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Lectures

ON

CERTAIN MUTUAL RELATIONS OF PHYSIOLOGY, PATHOLOGY, AND THE PRACTICE OF MEDICINE.*

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LECTURE I.

Physiology in its Relations to Pathology and the Practice of Medicine. Recent Physiological Researches. Cardiac Physiology in Relation to Cardiac Diseases. The Reflex Function of the Nervous System in Relation to Pathology, Diagnosis, and Therapeutics; its Bearings on Certain Organic and other Diseases, etc.

MR. PRESIDENT AND GENTLEMEN,—The mutual relations of physiology, pathology, and the practice of medicine, have ever formed a subject of no less interest than importance to the members of our profession; and I think it is scarcely possible for us to direct our attention too frequently to the questions which these relations involve. It cannot be doubted that, as our knowledge of structure and function has improved, so have we been able more easily, and more fully, to appreciate departures from physiological conditions, and, more rationally and successfully, to apply our remedial measures to the relief of these morbid states; and I think it capable of proof that it is with reference to those organs, the intimate structure and physiological action of which we are best acquainted with, that our diagnosis of disease is most accurate and that our therapeutics are most advanced. But it is not merely with reference to the condition of an individual organ that we form our opinion from the disturbance of its physiological action; but beyond this, and above this, is it not by the application of the same test to the system at large, that we estimate the general condition of a patient, and the impression which a disease has produced on the constitution? Is it not by the amount of functional disturbance which a local affection has caused in the various organs of the body, more especially in the nervous and vascular systems, that we gauge the severity of a disease and regulate our treatment?

In any local affection, the recognition of the extent to which the organ attacked has departed from a physiological condition, both in regard to structure and function—and the one is often, but not al-

ways, the gauge of the other—is the first point to which our attention is directed; but this ascertained, it is the amount of general functional disturbance which is considered. By this we judge of the reflex effects of the disease, or the way in which the system sympathises, if I may use the term, with it. By this we estimate the reserve force which the patient possesses; and by this, also, we judge as to the nature of the therapeutic measures to be employed.

And when, again, we have to deal with those affections which are truly of a specific character, but for which we have, as yet, discovered no distinct method of cure, is it not by the amount of functional disturbance they create, rather than by any local condition which results from these diseases, that we appreciate their mildness or severity? In the management of cases of fever, of small-pox, of measles, of scarlatina, diseases which depend on some poison which has found its way into the blood, and for which no specific remedy has been discovered, we judge of the nature of the treatment which is required, by an appeal to the extent to which physiological actions are perverted.

But it is unnecessary that I should illustrate by examples, or that I should further dwell on, the importance of the subject which I have selected for these lectures. Of the difficulty in which its consideration is involved, no one is more conscious than myself; and I shall not attempt, on such an occasion as this, to deal with it in any other than a very partial manner. To treat fully of a theme so important, would be a task far too comprehensive for such a course of lectures as this. My object is rather to consider briefly a few points which appear to me, not only of practical importance, but of general scientific interest; and I trust that in this first course of lectures which our Society have thought right to institute, no shortcomings on my part will be allowed to mar the prosperity of a scheme, which has been projected with every wish for the welfare of the Association.

In estimating the extent to which various circumstances have influenced the progress of medical science, it must always be a matter of great difficulty to assign to any one of them its proper value; nor shall I even attempt to show the effects which the use of the microscope or the test-tube has had in this respect. That the most valuable aid has been afforded by the microscope to the student of anatomy and physiology, and that the investigations of the chemist have thrown great light on many of the healthy and morbid processes of life, no one will for a single moment doubt; nor can we doubt the influence which anatomical and physiological knowledge has had on the establishment of correct principles of pathology, diagnosis, and therapeutics.

Even with regard to that single science which teaches of the structure of the body, it would be easy to show, did time permit, by taking up any in-

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dividual organ, that in proportion as researches into its minute structure have been attended with difficulty, so has our physiological progress been slow, and so also has our pathology remained imperfect and obscure. The researches into the structure of the kidneys, the liver, the lungs, and the other glandular organs of the body, have brought our knowledge of these structures to a degree of perfection, which has enabled us to see more clearly into the manner in which their functions are performed. It is true, however, that, in reference to some organs, although our anatomical knowledge is definite and precise, there are points in connection with their functions, of which we are still in doubt. We cannot with certainty assign a definite function to the spleen; nor do we rightly understand, in all its integrity, the function of the liver; and in respect to one particular pathological condition of the body, the diabetic, much doubt remains as to the particular organ, whose faulty action gives rise to the morbid secretion which appears in the urine. Even here, however, by pursuing a course of careful experimental inquiry, we seem to be tending towards some more definite conclusion, as to the nature of the disease, than has hitherto appeared probable.

I need not remind you of the investigations of Claude Bernard, which were of so striking, and, at first sight, so conclusive a character. From researches which commenced fifteen or sixteen years ago, Claude Bernard stated he had discovered that the liver possessed a glycogenic, or sugar-forming, power. He found in animals, only recently killed, that the blood of the portal vein, passing to the liver, was devoid of all traces of sugar; whilst that of the hepatic veins, leaving the liver, contained it in large quantities.

The conclusions arrived at by Bernard have been called in question by Dr. Pavy, whose experiments seem to show that the formation of sugar in the liver is a *post mortem* process, due to the rapid transformation of the "amyloid substance", which is stored up in the liver, into sugar. He believes that this change takes place only to a slight extent, if at all, during life.

This opinion, however, has not been confirmed by the most recent inquirers; and the original views propounded by Bernard have received substantial support, especially by Dr. Harley, who has experimented under the direction, and with the assistance, of Professor Sharpey. And, although there is conflicting evidence on the point—which we must naturally expect for a few years, in relation to so difficult and abstruse a subject—the present state of our knowledge seems to prove that, during life and health, a certain amount of sugar is formed in the liver, no matter what the diet may be; but that, as soon as vitality ceases, the quantity formed increases largely.

Now, in reference to a disease like diabetes, in which sugar is formed in excessive quantity in the system, and found largely in the urine, we shall never, I think, arrive at a knowledge of its true pathology, until we have learnt the exact relation which the formation of sugar bears to a state of health; in fact, we must study the disease from its physiological side.

It has been proved of late that the urine contains in health a small quantity of sugar; that a highly diabetic condition may be artificially produced in

animals; and that, as a consequence of certain diseases, or injuries of the nervous system, sugar frequently appears, in considerable quantities, in the urine of man. Anything which tends to produce a congestion of the liver, such as partial asphyxia, a division of the sympathetic, and especially of the medulla oblongata, will give rise to diabetic urine. Further, I have myself found sugar, in quantities to give a decided reaction to the copper test, in the urine of patients recovering from severe illness.

Now, it would occupy too much time to attempt to show how these various causes act in producing the result I have named; but, briefly, I may observe that, just as after death, when the regulating and controlling power of the nervous system is withdrawn, we find that the amyloid substance, stored up in the liver, becomes *rapidly* converted into sugar, so, when the circulation through the liver is retarded, and when, especially, its nervous influence is cut off, do we find that a similar result takes place. And although we cannot say, that diabetes consists either in a general or local deficiency of nervous power, it will be well to bear in mind the facts which experimental physiology and pathology have taught us. Nor need we, I think, despair that we shall yet discover the true nature of the disease. It is by steps such as I have referred to, and by a more careful study of the slightest deviations from normal action, that obscure diseases, like diabetes, will probably receive their full elucidation. And as we come more clearly to understand the relations of this newly-discovered "amyloid substance", the exact part which the liver plays in the transformation of the different elements of the food, and the various pathological states in which an excess of sugar appears in the urinary secretion, we shall probably be able to speak as certainly of the diseases of the liver, whether functional or organic, as we can now in reference to those of another organ, with the physiology of which we are far more intimately acquainted. I mean the heart.

And there are, perhaps, no diseases which show more fully the progress which medicine has made, and the influence of physiological knowledge, than those of the central organ of the circulation. Compare for a single moment, the condition of our knowledge of cardiac diseases at the close of the last century, when but few affections of the organ were recognised, with that of the present day.

We now know that the heart is subject to various diseases; and so great is our power of diagnosis, that we are able to discriminate, not simply whether it is the substance of the heart, or the bag which encloses it, that is diseased; not simply whether the muscular or fibrous structure has undergone a change, but the nature of the change which has occurred in the muscular walls, and the exact set of valves which is affected. And a knowledge of this kind is not only of importance in reference to therapeutics; but also, as I hope to show in a subsequent lecture, in regard to the probable duration of life, and the chances of sudden death occurring. And if, as is sometimes the case, we are told that medicine rests on no scientific basis; that it is founded on no fixed principles; that it is a mere empirical art, without any pretensions to the distinctions of a science; we may, I think, fairly point to the accurate knowledge we possess of the diseases we are referring to, to controvert the allegation. If,

from direct observation and experimental inquiry, we have ascertained the exact nature of the action of an individual organ, that under a condition of health it gives rise to certain phenomena, of whose sequence, of the period of whose occurrence, and of the movements which accompany and cause them, we have precise and positive knowledge; if, starting with a knowledge of these facts of physiology, we meet with the organ in a pathological condition, and pronounce as to its state; and if in the vast majority of cases this opinion shall be found a correct one, what, I ask, is this but the most rigid induction from clearly ascertained facts? and if this is not the practice of a science, I venture to ask, what is?

Nor is it any reproach to medicine that we possess no means by which we can specifically cure the various diseases to which the central organ of the circulation is subject. We know that, although we have no remedy that will absolutely cure a pericarditis, we can by the use of certain therapeutic measures, in the large majority of cases, promote the function of the organ attacked, and guide our patient through the disease. We have reason also to believe that, in reference to one very serious affection of the substance of the heart, in which it undergoes a degeneration of its tissue, we can, by the use of therapeutic means, and especially by the administration of a particular remedy, check the progress of the malady and prolong the duration of life; and in regard to those valvular affections of the heart with which, unfortunately, we so constantly meet, although we know of no means by which the morbid deposits can be removed, we do know that, when the deposit is the result of a chronic action, we can, by regulating the habits of life, by maintaining the physiological action of the various excreting organs, prevent the occurrence of that condition which is most favourable to further deposit; and that thus we can retard, or even check, the progress of the disease. And when these deposits have permanently settled on the heart, is it to be a reproach to the physician that he is unable to remove them? Should it not rather be considered the highest praise, that, by a mere physical examination, he is able to recognise their existence and their exact situation?—that he is able to direct his patient in the course of life which he shall follow, so as to stay the progress of those pathological processes which will necessarily ensue, and that rapidly, unless precautions are taken? Is it nothing, by the simple application of the ear to the chest, to recognise, from the absence of certain physiological phenomena, the results of a past pathological process; to be able to predicate the steps which the disease will take; and to find, as time rolls on, that our prognosis is verified; that, in obedience to pathological laws—laws whose action we are acquainted with—the changes we anticipated ensue, the abnormal takes the place of the normal, pathology steps in where physiology existed, and death slowly succeeds to life.

[To be continued.]

HEALTH OF SAN FRANCISCO. The San Francisco Medical and Surgical Journal says: "If we estimate our present population at 100,000, our rate of mortality has been less than 1 in 49; showing a degree of salubrity which may be advantageously compared with that of any large city in the civilised world."

Lectures ON ORTHOPÆDIC SURGERY.

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LECTURE V. ON CURVATURES OF THE SPINE. (Continued.)

The Causes of Lateral Curvature of the Spine.

Obliquity of the Pelvis, as was stated in the last lecture, is a very common cause of scoliosis. It gives rise first to a lumbar curve, as is shown in Fig. 13. But, perhaps, the mode in which spinal

Fig. 13.

curves are formed will be more readily understood by means of the following diagram (Fig. 14). Suppose the lines A B C D to represent the pelvis and spinal column in their normal relations; namely, that the spinal column forms together with the pelvis a right angle. And let E F represent the pelvis rendered oblique, from whatever cause; and G B the inclined column still retaining a right angle together with its base. How is equilibrium to be maintained? It is manifest that the line G B, if continued, would render equilibrium impossible; and, therefore, a series of curves about the perpendicular line A B are formed for this purpose as is better shown in the following figure (Fig. 15).