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SYNTHESIS AND DEGRADATION OF PROTEINS IN THE LABORATORY AND IN METABOLISM[1]

By MAX BERGMANN

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EVER since men have interested themselves in the study of the chemistry of vital processes the proteins have exercised a peculiar fascination. Many of our most distinguished investigators have been engaged in problems associated with their chemistry and metabolism. I need mention only such names as Dakin, Levene, Osborne and van Slyke among others in order to recall to your minds the achievements of modern protein chemistry in this country. Nevertheless, we are still far from an exact knowledge of the structure of a single protein molecule.

The foundations of our modern knowledge of proteins were laid for the most part by Emil Fischer and by Albrecht Kossel. These investigators provided the methods by which we separate and recognize the individual products resulting from the hydrolysis of proteins. To Fischer we owe the method of welding together the constituents of proteins by laboratory methods to form peptide structures resembling in character the proteins themselves. Fischer succeeded in synthesizing an octadecapeptide containing glycine and leucine. The latter striking synthetic achievement itself indicates, however, the unfortunate limitations of Fischer's methods, the application of which is confined almost exclusively to peptides containing the simplest amino-acids and the monoamino-monocarboxylic acids. Such peptides do not contain the free amino, carboxyl and guanidino groups, which are present in the natural proteins; they do not in fact contain the more complicated and therefore more interesting amino-acids.

If it is desired, therefore, to imitate the synthesis

[1] Lecture given November 17, 1933, in the Rockefeller Institute for Medical Research, New York.