

Focal contributions to Life Sciences and Biophysics in the 20th century

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Introduction

The purpose of this venture is to write a personal history of the biophysical sciences based on focal contributions from about the beginning of the 20th century, as seen at almost the end of maybe the most evolutionary, or rather revolutionary, period in the development of the natural sciences. By personal history I emphasize that it is not a complete history as produced by a historian, but rather a live presentation of a selection of scientists, laboratories and events as encountered in the course of a scientific career extending from about the middle of the 20th century to the present day. Thus part of the story is based on personal encounters and recollections, and part on events and personalities close to my own existence, but in contact only through their work or through common personal connectivities. I acknowledge a large number of written recollective contributions, quoted in this work, from which I have culled material for my efforts within the framework, albeit incomplete, of presenting the drama of discovery from various points of view, in a hopefully unified way. I also acknowledge valuable criticism from many highly qualified friends and colleagues who have experienced the same thrill as myself, maybe from a slightly different point of view.

Scientists and Laboratories

Scientists and Laboratories considered in this enterprise are as follows:

(1) Cohn and Edsall, authors of the classical book *Proteins, amino acids and peptides*; Scatchard, known to all for the Scatchard plot designation, contributor to electrolyte and physical protein research on a basic broad level; Stockmayer, basic theory in polymer research (Harvard University, MIT, Boston); (2) Kirkwood, Onsager, Fuoss, Sturtevant, followers of Gibbs in thermodynamic, electrolyte and, more recently, in protein calorimetry research (Yale University, New Haven); (3) Mark, Alfrey, Morawetz, Fankuchen, Zimm, the famous and original Polymer Research Laboratory founded by Mark, active in theory, experiment and crystallography (Brooklyn Poly, Brooklyn); (4) Debye, Hermans, Overbeek, Verwey, Staverman, the Dutch School in experimental and theoretical physical and biophysical chemistry (The Netherlands); (5) Eyring, Kauzmann, fundamental physical and biophysical theory, water structure and

hydrogen bond interactions (Princeton University, Princeton); (6) Pauling, polypeptide secondary structure and much more (Caltech, Pasadena); (7) Linderstrom-Lang, where and with whom many outstanding scientists met and collaborated in mid-century and in mid-Europe (Carlsberg Laboratory, Copenhagen); (8) The Katchalsky(i) Brothers, polyelectrolyte theory and practice, membranes, mechano-chemistry and irreversible thermodynamics, synthetic poly-amino acids, models of biological structure; Sela, chemical immunology; Lifson, theory, theory and theory; Wilchek, the avidin/biotin system (Weizmann Institute, Rehovot); (9) Flory, Fox, Casassa, polymer, polyelectrolyte, protein and nucleic acid theory and experiment, analysis of multicomponent systems (Mellon Institute, Pittsburgh); (10) Hill, Schellman, von Hippel, biophysical theory and practice (Oregon University, Eugene); (11) Perutz, hemoglobin; Kendrew, myoglobin; Watson and Crick, DNA; Klug, virus, tRNA and chromatin, structure and function (MRC-LMB, Cambridge); (12) Tomkins, Felsenfeld, Davies, Gellert, Anfinsen, Eaton, Bax, protein structure, folding and unfolding, DNA, polyA and chromatin, immunology, hemoglobin, crystallography and NMR (NIH-LMB and LPC, Bethesda); (13) Antonini, Brunori, Chiancone, Wyman, hemoglobin function, binding and linking (Rome University, Rome); (14) Eigen, fast chemical and biological reactions, principals of evolution and the origin of life, the yearly January Winterseminar in Klosters (Max Planck Institute, Gottingen).

Selected Publications:

- Eisenberg, H. (2002) Focal contributions to molecular biophysics and structural biology: A personal view. Part III. *Biophysical Chem.* (in press)
- Eisenberg, H. (2002) Focal contributions to molecular biophysics and structural biology: A personal view. Part II. *Biophysical Chem.* (in press)
- Eisenberg, H. (2002) Focal contributions to molecular biophysics and structural biology: A personal view. Part I. *Biophysical Chem.* (submitted)
- Eisenberg, H. (2001) Aspects of the evolution of Biophysics: Polyelectrolytes and the Weizmann, in *Supramolecular structure and function 7*, G. Pifat, editor. Kluwer, New York pp. 1-12.