THE APPLICATION OF ISOTOPES TO THE STUDY OF INTERMEDIARY METABOLISM

By RUDOLF SCHÖNHMEIER and D. RITTENBERG

DEPARTMENT OF BIOLOGICAL CHEMISTRY, COLUMBIA UNIVERSITY

The number of organic compounds involved simultaneously in the multitude of diverse chemical reactions in the living organism is exceedingly large. Substances are continually being degraded, while their split products are linked together again to form new compounds, and all these reactions and their reaction products are held in equilibrium so that the composition of the cell and the organism stays constantly within narrow limits.

By adding to this complicated system an excess of one of the components, it is in many cases possible to follow its conversions, provided one has some general idea as to its fate. Herein lies the principle of the classical balance experiments. In order to determine the fate of one of the constituents of the organism, the substance is given in large quantities and the tissues or excreta are investigated for the presence of related compounds in abnormal amounts. This method has proved to be extremely valuable, and most of our knowledge of intermediary metabolism is based on experimentation of this kind. Unfortunately this method has theoretical limitations. Many body constituents, especially the more active ones, are never produced in excess of the animal's requirements, even if the building material is available in large quantities. Another obstacle which sometimes makes the interpretation of such balance studies extremely difficult is the known fact that one substance may induce the formation of others without itself being involved in the synthesis. Thus, for instance, insulin induces glycogen formation, and fat induces an increased for-