

## **Functional disease / by Dr. Allchin.**

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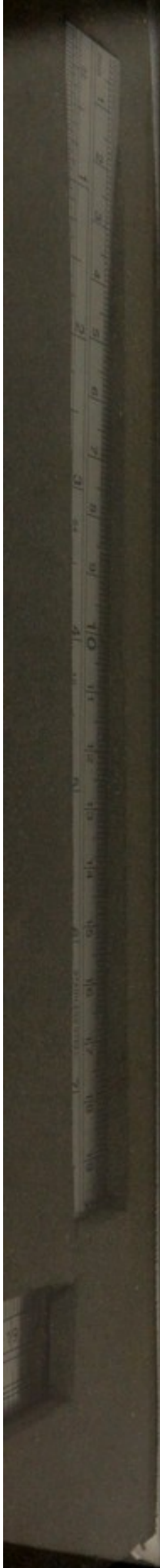
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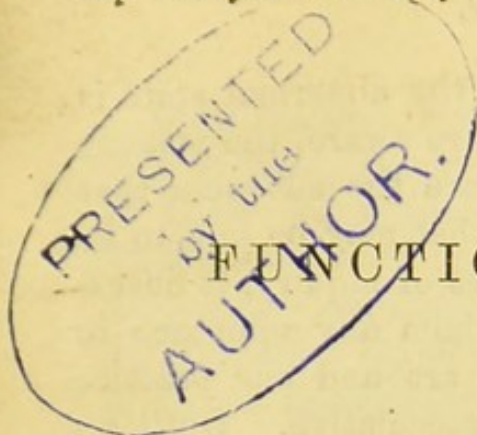
By Dr. A.

"I have explicitly enough spoken of the whole of this religion, that the sciences are full of these meanings right, not to take any term, however useful for anything till they have an idea of it. A word may signify, and be by them made use of as if it would mean them any distinct idea of that being, it is not well to know as well by all that is said of it, or all have empty words. They who would advance in it with a little articulated air, should be done this as a not suppose that names or books signify real entities like of those entities. . . . It is not without empty terms to be found in some learned writers, I agree when their understandings could not be made. I believe the supposing of some realities in nature as personal ones, and quite allied others in the study explain they are, if they are never so abstract or so far from. For no metaphysics being nothing but ideas cannot give us the ideas their words stand for, it is plain to have what the metaphysics, who have none, or some account by a learned term cannot make us have anything it never as long. Whether we are able to comprehend it then is matters not to inquire, but then is certain, we are distinctly meaning, therefore to obtain that they did mean or rather meant something, as well as hypothesis or our understandings. Words are meanings, when they are by those who pretend to something, but that that they cannot in nothing but for there is, in truth, setting the water there."—[L]

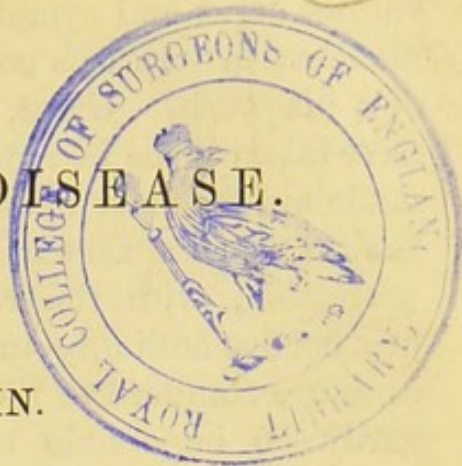
GERMANY,\*—The aim of you is to learn how most successful rational accomplishment of this as completely as you can, the more before you, and fully to do the cases which have led to the de  
\* The substance of the following paper of a lecture.

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## FUNCTIONAL DISEASE.



BY DR. ALLCHIN.

"I have copiously enough spoken of the abuse of words in another place, and therefore shall upon this reflection, that the sciences are full of them, warn those that would conduct their understandings right, not to take any term, however authorised by the language of the schools, to stand for anything till they have an idea of it. A word may be of frequent use and great credit with several authors, and be by them made use of as if it stood for some real being; but yet, if he that reads cannot frame any distinct idea of that being, it is certainly to him an empty sound without a meaning, and he learns no more by all that is said of it, or attributed to it, than if it were affirmed only of that bare empty sound. They who would advance in knowledge, and not deceive and swell themselves with a little articulated air, should lay down this as a fundamental rule: not to take words for things, nor suppose that names in books signify real entities in nature, till they can frame clear and distinct ideas of those entities. . . . It is not without all reason supposed that there are many such empty terms to be found in some learned writers, to which they had recourse to etch out their systems when their understandings could not furnish them with conceptions from things. But yet I believe the supposing of some realities in nature answering those and the like words have much perplexed some, and quite misled others in the study of nature. . . . When men have any conceptions they can, if they are never too abstruse or abstracted, explain them and the terms they use for them. For our conceptions being nothing but ideas, which are all made up of simple ones: if they cannot give us the ideas their words stand for, it is plain they have none. To what purpose can it be, to hunt after his conceptions, who has none, or none distinct? He that knew not what he himself meant by a learned term cannot make us know anything by his use of it, let us beat our heads about it never so long. Whether we are able to comprehend all the operations of nature and the manners of them it matters not to inquire; but this is certain, that we can comprehend no more of them than we can distinctly conceive, therefore to obtrude terms when we have no distinct conceptions, as if they did contain or rather conceal something, is but an artifice of learned vanity to cover a defect in an hypothesis or our understandings. Words are not made to conceal, but to declare and show something; when they are by those who pretend to instruct otherwise used, they conceal indeed something, but that that they conceal is nothing but the ignorance, error, or sophistry of the talker, for there is, in truth, nothing else under them."—LOCKE, *Of the Conduct of the Understanding*.

GENTLEMEN,\*—The aim of your studies here in the wards is to learn how most successfully to treat disease. To the rational accomplishment of this end you must first ascertain, as completely as you can, the nature of the disease that is before you, and fully to do this you must investigate the causes which have led to the departure from health and the

\* The substance of the following paper was originally delivered in the form of a lecture.

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various signs and symptoms by which the abnormal state is manifested. In this consists, as you are aware, the making of a diagnosis. Great, no doubt, as are the advances that have taken place in recent years, and that may be said to be made almost daily in the various stages of inquiry, it nevertheless remains that neither one can claim any approach to perfection, with the result that our art and our practice are correspondingly incomplete and speculative. Until an absolute standard of health can be formulated it must necessarily be impossible to define the limits of disease, and without a thorough knowledge of the influence of the environment on the body, the ætiology of disease must be correspondingly deficient. It may be reckoned fortunate that the advance towards perfection—if it be ever attainable—in our knowledge of disease does not always require a previous acquaintance with what may be assumed as health, since much of our knowledge of normal structure and function has come to be acquired by means of those natural experiments which disease affords. In the recognition of the cause of a malady are to be found a great step towards the true appreciation of its nature and the most pregnant suggestions for its treatment. Supplementary to this investigation of causation, do we note, with the most painstaking accuracy, those evidences of abnormal living action which constitute the symptoms of illness, aided, however, by such helps to our senses as thermometer, stethoscope, microscope, and the like. The art of diagnosis may be said to consist in endeavouring to ascertain "*what* is wrong" from the observation of evidences of the abnormal; to get behind, in short, the symptoms of disease to the structural imperfections upon which they depend, since it is to such imperfections that all treatment must be directed. But whilst such should be our endeavour, we must candidly admit that too often the causal material change of some abnormal symptom is quite beyond our present grasp; our knowledge of the normal is deficient, or our means of detection of the essential nature of what is before us are too imperfect to permit of our recognising *what* is actually at fault. Not infrequently do we meet with cases, wherein we are in doubt even as to what organ or what tissue it is that is diseased, though the patient may be



ill even to death, and post-mortem examination now and then fails to clear up our ignorance. But to consider such cases in other ways than those in which we regard maladies where the lesion is obvious, or to use concerning them a phraseology ambiguous and misleading, is to my mind quite unjustifiable. It is customary to speak of "such disorder as is not preceded by any structural change detectable by our present means of research, and further, because in many cases such disorder tends to recovery, in all probability not often followed by any permanent alteration,"\* as "functional," in contrast to those maladies where the lesion is obvious and recognisable, termed "organic." Although such language is sanctioned by high authority and constant use, I cannot but regard it as mischievous and unscientific; mischievous, as obviously suggesting an idea which its employers even for the most part repudiate, and unscientific, as being opposed to the universal teachings of observation and experience. To justify such an opinion, respectfully but none the less strictly maintained, is the object of my present remarks.

There can, I think, be but little doubt that among the most important, if not altogether the most important, advances in knowledge that have been made within recent years have been the conception of the cosmos in terms of matter and force, the mutual dependence of these, their individual indestructibility with the doctrine of the correlation of the physical forces or conservation of energy. "The two fundamental conceptions of matter and motion will be found sufficient to explain physical phenomena," says Grove.† Clearly the next step was to recognise the relationship existent between these conceptions, and this was done when we were able to say that force is an expression of the condition of matter, and that an alteration in the state or condition of matter implies a change in the manifestation of force and *vice versâ*. Beyond that we do not profitably seek to inquire; with the essence or the cause of these two concepts, true science has at present no concern.

\* "Suggestions as to the *Ætiology* of some so-called System-diseases of the Spinal Cord," by Dr. Donkin ('Brain,' Jan., 1883).

† Address at British Association for Advancement of Science, 1866.



To include within the scope of those conceptions the phenomena presented by living things was a separate effort, and may be said to have fully completed what has well been described as "one of the most sublime generalisations of modern times."\* On this point let me quote from Dr. Burdon Sanderson's address to the British Association for the Advancement of Science (1881): "It would give a true idea of the nature of the great advance which took place about the middle of this century if I were to define it as the epoch of the death of vitalism. Before that time even the greatest of biologists recognised that the knowledge they possessed both of vital and physical phenomena was insufficient to refer both to a common measure. The method therefore was to study the processes of life in relation to each other only. Since that time it has become fundamental in our science not to regard any vital process as understood at all unless it can be brought into relation with physical standards, and the methods of physiology have been based exclusively on this principle. The most efficient of the causes which had conduced to this change was the progress which had been made in physics and chemistry, and particularly those investigations which led to the establishment of the doctrine of the conservation of energy. In the application of this great principle to physiology the man to whom we are most indebted is J. R. Mayer† . . . . who, at a time when the notion of the correlation of different modes of motion was as yet very unfamiliar to the physicist, boldly applied it to the phenomena of animal life, and thus reunited physiology with natural philosophy, from which it had been rightly, because unavoidably, severed by the vitalists of an earlier period." Notwithstanding, however, that the alliance in methods of investigation and in mode of regarding the phenomena of the living and non-living world, and the recognition of their fundamental relation in nature had been thus authoritatively indicated, there have not been wanting among biologists (more particularly those of them whose attention has been specially

\* 'Energy in Nature,' by W. L. Carpenter, B.Sc., 1883.

† 'Treatise on the Relation between Organic Motion and the Exchange of Material,' 1845.



directed to pathology) some who have hesitated at accepting these conclusions, at least in their speech and writings, and this too when they have been most steadfast adherents of the prevailing notions of modern science, and most strenuous opponents of the old doctrine of vitalism. There would seem to have been a disposition to shirk, or a scarce admitted reluctance to accept, the logical consequence of their position. And it would appear that the survival of the phrase "functional disease" is a relic of this half heartedness, of this doubting attitude which its maintainers claim to be "scientific."

Consistently, then, with the principles laid down, we are bound to consider the varied manifestations of vitality exactly as we should investigate a problem in physics or chemistry; investigating them in the same way, and acting on the same assumption that they are but expressions of energy liberated by matter under certain conditions. Such expressions of energy we are in the habit of calling "functions," and the matter through which they are manifested we speak of as tissues and organs. Associated with a peculiar form of matter, of an as yet unascertained chemical composition, are invariably found the characteristic properties which collectively we term life, and certain arrangements of this matter along with variable kinds of non-living material make up the *structure* of the organs and living organisms. The word "organic," which is really in its present significance synonymous with structural, appertains to the arrangement of the parts or organs of living beings, and was more applicable in former days when a definite visible structure was deemed needful for the exhibition of vitality. It may be regarded as the complement to functional, referring as it does to the thing that does, the agent, the organ itself from its anatomical aspect, rather than to the thing done, the action, the function from its physiological side. Adapting these words to our present day conceptions we say that function is the outcome of structure, that given a certain structure under suitable conditions of environment there will follow certain functional manifestations, and that a variation in one implies an alteration of the other. This is the fundamental notion underlying our idea of health and



disease as correlative states, and as health is the functional expression of a certain structure (under healthy or normal surroundings) so disease is perverted function due to some alteration of structure outside those admittedly wide and at present undefined limits which we assume to be healthy. All living action, whether healthy or diseased, is functional, and "functional disease" is as redundant an expression as "functional health" would be, the very fact of vitality of necessity implies the term; I say of necessity, because were it not so the hypothesis of the relationship of matter to force would be only partially applicable, and the prevalent notions of the cosmos must be modified to accommodate this vague and meaningless phrase.

It is not, however, the vagueness or even the redundancy of the expression that leads me to deprecate its use, on such grounds trouble were wasted in contesting it, rather do I advise you to avoid it as actively mischievous by implication and as tending to mislead you in your studies.

In a recent work on 'Chorea and Whooping-cough,' by my colleague Dr. Sturges, is "an endeavour to show that the term is both necessary and expressive," an examination of which attempt will serve to illustrate my position. "If the animal functions were performed always after one pattern," says Dr. Sturges, "every deviation from which could be certainly recognised by a corresponding tissue-change, the definition of disease would be easy and precise. In the actual circumstances, however, the line which separates it from disordered function is in great measure arbitrary. Variations in function, which are temporary and occasional, depend upon material causes no less than do the several phases of what we choose to call disease; and if any one should say that this latter term becomes appropriate so soon as the structure-change becomes appreciable by the senses, such a description implies that the point of division is continually shifting, as the means and opportunities of observation multiply. Thus functional disease signifies no more than the imperfection of our search for the material basis of bodily arrangement; it occupies that interval, which it is the main object of pathology to abridge, between the earliest recognition of disorder in act and the earliest



discovery of structural change on which it depends." Now be it observed that in these remarks, which I have quoted verbatim from one who is a staunch upholder of the fitness of the expression, we have the following points: that variations in function to whatever extent depend on material causes (*i. e.* structural change); but that whilst in some cases these changes are perceptible in others they are not, and to those variations of function whose material causation is *not yet* discovered, the term "functional disease" may be applied. Did, however, the defenders of the phrase stop here I should not be disposed to take much exception, though whilst perhaps admitting the provisional desirability of having some designation for such cases, might still think that a more suitable one might be chosen, one less apt to imply by inference that there is such a thing as disease of function apart from disease of structure.

But it is clear that "functional disease" is not to denote a merely provisional group of perverted actions, the structural changes of which are not yet discovered, a group which is ever narrowing its limits as investigation discovers the material alterations, a term of convenience, in short, as we might have imagined from the words I have quoted; for we read a little further on: "It is not every disorder, of which the material element is unknown, that can rightly be admitted even provisionally into that class. The diagnosis of functional disease as such is not always easy. It requires, in fact, an intimate knowledge both of the limits of function and of the causes on which its variations depend. No disorder can properly be called functional unless it fall within these limits, and unless the causes which are competent to produce its particular phenomena are known to have been actually in operation. . . . So long as the organism remains obedient to its excitant, exhibiting no more than that deviation from its usual method which is commonly recognised as its proper response to the extra strain to which it may be subjected so long, we have that kind of disturbance (of whatever degree) which the term 'functional' accurately describes."

Surely no one believes that the activities of the neuromuscular apparatus, whether they be represented by the



voluntary or reflex movements of health, the "fidgetiness," as Dr. Sturges would call it, of chorea, or the tetanic spasms of strychnine-poisoning, are any or all *unaccompanied* by alterations in the protoplasmic tissues concerned. To a slight extent even the microscope renders the changes visible, whilst the chemical decompositions, and the important fact that the tissues will only perform their functions for a brief time and require rest for repair, are abundant evidences that the nerve-cells and muscle-fibres are not what they were previous to manifesting their irritability and contractility. And if no longer the same, in what way can the difference be but in their structure, however minute the change may be? The same may be said for secreting cells, the protoplasm of which obviously changes with the states of activity and repose. No one hesitates to associate in the relationship of cause and effect the imperfect action of a degenerated nerve centre or muscle with the structural lesion that the microscope lays bare, and that because the muscle-fibre is replaced by fat therefore it does not contract as it should, or, as we are accustomed to find it does, when a certain structure of fibre exists which we call healthy. It may be, and indeed is, difficult, if not impossible, I admit, to define health, or to say at what point healthy function passes into disease, or to draw an exact line between normal and morbid structure, but it is not rational to meet such a difficulty by talking of disease as having no causal structural change. Even healthy activity of our bodies is the outcome of tissue-change, and if vicious action be not due to morbid change, what, it may be asked, is its immediate causation? To call it "functional" is, I maintain, a misapplication of terms, for the word relates to the thing done, the act, the process, and not the agent, the organ, or the tissue.

That I have no way misstated the case will, I think, be apparent from the following:—After mentioning several conditions of body classified as functional disease, such as the reflex spasms of infancy, hysterical emotions, and "the restricted muscular obedience of advancing life," Dr. Sturges says, "such disorders are not to be regarded as mere accidents of life; they are its common incidents due to inherent defect; yet not the defect of disease in the sense of struc-



tural injury, but of unfinished development, or of that natural imperfection of being which is our proper inheritance." If unfinished development be not structural imperfection, I do not understand the meaning of words ; whilst the charming vagueness of the second-named cause cannot obscure the fact that imperfection of being, if it mean anything at all, means incompleteness of bodily structure.

Or, again, Dr. Sturges asks elsewhere,\* " What degree of disorder is to justify the anatomist in making search for its material expression ? " Surely the putting of such a question in such terms would seem to imply that in the mind of the questioner there is a point at which disease ceases to be associated with structure, and that this would seem to be so appears still stronger from the next sentence : " No one will answer any degree of it whatever, since that would be to include the whole of mankind, and would involve the absurdity of making disease a universal possession." Whether it be such an absurdity is perhaps an open question, but I would again ask, is there not here a confusion of idea, a confounding of the admitted difficulty of defining health (structural or functional) with the wholly different question, viz. the direct dependence of function on structure ?

Twenty years ago Dr. Reynolds wrote, in the Introduction to his ' System of Medicine : ' " in the present state of science the *onus probandi* lies with those who assert the constant presence of structural with functional change, and we affirm that those who make the assertion have never proved their point." Doubtless those who at the present day assert the same would find it difficult to prove their point. In the existing state of knowledge it is incapable of proof, but it does claim to be an assertion in harmony with the fundamental principle of our science, which regards no vital process as " understood at all unless it can be brought into relation with physical standards," and " refers both vital and physical phenomena to a common measure." And further, whilst thus placing the question on the same basis as the problems of chemistry and physics, it justifies the retort to those who ask for proof, if disease be not *always* due to some structural change, to what other cause, or kind of cause, can it be

\* ' On Chorea,' by O. Sturges, M.D., 1881.



ascribed? It would only be fair, however, to say that the twenty years interval that has elapsed since Dr. Reynolds located the burden of proof has been sufficient very materially to dispose of much of the three following grounds upon which he justified the use of the term functional disease. That post-mortem we may find evidence of structural disease which gave rise to no symptoms during life, or that many morbid manifestations of function have no recognisable material causation, is only another way of saying that our knowledge is very imperfect and that our powers of observation are very limited. But yet I have reason to think we have discovered a good deal that was quite undreamed of then, and have still certainly associated many symptoms of disease with tissue-changes, unsuspected at that time.

Dr. Reynolds' second reason had best be taken from his own words: "Function is related to structure, as being the wear and tear of the tissues, in other words, the outcome of their life. The essential conditions of the functional activity of a living organ are the nutritive molecular changes it is undergoing, and upon the interstitial movements of repair and waste depend the functional operations. But we should be wrong to confound functions with the nutritive changes which constitute not the function itself, but the condition of its exercise; *e.g.* it is the function of a muscle to contract, and the organ in exercising its function undergoes certain nutritive changes, but these molecular changes are not the functions of the organs, but the condition essential to their performance. The words functional disease denotes such changes as have no recognised morbid anatomy, but such as depend upon corresponding changes in the final processes of nutrition." There would not be many physiologists to-day, I apprehend, who would draw a distinction between the functions of a living tissue and the nutritive molecular changes it undergoes in the sense that would seem to be indicated here. But even did they so, there would still remain the fact that when the conditions of the exercise of a function are altered the function itself is perverted, such conditions being the afore-said nutritive molecular changes, which, as we shall hereafter see, are but a phase of structure.

Thirdly, to deny a structural causation for a malady



because it "consists only in an exaggeration or diminution of the organ of activity by which certain organs perform their functions," would lead to denying that the normal activities of organs and tissues are the expression of changes, however minute in their component materials.

The plea of convenience so frequently urged on behalf of the use of this phrase I am discussing finds expression in most or all of the authorities I have quoted, and is one upon which, I am of opinion, far too much stress has been laid. The late Dr. Moxon, after defining functional disease as "disease without coarse and mechanical change, not disease without any corresponding structural variation, for that is impossible," proceeds to affirm that "there is a practical gain in allowing the term, for the changes of structure may be so minute or remote, and when functions vary in this way without plainly evident structural change, then generally the disorders produced are of a temporary and less significant kind . . . and may be expected soon to recover; by a structural disease we understand one that will resist our medical efforts, and it is from this point of view that the division is practically convenient."\* Yet Dr. Moxon, in the same paragraph as the foregoing, recognises how many are the exceptions to such a definition of functional disease, and himself suggests tetanus and epilepsy as maladies the structural causations of which are (or were sixteen years ago) most obscure, whilst recovery from such is oftener to be hoped for than reasonably expected. The fact is, and the position cannot be escaped from, that all disease is functional, whilst how far the underlying structural changes are recognisable is a mere question of degree, gradually to be overcome as means of observation improve. The changes are none the less real; and the designation of the evidences of those not yet seen by a phrase with a conventional meaning tends to land the user in such difficulties and contradictions as I have above indicated. "There is nothing," said Professor Goodsir, "which has more retarded science and philosophy and the kindred subjects on which human reason has been employed than the introduction of terms with conventional meanings. Men come at last to

\* "Lectures on Pathology," 'Medical Times and Gazette,' July, 2nd, 1870.



defend the terms as if they were the truth, and to mistake an artificial shadow for the substance required.”\* I am very far from seeing the need, or, indeed, the practical convenience, of having a special term for this provisional group of maladies which is constantly growing smaller. Such diseases are not to be regarded as essentially distinct in their causation, their nature, their detection, their course, or their treatment, unless indeed we refuse to search for the material expression of disorder at a certain point, as Dr. Sturges would have us do, when it seems to me we should have to fall back upon a “perverted vitalism” to account for such conditions. The use of the term even by those who hold it to be “impossible for disease to exist without structural variation” is apt to be misleading, and to suggest an interpretation which they would be the last to admit. For those who wait like Dr. Reynolds for proof of the structural lesion in all cases, and who feel the necessity for some appellation which shall denote those maladies not yet associated with a demonstrable tissue-change, the term “functional disease” may be permitted, especially as there is an underlying idea, more or less definitely expressed by them, that there is such a thing as disease without structural imperfection. But in that case it behoves such pathologists clearly to say upon what those disorders do depend, and to formulate the conception of the liberation of energy apart from matter.

The relationship of function to structure, which in abnormal conditions I am here discussing, has, I venture to think with all deference, been obscured rather than explained by the enunciation of the dictum that “function precedes structure.” Mr. Herbert Spencer† observes, “That function takes precedence of structure seems almost implied in the definition of life. If life consists of inner actions so adjusted as to balance outer actions, if the actions are the substance of life while the adjustment of them constitutes its form, then may we not say that the action to be formed must come before that which forms them, that the continuous change which is the basis of function must come

\* ‘Address on Progress of Anatomy,’ 1846.

† ‘Principles of Biology,’ vol. i, p. 167, 1864.



before the structure which brings function into shape? Or, again, since throughout all phases of life up to the highest every advance is the effecting of some better adjustment of inner to outer actions, and since the accompanying new complexity of structure is simply a means of making possible this better adjustment, it follows that function is from beginning to end the determining cause of structure. Not only is this manifestly true when the modification of structure arises by reaction from modification of function, but it is also true when a modification of structure otherwise produced apparently initiates a modification of function. For it is only when such so-called spontaneous modification of structure subserves some advantageous action that it is permanently established; if it is a structural modification that happens to facilitate the vital activities 'natural selection' retains and increases it, but if not it disappears." It is apart from my present purpose to discuss this view of the subject and the inference that has been drawn therefrom, that "the properties of a tissue are more delicate tests of its nature than the structure,"\* except so far as to point out that if the manifestation of function precedes an alteration in structure then clearly such manifestation cannot be the result of such change, and we are entitled to ask upon what does it depend? And I frankly confess to being unable to imagine an answer that does not involve the conception of energy being developed apart from matter. Hinton,† in one of his thoughtful works, pointed out how "the dependence of the active powers of the body upon the decomposition of its substance was rendered difficult to recognise by the order in which the facts are presented to us. . . . The animal body came before men's senses as gifted with a power of acting; this was, to their thoughts, its nature—a property of life. They grew familiar with this 'property' and ceased to demand a cause or explanation of it, and long before it was discovered that with every such exhibition of power there was connected a change in its composition. Only after long study and thorough knowledge of many laws was this discovery made. How, then, should they have done

\* 'Lancet,' 1883, vol. i, p. 1011.

† 'Life in Nature,' by James Hinton, 2nd edit., 1875.



otherwise than put the effect before the cause, and say, 'the animal body has an active power, and as a consequence of every exertion of that power a part of its substance becomes decomposed?' The powers of nature are studied by us in an inverse order; we see effect before we discover causes. And such is the deadening effect of familiarity upon our minds that the seen effect has often ceased to excite our wonder, or stimulate our demand to know a cause, before the discovery of that cause is made."

Whether this be the explanation I cannot say, but the idea that functional succeeds structural change not unfrequently finds expression either in the form of a bare statement or as underlying such questions as the following, which were not long since suggested for discussion at one of the Societies: \* "Is the organic degeneration of the lateral columns of the cord, so frequently associated with spastic symptoms, essential for their production; or may they be accounted for by functional derangement of the same regions, or of the psychical or motor centres? May primary functional disorder eventually lead to secondary organic degeneration?" The contrast between the terms "functional" and "organic" in these questions can leave no doubt but that in the mind of their framer "functional disorder" does occur independently of "organic degeneration," which is one form of structural change. Again I would ask, how can such a view be reconciled with our fundamental conceptions of matter and force and our renunciation of the idea of a vital principal independent of tissue-change?

The various authorities I have quoted differ among themselves very considerably as to the exact significance they would attach to the term; some distinctly repudiating all idea of the possibility of functional derangement without corresponding tissue-change, but employing the expression simply and only for diseased states the anatomical substratum of which is not yet known, and suggesting that it is "practically convenient from a prognostic point of view" (Moxon). Others, again, protest much the same, but soon betray in the lan-

\* Medical Society of London, March, 1886. The questions were not, I believe, actually discussed, and we still remain unenlightened upon the interesting phenomena to which they refer.



guage they employ a tendency towards the belief that there is a point at which the "anatomist is not justified in searching for the material expressions of disorder" (Sturges). Whilst others wait for proof, discriminating meanwhile between tissue nutrition and functional manifestation, though making the former the "condition of exercise" of the latter (Reynolds). There remains but one more standpoint to occupy, and that is, a positive denial of the very existence of structural changes as the cause of some morbid states. To a certain extent this position is taken by those who conceive of functional manifestation preceding structural change, but the assertion is categorically made by a recent writer,\* who says of functional diseases that they are "characterised by the absence of very definite structural alteration to account for the abnormal symptoms, and not only are such changes impossible to discover, but the nature, progress, and termination of the complaint seem to indicate that they are not in existence. In short, the only evidence of any departure from health is the development of the varied abnormalities of innervation which appear to have arisen independently of any demonstrable organic lesion. There is no exact line of demarcation (between organic and functional diseases), the one blending with the other, and both very frequently associated in the same patient. The exact definition of functional disease is thus impossible, and a distinction between the disorders belonging to this class and other affections is an arbitrary one without definite limits, which, as our knowledge advances, will probably require modification. The former may, however, for all practical purposes be generally described as morbid states, usually apyretic, in which there is an exclusive, or at least a predominant modification, of the functions of the nervous system, presenting the double peculiarity of being produced in the absence of any appreciable lesion, and of not by itself necessarily inducing profound or persistent structural change." It does not seem very clear why, if in some diseases no structural alterations actually exist, whilst in others the lesion is obvious, that there should be such a difficulty in drawing a line of distinction between these groups of maladies. As a matter of fact, the difficulty

\* 'Medical Times and Gazette,' Dec. 8th, 1883, p. 658.



is most considerable, but is not that rather to be regarded as evidence of a mere difference in degree of the causal conditions than as consistent with such a very definite opposite as lesion and no lesion? Nor does the making of such a point of the "nervous" aspect of functional disease help the question much. Nervous diseases, we know, are now the fashion, and the extreme difficulty of their study and great complexity of their manifestations may temporarily pardon, though they cannot justify, an exuberance of language and vagueness of thought in respect to them, which a little more positive knowledge will doubtless help to correct. To those who, like myself, would insist on a very real tissue-change as the cause of every exhibition of living energy, healthy or diseased, it is merely shifting the ground to the nervous centres, abnormal changes in which produce impaired innervation which shows itself in the unhealthy performance of the functions of certain parts. Physiology teaches that the nervous system exerts a distinct trophic influence over the tissues; if that be perverted the tissue metabolism will depart from the normal standard, and the functions of the organ be improperly performed, just as surely as if the tissue itself were primarily injured. In both cases a structural change is the causal phenomena, though the site of it be different. In the same article, a few sentences further on, occurs the following, which I add as introducing the position which I myself hold in respect to the point at issue.

"An ordinary act," continues the writer, "motion or sensation, is not accompanied by any visible alteration of structure, although we may hypothetically assume that it is represented by molecular changes in the nerve tissues beyond our powers of appreciation. Should such acts, motions, or sensations become irregular, as in the transport of rage, the tremor of fear, or the palsy of shock, we may conceive there would be corresponding molecular change, but we could not hope to demonstrate such a condition. Finally, should these modifications become permanent, as in chorea, old age, or certain forms of paralysis, we call the results abnormal symptoms, but we do not and cannot expect to demonstrate the minute alterations representative of them. It is to these symptoms, consisting of a perversion of natural activity as a



result of molecular movement, which we cannot anatomically display, that we give the name functional, in distinction from those which are obviously the result of new formation or degeneration process." Herein lies, as it appears to me, the justification of the remark I made that the phrase "functional disease" is an evidence of the reluctance felt by its users to accept the logical consequences of the fundamental principle that "no vital process is to be understood at all unless it can be brought into relation with physical standards." So long as the structural arrangement, *e.g.* the bones, joints, muscles, &c., of the leg, is clear to the naked eye, the power of walking is admittedly dependent on the mechanical arrangement of the parts as clearly as the going of a watch is due to the particular dispositions of its wheels, axles, spring, &c. ; and it is readily admitted that a broken tibia would be a structural cause for an impaired power of walking. The dependence of the healthy performance of the functions of the limb on its structural integrity, or of the disordered action on the damaged structure would be admitted without question. The same principle leads to the recognition of the fact that a degenerated tissue which may require a microscope for its detection will not do the work of a healthy one, and that for the reason that it is not of the same structure ; *because* the muscular tissue of the heart is more or less replaced by fat, *therefore* the cardiac contractions are not of the healthy character ; no one questions the relation of the effect to the cause. Now, I maintain we cannot stop here. Why are we arbitrarily to stop at the limits our microscope prescribes ? "Every molecule has a definite structure ; it not only consists of a definite kind and definite number of atoms, but these atoms are arranged or grouped together in a definite order . . . and we have reached as much certainty in regard to the grouping of the atoms in the molecules as we have in regard to any phenomenon wholly supersensible."\* It may be urged that this idea of molecular structure is but an hypothesis, and one incapable of proof ; but it should be remembered that as a development of the atomic theory it forms an integral part of the all but universally accepted assumption upon which all physical and chemical knowledge rests. To

\* 'The New Chemistry,' by T. P. Cooke, 3rd edition, 1876.



me, I confess, it seems that the molecular structure of the constituent proximate principles of the tissue is but the final stage in anatomical investigation which starts from the body in the dissecting-room ; and at no point in the gradual passage from the clearly visible to this at present intangible is there anything but difference in degree. The only reasonable explanation of the marked difference in properties possessed by isomeric compounds depends upon this theory ; and our present-day conception of the nature of the various forms of energy are based upon this assumption of certain definite, though unknown, arrangements of the atoms and molecules of the material through which the energy in question is manifested. The doctrine of the correlation of the forces proceeds on the same assumption. And consistently with our principles we must regard the contractility of a muscle and the irritability of a nerve as equally the expression of certain molecular arrangements or structure of the respective tissue. Thus will be apparent my objection to the term functional disease as obscuring the structural nature of the underlying change. Nothing, as I have shown, can be reasonably urged on the ground of convenience for its retention, but on the contrary, by diverting attention from what really should be the line of inquiry only makes confusion. There are, however, very practical grounds for condemning the phrase with its inevitable suggestion. The important subject of pharmacology, which deals with the effect of drugs upon the tissues of the body, is mainly founded upon the interactions taking place between the constituent atoms of the drugs employed and of the tissues experimented upon ; and the connection between chemical constitution and physiological action is gradually becoming formulated. I might pursue this aspect of the question much further, but I have said enough to justify my asking you to avoid the use of a phrase which is a remnant of a long-discarded physiology, and one, which with the ideas it perpetuates, can only hinder your progress.







