

and it is equally the object of the CREATOR'S care and contrivance. To Ehrenberg are we indebted for a classification of the infusoria, which has been followed and adopted by all subsequent philosophers. He divides them into two classes; first, the polygastria, and secondly, the rotatoria.

We come next to consider one of the most important results of the improvement of the microscope, namely, the ultimate structure of all organised bodies. We have already shown that the simplest form of monad consists but of a single cell, that many others of the same family are but a collection of individual monads, either attached to a common base or contained in a globular integument. The vibrio, or trembling animalcule, again, for example, is a series of many individuals united together in a flexible chain, from imperfect spontaneous transverse division; and the same remark holds good with regard to the lowest forms of vegetable life. In the larger fungi, or sea weeds, the whole fabric consists of cells, and the fresh water confervæ are merely jointed films composed of cells; common mould or mustiness is a cluster of plants formed of cells only, and in the yeast fungus and red snow the entire plant consists of one isolated cell; and when we carry our observations still further, we find that the most complicated organs both in the animal and the vegetable are made up but of an aggregation of simple cells. These elementary cells have now been detected in almost all the solids and fluids both of vegetable and animal bodies; in the sap and succus proprius of vegetables, and in the blood, chyle, milk, and other fluids of animals; in the fecula, albumen, parenchyma of the leaves, cells of the flowers, etc., of plants, and in the cellular membrane, muscle, brain, nerve, glands, etc., of animals. As far as our present powers of observation go, there is no apparent difference in the formation of these cells, although it cannot but be believed that they must be endowed with specific properties. Thus, for example, one set of cells secretes bile, another fat, another the nervous matter; but how these special products are formed by cells apparently of similar organisation from the same nutrient fluids, we know not: many theories have been advanced. Thus, Dr. Willis has suggested whether this difference may not result from the different modes in which the elementary globules are disposed, and he adds, "it is not improbable that the difference of function they exhibit may yet be found in harmony with, and perhaps depending on, peculiarity of arrangements in their constituent molecules."* In the work of Dr. Mantell before us, another theory is thus hinted at:—

Whether the special endowment belonging to the system of cells of a particular organ depends on the intimate structure of the walls or tissue of such cells; and this structure is so attenuated and infinitesimal as to elude observation: or whether it results from the transmission of some peculiar modification of that mysterious vital force we term nervous influence, are questions to which, in the present state of our knowledge, no satisfactory reply can be given—Thoughts on Animalcules, p. 98.

But although the researches of microscopists have taught us that cells are the extreme limit of animal organisation; that the lowest and highest forms of animal life are but an aggregation of cells, each endowed with specific properties, capable only of performing particular functions; we must carefully guard against the idea that there is, therefore, any identity between these various cells of various animals: any identity, in fact, between the primary cells of the simplest animals or vegetables, much less between those of more complicated organisation. It is to such hasty generalization, to deductions thus made either from a misrepresentation or misconception of facts, that we owe so many of the absurd and fallacious theories of the present day. Perhaps one of the best examples of the errors into which such hasty generalizations inevitably leads, is to be found in a work which has, from its ingenuity and eloquence, gained great popularity; we allude to the Vestiges of the Natural History of Creation. All animals and plants, as we have said, are to be regarded as definite aggregations of cells, endowed with specific properties in the different types, and subjected to a never varying law of development. And yet, overlooking this latter fact, the author has erected a theory of creation which may, perhaps, be best stated in his own words. We quote them as they occur in the fourth edition of the work:—

"The idea, then, which I form of the progress of organic life upon our earth, and the hypothesis is applicable to all similar theatres of vital being, is, that the simplest and most primitive type under a law to which that of like production is subordinate, gave birth to the type next above it; that this again produced the next higher, and so on to the very highest; the stages of advance being in all cases very small, namely, from one species only to another; so that the phenomenon has always been of a simple and modest character."

Or, in other words, the monad was first created; it gave birth to the next species in the link, and so on, until from the monkey sprang man!!

To the unphilosophical reader this doctrine may appear, at a first glance, to bear upon it the impress of truth; but allowing for a moment that such were the case, how is it, it may be asked, that these cells have lost such a remarkable endowment? How is it that the more ambitious monkey do not still convert themselves into or give birth to men? And again, this progressive development, at all events in our present state of knowledge, is directly in contradiction to facts; the stages of advance could not, in all cases, be very small; the difference in the organisation of reptiles and birds, and again, of birds and mammals, is great; and, as far as we know, there is no intermediate class of organized beings to diminish the wide gulf which separates them. Here, therefore, the development could not have been gradual—the stage of advance could not have been very small.

Dr. Mantell was one of the very first philosophers who showed the fallacy of this plausible theory. In the work now before us, he has again adverted to it, and, in our opinion, has clearly exposed the error which pervades it. With an extract, therefore, from his remarks, we will close this part of our subject:—

Although it is now a received physiological axiom, that cells are the elementary basis, the ultimate limit, of all animal and vegetable structures; and that the varied functions, in which organic life essentially consists, are performed by the agency of cells, which are not distinguishable from each other by any well-marked characters; there is not any ground for assuming any identity between the primary cells, even of the simplest species of animals or vegetables, much less between those of more complicated organisation. The single cell which embodies vitality in the monad, or the yeast fungus, is governed by the same immutable organic laws which preside over the complicated machinery of man, and the other vertebrata; and the single cell which is the embryotic condition of the mammal has no more relation to the single cell which is the permanent condition of the monad than has the perfect animal into which the mammalian cell becomes when ultimately developed. The cell that forms the germ of each species of organism is endowed with special properties, which can result in nothing but the fabrication of that particular species. The serious error which pervades the theory advanced in the work entitled the Vestiges of the Natural History of the Creation, has arisen from its author having, in many instances, assumed analogy to be a proof of identity. There is an analogy between the human embryo and the monad of the volvox, in that each consists of simple cells; but there is no more identity between the human and the polygastrian cells, than between the perfect man and the mature animalcule.—Thoughts on Animalcules, p. 24.

But there is another point connected with this part of our subject, which we must not pass over in silence. We have already had occasion to observe that the physician had been indebted to the microscope for many improvements in the treatment of disease. All sciences, indeed have a natural dependence one on another, and any great discovery in one must sooner or later produce a corresponding change in others. The discovery of the fact, that cells were the ultimate limit to which all animal organisation can be traced; that it is by the agency of cells that all the vital functions are produced; that by them the bile, theucus, and all the other important fluids are secreted; naturally leads to the idea, that in many, perhaps in all instances, the origin of disease may depend upon some derangement of these microscopic elements of organisation; and that the maintenance of health may depend entirely upon the integrity of a cell or a cluster of cells. On this point Dr. Mantell justly remarks:—

Hence, we can understand how mental emotions, by disturbing or weakening the vital influence transmitted by the nerves to the cells of any particular organ, may impair the structure and vitiate the secretions, and ultimately induce extensive local disease, long after the cause of the physical derangement has passed away, and is forgotten. Of the truth of this remark, pulmonary consumption, alas! affords every day the most unequivocal and melancholy proofs. But the tree of knowledge yields good as well as evil fruit; and if recent microscopical discoveries are calculated to alarm the timid, by showing what slight causes may lay the foundation of fatal diseases; on the other hand, they encourage the cheering hope, that, by patience and perseverance, we may, at length, learn how to detect the first stage of disordered action, and correct the functional derangement ere the structure of the organ is seriously impaired.

And it is only by such patient and continued observations, it is only by taking advantage of the light thus thrown upon their path by the discoveries in other branches of science, that physicians can hope to raise medicine from an empirical art, which even to this day it, in a great measure, is, to the rank of a true science.

* Cyclopædia of Anatomy and Physiology, vol i, art. Animal.