In your profession you will have the opportunity of meeting with men who have obtained the highest honours in it, and others whom, although not occupying such prominent positions, you will learn to respect, whose friendship you will prize, and in whose society you will by and by find one of your greatest pleasures. The charm which surrounds such men you will discover to consist in a remarkable simple-mindedness. You will observe that they have an unbounded veneration for truth; that they approach any inquiry quite free from prejudice—that, indeed, they have none, since they regard prejudice as the child of ignorance; that if they conceive it right to adopt any line of conduct they will unflinchingly do so, even though it be against their own inclinations or interests; that if they do not know a thing, they are at once ready to confess their ignorance; that they record their failures side by side with their successes; that their sympathies are equally with the poor as with the rich, with the obscure as with the high born, with the Mohammedan as with the Christian, with the convert of all creeds alike. In politics you will fail to interest them in any party cry; but when legislation has for its object the eradication of disease, which they know can by appropriate measures be lessened or stamped out, their influence will be exerted in the direction which their knowledge tells them is the right one. When habits of intemperance are sought to be controlled they will tell how within their knowledge the lives of multitudes are shortened and embittered by drinking—how it is the fruitful source of crime

and misery, and they will raise their voices in favour of measures that may be passed to check it, or to substitute recreation for drinking—the often only available form of distraction from the cares of a laborious life. They will have something to say on education, or any subject which will improve the condition of the people. With State matters of this sort you may, I say, elicit their sympathies; but the eccentricities of religious sects or their quarrels neither interest nor disturb them, and from superstition of all sorts they are absolutely free. For as scientific knowledge advances so surely does superstition vanish. In saying this you will notice that I make no reference to religion, and, lest I should be misunderstood as to the place which I think religion should occupy in education, I may be allowed to express the belief that no thinking man can doubt the necessity of religious teaching for the young of all classes, as well as for the masses of all ages, and to add that, whatever his convictions in such matters may be, he is content to leave others in the undisturbed possession of their own; but religion is not superstition any more than theology is religion, and the study of science may be said to make us religious when she teaches us that obedience to the laws of nature leads to happiness, whilst their infringement just as certainly leads to the reverse. For the laws of nature are the laws of God. The teachers of superstition require in their pupils faith and credulity, whilst the teachers of science welcome incredulity and insist upon inquiry; the result in the one case being belief, in the other knowledge.

In your intercourse with the men I refer to you are dealing with the class of mind which inevitably results from the acquirement of sound scientific knowledge, and in presenting this to you as one of your rewards, I sincerely believe that I am offering you something better and more likely to conduce to your happiness than any riches you might acquire in commercial pursuits or the honours you might gain in other professions. No one who watches events can fail to notice that the social problems in this country are becoming year by year more numerous, and press upon us with increased urgency. The solution of these problems is largely in the hands of scientific men, for they are in a great measure the guides, although not often the exponents, of public opinion which originates legislation. To satisfactorily grapple with these questions, a corresponding intelligence greater than exists at present is required amongst those with whom they have to deal. When education has effected this amongst the working classes, then, and not till then, will they appreciate the lessons which experience ought to have taught them, and which they at present refuse to learn at the hands of their true leaders—the better informed. Then we may expect to see more thrift, less

drunkenness, more industry, more reliance on self and less upon trade unions, a better feeling between the employed and the employers, and, as an outcome of this, a power to compete with foreign manufacture, a power which is now unhappily becoming weaker. If education is to do this for the working classes, we must take care that in the case of others it continues to improve, and I therefore rejoice at the advance which has been made in the direction of natural science as regards general education during the past few years. Much yet, however, remains to be done, and you will begin by and by to think that the average citizen who simply employs his time in gaining his livelihood, and providing a competence for his family, does not occupy a position which would satisfy your intellectual wants, and that with a little more education in natural science he might be a far more useful, and, at the same time, a more companionable, fellow-creature. To him, as he now too often appears, the composition or architecture of his body, the ordinary processes of life, are so many puzzles which remain unsolved until the time arrives when he will come to you to solve the last of all, Why he must die? If he travel through a new country, all forms of animal life and vegetation are to him only what they appear; they convey no lesson to his mind; he can examine them no further; they are barren of suggestion. The progress of the world he regards with stupid wonder. For all this he will, perhaps, endeavour to make you a convert to spiritualism, or condemn you to everlasting perdition because you do not profess faith in some dogma which he has been brought up to believe in. He looks upon the world (a brief period being allowed for its creation) as having existed for all time very much as now he sees it. You will forgive me if I venture to speak to you to-day, as possibly on some matters equally ignorant, but on the eve of enlightenment, and to say that you will learn to regard (if you do not already do so) the history of the world as including a series of epochs, each epoch extending over periods so countless that we have no language in which to express their vastness. Geologists have given a description of this earth of ours as it existed at some periods in which it has been the scene of long histories of races bearing little resemblance to those now existing. Physiologists tell us how they are able to trace all forms of life back to its original form, the primeval cell. How this cell imbibes nutriment from without till in dying it gives birth to other cells. How next a many-celled creature appears protruding its limbs which serve to move it, and to place food into an opening which it has now displayed for its reception. Amongst communities of such as these whilst development proceeds, the weaker becomes the prey of the stronger, the better specimens remaining, and the offspring of these attaining to higher forms of organisation.

What form these animals shall, in the future, assume, will depend absolutely upon the conditions under which they are forced to exist. So long as they remain in water, fishes will succeed fishes, but when, as will happen from currents and tides, that during some periods they are left on shores, creatures of an amphibious nature will be produced, and provided that conditions obtain under which the lives of these animals are spent on the land, their descendants will be found as beasts and birds. By degrees, imperceptibly to yourselves, you will be able to overcome the difficulties which present themselves to the unscientific mind of estimating the requisite periods for development of species, and the necessity for demonstrating the connecting links between species will not exist for you, for you will have familiarised yourselves with the inevitable death of these links, death which now as ever takes place in the struggle for existence between individuals of similar habits and form.

What, then, is the cause of variety in the earlier forms of life? The force of circumstances. Whence the propagation of each species? Inheritance. Why the higher development of species? The struggle for life and survival of the fittest. How the countless varieties? The pairing of individuals. One more question. Why, whilst some forms of animal life appear in constant progress, do others remain the same for so long? Because in the case of the latter the conditions under which they live do not change. In considerations of this sort lies the poetry of the physiologist. A companion picture to this, and none the less true to life, may be drawn of vegetation as it has existed from early periods up to the present. Let me ask you for a moment to reflect how fascinating is at once the idea of possessing an intimate acquaintance with these things, how engrossing must be the study of any portion of their history. What an enlarged view of life will he take who understands these matters so well that his knowledge becomes a very part of him. Side by side with the development of animal and vegetable life must be placed the development of mind. This you will find to begin with the first glimmering of consciousness in the lowest forms of life where it is conspicuous. And here let me pass over a period until the expiration of that in which we find an animal performing, in obedience to his previous experience, some act with a definite object; then the first ray of reason appears. Thus we soon find ourselves on the road which leads us gradually, but surely, to the development of the highest order of brain, whose habitat is man. If in having thus briefly touched upon the ability which science has to trace onwards the development of living tissue to the organisms we see around us, or from these again backwards to the lowest forms which exhibit life, I have omitted to refer to a first cause, it is because such reference would not be within my province.

An attempt to examine beyond the point at which life begins and where it terminates would lead us outside the boundaries of science to the regions of speculation, and perhaps into the unwholesome atmosphere of metaphysics. For us it is sufficient if, in reflecting upon the countless ages which must have been taken up for the development of that brain which enables us so to reflect, we can see how, in the words of Professor Tyndall, "amid all our speculative uncertainty there is one practical point as clear as the day—namely, that the brightness and usefulness of life, as well as its darkness and disaster, depend to a great extent upon our own use of this miraculous organ."

You will find that, as the laws which regulate the development of body and mind are unchanging, so are those which determine their degeneration by age and by disease up to the time of their death. Every bodily and mental change having a definite cause, it will be your duty to discover it. You cannot fail to observe how indestructible is all matter; nay, how undying are our very deeds, in that it is impossible for anything to be done by one of us without a result for good or bad, twofold in its nature; in the one case upon those around us, in the other upon ourselves. How even our words and thoughts are productive—in short, how, whether we will it or not, we are perforce effective in the influence which we leave upon those who come after us. When, once for all, we thoroughly appreciate this, how careful do we become of the manner in which we spend the time we have to live: how anxious to do the most good we can whilst we have the opportunity. Such opportunities you as medical men will have in a larger degree than perhaps you could have in any other position, for your lives will be spent in work which is eminently productive of good. If, however, I were to tell you that every man who has left the various hospitals in this town with a licence to practise was a benefit to society, I should be telling you what is not true. I believe that a large majority of these have been; but in this, as in all other professions, there will be found some bad mixed with the good. You will notice that I speak in the past tense, for I wish to be understood to say that the members of the undesirable minority are now very few, and, belonging rather to the past than the present, may be well consigned to oblivion. Their propagation is restricted, not only by the increasing standard of professional knowledge insisted upon by the examining bodies, but especially by the higher degree of preliminary education required by the Colleges of Physicians and Surgeons. It is a matter of congratulation that this is so, for the profession of medicine is in consequence taking a position which it could not do when it was possible for the uneducated and ignorant to become enrolled amongst its members (for undoubtedly it was so

until recently), and possible for them to be portrayed and caricatured with any semblance of truth (as they were) by the novelists of a past generation. If there is a danger in this bettered condition, it is lest the standard for admission into the profession should be placed too high by the examining bodies in subjects which have no direct bearing on practical matters. For it must be remembered that there are two distinct classes who pass through the hands of the examiners: there are those who will, as hospital physicians and surgeons, become teachers, and for these it is manifestly important that their knowledge, for example, of physiology and pathology, should be at the same time most extensive and minute; we know that whilst a considerable part of *their* future will be spent in scientific investigation, in the case of the greater number of candidates for a diploma such opportunities will not be present, and *their* time will be employed in the ordinary laborious duties of medical men in populous, and perhaps poor, districts. For such men, whose whole period of study includes about four years, their stock of information should be of as practical a nature as possible; and to require that they should be conversant with the most recent views of German physiologists and pathologists, of comparative anatomists and embryologists, is to encourage the expenditure of time spent in reading, which should be employed at the bedside of patients, and is likely to produce a race of book-taught doctors, who will be found incapable of treating an ordinary case of illness or injury. For the present, however, I, for one, am prepared to do justice to examiners in believing that they endeavour to demand proof of knowledge acquired by observation, rather than the elaborate statement of facts given in answer to their questions. I may now briefly say that the course of instruction in this school will be divided into two parts: the first, or groundwork, consisting of the sciences, which include anatomy, physiology, and chemistry; the subjects of the second being the study of diseases and injuries, and their treatment. The first will occupy some two or three years; the second, which commences after the first year, will extend over the remainder of your lives; for in regard to disease we are all students, the eldest no less than the youngest amongst us. It is sufficiently obvious that the latter portion of the subjects can never be completely mastered if the former be not thoroughly learned: but if I feel very lightly the importance of urging this necessity upon you, it is because you have joined a society where industry is the habit of the students—where, I am happy to say, the students as a body would compare favourably with the young men at any of the universities, not only as to diligence, but as to their general education and behaviour. Those whose memories will carry them back some twenty or thirty years will bear me out in saying

how much improved as a class are those who betake themselves to medicine for an occupation. And the causes to which I have alluded are mainly responsible for this change.

If your choice of a career in the future is very wide I would even have the choice made wider, if possible; and I take this occasion to direct attention to what I venture to regard as a mistake in the system of scientific education as pursued in this country. In the first place, it will be admitted that the faculty of teaching is possessed by some in a far greater degree than it is by others. How some teachers are able to render their subject interesting to the students was simply and eloquently referred to in the last Hunterian oration by an orator who was unconsciously not aware that he in his teaching adds a charm to anatomy such as I have never known surpassed. It was impossible for me to hear him without thinking of the way in which I, amongst many of us, have seen him give bright illustrations to facts connected with the bones and the parts before him in such a manner that their details became firmly impressed on the memory. In the second place, according to present arrangements, the teaching in anatomy and physiology is carried on by the physicians and surgeons attached to hospitals where such subjects form part of the course of instruction. When these teachers become engaged in private practice the largest part of their time is spent in attending to their patients at home and at the hospital. By and by surgery occupies the time that was given to anatomy, and physiology is forsaken for medicine. Now, if the teaching of physiology were made a business of itself, the professor would be able to spend his whole day in the physiological laboratory and the lecture theatre, giving demonstrations on the dead and living tissues, and, above all, devoting a portion of time to research. The professors could be selected at first from amongst the lecturers at our hospitals; they should be paid salaries sufficiently large to induce them to give up private practice, and to devote themselves exclusively to the subjects which they have to teach. They should have under them assistants and demonstrators, proportionately paid; these would in time succeed to the professorships. Thus, not only would the subjects be better taught, not only would science make better progress, but there would be an opening for those whose tastes lead them to the pursuit of science as an occupation, rather than to the practice of our profession as generally followed. I have chosen physiology as an example, since a plan similar to this has been eminently successful at Cambridge and elsewhere, but the same remarks would apply to anatomy, and perhaps to pathology. In chemistry such a necessity has been partially recognised. Two or three schools upon this principle with professors and an efficient staff of assistants,

would be enough for the requirements of London, and the students could, as before, pursue their clinical work at the hospital to which they have entered. It would not then be necessary for every one to become a student in medicine in order to obtain a good practical scientific education. You will perceive that I value this very highly, for it is one in which the student learns facts for himself. In every system of education in which natural science forms no part of it, whatever knowledge the pupil gains is acquired from what he reads or from what he is told, and the truth of facts so presented to him he must take either upon trust or, in so far as they can be demonstrated to his reason, by logic or mathematics. In the study of natural science, on the other hand, he sees, he feels, he hears the same fact repeated again and again under the same conditions; and his informant is Nature—Nature, who never errs. Which is the better mode of acquiring information? Which information is the more likely to be true, to be the more worthy of trust, and safer to be acted upon? These questions need no reply. We shall all agree that one of the most important elements in education is English literature, and certainly in this department history must be included as not the least useful and delightful. But consider for a moment how entirely different, as a force in mental culture, is the information acquired by learning anything in science or in history. Take for example, the character, or even the acts, of Mary Stuart. Although the events in her life occurred only some 300 years ago, I dare say I could find amongst the students I am addressing as much difference of belief in many of her recorded actions, and certainly of opinion in regard to her character, as on any subject I could raise. To do this it would only be necessary to select a student fresh from the reading of Mr. Froude's history, and another who had derived his impressions from earlier histories, and had not laid aside the romance with which Scott's novels have surrounded this queen. Mr. Froude's references to existing documents may be sufficient to induce me to receive his facts for purposes of history, but accept his accounts as much as I will my belief is of a very faint sort if I compare it with anything I have seen for myself. Viewed in the light of actual knowledge the facts derived in the two ways have a different kind of value to me, both no doubt good in themselves, but still widely apart. With all due respect to the authorities at our old universities, I cannot but think that the time will come when the elements of physiology and chemistry will be considered as valuable a method of mental training as the production of what are fancifully termed Latin verses, as the study of the traditional records of Jewish history, or the learning by heart of sentences from Paley's Evidences. In the work which you now propose to undertake you will require

no one's evidences but those of your own senses, and any statement from your teachers you will be able to subject to such tests. In whatever degree you do this your studies will be useful; when once you omit this they will be feeble and barren in their results. When you read or are told that an artery pulsates, that it is composed of so many coats, each possessing peculiar properties and uses, you will see and feel the artery to beat, you will examine its coats, you will see their properties exemplified in life, in death, in health, and in disease: in health when it is divided by the knife, or tied to arrest hæmorrhage; in disease when it is the seat of aneurism and other changes. Of what service would it be to you to read of all this? You would be better almost without such miserably insufficient information. Besides, what you read may not be true; you will decide for yourselves whether it is or not. If you wish to see the result of an education which makes a man arrive at an opinion accurately, act boldly, display manual dexterity, and effect good results, you may see it in any of the surgeons whilst deligating an artery to cure an aneurism. Again, supposing you to have made yourselves acquainted with the most complete account of typhoid fever, and simply to have supplemented what you have so learned by looking at any number of cases, and hearing what others have to say upon them. Until you have tested for yourselves the truth of all that you have heard or read about the disease, your knowledge would be worse than useless, for you might fancy that you know something about it, and, armed with such conceit, have the effrontery to take charge of a patient so suffering. When you have seen patients every day from the beginning to the end of the fever, have taken the temperature of their bodies and noted its variations, become so familiar with their pulses that you recognise the period at which it may be necessary to administer stimulants, examined the excretions, watched the changes in symptoms, noted the effects of treatment, observed every detail in diet and nursing, made yourselves acquainted with the affections which the fever leaves behind, witnessed the modes of death with patients who do not recover, examined the post-mortem changes in those who die from it, and, lastly (most important of all) have discovered the source from whence the fever arose,—if you have done all these things, your knowledge of the subject will be real, and you will have learned that though books have their uses, they should in science and medicine be only used for the purpose of directing attention to what is to be looked for, and as a means of comparing the observations of others with your own. Thus far, then, books may be relied upon and no farther. If this be so, the very essence and goodness of a scientific education is lost when a student endeavours to pass his examinations by learning from text-books what he should have taught himself by

observation, and from pictures what he should have learned from realities. Those whose information is so gained have seized the shadow instead of the substance, and their work will for ever bear the marks of their indifferent education.

The results of the two different modes of acquiring knowledge will be seen in the different classes of practitioners which they respectively produce. In the first order is the physician who intelligently studies physiology, who recognises in pathology what I would for the moment call an eccentric physiology; who says to himself when contemplating disease, "I here see such and such organs of the body out of order, such and such functions imperfectly performed; let me try to place these organs at rest, so that they may recover themselves (where recovery is possible) and perform, perhaps, in time their functions as heretofore;" who appreciates that in pneumonia the tendency is towards recovery when not interfered with, if the patient's strength is so supported that he can tide over the period during which the lung recovers itself; who sees in typhoid fever the same necessity for support, with the additional one of resting the intestine until the ulceration has time to heal; who, in the case of diseased kidneys, rests these organs by putting their work on to other organs, such as the skin and intestines, and allows no food which requires the special exercise of the kidneys for purposes of elimination. Similar management with other diseased organs. Here knowledge of physiology precedes knowledge of disease, and disease means to this physician disordered physiology. How different from the meddlesome apothecary of not long ago—never easy without he was pouring his medicines into his patient every few hours, having for every symptom a fresh drug which added to his patient's difficulties, and for every pain some outward application which increased his discomfort. Now, his modern counterpart is he who has learned chiefly from books and untrained observation what he knows of disease; for, please notice, that constantly seeing patients by no means implies that the faculty of accurately observing has been attained, and if this faculty is not acquired by a man early in life he will blunder on into old age. Such an one does much the same as his predecessor in a milder way when his first consideration takes the form of the inquiry, What is a good medicine for this, and what for that? He knows what will cure something or other, and so prescribes it. So well is what I am saying beginning to be understood that the very expression "cure," unless applied with a special meaning as to an aneurism, a hernia, or the like, has become almost offensive, and will ere long be used only by the ignorant and pretentious. The physician does not pretend to cure his patients; he places them in the conditions most favourable to recovery, and is thus often the

means of averting death and conducting them to health. You must not think that I am underrating the value of medicines; a large number of drugs we know well to be most useful and often necessaries in the treatment of disease, but the practice of ordering medicines to every patient who applies for relief is no longer the practice of physicians, although, perhaps, it may be followed by those who would on occasions be the last to resort to it, if they had the courage of their opinions. But pathology is better understood than it was a few years since, and with a more complete knowledge of morbid processes has come a corresponding knowledge of the frequent inability of drugs to control them; add to this that with a fairly intelligent patient, the man who possesses an intimate acquaintance with the morbid change which produces the symptoms, has the power of explaining his disease to him, and so successfully insisting upon the requisite conditions for treatment, irrespective sometimes of little, if any, assistance from drugs,—such a knowledge cannot be attained without a thorough scientific training, and I could multiply examples where this kind of education is as useful as it is to the physician.

At the risk of being tedious, I cannot help repeating that the mental training which encourages the habit of careful observation, of accumulating facts, the reality and truth of which are tested by experiment, which sweeps away opinions based upon imperfect premises, which succeeds in leaving upon its pupil a profound regard for accuracy in all his work, must be a valuable addition to any course of education,—an addition, for I should be sorry to urge that it was a complete substitute for any branch of knowledge except it be philosophy and metaphysics. How science has superseded philosophy was well told by George Henry Lewes when he wrote: "The method of verification, let us never forget, is the one grand characteristic distinguishing science from philosophy, modern inquiry from ancient inquiry. The proof is with us the great object of solicitude; we demand certainty, and as the course of human evolution shows certainty to be attainable on no other method than the one followed by science, the condemnation of metaphysics is inevitable. Philosophy was the great initiator of science: it rescued the nobler part of man from the dominion of brutish apathy and helpless ignorance, nourished his mind with mighty impulses, exercised it in magnificent efforts, gave him the unslaked, unslakeable thirst for knowledge which has dignified his life, and enabled him to multiply tenfold his existence and his happiness. Having done this, its part is played; our interest in it is purely historical."

I have only to add to what I have said that if your choice of a profession should be the means of your acquiring the character of mind which in my imperfect way I have endeavoured to describe, you may

indeed consider yourselves happy in your selection. I would rather say this than congratulate you on having joined what has sometimes been vulgarly described as a noble profession. Productive work of all sorts is good, and whether it be done in the pursuit of science, in the advancement of art, in the practice at the Bar, in the duties of the Church, in the gallant defence of one's country, the man ennobles his profession or makes it ignoble by the way in which he pursues it. It is for us to make such an eulogy possible, and to await the verdict from without rather than pronounce it upon ourselves. I feel how incompletely I have expressed what I have wished to say, how differently the subject might have been treated by a more able lecturer than myself; but the very writing of this short address has served to bring more forcibly to my mind, if possible, that the value of all education should be measured, not by the power which it gives of achieving what is commonly called success, but by the influence which it lends to any sort of work a man may do, by its secondary influence upon all with whom he may be brought in contact; lastly and chiefly, by its effects on his thoughts and happiness. Surely on such things more often than on circumstances depends the amount of satisfaction which we can extract from our lives. Let me ask you then not to look on your studies as merely the means of qualifying yourselves for your profession. Let them be pursued for their own worth, and that the truths which they cannot fail to give may be yours. You will then be something more than successful; you will be good men and true.

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