

the influence of the same laws as those which govern the life of vegetables, but to be in one sense diametrically opposed to the latter; for firstly, as to matter, it requires for its maintenance to be supplied with organic compounds, animals not possessing the power of appropriating to themselves mineral matter;* and secondly, as to force; it is supplied with no dynamic agency from any external source, at least not in the same direct manner that plants are.

This difference may be briefly expressed by saying that through plants the other physical forces are converted into chemical force; and in animals this chemical force is reconverted into the ordinary forms of physical force, and so returned to its former state. In each case, by its passage through particular forms of structure, taking on, in some part of its course, the various forms of force called vital. And did this hold good throughout it would afford an exceedingly beautiful and useful line of demarcation between the two kingdoms, but unfortunately as with all other distinctions, the exceptions to it are numerous, though with them we need not now concern ourselves, as they have not the least effect upon the theory for which I am contending.

Now these two facts are easily seen to be intimately connected with one another; for as the food of animals is organic matter, that is, matter in a state of weak union, of highly complex chemical constitution, the elements of which readily, upon the least provocation enter into more intimate combination, at the same time (Law III) evolving force, so animals may be said to appropriate force along with the matter they eat.

Further, plants receiving force from without, do not again while they continue to live, or even perhaps till long after their death, give out that force but hoard it up; whereas animals taking in this force with their food, give it out in the performance of all their functions, such as innervation, muscular action, secretion, &c., and after the animal body has arrived at its full size, so that it requires no force or matter to be used in building it up which is not again given out in its breaking down, it stands in the same relation to force that it does to matter, not retaining any but giving out in some form or other all that it receives. But it will of course be observed that this is not the case as long as any processes of growth or development remain to be accomplished.

Let us now consider the animal organism in the same way as we have done the vegetable, and to do so let us begin with the egg.

The egg being subjected to a certain degree of heat, probably required to give mobility to the particles of which it is composed, and not itself meant to be converted into vital force, soon enters into the same sort of decomposition as did the seed in the former case, oxygen is absorbed, and carbonic acid and perhaps water is given out, through the minute pores of the shell or sac as the case may be, in which the egg is enclosed. As a consequence of the formation of these simple and stable bodies from the elements of other complex and unstable bodies, together with free oxygen, force is evolved. (Laws I and III). At the same time

*I do not speak here of the water used by animals, because although they ingest and in a sense assimilate it, it evidently can take no active part in the economy, as do the organic articles in their food, and though it is extensively used, it is so as a purely passive agent.