The collection of articles in this special topical section were prepared based on presentations made at the 1993 Annual Meeting of AIChE. The theme of the session was the applications of molecular thermodynamics to problems of protein structures, solution properties, transport properties, separations, and other issues important to chemical engineers in the biotechnology, biomedical, pharmaceutical and food industries. These articles were submitted to and survived the regular Journal *reviewing procedure; they were grouped to highlight this important area with a concentration of articles similar to the special section we published last year on new imaging techniques. Further background on this subject is given in the following remarks by Bramie Lenhoff and Mike Paulaitis.*

Matthew Tirrell
Editor

Introduction to Cohn & Edsall Symposium Articles

The articles in this group were contributed by participants in a session at the 1993 Annual Meeting of the American Institute of Chemical Engineers to commemorate the book titled *Proteins, Amino Acids and Peptides as Ions and Dipolar Ions* by Edwin Cohn and John Edsall, published 50 years earlier. Our motivations for holding this session and subsequently publishing the articles as a collection in the *AIChE Journal* were twofold. The first was our desire to introduce to chemical engineers a book that has influenced our own teaching and research in biochemical engineering through its approach to seek a clear quantitative relationship between the molecular structure of proteins, peptides, and other biomolecules and their solution thermodynamic properties. The second was to showcase research today, within the chemical engineering community, that embraces this molecular thermodynamic approach to resolve protein structure/solution property relationships.

Why should the Cohn and Edsall book be of interest to practicing chemical engineers today, not just historians? The work of more than half a century ago has dated little for several reasons. The volume provides an encyclopedic overview of the state of knowledge of protein biophysical chemistry around the time of World War II, most of which had emerged in the preceding two decades, at a time when little had been known about the structure of proteins and peptides. Thus, much of the research effort was devoted to physical measurements of the properties of amino acids, in conjunction with theoretical work directed mainly at developing models that would aid in inferring structural information about proteins and peptides from the measured behavior of these molecules. The actual structures were obviously more complex than those employed in the idealized models, but the key effects are still generally thought to be the same as those discussed in Cohn and Edsall. Thus, the model formulations and predictions presented in the monograph remain largely correct in a conceptual sense, and it is only in the last decade or so that experimental, theoretical, and computational capabilities have made application of these concepts possible in a more realistic fashion.

Additional links to chemical engineering have flowed from the evolution of the disciplinary boundaries in science and engineering. The foundations of protein biophysical chemistry summarized in Cohn and Edsall were developed contemporaneously with the great advances of the 20s and 30s in other disciplines, such as physics and chemistry. Edwin Cohn and John Edsall often interacted with their counterparts in these and other disciplines–George Scatchard and John G. Kirkwood were major contributors to the volume—and the term "interdisciplinary research" applies as accurately to much of that work as it does to much of biochemical engineering today. Many of the basic sciences touched on in the book have since become part and parcel of chemical engineering: classical and molecular thermodynamics, transport phenomena, rheology, and colloid science. In addition, several contributors to the monograph, whose early work was in protein physical chemistry, went on to become well known in other fields associated with chemical engineering, such as John D. Ferry in polymer rheology.

The state of protein biophysical chemistry that provided the historical context in which the book was written was eloquently portrayed at the meeting by John T. Edsall, coauthor of the monograph and Professor Emeritus, Department of Molecular and Cellular Biology, Harvard University. Professor Edsall's participation was made possible through a contribution from the Merck Company Foundation. His thoughts also provide a fitting introduction to the articles presented here.

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