

Perspectives on bioorganic chemistry

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Chemistry & Biology September 1996, **3**:727

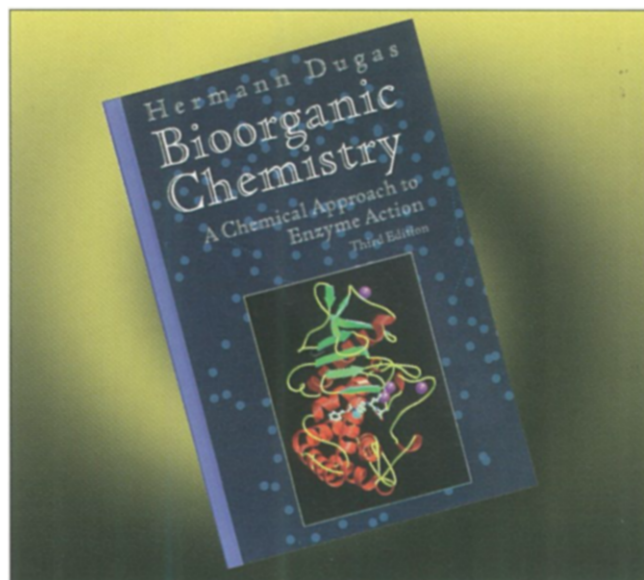
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Bioorganic Chemistry: A Chemical Approach to Enzyme Action by Herman Dugas. Third edition, Springer-Verlag, New York, 1996, 700 pp. \$49.95 (Hardcover) ISBN 0-387-94494-X.

Broadly defined, the discipline of bioorganic chemistry seeks an understanding of biological processes through the tools and principles of organic chemistry. This multifaceted field has its historical roots in detailed mechanistic studies of enzyme and coenzyme models. Currently, it focuses more generally on molecular recognition, encompassing mechanistic investigations of enzymes themselves, drug design and the study of drug action, problems in biosynthesis, protein engineering, molecular evolution, supramolecular chemistry, and many allied subjects.

Bioorganic Chemistry, the third edition of a text originally co-authored with Christopher Penny, provides an introduction to the burgeoning field of bioorganic chemistry, targeted primarily to the advanced undergraduate or beginning graduate student. Although the subtitle suggests a relatively narrow focus, a wide range of specific and more general topics is treated. Individual chapters include discussions of amino acids and polypeptides (Chapter 2), phosphate esters, including polynucleotides (Chapter 3), enzymes and enzyme models (Chapters 4 and 5), metal ion chemistry (Chapter 6), coenzyme mechanisms (Chapter 7), and molecular devices (Chapter 8).

Most chapters have been updated to some extent; a major departure from the second edition is the inclusion of a new chapter on supramolecular chemistry and molecular devices. Here, the principles of self-assembly are reviewed and recent applications to the construction of novel molecular architectures such as catenanes, rotaxanes, dendrimers and self-replicating systems are emphasized. This chapter is informative in a breezy way, but is unlikely to justify purchase of the text if one of the earlier versions is already on your shelf. Furthermore, the failure to include a section on sugar chemistry or a discussion of oligonucleotide-based receptors and catalysts is regrettable given significant recent advances and the high level of current interest in both areas. Although space limitations naturally preclude adequate coverage of all aspects of bioorganic chemistry, more traditional subject matter,



such as the asymmetric synthesis of amino acids, could have been easily sacrificed in favor of these important topics without compromising instructional value.

Not surprisingly, the current incarnation of *Bioorganic Chemistry* retains both the strengths and weaknesses of the earlier editions. The author's approach is to teach through example: each chapter presents a large number of chemical model systems that illustrate basic concepts. Numerous schemes and figures clarify and amplify on points made in the text. In addition, many citations from the primary literature and important review articles make the book a valuable, if not uniformly up-to-date, reference source. Unfortunately, the disadvantage of the author's approach is that it is often difficult to see the forest for the trees. Because relatively little analysis is provided, the uninitiated reader may have difficulty discerning underlying principles. This problem is compounded by the often haphazard organization of topics. For example, enzyme inhibition by transition state analogs and the use of antibodies as enzymes are presented in an early chapter on amino acids, more than 100 pages before enzyme chemistry is formally introduced. Furthermore, numerous graphic and typographic errors mar the text, a seemingly inexcusable lapse for a third edition.

Overall, the new edition of *Bioorganic Chemistry* provides an introduction to a large number of fascinating topics, cataloging much of current interest in the field. While this text offers more material than formerly, the defining document of modern bioorganic chemistry probably still remains to be written.