

Introductory address delivered at the opening of the second session of the Metropolitan School of Dental Science.

Contributors

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INTRODUCTORY ADDRESS

DELIVERED AT THE

OPENING OF THE SECOND SESSION OF THE
METROPOLITAN SCHOOL OF DENTAL SCIENCE.

GENTLEMEN,

We have met to-day for the purpose of opening the Second Session of the Metropolitan School of Dental Science. There are not wanting those who have questioned the utility and the wisdom of these annual addresses. Thus much may, at least, be said in their favour, that as no other mode of opening the Medical Session has been adopted, it is fair to presume that no better has hitherto been devised.

I believe, however, that the custom has other advantages besides those which are merely negative. There is probably no other occasion throughout the session upon which we are all assembled together, the students on the one hand, the lecturers on the other. There is no other opportunity when we can speak to you, as it were, with one voice ; that we bid those welcome whose faces are familiar to us ; or that we can say to those whom we may now see for the first time, that it will be our earnest endeavour so to teach them, so to work with them, that when they leave us to enter upon the active duties of their Profession, they may possess a thorough knowledge of those principles which should guide them in practice. It is the only time when your studies can be spoken of collectively, that the bearing which they have upon each other can be placed before you, and the necessity of attending to them all can be impressed upon your minds. When this address shall have been delivered, and each lecturer shall have entered upon the subject-matter of his special course of lectures, the harmony and connection which exist between the different subjects are too apt to be lost sight of in the multiplicity of details which you will have to learn. We have most of us a greater inclination for certain studies than for others ; and it not unfrequently happens that even the industrious student, following in this respect the bent of his own mind, cultivates his favourite study at the expense of others which he has less inclination to. It is, however, a great mistake, and one which the very ambition to excel in certain subjects tends to encourage. It should be the endeavour of the student thoroughly to ground himself in all those sciences which are essential to

the practice of his Profession : then, when he has done this, and not before, let him turn his attention to his favourite pursuit, and he will be all the more certain to excel in it for the knowledge which he has obtained of other collateral sciences. So long as you are students, you should carefully bear in mind the real object of your studentship ; not that you should be only good anatomists, or good workmen, or good chemists, or good surgeons, but what all these are essential to form—and that is, good Dentists.

Before entering more fully upon the subjects to which I have just alluded, it will not be misplaced if I say a few words with respect to the School itself. Gentlemen, our School is still young, so that we cannot dwell upon the past, but must look rather to the future : nevertheless, it has passed safely and prosperously through that critical period, the first year of its existence. Let it only thrive as much during the next two or three years as it has done during the last, and it will be destined to enjoy a long and vigorous manhood. It has not had the good fortune to be established in the midst of unanimity and peace in the Dental Profession ; but it has had to make its way against opposition and against conflicting opinions. It has been condemned by some ; it has been looked upon doubtfully and lukewarmly by others ; but, at the same time, it has met with true and earnest supporters. In spite of these disadvantages and discouragements, it numbered seven-and-twenty students during the first session. It was not to be expected that an equal number would enter the School in the second session ; but there are already several additional students, and there is every prospect of others joining when the business of the session shall have commenced.

Since we last met together, an event has taken place which must not be passed over in silence. I refer to the establishment of the London School of Dental Surgery. In the Inaugural Address which was delivered at the opening of the School, there are certain passages which have reference to our own, and which do not fairly represent the feelings and opinions of those who belong to it. It is stated that it is the wish of those who represent the College of Dentists to detach the Dental Profession from the general Profession of Medicine. This is a somewhat ambiguous phrase, and may be interpreted in two very different ways. If it is meant that they desire the Dentist should be ignorant of medicine and of surgery, then it is incorrect ; but if it is intended thereby that they desire to see the Dental Profession, as it has ever been, a separate and distinct branch of practice, and that they conceive that its members form a sufficiently numerous and important class of practitioners to have a governing body of their own, selected from amongst

themselves, then it is perfectly correct. It is also stated, that "a School has been formed in which the curriculum appears to be more restricted than it should be." In this respect, I, for my own part, am willing to admit that there is some truth in the statement; and I so far agree with this latter charge, as to acknowledge that the curriculum is not that which it ought eventually to be. But herein lies a most essential distinction between the College of Dentists and its opponents—a difference in which none are so much interested as yourselves. In spite of the misrepresentations of party zeal, it may at least be assumed that the supporters of the College of Dentists possess the same amount of integrity, and have been actuated by the same laudable purpose as they are willing to suppose has governed the conduct of their opponents; viz., that of raising the status of the Dental Profession. The supporters of the College of Dentists have endeavoured to do this in such a manner that those who had already entered the Profession, and had probably been engaged in the study of it for some time, might be included in and able to avail themselves of this reformatory movement; while, on the contrary, the opponents of the College appear to have set down for themselves an ideal standard of excellence, without any regard to the interests or opportunities of those who might have already entered the Profession under the old state of things, when no examination or any definite qualification was even expected of those who practised as Dentists. The one party has been desirous of elevating the Profession, but, at the same time, of retaining those who had previously joined it; the other party appears utterly to have ignored the past, and to have been desirous of creating an entirely new body of practitioners. I am speaking now, Gentlemen, of the time when the examination at the College of Surgeons shall have ceased to be a matter of form, when its Dental Certificate is no longer to be obtained by asking for, and the curriculum which has been put forth shall be carried into effect. No one can have kept more aloof from the political discussions which have disturbed the Profession than I have done; and I have certainly no wish to plunge into the mire and discomfort of them now. I desire only to regard the present subject as a student's question, and to speak of it so far as it affects your interests, and that of every Dental pupil throughout the kingdom.

I will not enter into all the details of this elaborate curriculum; but I will merely direct your attention to one point—and that is, to the length of time during which the student in Dentistry and the student in Surgery are to be engaged in the acquirement of professional knowledge. Four years is the period assigned to both; but how differently are they placed as to the manner in which they can occupy

themselves during this time! It is usual for the Medical student to pass six or nine months of these four years in dispensing, while during the remainder of the time he is engaged in attendance upon lectures and hospital practice; so that at the end of the four years he is able to present himself for examination. But how does it stand with the Dental student? In addition to the four years to be passed in the general acquirement of professional knowledge, there is an additional clause which imposes upon him a distinct term of three years, during which he is to be engaged in the work-room of the Dentist. I need not tell you that while he is doing this, he cannot be attending to lectures and hospital practice in the manner which is required by the curriculum of the College of Surgeons. It will, therefore, occupy more time, and will consequently cost more money, to obtain the Dental Certificate of the College of Surgeons than to become a full member of that body. Lastly, when the student shall have passed through the necessary studies—when he shall have successfully gone through the ordeal of his examination in the various subjects which form the curriculum,—that is to say, in the General Anatomy of the body, in the Special Anatomy of the head and neck, in Dental Anatomy and Physiology, in Materia Medica, in General Surgery, in Dental Surgery, in Dental Mechanics, and, lastly, in Chemistry and in Metallurgy,—what, I would ask, is to be the reward of all his labour, and in what relation will he stand to the chartered body which has undertaken to direct his studies and to pronounce upon his qualifications? He will receive a certificate, stating that, in the opinion of the three Surgeons and the three Dentists who form the Examining Board, he is fit to practise his Profession; but beyond making this bare assertion, the College of Surgeons have nothing whatever to do with him. The Certificated Dentist, once that he has quitted the College of Surgeons, has no more right to re-enter within its walls than if he had received a similar testimonial from the College of Preceptors, or from the College of Dentists itself. During his studentship, he will probably have gazed with wonder and admiration at the rich stores of anatomy and physiology contained in that museum which has been founded on the genius and industry of a Hunter, organised and arranged by the kindred spirit of an Owen, and is now advancing to still greater perfection through the important though unobtrusive labours of a Quekett. He may have passed through the spacious library, thinking of the time when he should be privileged to avail himself of its valuable contents—when he might there commune with the master-spirits of old, or pursue the latest discoveries of science in the writings of his contemporaries. If he has indulged in any such

vain delusions, the period has arrived when he must cast them off. The possession of the Dental Certificate has abruptly severed the tie that bound him to the College of Surgeons. The educational establishment disowns the offspring it has reared, and he is sent forth into the world like an illegitimate child whose parent is ashamed of him and disowns him. I can hardly suppose that such a barren result, after so much time and study had been expended in the preliminary education, could have been contemplated even by those who were willing that the Dental Profession should be swallowed up in the College of Surgeons. In commencing with a limited curriculum, the College of Dentists has only followed in the footsteps of similar educational establishments. It is precisely what has been done by the College of Surgeons itself. Let any one compare the present curriculum of that body with what it was thirty years ago, and say whether this is not the case.

I am afraid that the discussions and dissensions which have agitated the Profession have created too much antagonism and too much angry feeling to leave any hope that these wounds can be healed at present. There is, however, one point upon which I venture to think an error has been committed by some members of the College of Dentists ; and that is, in supposing that the possession of the Certificate of the College of Surgeons must necessarily prevent those who hold it from acting with the College of Dentists. I would say, let those who wish possess the Dental Certificate, just in the same manner as they might have the full membership of the College of Surgeons or any other medical qualification. I would forget these minor differences for the sake of union. After all, there is much that both parties possess in common ; there is an earnest, and, I am convinced, a most unselfish wish, on the part of the majority, to elevate the Profession, and to rid it of the quacks and impostors who have so long disgraced it. There are many who have taken the Certificate of the College of Surgeons, who still desire to see a separate and independent body which shall represent the Dental Profession. Are there not some, I would ask, who might reconcile these unfortunate differences, which, while they benefit none, throw discredit upon all ?

There is one more passage I will refer to, and with which I am sure we shall all most heartily agree. Mr Cartwright says, "It must be acknowledged that the Dental Institutions of America have sent forth a great number of gentlemen who form a body of Dentists of a high and uniform standard ; and, scattered over the world, they exhibit a degree of excellence, individually, which is conclusive of the value of their practical and systematic education." To this I will only add, that it is upon

the very principles upon which these institutions have been established in America, that their counterpart in this country—the College of Dentists—has been founded. If you will contrast the curriculum of the American Colleges with that which has been laid down by the College of Dentists, you will find that it is essentially the same. If you inquire into the relation in which these Colleges stand with respect to the Medical Profession in the New World, you will find that they are entirely distinct, and that the Medical and Surgical Institutions of that country have never felt it incumbent on them to interfere with the education or organisation of the Dental Profession. Let those, then, who have hitherto laboured for a similar object in this country, continue their efforts; let them take heart against all discouragements, not doubting but that they will yet see the accomplishment of their wishes, and that the seed which they have sown will in due time bear fruit.

Thus much, Gentlemen, by way of justification of the course which has been pursued by those who founded our School. Let us now pass to the consideration of those studies which will occupy you during the Session. First, however, there is a question to be considered, which, if it has not arisen in your own minds, may possibly be suggested to you by others. Is it, after all, really necessary that you should go through this course of study at all? Will it not be sufficient if you obtain what is called a practical knowledge of your Profession?—that is, in other words, blindly follow the practice of those who have gone before you, without troubling yourselves to inquire into the principles upon which it is founded. Of all nations, it is the Englishman who has been proudest of being what is termed a practical man; at the same time holding in contempt all that is spoken of under the name of science, as though science was something which was opposed to practice; yet, after all, what is Science, but practice which has been argued and reasoned upon, and thereby reduced to a system? It has been this exclusive devotion to the Practical, or, as it is often termed, common-sense view of the matter, which has retarded the progress of our arts, of our sciences, and of our manufactures, and, until lately, has left England so far behind in the competitive struggle of the nations of the world. Let us hear what Archbishop Whately has said upon this practical or common sense. “By common sense,” he says, “is meant, I apprehend (when the term is used with any distinct meaning), an exercise of judgment, unaided by any art or system of rules; such an exercise as we must necessarily employ in numberless cases of daily occurrence, in which, having no established principles to guide us—no line of procedure, as it were, distinctly chalked out,—we must needs act on the best extemporaneous

conjectures we can form. He who is eminently successful in doing this, is said to possess a superior degree of common sense. But that common sense is only our *second-best* guide. That the rules of art, if judiciously framed, are always desirable when they can be had, is an assertion for which I may appeal to the testimony of mankind in general; which is so much the more valuable, inasmuch as it may be accounted the testimony of *adversaries*: for the generality have a strong predilection in favour of common sense, except in those points in which they respectively possess the knowledge of a system of rules; but in these points they deride any one who trusts to unaided common sense. A sailor, *e. g.*, will perhaps despise the pretensions of medical men, and prefer treating a disease by common sense; but he would ridicule the proposal of navigating a ship by common sense, without regard to the maxims of nautical art. A physician, again, will, perhaps, condemn systems of political economy, of logic, or of metaphysics, and insist on the superior wisdom of trusting to common sense on such matters; but he would never approve of trusting to common sense in the treatment of diseases. Neither, again, would the architect recommend a reliance on common sense alone in building, nor the musician in music, to the neglect of those systems of rules which, in their respective arts, have been deduced from scientific reasoning, aided by experience: and the induction might be extended to every department of practice. Since, therefore, each gives the preference to unassisted common sense only in those cases where he himself has nothing else to trust to, and invariably resorts to the rules of art wherever he possesses the knowledge of them, it is plain that mankind bear their testimony, though unconsciously, and often unwillingly, to the preference of systematic knowledge to conjectural judgments.* But, whilst I am thus urging upon you the practical utility which belongs to your studies, I would not have you altogether overlook the purely intellectual grounds upon which such scientific knowledge may be advocated, as providing you with sources of enjoyment which the uncultivated mind can never possess. "The question, *Cui bono*—to what practical end and advantage do your researches tend?" says Sir J. Herschel, "is one which the speculative philosopher who loves knowledge for its own sake, and enjoys, as a rational being should enjoy, the mere contemplation of harmonious and mutually-dependent truths, can seldom hear without a sense of humiliation. He feels that there is a lofty and disinterested pleasure in his speculations which ought to exempt them from such questionings: communicating, as

* 'Elements of Logic,' Preface, p. 15.

they do, to his own mind the purest happiness (after the exercise of the benevolent and moral feelings) of which human nature is susceptible, and tending to the injury of no one, he might surely allege this as a sufficient and direct reply to those who, having themselves little capacity and less relish for intellectual pursuits, are constantly repeating upon him this inquiry. But if he can bring himself to descend from this fair but high ground, and justify himself, his pursuits, and his pleasures in the eyes of those around him, he has only to point to the history of all science, where speculations, apparently unprofitable, have, in innumerable instances, been those from which great practical applications have emanated. What, for instance, could be more so than the dry speculations of the ancient geometers on the properties of the conic sections, or than the dreams of Kepler (as they would naturally appear to his contemporaries) about the numerical harmonies of the universe? Yet these are the steps by which we have risen to a knowledge of the elliptic motions of the planets and the law of gravitation, with all its splendid theoretical consequences and its inestimable practical results.* Our own Profession is not without examples of useful and unexpected applications arising from apparently remote and unconnected discoveries. When a combination of sulphur and caoutchouc was first formed in the manufacture of elastic bands, who could have supposed that we had here an indication of that valuable material for the application of artificial teeth, which we are all familiar with under the name of vulcanite? Still more remote appeared the discovery that paper immersed in nitric acid unites with that body and becomes highly combustible. Years afterwards the same fact is put forward in another shape, and we are told that cotton when treated in a similar manner becomes converted into a material more explosive and dangerous than gunpowder. The next step consisted in finding that this same explosive material was soluble in ether. In this shape it is known under the name of collodion; the surgeon has already made use of this substance as a dressing for wounds, and it has recently been announced as the rival of vulcanite for Dental purposes. The contraction of the frog's leg first led Galvani to the discovery of the electric current: years had to elapse before this new power grew to its full magnitude and importance; but in the present day we make use of it to convey our messages and to connect the ends of the world together; or, under another form, we use it to explode the mine and rend the bowels of the earth asunder; or, under that same form, we convey it into the cavity of the tooth, and destroy the aching and sensitive pulp.

* 'Natural Philosophy,' by Sir J. Herschel, p. 10.

Of the various subjects which will require your attention, the first and most important is Anatomy. If this science does not constitute the foundation of all which you will have to learn, it is at least the basis upon which you will have to depend in the application of that learning to practice. He who would undertake to repair the derangements of a complicated and delicate piece of machinery, must first make himself acquainted with the normal or natural arrangement of its parts: if this is necessary with a piece of human mechanism, where every portion is visible to the naked eye, and every part can be freely examined, how much more must it be so in the case of the living body, with its wondrous assemblage of bones and ligaments, muscles and tendons, nerves and brain! These portions of the body serve to bring us in relation with the external world, and into communion with our fellow-men. The central portion of the skeleton, the vertebral column with its expanded thoracic and pelvic cavities, serves to contain and support the viscera. The long levers which form the upper and lower limbs, held together by their strong but flexible ligaments, constitute the passive organs of locomotion. Around these are grouped the multitude of muscles which move the bones and form the active organs of locomotion. Above all is the expanded series of vertebræ, commonly termed the skull. It is in this osseous cavity, which in man is so much more capacious than in any other animal, that the nervous system becomes developed into the brain. This important organ regulates the actions of the rest of the body. It may be regarded as the seat of government, from whence all acts of volition proceed. These are communicated to every part of the body by certain of the nerves which are in connection with the brain, while another series of these passive and involuntary messengers convey to it every sensation, and it thus becomes the centre of all our pleasurable and painful feelings. But how little is to be learnt of the actual structure of these organs by means of the unaided senses! It was not until the natural philosopher and the optician had prepared for the use of the anatomist that triumph of human knowledge and ingenuity, the modern microscope, that he could pass beyond the coarser parts of animal structure, and solve the mystery of their ultimate arrangement. When the various tissues are examined by means of this instrument, all our previous ideas concerning them are changed. Muscular fibre is found to be no fibre, in the ordinary acceptation of the term. Each ultimate fibrilla, measuring on an average the ten-thousandth of an inch in diameter, is seen to be made up of a number of cells arranged in linear series. Each cell contains a dark mass in its centre, of a highly-refracting substance; this forms the

cavity of the cell; while around each central mass is a clear space, consisting of the cell-wall. Nerve-fibre in like manner presents externally a delicate transparent membrane in the form of a tube, *tubular membrane*; within this is a hollow cylinder of a material known as the *white substance of Schwann*, containing in its centre a transparent substance termed the *axis cylinder*, and which appears to be the essential element of the nerve. Bone, again, when submitted to a similar investigation becomes bereft of its apparent solidity, and is seen to be permeated by a multitude of microscopic cavities, with a much larger number of canaliculi or tubular processes radiating from them: these convey the elements of nutrition to those portions of the bone which are not reached by the capillary blood-vessels.

In this way we obtain a very precise idea of the structure and arrangement of every organ of the body; but, after all, we have only learnt what is the condition of these organs in a state of rest; as yet we know nothing of the manner in which these structures contribute to the performance of the functions which they are destined to fulfil. Minute and interesting as are the results afforded by the previous mode of investigation, it gives us no information with respect to the changes which take place when the machinery is in action. At this stage of the inquiry pure anatomy begins to fail us, and in order to proceed further we must leave the consideration of mere form and arrangement, and endeavour to ascertain what are the conditions which govern the actions of the organs—or, in other words, we must ascertain what are the laws which regulate the functions of the living body, and to Anatomy must be added a knowledge of Physiology.

It requires but little advance in the latter science to teach us that there is an essential difference in the manner in which these muscles and nerves perform their functions. Thus, some muscles are under the control of the will, and are hence termed *voluntary muscles*. There are others, on the contrary, which are not only not under the control of the will, but which act in spite of it: this is the case with the muscles of the heart, of the stomach and intestines, and, in fact, with all those which are engaged in carrying on what are more especially spoken of as the vital functions; these are, therefore, termed *involuntary muscles*. Of the nerves, some convey *sensation*, others bestow the power of *motion*; and there are a third series which preside over the functions of the involuntary muscles, and serve at the same time to harmonise and connect the different parts of the body together: these are termed the *sympathetic* nerves. It belongs, however, to physiology to ascertain not only the manner in which the different

organs act, but also the way in which these acts are accomplished, and to take cognisance of the changes which they induce in the organs themselves. To solve these questions, it is necessary to enter upon an entirely new series of investigations. We must ascertain what is the composition of these muscles, nerves, and bones; what are the elementary bodies which enter into their formation, and what are the proportions in which they are combined. The physiologist must call to his assistance the science of Chemistry. Physiology has ever advanced in proportion to the progress which has been made in Chemistry. Experience teaches us the necessity of respiration, and of a due supply of air; but it took nearly four thousand years for mankind to learn what was the actual nature of this important function. Up to the middle of the sixteenth century, the passage of the air into the lungs was supposed to be for the purpose of cooling the blood. It was only after the successive labours of Van Helmont, of Robert Boyle, of Mayow, of Priestley, and many others, upon the nature of the atmosphere and of the different gases, and when their researches had been crowned by the discovery of oxygen and the composition of the atmosphere by the great French chemist Lavoisier, that the true nature of respiration was ascertained.

There can scarcely be a more striking instance of the intimate alliance which exists between Anatomy, Physiology, and Chemistry, than the successive steps by which this knowledge was acquired. The heart, the veins, and the arteries were known to exist in the body in the most ancient times of ancient Greece; but, finding the arteries always empty after death, the anatomists of those days supposed that during life they were filled with air—a doctrine which is still recorded in the name which these vessels have received. It was not until six hundred years afterwards, when Galen proved by direct experiment that, like the veins, the arteries also contain blood, that their true purpose was explained. The blood was, however, still supposed to pass direct from one side of the heart to the other; and it was only after the lapse of thirteen centuries, and when the dissections of Vesalius had shown that this could not take place, that Columbus of Padua and Cesalpinus of Pisa showed that the blood which was conveyed to the right side of the heart passed into the lungs, and from thence it returned to the left side of the heart, the air from the lungs being supposed to accompany it. Cesalpinus also ascertained that when a ligature was placed on a vein, it became distended on the side of the ligature which was farthest from the heart. About the same time, Fabricius, of Aquapendente, carefully examined and described the valves of the veins; but he only regarded them as serving to

support the column of blood which these vessels contain. It remained for his illustrious pupil Harvey to give a definite meaning to these scattered and unproductive notices of his predecessors. By a series of careful and logical inductions, founded upon numerous dissections and experiments, this great man gave the true explanation of the way in which the blood is circulated through the body. In 1616 Harvey publicly demonstrated his discovery: but now anatomy and physiology had performed their part, another century passes away, and in 1777 Lavoisier announces to the world the composition of the atmosphere. In his experiments on respiration, he found that the air which issued from the lungs was different to that which had entered: it would not support combustion; it could not sustain life; it had gained carbon, it had lost oxygen. Here, then, was the explanation which had been so long sought for; and at the end of more than two thousand years, by a combination of Anatomical, Physiological, and Chemical investigations, the problem was solved.

Life is a perpetual vortex, in which there is a constant interchange between the fluids and solids of the body. Every movement, whether voluntary or involuntary, every sensation which is conveyed by the nerves—nay, every act of thought involves the destruction of certain particles of the body. Hence the organs which have been previously mentioned would only suffice for the momentary existence of the individual. In order that he may continue to live, means must be provided for repairing the loss which ensues from the action of the different organs. This leads us to recognise the necessity of those parts of the body which are provided for its nutrition, and for supplying fresh particles which should take the place of those which have been destroyed. In the lower animals, where there is little differentiation between the tissues of their body, this process is exceedingly simple. The food is received into a central cavity, where it becomes digested, and from whence it is directly diffused throughout the body. As we ascend in the scale of organisation, the process becomes more and more complicated, until it attains its climax in the Mammalia.

In these higher animals and in Man there is a preliminary stage, during which the food is specially prepared before it is allowed to pass into the stomach, where the actual process of digestion takes place. This first stage is accomplished in the mouth, and is that in which we are more especially interested. In order that the food may be properly acted on by the gastric juice, it must first be thoroughly masticated, and mixed with the saliva. If this is imperfectly performed, additional work is thrown upon the stomach, and thus lays the foundation of impaired

digestion. If the chyle is imperfectly formed, we know of no supplementary process by which the first error can be corrected. Abnormal chyle must necessarily lead to a deficient or vitiated state of the blood, and this to imperfect nutrition of the organs. It is, therefore, most essential that the teeth should be preserved and maintained in a healthy condition. From this circumstance arises the importance of Dental practice—first, in endeavouring to preserve the teeth ; and when this can no longer be accomplished, in providing artificial substitutes to take the place of the natural organs which have been lost. The organisation of the teeth, though different in its kind, is little less complicated, and certainly not less admirably contrived, than that of every other part of the body. Only a few years ago, these organs were regarded as dead, inert bodies, which were incapable of undergoing any change, excepting such as was of a purely chemical nature. The treatment of the diseases of the teeth was necessarily on a par with this imperfect knowledge of their anatomy and physiology. Here, as elsewhere, the microscope has come to our assistance, and revealed the true nature of their internal structure.

Hunter hesitated to regard the teeth as organised, because he was unable to find blood-vessels in the dentine. Yet, after all, the immediate presence of the capillary blood-vessels in an organ only implies great activity of the parts. Thus, in the muscles they penetrate in every direction between the component fibrillæ ; but examine the ligaments and tendons, which are passive rather than active organs, and in these the blood-vessels are but sparingly distributed, while in the case of cartilage, which is entirely passive, they are absent ; before reaching this structure they curve back upon themselves, and end in a series of loops. In the case of the teeth, the blood-vessels are seen to terminate in a similar manner on the surface of the central pulp, where it is in immediate proximity to the dentine. The dentine, although it is not permeated by blood-vessels, contains a system of delicate tubes ramifying through it, and by means of which the transuded plasma of the blood is conveyed to every part of the tooth, except, perhaps, the enamel. In addition to this vascular pulp and tubular dentine, there is a layer of periosteum around the fangs of the teeth, which has a plentiful supply of blood-vessels ; and the teeth, therefore, stand in nearly the same relation to the nutrient fluid of the body as the other structures to which I have just alluded. Yet those organs are liable to inflammation, and to undergo various morbid changes ; it will, therefore, be readily conceived that the teeth are subject to analogous changes to those which occur in other parts of the body. That the teeth are constantly undergoing change, may be shown by comparing two teeth together which have been cut in halves, the one from the young subject, the other from the

old. In the first, the dentine is of a pure white, and perfectly opaque ; in the second it is much darker, frequently marked with patches of a brown colour, and in many parts semi-transparent, while the pulp cavity is greatly diminished by the gradual increase of the dentine.

The treatment of the diseases of these organs, therefore, requires a knowledge of the principles of general surgery. What these principles are, you will learn in the course of lectures which will be delivered on that subject. I may perhaps be permitted to observe, however, that the advances which have been made of late years in the sciences I have already referred to have exercised a marked and beneficial influence on the medical treatment of disease. Formerly it was a constant struggling and fighting with Nature ; whereas in the present day it is rather a humouring of Nature—a removing of obstacles, thereby enabling her to accomplish that cure which, after all, must in reality depend upon herself. The change which has taken place in the practice of Medicine might be compared to that which has occurred in Navigation. The old and hardy mariners of England battled bravely and gallantly with the storm, only too often to be vanquished in the unequal contest. The sailor of the present day, if he has paid due attention to the teachings of science, knows that there are laws which govern the tempest as well as the calm ; the actual law being that the hurricane moves in circles. Instead, therefore, of contending with the tempest, he places his vessel in safety by steering her out of its course, and not by driving her through it.

The peculiar structure of the teeth imparts a special character to many of their diseases, which, in consequence, require a particular mode of treatment. The irregularities of the teeth, arising in various ways, and depending upon a variety of causes, also demand a method of treatment peculiar to themselves ; in this manner there has arisen a special branch of practice, which, while it requires a knowledge of general surgery, yet possesses distinctive characters of its own, and constitutes the subject of the Lectures on Dental Surgery.

In spite, however, of every method of treatment, the teeth are peculiarly liable to be prematurely lost. When this is the case, the Dentist must avail himself of the mechanical appliances of his art : of these he may be justly proud ; for although fully aware how far it must ever fall short of the perfection of Nature, yet it is the only instance in which a mechanical substitute does really perform the office of the natural organ. The excellence to which Mechanical Dentistry has been brought in the present day, precludes a man from succeeding in practice, unless he is able to do something more than take an impression of the mouth. There will be little hope of his prospering, unless he not only knows the way in which the work should be done, but can also do it for himself. It is true that this part of practice can only be

learnt in the work-room, and by labouring at the work-bench. There are, however, often various ways of doing the same thing; and there are, also, many points connected with the application of artificial teeth which cannot be learnt in the work-room, and in these matters the information to be obtained from an experienced and practical teacher is of great value. I feel, however, that in the present day it is unnecessary for me to urge farther upon you the importance of the Course of Lectures on Mechanical Dentistry.

I have already referred to the subject of Chemistry, when speaking of Physiology; but this is a science of universal application, and there are few of the natural sciences, and scarcely any of the arts, to which it does not afford important assistance. It has, moreover, special claims upon the attention of the Dentist. Not only is he constantly employing the various metals in the operations of the work-room, but he also makes use of them in the pure state as remedial agents. The extraordinary malleability and ductility of gold, which allows of a single grain being drawn out into five hundred feet of wire, or being beaten into leaves not more than one two hundred and eighty thousandth of an inch in thickness, together with its adhesive, and I might almost say welding properties, and its indestructible nature, render it the most appropriate material which has hitherto been obtained for the purpose of stopping teeth; yet the presence of the two-thousandth part of antimony, lead, or bismuth, would so far destroy these properties as to render the gold unfit for the use of the Dentist. Tin is another metal which is occasionally employed in place of the more costly material; and others of the metals are used for the same purpose in the form of amalgams. For these reasons, Metallurgy forms a special feature in the Course of Lectures on Chemistry. It can hardly require any argument on my part to convince you that it is most desirable you should be acquainted with the nature and properties of bodies which you are constantly making use of, and which are liable to be altered by such slight admixtures as those I have referred to.

The remaining subject, that of Comparative Anatomy, forms an important adjunct to the sciences of Anatomy and Physiology. We no longer regard man as an isolated being, whose organisation can be properly studied apart from that of the rest of the animal kingdom. Every animal may be regarded as an experiment which has been prepared for the use of the physiologist by the hand of Nature herself. In these lower animals he meets with the several organs reduced to their simplest condition; he learns to distinguish between the essential parts of an organ, and those parts which have been added to fulfil the special requirements of the individual. It was in the lower animals that the

tubular structure of the teeth was first discovered; and if the anatomist had followed up the hint which Nature thus gave him, we should long since have learned the structure of these organs in man, and should have been spared much useless argument as to their actual nature. In itself, Comparative Anatomy constitutes one of the most delightful studies you can pursue, bringing you, as it does, to an intimate knowledge of the living works of the Creator, and revealing to you the successive phases through which the animal kingdom has passed from the first dawn of creation until the present day.

In addition to attending the Courses of Lectures, I would particularly urge upon you the advantage of being present at the Examinations which are held in each of the classes at stated intervals throughout the Session. I have purposely made use of the term "being present," because I am satisfied that even by this you will gain much good. It will of course be still more advantageous to you, if you will endeavour to answer the questions which are put by the Lecturer. It is by far the readiest mode in which you can ascertain what you really know, and what you are deficient in; it is like a man taking stock, and learning what goods he has got in hand and what commodities he is in want of. If you will only attempt to answer the questions, you will acquire a habit of expressing yourselves with a precision and accuracy which can be obtained in no other way: it teaches you to arrange your thoughts in a methodical manner, and to avail yourself to the utmost of whatever knowledge you may possess. "Reading," says Bacon, "makes a full man, writing a correct man, and conference a ready man."

Lastly, Gentlemen, a few words upon the subject of prizes. These public recognitions of his merits form, not unreasonably, the great object of the student's ambition; and those who succeed in obtaining them have a just right to be proud of the success which has attended their exertions. Still I would say, be not over-anxious about them. Men are naturally endowed with different degrees of ability, and that which we term genius must of necessity stand first in public estimation; but he who labours diligently upon a worthy object is as much to be commended as he who, with greater abilities, gains public honours. Only a few can possess these marks of distinction; but by steady perseverance and a due attention to your studies, you may all fit yourselves for the honourable and successful practice of your Profession, and, above all, you can obtain the approval of your own conscience—that *mens conscia recti*, which bestows firmness and dignity on the character, gives patience in adversity, and produces moderation in prosperity.