

36.  
The  
"physical"  
method.

There is, however, a second way open to the student of the phenomena of life, and this may be termed the "physical method," as opposed to the "structural." Thus chemists and physicists first establish the general laws of motion and change in dynamics and energetics, and subsequently apply them to special problems, such as those of physical astronomy or the chemistry of electrolysis and solution. Similarly the physiologist may study the processes common to all living matter, and look upon the action of a definite cell, tissue, or organ merely as an application of these general processes. From this point of view structural biology, like structural chemistry, only furnishes illustrations, not an explanation, of the vital processes: the special structure or organ is a result of the process or function—not its cause. As Prof. Michael Foster says, "We may throw overboard altogether all conceptions of life as the outcome of organisation, as the mechanical result of structural conditions, and attempt to put physiology on the same footing as physics and chemistry, and regard all vital phenomena as the complex products of certain fundamental properties exhibited by matter, which, either from its intrinsic nature or from

plasm. Protoplasm consists of a ground mass in many cases completely homogeneous, in most cases very finely foam-like or honeycomb-like, in which lies embedded a greater or less quantity of very various solid elements or granules. In the foam-like protoplasm the granules always lie at the corners and angles where the foam-vacuoles come together, never in the liquid of the bubbles themselves." Some physiologists think that none of

the descriptions of protoplasmic architecture help us much, and "hold to the fundamental principle that living matter acts by virtue of its structure, *provided* the term structure be used in a sense which carries it beyond the limits of anatomical investigation—*i.e.*, beyond the knowledge which can be attained either by the scalpel or the microscope" (Burdon Sanderson, 'Address,' Brit. Assoc., 1889, p. 607).