



# Proteins, Enzymes, Genes: The Interplay of Chemistry and Biology

By Joseph S. Fruton

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An account of how biochemistry and molecular biology emerged as major scientific disciplines from the interplay of chemical and biological ideas and practices. It examines their institutional settings, and discusses their impact on medical, pharmaceutical and agricultural practice.

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**Editorial Review**

From Library Journal

Fruton, a biochemist turned historian, has revised and updated portions of his previous book, *Molecules and Life: Historical Essays on the Interplay of Chemistry and Biology* (1972). Using contemporary scientific writings, he traces the historical developments leading to the emergence of biochemistry and molecular biology as a discipline, primarily after 1800. Not intended as a comprehensive history, the text focuses on the chemical study of proteins, enzymes, and nucleic acids, which is still a pretty broad topic. As a result, there is more breadth than depth. Somehow, Fruton loses the flow of writing he had in *Molecules and Life*. He does not follow any chronological sequence and jumps from topic to topic so much that the text is sometimes difficult to follow. The book's most valuable feature may be the bibliography, which runs over 180 pages. Recommended for graduate-level biochemistry collections. Teresa Berry, Univ. of Tennessee Lib., Knoxville  
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From The New England Journal of Medicine

Research in biochemistry and molecular biology is proceeding at a furious pace. Thousands of scientists, in both academia and industry, are working in this area. The literature has become unmanageable; the *Journal of Biological Chemistry*, once a modest-sized monthly, is now a weekly the size of a small telephone book. How did all this frenetic activity begin? The tale is told by Joseph Fruton, historian of science and former head of the department of biochemistry at Yale University, in *Proteins, Enzymes, Genes*.

The book begins with three background chapters, the first dealing with approaches to the history of science, the next with the institutional settings in which chemical and biologic sciences developed, and the third a philosophical chapter in which Fruton discusses the current sociological "deconstruction" of science -- the claim that scientific data are relative to the societies in which they are obtained rather than objectively true. These are followed by a chapter on ways in which studies of fermentation chemistry led to the discovery of enzymes and five chapters on the history of proteins, oxidation and energy production, intermediary metabolism, DNA and heredity, and biochemical regulation. In each of these five chapters the author shows how the biology arises from the pertinent chemistry -- for example, how the chemistry of the amino acids ultimately revealed the structure of proteins, and how the double helix of DNA is dictated by the structures of the purines and pyrimidines.

In writing this book, Fruton displays formidable erudition and outstanding judgment in selecting what to include and what to leave out. I am personally acquainted with about 40 years' worth of the work described in this book, and as far as I can tell, the author has left out few of the high points. Furthermore, the book is supplemented with a 182-page bibliography and an index of the nearly 2000 scientists who are referred to in the book. Included in the book are such recondite facts as the original use of the word "enzyme," which was employed in medieval times to describe a Eucharist made with yeast, as opposed to the yeast-free "azyme" Eucharist, and the fate of Eduard Buchner, who described one of the first cell-free fermentation systems (a yeast preparation that manufactured ethanol and carbon dioxide from sugar) and who died in World War I while serving in the German army. Here and there, aspects of the personalities of some of the most prominent scientists are described: for instance, Otto Warburg, who had the arrogance of "a Prussian army officer," and Louis Pasteur, whose "skill as a scientific debater" left his opponents in a shambles.

The book is written in a smooth, easy-to-read style. Fruton follows the refreshing practice of using the first-

person singular when he refers to himself and spices the text with dry humor.

I suppose there are those who might complain that the book does not go into enough depth, but this is certainly not true of the chapter that describes the way in which enzymology grew out of the chemistry of fermentation. This criticism may apply to the later chapters, but this is not appropriate for a book that was written as a survey of the history of biochemistry and molecular biology during the past 200 years.

Broad coverage and an extensive bibliography make this book of great value as a point of departure for anyone who is interested in a particular aspect of the history of biochemistry or molecular biology. I can recommend this book as a superb choice for anyone interested in biochemistry or molecular biology who wants to know where it all came from.

*Bernard M. Babor, M.D., Ph.D.*

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