INTRODUCTORY: CELLS AND TISSUES

Enzyme Action.-We lay stress upon a proper understanding of enzyme action because we regard it as being a type of much of what we call metabolic processes in the cell; we shall constantly recur to the conception here indicated. We understand first of all, that there are enzymes¹ in the cell and enzymes outside the cell, the latter being elaborated in the cell and discharged. Each enzyme acts upon a particular substance or series of substances in the external mediumptvalin upon starches, making sugars; pepsin upon proteins in an acid medium, making peptones; trypsin upon proteins in an alkaline medium, and steapsin upon fats. It is not possible to obtain the enzymes free from combination with protein bodies; as the proteid material disappears from the solution the enzyme action disappears. Finally, an extremely minute amount of combined enzyme and protein can convert a maximum amount of fermentescible substance, and yet the enzyme itself be not used up; the action does cease, however, when the products of fermentation have accumulated up to a certain point.

It will seem strange to the reader, at this juncture, to say that enzymes do not exist, but such seems to be the case. Enzyme action does, but enzymes as definite chemical entities in all probability do not. Enzyme action is an interaction between a proteidogenous molecule, and a fermentescible substance present in the same medium, part or the whole of the molecule acting on part or the whole of a molecule of the fermentescible substance with the result that a new substance appears—the product of fermentation.

The Enzymes.—Enzymes are intracellular and extracellular; the former act in such close combination with the biophore, the compound protoplasmic molecule, that we have to conclude that their action is part and parcel of the activity of the biophore. This is proved by the fact that such enzymes cannot be extracted, in fact, are not existent in the molecule unless it be alive. If this be true of the intracellular enzymes, it is also true of the extracellular; these enzymes, in fact, are free protein molecules, divorced from cellular relationship, but still manifesting a characteristic of life, viz., that of being able to act upon other molecules and cause their rearrangement.

Some hold that enzymes act by **katalysis**, but this view we do not advocate. They consider the ferment as a body possessing active molecular vibration, so that, in apposition to molecules of the fermentescible substance, it communicates to them its vibration with the result that their particles are shaken into a new arrangement and the fermentescible becomes the fermented substance. This is the explanation given of the process by which finely divided platinum converts hydrogen peroxide into water and oxygen, and this process is katalysis. A more satisfactory explanation of ferment action seems to be that exemplified by making sulphuric acid from sulphurous anhydride by the mediation

 1 To prevent confusion we employ the term *enzyme* to designate those ferments which are produced by the living cell, to distinguish them from inorganic ferments, e.g., gold and platinum.

28