

The influence of the microscope upon the progressive advance of medicine : an address delivered at the opening of the session 1859-60, at the Liverpool Royal Infirmary School of Medicine / by Cuthbert Collingwood.

Contributors

Collingwood, Cuthbert, 1826-1908.
Royal College of Surgeons of England

Publication/Creation

Liverpool : Printed by Henry Greenwood, 1859.

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CUTHBERT COLLING

MEMBER OF THE ROYAL
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UPON THE
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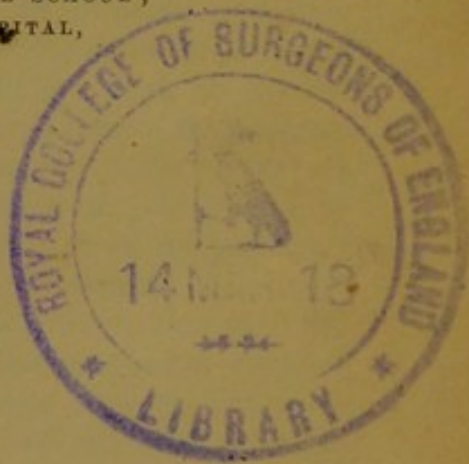
CUTHBERT COLLINGWOOD, M.A., M.B. OXON., F.L.S.

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&c. &c. &c.



LIVERPOOL:

PRINTED BY HENRY GREENWOOD, 32, CASTLE STREET.

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1859.

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ADDRESS, &c.

GENTLEMEN,

THE first of October is a *white day* in the annals of medical education. On this day are assembled throughout the country the students of the numerous medical schools, to inaugurate a new session, and to give an earnest of the zest and diligence with which they intend to resume its duties. On this day the working practitioner throws aside for an hour the cares of his busy profession, for the pleasure of meeting his old student-friend upon the familiar benches, and delights to recal his long past student-life by an agreeable intercourse with his former *confères*. And on this day, also, the new student, fresh from the discipline of school, stands for the first time in a position which is at once a novel and an exciting one. He finds himself suddenly thrown into the society of those who, since they are no longer boys, feel that they have serious work before them; and being men, are determined to meet it in a manly spirit.

On this day, too, it falls to my lot, as the representative of the Liverpool School of Medicine, to address you. It is at once a difficult task and an agreeable privilege: for it is a privilege to have it in one's power officially to hold the attention of an intelligent auditory, composed, as this is, of experienced colleagues, of diligent and discriminating students, and of novices thirsting for information. I say it is an agreeable privilege, to be able to stand before such an assemblage even for one short hour—but it is at the same time a task whose difficulty I can well appreciate. An Introductory Address is no novelty—many of you have heard a dozen—some of you have had experience of the difficulty of selecting a subject, or of saying anything which has not been said a score of times upon similar occasions. The path before me is a thoroughly beaten one; worn bare by the feet of hundreds of previous travellers. No fertile patches of verdure do I perceive in the vista before me—no wayside flowers but have been culled by those who have preceded me. And yet I think I can perceive paths which, although they may slightly diverge, lead nevertheless, eventually, to the same goal.

The very fact that his audience is composed of such extremely diverse elements, is one of the chief difficulties which beset the writer of an Introductory Address. Were there none but young students, eager to commence their studies, and expecting some information

which may serve them as a guide in the prosecution of them, the case would be different; but there are, in addition, tried practitioners, whose student-life dates ten or twenty years back, and who can hardly be expected to sit with patience and listen to the good advice of which the tyro stands in need. It will be necessary for me, therefore, to meet the exigencies of the case in such a manner as that, while the one shall not feel that his cause is neglected, the other shall not have reason to consider his valuable time to be wasted.

Let my earliest observations, then, be directed to those students who, on this day, enter for the first time within the walls of the medical school. Of such I would fain believe that they do so, probably without exception, in a hopeful, in a willing, and in a determined spirit. They do not come here at a day's notice, for they have probably well weighed the question of their future profession; and circumstances, or their own bias, or perhaps both combined, have led them to the choice of Medicine. Neither are they altogether unprepared, for although upon the very threshold of the Esculapian temple, it is possible that they have made themselves to a certain extent acquainted with the nature of the studies which lie before them, though they can have but indistinct and inadequate impressions of the extreme interest which surrounds each one of them. In entering upon a new undertaking of this nature, there is a degree of healthy excitement produced, which serves to stimulate the student and to encourage him to throw himself heartily into the work before him without loss of time; and there is also a degree of freshness of thought—a youth of intellect, as it were, which renders the mind susceptible of being favourably impressed by the varied studies upon which he is entering. Novelty is always pleasing, and especially so when combined with an intrinsic charm, such as is possessed by the Sciences cognate to Medicine. Such an exhilaration of the mental faculties, therefore, being highly advantageous in the outset for the prosecution of studies so diverse and so abstruse as those which constitute the medical curriculum, it is no less important that it should be sustained as much and as long as possible—that the attention should not be permitted to flag, nor the freshness to be worn off by the reactionary attacks of indolence which are but too likely to ensue.

The thoughtful student comes to his task stimulated by example and armed with hope. He sees men filling various high and responsible stations in life—men who are regarded by their contemporaries with esteem, and even with veneration—men who have enriched science with the development of their intellect—men who have advanced their art by the philosophic application of their long experience—he sees these men, on the one hand, illuminating the brilliant intellectual circle in which they move; and on the other, imparting their stores of knowledge to eager disciples; and he knows that these were once, like himself, listeners—that they, like himself, were once hopeful beginners—that their advantages were not greater than those which he possesses—and that by diligence and integrity he may aspire one day to occupy a position inferior to none of them. With this thought

in view, he has a powerful inducement to *work*, not by fits and starts, nor yet unduly, but steadily and perseveringly, with the full assurance that no man ever won his way to an enduring and enviable reputation who did not earn it by close application and the conscientious performance of his daily duties.

These duties, Gentlemen, in the course which you have chosen, are devoid of glitter and of extrinsic attraction, but they are far from possessing monotony or sameness. You might in other professions have found more opportunity for the exercise of superficial qualities and ornamental accomplishments; but you would have met with none which offered such scope for profound investigation, or for the successful cultivation of which such a combination of mental qualities is desirable.

Yes, Gentlemen, I commend your choice—it is a noble one, and Medicine is a noble Profession, so long as its professors are united in brotherly concord—so long as its aim is single—and so long as petty jealousies and envious bickerings do not disturb the harmonious tendencies of the healing art, and the philosophic calm which should spread its influence over the earnest searcher after Truth in Nature. For what is the profession of Medicine, but first, an inquiry into the abstrusest natural phenomena; and secondly, the application of the principles thus arrived at to the alleviation of human suffering, and the smoothing of the pillow of death! For the first, it is the highest exercise of the functions with which the Creator has endowed reasoning Man, to search out the springs of the Divine Mind, and to reconstruct, as it were, the Divine will from the glimpses which are afforded us of the government of the material world. The masterpieces of Creation can only fully declare the ineffable glory of the Creator, when they are submitted to the investigation and analysis of reasoning minds—for it is then alone that an insight is gained into the causes of things—it is then alone that a reflection is obtained of the Divine wisdom and beneficence. And of all the secular studies which exalt the intellect by assimilating it to the mind of God, the study of the ultimate laws which govern organized bodies is at once the highest and the most ennobling. What can be a more elevating study than that which teaches us how fearfully and how wonderfully we are made—and how complex a mechanism it is which carries on the mysterious functions of life? What a more awful profession than that which brings us into daily contact with Death?

But the votary of Medicine must not expect to draw upon himself the notice of the world at large. The *éclat* which accompanies the destruction of an host cannot be expected to follow the silent working of the good Samaritan. Self-denial must constitute a prominent feature of the medical character. Content to inure himself to sights of suffering and sounds of grief, he must find his reward in the conscious performance of his duty, and in the knowledge that no class of men have greater power of doing good than the medical profession. It is essentially domestic—essentially benevolent—and offers scope for the exercise of many of the finest feelings which adorn our human

nature. And although a few narrow minds may affect to underrate the services rendered by our profession to mankind at large, still we may rest assured, that in all ages a due estimate has been, and will be formed, of the value of our Art—"an Art so much sought after," says Cicero in the *Tusculan Disputations*, "that the invention of it, as being so useful, is ascribed to the immortal Gods."

Having then once given himself heartily to the preparation for his professional career, the student need not fear that his interest will be allowed to flag, or his willingness to work have just cause for diminution. Let him only keep up his attention, and each successive phase of his studies will but appetize him, as it were, for the reception of fresh mental food, and stimulate him to advance, step by step, with energy and with advantage. It does occasionally happen, that a taste for the medical sciences, combined with an industrious turn of mind, has led to a too great devotion to them, to the detriment of what is equally necessary to be attended to, namely—*health*; for such is the fascination which knowledge has for some minds, that every thing else is lost sight of in the race for its acquisition—an abuse to which the greatest and best things are unhappily liable. But it is less necessary to insist upon this point than on its converse. While one student neglects his health for his studies, a dozen are too apt to neglect their studies for the sake of any present pleasure which may allure them, not recollecting that study is the business of their life at that period, just as commerce, or practice, is the business of life of the more matured individual. The student would perhaps be foremost to blame the practitioner if the latter neglected his daily avocations; but it is a most illogical conclusion, if the student imagine that he has any more right to neglect *his* opportunities than the practitioner his duties; they are both equally incumbent upon them—they are both the appointed business of their respective periods of life.

But it will be far more difficult for one who has comparatively little interest in his pursuits—I would not say *to excel* in them, for that were next to impossible—but to follow them with advantage, and upon equal terms with those whose heart is in their work. It too often happens in our profession, and indeed in *all* professions, that the student discovers, too late, that he has mistaken his vocation. If this should happen, and he cannot retrace his steps, I would recommend to him the advice which Lord Bacon gives in his essay *Of Nature in Men*—"In studies, whatsoever a man *commandeth* upon himself, let him set hours for it." It will require no small amount of self-discipline for such an one, even when aided by principle, to keep his place in the ranks with those who pursue their studies *con amore*. But I would have no one voluntarily bind himself to a profession in which he takes no interest; for by so doing, he condemns himself to a life of vexation and disappointment, while it is not possible that the profession itself can derive any benefit from his presence in it.

It must not be imagined, however, that even moderate diligence and application will carry the student forward in his career with such an impetus, that he shall ever feel himself upon the crest of an advancing

wave. It is not in the nature of things, nor, if we knew what was for our advantage, would it be desirable. The apothegm of Ennius, *nimum boni est, cui nihil est mali*, "nothing is really good which has no admixture of evil," although disputed by the ancient philosophers, will be accepted by us, as containing germs of Truth; and nothing can be better established than the fact that too great facility is apt to beget a careless ease, and all the train of disadvantages flowing therefrom. How often do we see a promising career blasted, and turned to gall and bitterness, by a neglect of talents which only required ordinary cultivation to render them pre-eminent: how frequently does it happen that too great dependence upon natural powers has made shipwreck of the prospects of one, who, but for this fatal facility, might have surpassed all his fellows? It is perhaps, then, a fortunate circumstance, and it certainly is one of those compensating circumstances which we see everywhere around us, that indolence and satiety are likely to arise but rarely from this cause. It is, I say, a circumstance by no means to be regretted, that the earnest student is not always advancing with an equal rapidity, nor always elated with success. Difficulties and temptations will beset his path, but their effect will be, not to discourage him, nor to cause him to abandon the career to which he has once applied himself—such a result would be but a poor comment upon his former earnestness and application. No! difficulties must be met by manly resistance, not by pusillanimous retreat. Nothing is worth acquiring which does not cost something in the acquisition, and the greater the difficulty, provided it is not insuperable, which few difficulties are, the greater is the value of the victory achieved over it. The difficulties and temptations, therefore, which meet the student will not arrest his career, but will only act as a healthy stimulus to his powers—will only arm him with determination to go forward, and will only serve, therefore, to ensure his final achievement, and to enhance the value of success.

Among the difficulties which the medical student discovers in an early stage of his career, is that arising from the number and variety of the studies he has to pursue. Let us suppose that he starts with a resolute determination to work hard at Anatomy—it is an excellent resolve, but he soon finds that the subject is extensive, and that the facts easily escape his memory; that this alone, indeed, is a subject which itself might lay claim to a large portion of his time. But there are others with no less pressing claims—Physiology calls for his attention, Chemistry must not be neglected, Medicine, Surgery, Materia Medica, Botany, and other subjects present themselves in rapid succession before his notice, so that in the multiplicity of his studies he begins to feel perplexity—while one is learnt another is forgotten; he may become temporarily discouraged, and perhaps feel something akin to despair, as the wide field of medical science gradually unfolds itself before him.

The remedy for this difficulty evidently is to be looked for in a methodical arrangement. The time should be duly apportioned to each subject, and the student should make it a matter of duty that

the rules which he lays down for self-guidance should be conscientiously adhered to. Without this, of course, it would be folly to expect any benefit to accrue. Studies, like other things, become habits when persevered in, and studious habits, like business habits, when once acquired will be found of the utmost value. By the adoption of this method, the student will himself be surprised at the steadiness and rapidity of his progress. The University of London has recognized the difficulty arising from this multiplicity of subjects, which (although in turn it is necessary that they should all be mastered) yet without doubt, overload the brain during the brief period of the curriculum, and more particularly as the time of examination draws nigh. By the division of these subjects, however, into two parts, each of which forms the material for an examination, separated by an interval of two years, the student has the opportunity of giving especial attention to certain of his studies unclogged by others, and having been examined in these, he may, to a great extent, divest his mind of an immediate attention to their details, while he is devoting himself more particularly to the *second* class of subjects, which arise more or less out of the first. This is an advantage which cannot be overrated, and an example which I should be glad to see carried into practice by other examining boards.

But there is also another mode in which this difficulty may be at least diminished — a mode which has the double advantage of costing nothing, and being within the reach of every one. I refer to *early-rising*, a habit which nearly all those men who have achieved greatness, have found not only serviceable, but necessary. By rising an hour or two hours before the accustomed time, the day is lengthened, work is facilitated, and a satisfaction is experienced throughout the day which those alone can judge of who have made the trial. One-third of a man's life, on an average, is spent in sleep; and how much more even do some devote to the dreamy pleasures of the placid Morpheus. There can be no doubt that the majority of persons sacrifice far more time than is necessary to this part of — I cannot say their *economy*, for its excess is evident *waste*; nor can I call it their existence, for it is but the shadow of Life. Early-rising soon becomes habitual, and I doubt not that those who imagine that they require more sleep than others, are, in general, egregiously deceiving themselves. The great Boerhaave was in the habit of rising at four o'clock during the summer, and at five during the winter, devoting to study the early hours thus saved, and gaining that health and vigour which enabled him to carry on this practice until his death, at the appointed age of three score years and ten. Consider only, that rising two hours earlier, or at six instead of eight, will, at the year's end, have increased your waking life by as much as two calendar months of twelve hours to the day! Such a simple calculation makes one ashamed of opportunities lost, and of precious time wasted. Let it also produce a determination to profit by it for the future.

The medical student is doubtless exposed to peculiar temptations, which will at once occur to the thoughtful among them, and will be

jealously guarded against. It is not my intention to dwell particularly upon those temptations to swerve from morality, from which all right-minded and earnest young men will recoil with loathing, but I would only remind you, that success in professional life is not alone to be won by that confidence which expertness and readiness are capable of supplying — there are yet important qualities to be taken into consideration, which are as essential even as professional capacity and medical knowledge. No one, perhaps, is admitted so freely into personal or family confidence as the medical adviser, and to no one will persons become more attached than to the medical man who has won their confidence and their esteem, for the one cannot be had without the other. The social position which the Doctor occupies is a proud one, and no right-minded man but will, by the punctilious performance of social duties, and the blamelessness of his life, strive to render himself worthy of the sacred confidence which many delight to repose in him. There is, however, one temptation peculiar to students, of a nature rarely dwelt upon, but which I think deserving of especial notice. It is a very general custom at the present time to offer *prizes* in the various departments, in order to stimulate the student, by means of honourable rewards, to outstrip his companions in the fair contest for mental supremacy. I think, on the whole, that such prizes are useful, and that they *do* offer something tangible, which the student considers worth striving for; and I further believe that a stimulus of this kind is, in general, of a healthy nature. But I am persuaded no less, that this system is liable to a great abuse, owing to the prevalence of the feeling that a single prize will confer more distinction than a general sound acquaintance with *all* the subjects studied; and to obtain this single prize, it certainly does sometimes happen that every thing else is neglected and thrust into the background. Now this is not the spirit in which prizes should be striven for, nor is it the spirit in which prizes should be awarded. A prize is not for one who, though he may be a proficient in a particular subject, is a dunce in every other, but rather should be given to that one who having a satisfactory and sufficient knowledge of all, at the same time excels the rest of his fellow students in one or more. This should be a *sine quâ non* in the adjudication of prizes — and it is the neglect of the first part of this proposition which not unfrequently develops a prize-taking boy or student into an ordinary and mediocre individual. Diffuseness, or the study of numerous subjects at one time, is a thing to be avoided in after life, or at all events should be severely regulated by the broadness of the educational basis. Scarce any man who has made for himself a name in science, or in art, but has devoted himself more particularly to a certain branch of human knowledge, towards which he naturally leaned, and which he has patiently and thoroughly investigated; for so wide is the domain of Nature, and so short is human life, that any one department affords ample material for thought and for discovery, which a life-time is not sufficient to exhaust. But with the student it is widely different. *He* is laying a foundation for the future. *His* education is not the end, but the means — and the broader, the firmer

the foundation, the nobler, the more extended the superstructure which he will be enabled to raise upon it with safety. The sciences which relate to Medicine, and upon which a true estimate of disease and the means of cure are founded, are, it is true, not few nor insignificant; no student can be expected to master them all in their details, but nevertheless, there is an absolute necessity for obtaining as deep an insight into them as the opportunities of student-life will afford. They are so knit together, that neglect of one may paralyze the functions of another, and in applying his knowledge to practice, the consequences of this neglect, too late perhaps, become painfully apparent. Nothing which enters into the curriculum of study should be neglected—every thing is worth knowing, and although some things are at the very basis, and form the very groundwork of medical knowledge, still no opportunity should be lost of acquiring information—still less should any one make to himself the excuse for neglect, that the subject before him has not a practical bearing, and that the aim of it is not at once perceived.

But although none of the sciences bearing upon Medicine can with safety be neglected, it does not follow that every one of them is to claim an equal amount of time and attention. Without entering into a comparison of them all, it will be sufficient to single out one, as above all the most important, and the most deserving of extra-diligence, inasmuch as it forms the *pivot* upon which all the rest turn. I refer, of course, to Anatomy—the key-stone of the Asclepian arch—the alpha and omega of medical and surgical science—and without which all is empiricism and guess-work. Who would attempt to repair a piece of machinery unless he possessed a knowledge of mechanics? What watchmaker would think of employing, as an assistant, one ignorant of lever and escapement? And yet the human body is more complex than the most intricate machinery—more wondrous than the most delicate watchwork. It cannot be too often impressed upon the student, nor in terms too strongly marked, that Anatomy is the groundwork of safe and scientific practice, and that it is to the development of our knowledge of *it*, and of its sister science, Physiology, that we must look for the levers which must work the progressive advance of scientific medicine. Only let me give one caution—and let it not be considered as an over-refinement, or a superfluity of delicacy. The atmosphere of the dissecting-room—the constant contact with dead humanity—is liable to beget callousness of feeling, and, I think I may add, coarseness of sentiment, which, to say the least, is extremely undesirable in a class of persons whose finer sensibilities are so often called into requisition. The dignity of the human body is entirely lost sight of in its corruption and degradation; and unless a high standard of feeling and principle support the student, he is apt, from too frequent familiarity with lifeless humanity, to scoff at death and make a jest of mortality. The body which has “shuffled off this mortal coil,” is not merely a mass of inanimate clay—were it only that it is a most curious and inimitable machine, ever revealing to his scalpel, as Harvey said, some new proof of God's wonder-working hand, there

would be cause to admire it; but since it is, we are assured, only awaiting the summons to put on immortality — corrupt, that it may be rendered hereafter incorruptible — degraded, that it may be hereafter perfected — a foreshadowing of the appointed state of all of *us* — these considerations should check the levity of the thoughtless student, and cause him to leave the half-formed jest unsaid, and turn his coarse ribaldry into reverential respect.

I have just referred to the value of Anatomy as a branch of special medical education, and, more briefly, to the importance of its hand-maid, Physiology; and in the following remarks my aim will be more fully to illustrate this subject, by endeavouring to point out that it is to these two sciences that we must look for the advance of Medicine from empiricism to rational principles — and how the more recent discoveries in Physiology promote this desirable end, by affording us palpable and established data, upon which we may safely found modes of practice with the reasonable hope of successfully combating disease. “Physiology,” says Wolff, in his “Theory of Generation,” “is related to Anatomy precisely as the corollary is related to the theorem from which it is deduced;” — and this being the case, it follows that a most minute and careful study of *structure* must ever precede and pave the way for any theory of *function*. And let it not be imagined by any one that this stepping-stone is safely and permanently laid down. The anatomy of the larger organs has, it is true, been long since satisfactorily ascertained; but the anatomy of *tissues*, which in the aggregate perform the most important functions of the economy, requires patient research — an eye accustomed to use the higher powers of the microscope — a hand to which the delicate scalpel is a familiar instrument — and a judgment not easily carried away by phantasies, but able to weigh cautiously the evidence of fallacious senses. This being the case, it is evident that *the study of ultimate structure* presents a no less inexhaustible field of investigation than that afforded by other natural sciences, and that therefore the knowledge of *function* must ever be limited by *its* boundaries.

In all physiological investigations we may set aside *vital force* as an ultimate fact, which may be taken for granted as acting in all organic changes. The physicist does not feel called upon to explain the *cause* of gravity, but only to elucidate the mathematical laws through which it acts — neither should the physiologist be too eager to grapple with an ultimate fact, which if it ever be fully comprehended at all, must be so as the result of a far higher generalization than he is yet in a position to make. But herein, as appears to me, lies the error of physiologists, that they, at the very outset, make an attack upon that most mysterious and impregnable position, from which they must necessarily fall back discomfited, like the moth which flutters round the bright and flaming candle. The nature of vital force is doubtless the most interesting problem in physiology — attractive from its very mystery — a problem which, like the philosopher’s-stone, is destined to occupy the thoughts of, and to serve as food for speculation to

many a master-mind; but its solution cannot be expected until many a yet unexplained fact be bridged over by a scientific induction, and many a missing link of the Titanian chain be painfully forged in the furnace of profound thought and patient philosophical investigation.

There is no direction in which Physiology has made such rapid and interesting advances as in the elucidation of the developmental changes which occur in organized beings. This branch of biology has risen into a distinct science, under the name of Embryology; and that evidently, because the high value of the lessons taught by the various stages of development is now fully recognized and appreciated; and observers have multiplied in a field which promises such a rich harvest of new facts and deeply interesting problems. The whole process abounds in suggestive points, which are throwing considerable light upon our knowledge of function; and inasmuch as the history of development, as Von Baer remarks, is "the history of a gradually increasing differentiation of that which was at first homogeneous," the progressive rise and comparative succession of the various organs, afford indices of the highest value as applied to the elucidation of the functions of the matured parts. In fact, the study of *development* is auxiliary to the study of *function*, just as the study of Comparative Anatomy, by pointing out the order of evolution of special organs, from which their comparative value in the economy may be safely deduced, is a valuable aid to the same important end. Any theory therefore, which runs counter to the information afforded by embryology may be regarded as spurious and unfounded—just as though it were not borne out by a comparative examination of the structure of inferior animals. Thus it was long held that the liver was the "sole source and prime mover of all vital organization"—a doctrine disproved by the subordinate value which that organ assumes in the development of the chick, in which its appearance is preceded by others which are of greater importance, as the heart, cerebral cells, &c.

It is to the Microscope that we are indebted for the basis of these generalizations; an instrument which has contributed vastly—and will contribute yet more—to the advance of physiological science. The imperfect apparatus in the hands of Leuwenhoeck and Swammerdam afforded revelations which astonished the scientific world two centuries ago; and the careful labour which has been expended in recent times upon the construction of achromatic lenses, has placed the histological knowledge of our own day upon a basis as firm as that which supports our knowledge of general Anatomy. It is only, however, within the last ten years, that that perfection of definition and illumination have been attained, which render the microscope the most powerful auxiliary in anatomical analysis; and it is scarce twenty years since the science of Embryology began its existence—a bantling of the Microscope;—a marvellous instance of the rapidity of development which characterizes the arts and sciences in our own age—surpassed by no bygone era in human history.

No *laudator temporis acti* can venture, in our day, to compare it with the past, having any hope of success—for the greatest nations

of Antiquity must hide their diminished heads before the progress of the present century. Assyrian tyranny may have fostered early science — Egyptian priestcraft may have been instrumental in developing the mechanical Arts — Greek heroism may have extended regions of philosophical speculation — and the fine arts may have found their grand climacteric in the luxury of Rome — but it was ordained for our country, in the nineteenth century, to create more “wonders of the world” than the ancients spread over a hundred Olympiads, and to win in half a century more trophies of science and art — in geology — in organic chemistry — in photography — in steam locomotion — in naval architecture, and in the electric telegraph — than all the nations of antiquity produced in the four thousand years which preceded the birth of Christ. We may contemplate with reverence the ruins of Thebes — we may recur in spirit to the days when the Parthenon was a magnificent edifice, resplendent with the freshness of its pristine beauty — or we may carry our thoughts back with admiration to the Augustan age of philosophy and letters — but I maintain that this present era, in which we live, is the most wondrous age which the human race has yet beheld, wherein the arts and sciences are every year applied to some new and stupendous undertaking, the conception of which, a century ago, would have been ranked with the wildest fables of the “Arabian Nights” — when *new* arts and *new* sciences are almost annually springing up, full-grown, as it were, from the practical application and correlation of the vast stores of human knowledge, which are garnered up, not alone in books, but also in the active brains of the brightest intellectual ornaments which have adorned any age or country.

But this is a digression, into which I have been led by a consideration of the rapid strides which one important science has made through the improvements which have taken place in the construction of Microscopes — illustrating the interdependence of the physical sciences, and the close connection which exists between the labours of the physicist and the natural historian. The conclusions to which the study of embryology in the lower forms of life has led, are among the most unlooked for, and the most startling, even to the physiologist; and under the various terms alternate generations — parthenogenesis — agamogenesis, &c., are included a series of phenomena which demonstrate the proverb, that “Truth is stranger than fiction.” It might perhaps at first sight appear that these phenomena can have no practical bearing upon our profession; and yet certain facts included in the term alternate generations, are of the highest interest in a pathological point of view. For example, it is now well ascertained that the intestinal worms pass through their various changes in more than one animal — that each developmental stage of these Entozoa requires a special nidus, which, in some cases at least, it finds in a different animal from that which finally perfects it. Thus the *Tænia caninus* which infests the intestines of the dog, has been identified by Küchenmeister as only a more perfect form of the

Cœnurus cerebralis, whose nidus is in the brain of the sheep; and what interests the practitioner even more, is the fact, that it has been made the subject of proof, by direct experiment, by the same eminent helminthologist, that the *Cysticercus cellulosæ* which infests the pig or the sheep, becomes, when transferred to the duodenum of man, the troublesome *Tænia solium* (or tape-worm)—a fact, which, while it strikes at the root of the old theories of equivocal generation, serves to show that it is not always by the most direct paths that we must search for explanations of physiological phenomena; and at once suggests preventive measures against the attack or recurrence of the disease. Other cystic Entozoa appear to be developed in the same remarkable manner—and the extreme diversity of the metamorphic forms of identical animals, hitherto regarded as distinct, points to the strong probability that the number of species of the lower or protozoic forms of life, at all events, may be very materially diminished by the continuance of such investigations.

The aspect of practical medicine has undergone considerable change of late years, as careful examinations have been instituted into the modes in which the ultimate structures of the organized body perform their functions of nutrition, secretion, and elimination. It is in these inquiries that the Microscope also has been of essential value; for without it, not a step could have been taken, except in darkness and doubt. Physiological chemistry has also afforded the most useful collateral aid—demonstrating that a proper combination of albuminous and fatty principles is absolutely necessary to healthy nutrition—and that, with these, a due admixture of mineral substances must not be neglected. The enunciation of this great principle was a step which indicated a vast advance in the groundwork for a rational method of the treatment of disease by dietetic rules; and while it could be applied to the explanation of many heretofore obscure and anomalous disorders, it threw a flood of light upon a vast series of diseases of nutrition, by pointing out how, owing to an hereditary or acquired organic vice, there might be an excessive or defective assimilation of one or more of these principles. The indications thus afforded become useful, accordingly as the organic vice is eradicable or amenable to treatment; for still the ultimate cause of this want of balance is as obscure as ever, and is probably dependent upon a modification of the vital force, that intangible phantom, which Lewes calls “one of the metaphysical entities.”

But while a general vice of nutrition, such for instance, as that which results in the deposition of tubercular matter throughout the whole system, seems thus to indicate a special dietetic treatment, there are changes to which particular and important organs are liable, in which the Microscope has been useful in pointing out their nature, and to a certain extent, their cause. Thus, for example, fatty degeneration—the cause of the sudden cessation of the heart's action, or the gradual loss of function by the renal apparatus—could not possibly be elucidated until the Microscope had elicited the ultimate structure of muscles and glands, and pointed out how, particle by particle, the

true muscular or cellular substance, upon which the integrity of the economy depended, gave place to oil-globules, which destroyed its cohesion, weakened its vitality, and ultimately abolished its special function. The long-known change of muscle into adipocere seems to bear upon this most important condition; and it appears probable, according to Dr. Quain, that the fatty matter is a result of the chemical transformation of tissue or exudation, subsequently to its deposition from the blood. Whether this be the *rationale* of the degeneration, or whether it arise simply from the vicious secretion of fat in such abundance, as by obstruction of the capillaries to produce atrophy of the original secreting organ, is undecided — though it *does* seem highly probable that fatty degeneration and simple atrophy may be more nearly allied than is at first sight apparent. It will be remembered, however, that it is to a physician who has but recently departed from us, that we are indebted for the first association of the phenomena of albuminuria with renal degeneration; a discovery which arose out of the minute structural acquaintance with the complicated and important secreting organs involved; and the recent perfection of which acquaintance could alone have given the power of appreciating the value of these pathological changes. Thus, although it has not been hitherto productive of important remedial measures, this most valuable discovery has facilitated diagnosis — rationalized medical theory — and removed an opprobrium which the large class of cases of this nature was constantly bringing upon our science.

Again, the theory of Inflammation, that most curious and most important process, which from the very earliest times since medicine has been cultivated as a science, has attracted the eager attention of the physiologist and pathologist, has only, within our own times, and by the aid of microscopic research, received such a degree of elucidation as has served to place it upon a sound scientific basis. Perhaps no change has been more carefully watched, and more variously accounted for — none has served as a more convenient peg upon which to hang an ingenious speculation, or to support a baseless and extravagant theory, than has this. The history of these hypotheses is perhaps the most instructive chapter in the annals of medical science, as serving to illustrate how prone men are to run astray from the positive and real in search of the abstract and the speculative, and how great errors may arise from arguing upon ill-founded premises and premature conclusions — from giving to effects the importance due to their causes. Such errors as these have retarded science, and established prejudices which it takes whole generations to shake off. Heat, pain, redness, and swelling — that quartette of symptoms which have been so long regarded as pathognomonic of the inflammatory process — are now each estimated at their true value; and while some of them have been elucidated by the microscope, others can be only provisionally explained by the aid of physiological experiment and analogy. A change occurring in the minute capillaries, and revealed to the microscope in all its detail of contraction, reaction, stasis, and exudation, is the basis upon which the scientific practitioner of the present day endeavours to build

a rational theory of this most interesting condition. The process is no longer open to discussion—the long current phenomenon of *determination of blood* is shown not to be a cause, but a secondary condition; and the physiologist is able to trace back these effects beyond the influence of mechanical causes, and to show the high probability that both local inflammation, and the febrile condition generally, arise from a modification of innervation. Nor is this so vague a result as at first sight may appear. The experiment of Bernard upon the sympathetic nerve, in which a section of it in the neck was followed by a rapid elevation of temperature in the corresponding half of the head, have led Virchow to suggest, that the heat which is so marked an accompaniment of the inflammation, may be dependent upon a loss of power of the nerves—the natural moderators of the development of heat; while the known functions of the vagus, which have been experimentally ascertained, seem to point to it as the principal source of the symptoms so long remarked as characterising the inflammatory attack. The same great authority is disposed to regard the inflammatory process as very closely related to *irritation*, and differing from it only in degree. And when we consider the *rationale* of a mechanical irritation, this theory appears philosophical, and in accordance with observed facts; for irritation acts by modifying the vital powers of a tissue, which modification may result in such a destruction of the balance of nutritive functions, that secretion becomes excessive, and materials are allowed to pass through the coats of the vessels in greater abundance than is necessary for the processes of repair.

New light, too, has been thrown upon the phenomenon of hyperinosis, or increase of fibrine, from which it appears, that instead of being, as it was always imagined to be, a sign of preternatural power, and indicative of the necessity of depletive measures, it is in reality the very reverse, its appearance being in some manner related to a deficient vitality, requiring an economy of the vital powers for the after-repair of the lesion. Thus it is evident, that the complicated process which is included under the general term inflammation, being at the very root of medical science and practice, correct views of it are absolutely essential to a rational plan of treatment; and such views are even yet struggling for acceptance.

It cannot fail to strike a person who is not acquainted with the difficulties which beset the path of physiological investigation, as not a little remarkable, that there should be so many internal organs whose existence, from their size, could not fail of being observed from an early period, but whose functions have hitherto baffled the most ingenious experimentalists. Such, for example, are the spleen, the thymus and thyroid bodies, and the supra-renal capsules. The study of developmental changes has shown that some of these are more particularly organs of foetal and infant life, but become gradually reduced to a mere vestige at adult age; while others, however, as the spleen and supra-renal capsules, appear to perform important functions throughout life, although the precise nature of these functions has not hitherto been made evident. Collateral light has however been thrown

of late years upon these subjects, by a careful observation of the effects which result from changes of structure in these bodies, which changes seem to be pretty constantly associated with important derangements of function; so that, although the normal function is concealed, the abnormal results are palpable. Professor Bennett, of Edinburgh, and the German physiologist Virchow, have both paid considerable attention to the first-named organ, and it appears from their clinical researches, that hypertrophy of the spleen, a form of disease only too common, is very generally accompanied by a most remarkable condition of the blood, in which the white, or colourless corpuscles, are very considerably increased in number, so that instead of being as one to fifty of the coloured corpuscles, they sometimes constitute as large a proportion as one-fourth part of the whole. The questions which naturally arise out of a consideration of these curious and interesting pathological conditions, bear intimately upon the physiology of the organ. Does the spleen, from the fact of its enlargement of substance, form these colourless corpuscles in so much the greater abundance? and, are these white cells the embryo condition of the ordinary red corpuscles? These questions will not remain long unanswered; inquiry once set on foot by such interesting facts, threatens to demolish the stronghold of mystery which has so long concealed the functions of that remarkable body.

We have here an instance, not of physiological knowledge helping us to an acquaintance with the nature of disease, but the converse; and another example occurs in the case of the supra-renal capsules. Although these bodies at birth are proportioned to the kidneys in size as one to three, while in the adult they are but as one to twenty-two, and gradually diminish in size throughout life, they nevertheless appear to be of essential importance to healthy existence. The normal functions of these ductless organs have never been recognised, and they have long been regarded as bodies, which, like the thymus, have performed their duties during the period of intra-uterine life. It appears, however, from the careful inductions of Dr. Addison, that these bodies cannot become the seat of disease with impunity to the system; and a train of symptoms, terminating in dissolution, have been, with apparent good reason, connected with morbid changes in them. Among the most well-marked characters which distinguish these changes, is the peculiar and general bronzing of the skin, which however, although unmistakable as a symptom, is unfortunately too tardy a symptom to be of value as an indication for relief; for the structural changes which it appears to indicate are then too fully established to admit of remedy. Still, these things demonstrate that Medicine is not standing still—they show what we might expect to be the case, that the great body of intelligent followers of the medicine of this day leave no corner of anatomy, physiology or pathology, unransacked; and that the *last ten years* have not been barren of tangible materials to add to our knowledge of disease; for I was in the wards of the Edinburgh Infirmary when Dr. Bennett's prime case of Leucocythæmia occurred; and as Dr. Addison's clinical clerk, I drew up several of the important cases which led to his generalization upon capsular disease.

But to no part of the organism has so much attention been directed of late, as to the *nervous system*, and particularly to the cerebro-spinal axis, the histological details of which are being worked out with admirable care, patience, and success. In these tissues, whose functions are more mysterious and more obscure than those of any others, it is particularly the case that an acquaintance with structure must precede and pave the way for a comprehension of function; but from the nature of the nerve-structure, it results that investigations of this kind are accompanied by more than ordinary difficulty, and demand more than ordinary ingenuity and patience. Even the membranes which envelope the brain partake of this general recondite character, and it has only been within the last few years that the true nature of the Arachnoid has been elucidated. Hitherto it had been regarded as a serous sac like the pleura or pericardium, until Henle showed that its inner surface, with the epithelium, is everywhere in contact with the dura mater, and that it does not line the ventricles of the brain. But when we turn our attention to the grey and white nervous substance itself, and examine the inextricable interlacement of fibres of various calibre, their decussations, loops, and connections, and the variety of ganglionic cells, simple, bi-polar or multipolar, which are so abundantly entangled in the fibrous tissues, our surprise at the slow progress of neuro-physiology must give place to a feeling of wonder that so much has been satisfactorily ascertained. Many important questions in the minute structure and arrangement of the nerve-substance still baffle the most ardent and enthusiastic inquirers — as, for example, the nature of the flat gelatinous fibres, the functions of the ganglia upon the posterior roots of the spinal nerves, and the mode of termination of the nerve-tubes in the grey matter of the brain. But on the other hand, there are triumphs of physiological investigation, as the result of recent inquiries, which give an earnest of future success. Such are the discoveries of the afference and efference of distinct nerve tubes from the same ganglionic cell, and of the fact that it appears to be by means of nerve fibres entering ganglionic cells in the grey matter upon one side of the cord, that an anastomosis is kept up with similar cells upon the opposite side, by means of commissural fibres stretching in loops between them — a fact which must modify our notions of reflex action.

The discoveries of Brown Sequard, Van der Kolk, and a host of other eminent investigators, have, however, not as yet added very materially to our knowledge of therapeutical indications in nervous diseases. They have rather been of value as assisting the pathologist in his examination of the structures involved, after death has supervened, and affording him a more just appreciation of the nature of the processes which had taken place during life. Beyond the broad fact of the amenability of certain mechanical lesions of the nerve-substance to relief at the hand of the surgeon, our knowledge of the *treatment* of nervous diseases cannot be said to have been yet very much advanced by the recent discoveries. In a physiological point of view however, as establishing relations between various parts, and offering explanations of complicated and recondite vital phenomena, they possess the

highest interest. What is requisite is only a sufficient accumulation of facts, in order that they may in time be correlated and made subservient to generalizations which may bring us to a more intimate comprehension of nervous phenomena. But it would be foolish to underrate the value of careful observations and well established inductions, because they do not instantly supply indications for superior modes of treatment. Every fact observed and placed upon a firm experimental basis, is valuable, as tending to the great end in view; and we hail with satisfaction and pleasure the great accession of observers, and the important chain of observations so quickly collected concerning *this wondrous apparatus*. For this it is which makes us cognizant of our own individuality, as well as of our mutual relation both with other organisms, and with the world at large. This it is which renders us sensible of feelings and impressions of pleasure and of pain — which initiates thought, which develops ideas. This is that medium between the material and the immaterial, the finite and the infinite, the seat of that *divinæ particula auræ* which links us indissolubly with conscience, and which sets up within our inmost souls a firm seat for principle, morality, and religion, here, and a confident hope of a bright immortality hereafter.

In these remarks I would not be understood as pretending to do more than to indicate the direction in which we may look for the advance of Medical Science; a more extended sketch would be out of place upon an occasion like the present, and would trespass more upon your time than an introductory lecture can claim to do. "Two things," says Whewell in his *History of the Inductive Sciences*, "two things are necessary to the formation of science, observation of things without, and an inward effort of thought — in other words, sense and reason." These are the requisites which must be brought to bear upon the subject — cultivated external means of appreciating nice and delicate points of structure, and a comprehensive mental vision, which can grasp a wide range of facts and perceive their mutual relation. These two qualities are by no means always found united in the same individual, but while the means of research are always open to the former class; accumulations of facts are arranged ready to hand for the latter. Such works as Todd and Bowman's "*Physiological Anatomy*," and Todd's "*Cyclopædia of Anatomy and Physiology*," are monuments of science of which we may feel nationally proud. In them the student will find how every ramification of the subject has been touched upon more or less, by investigators who have left no corner of organic nature into which they have not pryed. Materials for future generalizations, suggestions for further inquiry, abound in every direction, and I would advise the student to take up some special subject which requires further elucidation, and by experimental research and mental effort, to endeavour to throw light upon it. By so doing, desultoriness will be avoided, and the training which the mind receives from such discipline will be found of the highest value; while the special study of a particular subject will insensibly involve a fund of information which may at any time be brought to bear upon collateral branches.

In conclusion, Gentlemen, I would congratulate you upon the times on which you have fallen, when so many facilities for education of all kinds are at command. Education cannot be too highly valued; it is an engine which, when properly wielded, is capable of achieving all that money, that potent talisman, can do, and more: for social position is, in this age, regulated rather by education than by wealth; those who are so fortunate as to possess it, know its worth; and those who possess it not, value it no less highly in others. There is nothing to which education may not aspire—and there is no education to which a youth may not aspire in the present day. The facilities afforded by our old Universities have been wonderfully increased of late, and crowds of aspirants seek the advantages they are liberally holding out to them. No class of men, now, can claim to be the educated class *par excellence*; for all classes are fairly in the race. Let not the Medical Profession, as represented by its young and commencing members, be behindhand—let them keep up the *prêstige* so long held by it; and while they are not found wanting in the technical knowledge which is necessary for professional success, let them also seek to improve that general and earlier education which every gentleman is desirous of possessing.



