auspices David Rittenberg came from Urey's group to the laboratory in which Schoenheimer had been working for a year. From their association there developed the idea of employing a stable isotope as a label in organic compounds, destined for experiments in intermediary metabolism, which should be biochemically indistinguishable from their natural analogues. Justification for this scheme was found in the established fact that the hydrogen in organic matter displays the same isotope abundance as that in common water. Exploratory experiments soon showed that the feeding of 4,5-deuteriocoprostanone led to the presence of deuteriocoprosterol in the feces and that the ingestion of fat containing combined deuteriostearic acid was, surprisingly, followed by the rapid deposition of a large proportion of it in the body fats.

A similar effect was then observed to occur in animals the body fluids of which were enriched with heavy water; deuterio fatty acids appeared in the depot fats and reached a maximum in a strikingly short time. Conversely, with ordinary water in the body fluids, the isotopic label in the depot fats disappeared equally rapidly. This rapid interchange between components of the diet and of the tissues proved on further investigation to involve not only direct replacement of chemically identical fatty acids but rapid transformations, notably desaturation, saturation, degradation, elongation and reduction to alcohols. The only natural fatty acids which appeared not to be synthesized by the rat were the highly unsaturated acids known to be essential for health.

As soon as the stable isotope of nitrogen, N^{15}, became available, Schoenheimer and his colleagues applied it to an analogous study of protein metabolism. Amino acids synthesized from isotopic ammonia and added in small quantities to the diet of adult rats in nitrogen equilibrium were found to be rapidly and extensively incorporated in the tissue proteins. Like the fatty acids, they also gave evidence of chemical transformations; after the ingestion of isotopic amino acids or ammonia, heavy nitrogen was found in all amino acids isolated from the proteins, except lysine. Advantage was also taken of the possibility of labeling compounds with both isotopes, the ratio of which in the products isolated from tissue proteins indicated the extent to which the carbon chain of an amino acid had followed a different metabolic pathway from that of the nitrogen atom.

As a result of Schoenheimer's investigations, of which but a few examples have here been outlined, there has emerged a concept of metabolic "regeneration," wherein the central idea is the continual release and uptake of chemical substances by tissues to and from a circulating metabolic "pool." Coincident with these cyclic processes there occur among the components of the pool multitudinous chemical reactions, of which only relatively few are concerned with elimination of waste products. These general interpretations were summarized by Schoenheimer in his Harvey Lecture of 1937 and his Dunham Lectures of 1941.

Schoenheimer died by suicide, at the height of his productive career, on September 11, 1941. Few men had more reason for desiring to live; his work gave him intense satisfaction, and its increasing importance was widely recognized. He was surrounded by devoted friends; all who knew him held him in admiration and affection. He leaves his mother, a brother; his widow, Salome Glücksohn Schoenheimer, is an accomplished embryologist.

One of Schoenheimer's most striking characteristics was his ability to correlate pertinent facts from highly diversified branches of knowledge and bring them to bear upon problems under immediate consideration. He not only sought the advice of experts in fields other than his own, but freely discussed his scientific plans with his colleagues as well as his direct collaborators. He led his research group with tact, understanding and constant stimulation.

HANS T. CLARKE

DEPARTMENT OF BIOCHEMISTRY,
COLLEGE OF PHYSICIANS AND SURGEONS,
COLUMBIA UNIVERSITY

DEATHS AND MEMORIALS

DR. THOMAS HERBERT NORTON, research chemist, from 1883 to 1900 professor of chemistry at the University of Cincinnati, died on December 2 at the age of ninety years.

DR. CLYDE SHEPARD ATCHISON, since 1912 professor and head of the department of mathematics at Washington and Jefferson College, died on November 21, at the age of fifty-nine years.

DR. FREDERICK HUTTON GETMAN, director of the Hillside Laboratory at Stamford, Conn., from 1909 to 1915 associate professor of chemistry at Bryn Mawr College, died on December 2 at the age of sixty-four years.

A MEMORIAL service for the late Walter Granger under the auspices of the American Museum of Natural History and the Explorers Club of New York was held on November 25.

ACCORDING to an Associated Press dispatch the Government of Newfoundland has issued a five-cent postage stamp in honor of the late Sir Wilfred Grenfell, medical missionary, commemorating the fiftieth anniversary of the founding of the Grenfell Mission.