

SYMPOSIUM ON PHYSICOCHEMICAL METHODS IN PROTEIN CHEMISTRY¹

INTRODUCTION TO THE SYMPOSIUM

D. A. MACINNES

Laboratories of The Rockefeller Institute for Medical Research, New York, New York

Received March 26, 1942

If at any time the progress in the direction of the understanding of the chemistry and physics of proteins appears to be slow it may be well to recall that, as late as twenty years ago, there was a school of physical chemists which held that proteins could be regarded as structureless continua the properties of which were considered to be determined by the state of dispersion and by materials adsorbed on the surfaces produced by such dispersion. The impossibility of holding such an opinion at the present time is a rough measure of the advance in this field. While it is true that no single fundamental problem concerned with proteins has been finally solved, the tools with which such solutions will finally be attained may very well be in hand. The following papers, which are the result of a symposium held at a meeting of the American Chemical Society at Atlantic City on September 9, 1941, illustrate the diversity and the power of the physicochemical methods now available. One of the first breaks with the older "colloidal" conceptions was that produced by Sørensen and by Loeb when they showed that proteins can combine stoichiometrically with acids and bases. Svedberg and his school have shown that proteins have definite molecular weights. Tiselius has demonstrated that proteins have reproducible electrophoretic mobilities at given pH values and ionic strengths. It has been shown by Northrop and his associates that these substances have definite solubilities and are thus components in the sense of the phase rule. The diffusion measurements of Lamm are also consistent with the assumption that proteins are large molecules of definite molecular weight. To interpret the results of dielectric-constant measurements, and with the ultracentrifuge, the shapes of the protein molecules must be considered. Improved analytical methods, due largely to Bergmann and to Van Slyke and their associates, have demonstrated that proteins have definite chemical compositions.

One result of the use of these physicochemical methods is the ever-increasing number of proteins that can be proved by all the tests available to be definite chemical substances. The importance of these pure proteins to chemistry and physiology can hardly be overestimated.

In addition to the papers published in this number of *Chemical Reviews*, papers

¹ This Symposium was held under the joint auspices of the Division of Physical and Inorganic Chemistry and the Division of Biological Chemistry at the 102nd Meeting of the American Chemical Society, Atlantic City, New Jersey, September 8-12, 1941.

were also presented at the symposium by Dr. David Rittenberg on the investigation of the composition of proteins by means of isotopic tracers, and by Prof. W. D. Harkins and Dr. G. E. Boyd on the study of proteins with surface films. It is to be regretted that the defense researches of these authors have made it impossible to prepare these papers for publication.