AN ADDRESS

DELIVERED AT THE OPENING OF

THE SECTION OF ANATOMY
AND PHYSIOLOGY,*At the Annual Meeting of the British Medical Association in Worcester,
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It is no small pleasure, as well as honour, to me, at this our Jubilee meeting, to occupy the chair in a Section where the twin sisters, Anatomy and Physiology, which have been diverging more and more during the fifty years of the existence of the Association, are once again yoked together at the suggestion of our President. This is the first occasion on which anatomy has thus been recognised by the Association. We may congratulate ourselves on the appreciation of it, thus shown by a body the chief object of which is to promote the practical interests of the profession, and not less at the manner in which the call has been responded to by labourers in various parts of the kingdom. Our programme gives reason to hope that the time of the Section will be fully and profitably employed.

The divergence of anatomy and physiology from one another, to which I have referred, may seem to be unnatural, and in some respects to be regretted; and there may be a feeling, though it is not a well grounded one, that it implies a disjunction of the investigation of structure from that of function, whereas we know that these two should ever proceed together, and be supplementary to one another. But the separation of anatomy and physiology, in the way in which it is taking place, if an evil, is a necessary evil shared by them in common with other branches of science which have a similar relationship. As the several members of the great family of science grow older they grow larger, fall away from one another, occupy independent ground and independent labourers, and form centres from which new individualities will, in their turn, bud off. In the present instance the separation is, in the main, due to, and is the necessary and natural result of, the development as well as growth of the younger of the two sisters which, during the last half-century, has been not only unceasingly, but in geometrical ratio, expanding. It deals with, and is felt by some rather greedily to absorb, minute structure and the associated delicate processes. It leaves to anatomy the investigation of the coarser structures of the body—the investigation, that is, which can be carried out by the unaided eye. It is clear that such investigation, so far at least as the human body is concerned, must, after so many centuries of labour first it, chiefly in Italy and subsequently in France, Germany, and England, be nearly complete, and can therefore scarcely admit of much further extension. Viewed, indeed, in this way, it has almost ceased to be a progressive science, and must lack the interest which attaches to advance and new discovery. True, it remains, and always must do so, an important, an essential, a fundamental feature of medical knowledge and of medical education. Upon the good, clear, ready knowledge of it, more than upon that of any other branch of his science, depends the power of the medical man, more particularly of the surgeon, to do definite positive good: to form, that is, distinct diagnosis and to adopt decided treatment; and the want of interest which anatomy suffers from not being a progressive science is more than compensated for by its practical importance. Here I would remark that I think this, its paramount and unassailable *locus standi*, has of late been somewhat lost sight of in its teaching. The books on anatomy, whether manuals or more formal treatises, commonly contain little or no allusion to the practical import of the several structures and their disposition, and the methods of description have usually no relation to this point. All the features are placed too much on the same level, without light and shade, and the whole landscape proves to be proportionately dull and uninviting. This is also a result—I fear an inevitable result—of that increasing subdivision of labour which causes the investigation and the teaching of anatomy to devolve more and more upon the pure anatomist.

Moreover, the anatomist does not seem sufficiently alive to the value of that kind of physiological knowledge—the knowledge of mechanical adaptation, of morphological relation and of developmental phenomena—which is the proper associate of anatomy, which appertains to it in

the same way and in the same right as the study of process appertains to the study of minute structure, which gives to it the claim to a scientific position, upon which its quality for mental training not a little depends, and which throws a halo of colour and freshness and cheerful glow over it. Too often the bare naked facts are marshalled in solemn dullness one after another, and are crammed down the reluctant throat of the student, without spice or flavour of any kind, not be digested, but to be gulped again, much as they went down, under the examination squeeze.

Doubtless, the careful study of anatomy, regarded merely as entailing the acquisition of a certain number of facts, as acquiring a cognisance of the structure and relations of the several parts of the body, is a good mental exercise, inasmuch as it cultivates, among other qualities, those of attention, accuracy, and painstaking, which are the very foundation stones of the educational building. I question indeed whether any other of our studies does this quite so well. Longer experience impresses me more with this; and I regard anatomy not only as the veritable basis of medical knowledge, but as the veritable basis also of medical education; and this apart from the manipulating skill engendered in the work of dissecting, which is a matter of some importance. I by no means, therefore, wish it to be thought that I depreciate the pure simple study of anatomy, especially if it be pure in the higher sense of that word; and no small interest attaches to the mere unveiling of the mechanism of the human body. We remember the pleasure we all had in displaying for ourselves, and seeing exposed to view, the several parts which make up a limb or an organ; and the teacher has the opportunity of living that pleasurable time over again in witnessing it as vivid as ever among the present race of students. The higher their education and the better their previous mental training, the more cordially and systematically will they pursue the study; and it is no small satisfaction to me to have the opportunity of seeing the senior wrangler and the senior classic humbly and cheerfully bending in the dissecting room, and applying the earnestness and ability which has gained them their high positions to the elucidation and appreciation of the disclosures which their own scalpels and forceps can make.

Thus, as I grow older, I grow stronger in my respect for anatomy *per se*; but I grow stronger still in my estimation of its capabilities to excite interest, to nurture inquiry, and to strengthen the mental faculties, by virtue of the practical and physiological expositions which are its legitimate accompaniments. I feel that its educational as well as its practical value would be vastly increased, and its interest heightened, if the relations of form and structure to disease and accident and treatment were more fully pointed out, if the purposes served by the conformation and disposition of the several parts were more thoroughly worked at and detailed, and if the various morphological bearings were more carefully elucidated. In these directions, there is ample scope for investigation; and deep mines are to be found of interesting material for study and teaching, which will well repay the thoughtful and earnest labourer. A careful and accurate description of the form of the tibia, for instance, may be, and is, good in itself, and in its way satisfactory and improving; but an account which associated that form with the liabilities to accident and disease, with the various distinctive peculiarities of the human form and gait, with the laws of growth and development, would be far more improving and impressive, because more instructive and suggestive. The features in the anatomy of the aorta which render it liable to disease and to aneurysm, those of the knee-joint which induce knock-knee, of the fingers which cause them to slant outwards in rheumatism, of the ball of the great toe which predispose to gout, of the wrist which prevent dislocation, and of the shoulder which entail liability to dislocation—and many other instances of a similar kind will suggest themselves—would, if properly dwelt on, shed the interest, the surpassing interest, of practical value over the anatomy of the several parts, and would impart a healthy reflective tone to the learner's, I might add also to the teacher's, mind.

It must be fully admitted that many questions bearing upon development, morphology, and anthropology, which appertain to, and grow out of, the subject of human anatomy, which add much to its scientific interest and its educational value, and which fitly form part of a course of instruction at an university, can scarcely be comprised within the range of the teaching of the ordinary medical student, in whose case much, too much, has now to be compressed within a given short time. Still the intelligent curiosity of such a student will sometimes require to be satisfied, and his interest may be roused by reference to these questions. He looks at the *plantaris* muscle in the leg. He wonders what need there is for it, and how it comes to be there. He sees that any slight assistance it may render to the great calf-muscle is scarcely a sufficient pretext for its existence in a separate form; and he finds relief and pleasure in learning that this little muscle is an *attaché* to the short flexor of the toes; that its severance has been caused by

that projection of the heel-bone, which is one of the attributes of the erect posture; and that, when it is continuous with the foot-muscle, as is the case in most of the lower animals, it is clearly seen to be the homologue of the *flexor digitorum manus*. Possibly, he may still indulge in the luxury of speculating as to the law of evolution, by virtue of which it has maintained its individuality through so many ages of comparative uselessness. He looks with vastly increased interest upon the construction of the great toe, when he learns by what slight modifications from the lower animal form that solidarity has been given to the human foot, upon which, more than upon any other single speciality in his anatomy, the pre-eminence of man is due; and he views with respect the flexor and the middle extensor of the thumb, upon finding that the complete segmentation or separation of these muscles from their surroundings is to assist in correlating the free mobility of the human pollex with the fixity of the human hallux. He is agreeably surprised to find that the dry bones in the open valley of the class-room are made to live and stand upon their feet, an exceeding great army of instruction and interest when breathed upon by the teacher, and clothed by him with the warm flesh and blood of development, morphology, mechanical purpose, and practical bearing.

The high-and-dry style of anatomy—and the remark applies no less to other educational subjects, general as well as special—has grown partly, perhaps chiefly, as a corollary to the higher and drier character of the examinations, and to the difficulty which is experienced in carrying the examination test beyond the range of simple facts: a difficulty which all who have been engaged in this work must admit, and which can be overcome only by a considerable extension of the time occupied in the examinations. Seeing how important, as directors of education, examinations have become, and must be, I make no doubt that some different system of conducting them, which will give greater stimulus to the intelligent appreciation of facts, and will cultivate the reasoning as well as the acquiring faculties, must, ere long, be attempted. I look upon the attainment of that end as one of the great educational desiderata of our time—so great and so important, that it can be worked out only by slow degrees, and as the result of much deliberation and much effort.

I have said enough to show my hope and my confidence that the anatomy of the coarser structures, with its attendant physiology, will not be allowed to pass into the category of subjects dead and barren as regards scientific character; but that it will be more and more cultivated, not merely for its practical value, but as a repertorium of scientific interest.

With regard to the special subject of physiology, which has relation to minute structure, and more particularly to composition and processes—that is, the *changes*, chemical and physical—of structure, we may be sure that it will never cease to command interest and to engross a large share of attention. It will always be able well to take care of itself. It is essentially and rapidly progressive, and it is illimitable. Its investigations lead in those directions in which there must ever be a near borderland of the seemingly mysterious and inscrutable to fascinate and tempt the inquirer on. It dives into the deepest recesses of nature's works. It brings to its aid, and gives the greatest range to, chemistry, physics, and mechanics, and advances with them, its progress being checked mainly by their imperfections. It profits by the newest refinements of optical and other instrumental apparatus. Its searchings cannot be confined to dead matter. The very essence of the science demands that the processes, "living as they rise," should be submitted to its scrutiny. It is quite certain that this must be done, and will be done, largely, whether in England or abroad, whether in this generation or the next, whether under Parliamentary control or under trust in the good feeling and conscience of educated men.

In this point we are all deeply interested, not merely as physiologists, but as members of a practical profession, and as members of the human family—I might say, as members of the animal kingdom: for the highest and most important flights of physiology are those which carry it into the region of pathology, and which demonstrate the continuity between the healthy and the morbid processes which indicate the transition of the one into the other.

In illustration of this, I will refer only to a few points.

The greatest accession to knowledge in medical science, which has been made during the era of this Association—one, indeed, of the greatest ever made—is that included under the term "cell-development", which was worked out, in the first instance, by Schleiden and Schwann. This has caused a recasting of all our ideas of nutrition, including development and growth; and has, at the same time, given an entirely new ground to the science of pathology: for it has shown that the agents which are the media of nutrition are the media also of those modifications of nutrition which we call disease. It has taught

us that a malignant cancer-growth is probably the result of a perversion of, perhaps intrinsically only a slight departure from, the ordinary and normal processes of cell-growth in the natural tissues; and the suggestion brings with it a ray of hope, that these deviations may one day be checked or prevented, and that this most terrible scourge of humanity may be amenable to treatment. Associated with this great theory are the investigations respecting the movements, the migration, and the absorbing properties of leucocytes, which, as well as the investigations respecting the influence of the medulla oblongata and other ganglionic centres, great and small, upon the action of the heart and blood-vessels, and the investigations respecting the formation of sugar and albumen and their modifications, have a very direct bearing upon various pathological processes, and upon some of the most common and important diseases, and must lead to the better treatment as well as the clearer knowledge of those diseases.

The consciousness of the close bonds which unite physiology, practical physiology more especially, with medicine, and of the benefits which the whole history of medicine shows to have accrued to it from the cultivation of physiology, as well as the prospect of far greater benefits which are certain to result from it, if it be allowed free scope—the gratitude, in short, for favours to come, no less than for those already received—has induced many of the eminent men of our profession to form an Association for the Advancement of Medicine by Research. It is conceived in no hostile spirit to this Association. I am glad to see that it includes many of our members; and I trust that the two associations will work on together, and benefit each other in their co-operation for the great purpose of advancing the science and practice of medicine.

I cannot conclude without adverting to the loss, the terrible loss, which biological science, the world at large, and the University of Cambridge in particular, have sustained by the recent untimely death of my colleague, the Professor of Morphology. I doubt, indeed, whether we could have sustained any other loss of this kind so severe and so irreparable. If at the early age of thirty his high intellectual gifts, his great powers of observation, of consecutive inquiry, and of philosophical deduction, as evinced by his researches in embryology and morphology, had gained him a reputation second to none in Europe, what could we not have hoped from the future that might have been expected to be before him, devoting himself as he was in an earnest and honest spirit, in simple unabating love to the unfolding and the teaching of the laws of animal life? But, further, the name of Frank Maitland Balfour stirs the warmest feelings in those who lived and worked with him and knew him best. By all of them he will be remembered as representing, in birth, in education, and in character, a noble example of the best chivalry of Britain. They will recall his fine, upright, elastic youthful frame, with open face and beaming eye, as typifying the keenness and strength of his intelligence, his high-mindedness, and the geniality and sincerity of his nature. They will feel that the words of the beautiful anthem sung in the chapel of Trinity College on Saturday last, in the presence of all the resident members of the University, while his body was being committed to the ground at his family home in Scotland, were singularly applicable to him.

"When the ear heard him, then it blessed him;
And when the eye saw him, it gave witness to him."

Pure in thought and pure in work, he laboured simply to know and teach the truth. Dignified, yet simple and utterly unassuming in manner, liberal in purse, wise in counsel, and firm in opinion, but gentle and full of kindness, he had the respect and admiration of pupils and colleagues. The true gentleman, he was a power for good among us all. With the tempting offers of Professorships at Edinburgh and at Oxford dangled before his eyes, he proved his good feeling by a faithful adherence to his *Alma Mater*, bound to it by the associations of early training, by affection to Trinity College, which showed a prophetic appreciation of him by electing him a Fellow, the first elected for Natural Science, and held by strong attachment to the circle of friends and pupils who loved and were proud of him, and who deeply lament his loss. The Royal Society had awarded him its medal, and placed him upon its Council. Glasgow had given him its honorary degree. Cambridge had instituted a new Professorial chair and seated him in it, and is even now completing the laboratory which was destined for him, and in which it was anticipated that a long career of sound research and teaching would bring fresh reputation to him, and shed fresh lustre on the University. Alas! the golden bowl is broken, and with it many hearts and many hopes are scattered.

A LOCAL newspaper reports the death of Miss Sarah Hadley, of Stafford Street, Walsall, at the age of 106 years.