

structure has suggested which is of physiological interest. The idea is, that a cell consists of a relatively stable living framework, and of a changeful content enclosed by it. Prof. Burdon Sanderson expresses it thus: "The framework is the acting part, which lives and is stable; the content is the acted-on part, which has never lived and is labile, that is, in a state of metabolism or chemical transformation". This view naturally leads those who adopt it to regard protoplasm as a sort of ferment acting on less complex material which is brought within its sphere of influence. It is the strange characteristic of a ferment that it can act on other substances without being itself affected by the changes which it produces, and that it can go on doing so continuously with a power which has no direct relation to its amount. In these respects a ferment is suggestive of what many suppose living matter to be. We may note, however, that to credit the framework with essential vitality and to regard the interstitial content as merely material is an assumption, comparable to that which exalts the chromatin of the nucleus and depreciates the achromatin.

Another certain fact is, that the functioning of cells is often demonstrably accompanied by marked changes in the physical appearance of the cell-structure. Relatively simple illustrations are furnished by glandular cells, like those of the pancreas, as described by Heidenhain and others; more difficult instances are the structural changes of nerve-cells after prolonged function, as demonstrated by Hodge, Mann, and others. There is no doubt that a considerable area in the cell is often affected by vital function, and this might be called the protoplasmic area. In such facts, at least, a basis might be found for another conception of protoplasm, that it is itself the seat of constant change, that it is constantly being unmade and remade, that it is the central term in a metabolic series. Thus Prof. Michael Foster speaks of protoplasm as if it occupied the summit of a set of chemical staircases. On the one hand, there is an ascending series of assimilative or constructive chemical steps, with each of which the material taken in as food