

ern chemistry, who by ingenious experiments discovered that the essential feature of the chemical process in the animal is combustion or oxidation, and that the amount of oxygen required by such combustion is not much less than that needed to burn substances which resemble the foods in the air. The problems which thus arose have been studied by a host of later investigators, notably by Liebig and Voit, and gradually a vast array of facts concerning the turnover of matter and energy in the body have been accumulated. Among other achievements is the proof that the principle of the conservation of energy applies to the living organism. These have been chemical investigations, carried out by chemists, and for that reason, until quite recently, they have not received their due in general biology.

Meantime, as knowledge of the balance sheet of the body, the total metabolism so-called, has been perfected, more and more interest has developed in the changes which attend the passage of matter and energy in their various stages through the organism. Such problems at once demand a physico-chemical description of protoplasm as a necessary basis for their solution. The same demand has also arisen in other quarters.