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## CONTRIBUTIONS OF THE CHEMIST TO OUR KNOWLEDGE OF BIOLOGICAL OXIDATIONS<sup>1</sup>

THE contributions of the chemist to our knowledge of biological oxidations are today of such magnitude that they constitute a subdivision of biochemistry. A mere enumeration of the problems which have been solved would be of little purpose; on the other hand, to speak at length on a few interesting details would be evidence of lack of appreciation of the great contributions which have been made. I shall therefore try to point out the methods by which the various types of investigation have been carried out rather than give great detail concerning any one investigation.

### CALORIGENIC RELATIONSHIPS

The problem of the oxidation of foodstuffs may be considered from the standpoint of the three classes of compounds, carbohydrates, fats and proteins. The calorogenic relationships were placed on a firm basis when it was shown that the same amount of heat was produced whether glucose was burned in the body or in a bomb calorimeter. Studies in the complicated apparatus necessary for direct calorimetry have now given way to the analysis of expired air, and for most work all the essential data may be obtained by indirect calorimetry.

After it had been shown that 1 gm. of glucose, 1 gm. of fat and 1 gm. of protein furnish to the animal organism 4.2 calories, 9.46 calories and 4.3 calories, respectively, it was realized that all the essential data required to estimate the diet requirements of an animal organism were at hand. These data, however, furnished no information concerning the mechanism by which glucose, fats and proteins were burned in the animal organism.

### INTERMEDIARY METABOLISM

Despite the large amount of work carried out in the field of intermediary metabolism many important questions remain unanswered. Embden and Meyerhof have shown that glucose apparently is utilized through the decomposition of a hexose phosphate, and the work of Hill and Meyerhof is very suggestive that at least a portion of the lactic acid is burned to

<sup>1</sup> Presented as part of a symposium on "The Contributions of Other Sciences to Medicine" at the annual meeting of the American Association for the Advancement of Science, Nashville, December 28, 1927.

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