THE HUXLEY LECTURE ON RECENT ADVANCES IN SCIENCE, AND THEIR BEARING ON MEDICINE AND SURGERY.

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[ABSTRACT.]

THE lecturer began by stating that he proposed to make this first lecture different in character from, and, as it were, a sort of preface to, those which would follow. His successors would, he supposed, each in turn single out some important new advance in science, and expound in detail its bearings on medicine and surgery. It seemed fitting that this first lecture should take account of the condition of science in the day when Huxley took his seat as a student at the school of Charing Cross, as compared with its condition now; but the lecturer shrank from attempting any general survey of the progress of science, as affecting the profession, during the fifty years which had intervened. Nor would he select what might be deemed the most important steps, and expound these alone. He proposed simply to dwell on one or two themes suggested by the history of science and of the profession during the time in question.

IN THE DAYS OF HUXLEY'S STUDENTSHIP.

The first theme was a special bearing on the profession of the advance of science, which became apparent from a survey of the studies of the medical student in the days of Huxley's studentship, and a comparison of these with the like studies of the present day. An examination of the schedule of compulsory studies issued by the Royal College of Surgeons in the early forties showed that of the sciences ancillary or preparatory to medicine, no instruction was provided in physics, and very little in chemistry, that little coming in the middle of the student's course, and being instruction by lectures only. Of general biology nothing was demanded by the College of Surgeons, save what incidentally came in materia medica, and only a little botany by the Society of Apothecaries. On the other hand, the greater part of each of the three years of study, right to the end of the course, was taken up by what was called anatomy and physiology, but was, in the main, human anatomy, and which alone of the studies was taught practically—namely, in the dissecting room. In appreciating the value of such a curriculum as the above, it must be borne in mind in respect to any science ancillary to medicine, that great as may be the practical usefulness of the facts embodied in the science, far greater is the worth of an adequate study of the science as a mental training. An ill-trained mind bumbles with the facts which are before it, a well-trained mind can pick up the facts as it goes along. The methods of medicine, the mother of most of the sciences, are at bottom the methods of the children sciences; a training in the latter fits a man quickly for the use of the former. At the present day, physics, chemistry, biology, and physiology have each developed into a body of learning, capable, when rightly taught, of being used as instruments of mental training of great value, the right teaching being that by which in the laboratory the student is made to tread in the very steps of those who have built up the science. This is the chief justification of the study of these sciences being made a part of medical education. In the days of Huxley's studentship, things were very different. None of the sciences in question, perhaps not even physics, presented such a body of truths as could be taught in such way as to serve for a real training to the medical student; what was taught to

him was taught merely for the practical utility of the facts. One branch of knowledge only had in that day achieved such completeness, and the machinery for teaching it become so perfected as to be a real engine of culture, and that was human anatomy. The acquirement of that knowledge was at that time the one real discipline for the medical student, and its value as a discipline even exceeded the practical usefulness of the facts of which it was made up. The authorities of that day were wise in making it the backbone of the student's education. To-day we shall be wise if, departing from their letter, we follow their spirit in leading the student along that path of study which will vest and most swiftly arm his mind to grapple successfully with the series of scientific problems making up the doctor's daily life.

COMPLEXITY OF THE PROGRESS OF SCIENCE.

The second theme on which the lecturer desired to dwell was the complexity of the progress of science, and the intricacy of the bearings of even a single scientific observation. No one observation or experiment can be judged as it stands by itself alone. Its effects, and so its worth, will depend not alone or even chiefly on its own intrinsic merits, but also on the way in which it joins hands with its fellows. The bearings of a new truth cannot be rightly expounded immediately on its birth; its value hangs on that which went before, and its power rests on that which is to come. In illustration of this the lecturer proposed to consider the bearings of some three or four physiological discoveries, some three or four observations each the result of experiments on living animals made in the years of, or in those following closely upon, Huxley's studentship.

THE HEART AND THE CENTRAL NERVOUS SYSTEM.

The first such observation was that made by the brothers Weber in 1845, in Huxley's last student year, in which they showed that electric stimulation of the vagus nerve stopped the heart in diastole, or, as we now say, inhibited it. If the question be asked, What has been the gain of that experiment? the answer is that its effects have gone far and wide into the whole of physiology, and thus into the whole of medicine, and indeed have not yet come to an end. It has enabled us to understand, and that more and more clearly as succeeding observations have illumined the original one, how the heart is governed by the central nervous system, a matter which, before Weber's experiment, was merely the subject of fruitless contention, and that has shown us how we too may control it. It has become, in the hands of the physiologists, a method enabling them to solve problems which without its aid had baffled them. But perhaps its most far-reaching effects, and those which even to-day cannot be fully measured, lie in having started a pregnant idea, that of regarding the phenomena of life as the outcome of opposing and antagonistic forces, now carefully balanced, now swaying on this side and on that, an idea which has been a guiding light, even if sometimes misused, in our advancing knowledge of the processes both of health and disease, not only in the tissues of the nervous system, but in all those of the body.

THE VASOMOTOR MECHANISM.

The next such observation to which the lecturer called attention is that by Claude Bernard in 1851, when he showed that section of the cervical sympathetic led to fulness of the blood vessels in the head and face. The same experiment had been made a century or so before, but dropped stillborn: the fulness of its time had not yet come. In Bernard's hand the experiment became the origin, the beginning, and so the cause, of all that advance of physiological and medical knowledge which is indicated by the word "vasomotor." There can be no need to dwell on how this knowledge has entered into and modified our conceptions of physiological and pathological events, general and special; or how, again and again, it comes to the front in therapeutic endeavours. Yet, when Huxley was a student, the very basis of this knowledge was not as yet assured; only the most advanced were prepared to admit that the blood vessels had muscular walls. Bernard's experiment had its strength in Henle's histological demonstration, but has in turn been of such effect that could we draw from the web of the medical knowledge of to-day all that has come of it, that knowledge would become

in large measure a confused tangle—so much do we owe to one single experiment.

THE DISCOVERY OF GLYCOGEN.

The lecturer next dwelt on Bernard's discovery in 1850 of glycogen. The effects of that one observation are again manifold. It had an immediate and direct effect on medicine in throwing light on that terrible disease diabetes, a light which, even if it has not fulfilled the hopes which were first held, has at least, by pointing the way towards alleviation, saved much suffering and greatly prolonged valuable life. But this has been only one, and not the greatest, of its effects. It has had a most powerful influence as the mother of ideas. It was the first clear direct proof of the synthetic powers of the animal body, and as such has been the parent of great additions to knowledge, more especially in these latter days. But its chief influence has been, perhaps, that by showing how a tissue in a hidden way profoundly affects the blood, apart from any visible event, such as an outward blow, of secretion fluid, or a muscular contraction or a nervous impulse. It was the first exemplar of what we now call "internal secretion." Bernard's experiment has the relation of a father to a son towards all those researches on the thyroid and other organs which in our day have thrown so much light on the inner workings of the body, and added such powerful weapons to the medical armoury; and further, doubling, so to speak, on itself, has led us to a knowledge of the work of the pancreas, in the story of sugar, a knowledge which has cleared up much, and promises still more.

WALLERIAN DEGENERATION.

The last illustration taken was Waller's observations in 1850 and 1852 on the dependence of the nutrition of a nerve fibre on its continuity with the body of the nerve cell of which it is a process. This discovery, also the direct gain of experiments on animals, was in itself alone of value as a contribution to our knowledge of the influences which the central parts of a cell surrounding the nucleus exert on other parts of the cell, and perhaps we do not as yet fully realise all that the observation teaches. A still greater effect, however, on the progress of physiology and of medicine has resulted from the guidance and support which it has given to the experimental results of stimulating the cerebral cortex, an effect which yet another result, that gained by the application of the silver method to the histology of the nervous system, is converting into an advance of knowledge of momentous importance. So far as can be seen, the Wallerian degeneration by itself, the experimental results of stimulation by themselves without anatomical support, and the results of the silver method by themselves, would each of them have gone but very little way; the union of the three has produced, and is producing, a movement of theoretical and practical advance, the limits of which it is difficult to foresee.

HUXLEY'S INFLUENCE ON PHYSIOLOGY.

The lecturer concluded by a few words concerning the influence exerted by Huxley on physiology and so on medicine. Debarred by circumstances from fulfilling his early desire to become a physiologist, Huxley was ever ready with a helping hand to others. If English physiology stands at the present day, as it appears to do, in a sound and hopeful position, that is in large measure due to Huxley's direct and indirect influence.

FEVER IN CENTRAL ASIA.—A Reuter's telegram from Merv, dated October 1st, states that during the past two months a malignant fever has raged among the Turcomans, nearly 10,000 persons having been carried off. Most of those attacked are children. A similar violent outbreak of fever occurred in 1893.

EXAMINATION OF PLUMBERS.—Twenty-one operative plumbers were examined for enrolment on the National Registration of Plumbers at the Borough Polytechnic Institute on September 26th. The examinations were to test the candidates' handicraft skill and knowledge of subjects relating to internal and external plumbing and house drainage. The candidates were from Cambridge, Seaforth, Chesterfield, Nottingham, Cardiff, Oxford, Northampton, and various districts of London. Seven candidates succeeded in passing the full examination.

OPENING OF THE MEDICAL SCHOOLS : INTRODUCTORY ADDRESSES.

OWENS COLLEGE, MANCHESTER.

MEDICAL EDUCATION IN THE FUTURE.

By JONATHAN HUTCHINSON, F.R.S., F.R.C.S.

A SOMEWHAT roughly-expressed Buddhist maxim declares that the social duties of a man are three—to beget male children, to build houses, and to plant trees. If, however, we soften the terms a little, and regard them in a broad rather than a literal sense, we shall see that they do very fairly express what is intended. They comprise the moral creed of a terrestrial as opposed to a celestial religion; they recognise the great truths of heredity and of the perpetuity of planetary life, and say that the duty of each generation is to provide its successors, and to provide well for their comfort. It is in the same spirit in which Cicero makes an old man, of whom it was asked, "Why do you labour to plant trees which you cannot possibly live to see grow?" reply so nobly, "I plant for the immortal Gods!"

There is but one topic which commends itself before all others as suitable for an occasion like the present. We are met to open a new session of work in the medical department of Owens College, and our thoughts turn naturally to consideration of the present condition and future prospects of medical education. It is no new one, but its interests are perennial, and it will never grow old. Year by year we may feel sure that the scope of the medical art will widen, that its victories, and at the same time its responsibilities, will increase. With this advance there must also go perpetually recurring attention to the modes of training of those who are to wear its colours and carry its flag. The methods of medical education which did well enough a century ago are inadequate now, and our successors will, it is to be hoped, make great improvements on our own.

It is often asserted, and it is true, that a pigmy on the shoulders of a giant sees further than the giant himself. The rising generation is the pigmy, and the great past is the giant. It is the business of education to help the pigmy up. The simile here fails me, for in our case the giant, helped in turn by the pigmy, goes on growing year by year, and the task of climbing his sides is more difficult. It would, as many here well know, be impossible for me to exaggerate the extent to which the horizon of our profession has widened within the last half-century. In all directions new vistas of knowledge have been opened, and the details which might now not unreasonably be required of a candidate for a medical diploma are such that, in comparison with them, those asked for fifty years ago were mere child's play. Now, in face of this enormous multiplication of things useful to be known, it becomes us to ask whether all has been done that is possible to facilitate their attainment. It may be that we have allowed our machinery to retain too much of its mediæval type, and that it is not now so well adapted as it might be to our much altered requirements. Another suggestion is that we should no longer attempt to comprise the whole, but should deliberately restrict our efforts to that only which we may imagine to be of practical value. This last seems to me much like cutting the giant down by the knees in order that we may climb him the easier.

Let us glance for a moment at the sphere occupied by members of our profession in the past, and that still retained, I trust, by many in the present. It may go without saying that they were skilled in midwifery and knew how to treat fevers, to reduce dislocations, and to set fractures. These and other departments of practice of which these are fair examples were then, as now, the *sine quibus non* of the medical man engaged in practice. In addition to his knowledge of them, however, he was the unfeeling adviser of his friends and patients in a hundred other matters, some of which lay near to his special vocation and others at more or less distance. He was usually, wherever resident, the mainspring in all scientific movements and all that had for its aim the spread of culture. By him superstitions were combated and the operations of Nature's laws