Book Reviews

Structure and Bonding. By Jack Barrett. Wiley-Interscience and Royal Society of Chemistry, New York. 2002. vi + 181 pp. 19 × 24.5 cm. ISBN 0-471-22479-0. $34.95 (Paperback).

This excellent short textbook is one of a six-book series on basic concepts in chemistry. The author intends to expose undergraduate students to as much of atomic and molecular chemistry as is compatible with their qualifications and the requirements for the rest of the chemistry curriculum, in order that they make further progress in their understanding of chemical bonding.

The book contains seven chapters, and each begins with a short introduction and a list of the aims of the chapter. To provide a better understanding of the textual material, some figures, worked problems, and exercises are included. A summary of key points and a few more problems are listed at the end of each chapter, with answers to some problems at the end of the book. Also, some very selective book readings are recommended, with a short, useful description of the reference.

As an introduction, the first chapter covers fundamental concepts of atomic theory: atomic orbitals, the four quantum numbers, the general structure of the periodic table, and some general trends on the periodicities of the elements, particularly atomic properties that are relevant to chemical bonding. Chapter 2, Molecular Symmetry and Group Theory, serves as an introduction to chapters 3−6, which address covalent bonding. Chapter 2 introduces the seven elements of symmetry, symmetry operation, point group, and character tables. The most used character tables are in Appendix 1.

Chapter 3 discusses the application of symmetry concepts to the construction of molecular orbitals for H_2^+ and H_2 molecules. Valence bond theory is compared to molecular orbital theory. Photoelectron spectroscopy is described to illustrate a method for study of ionization energies. Chapter 4 adds applications to the construction of molecular orbitals for a range of diatomic homo- and heteronuclear molecules of the second period. Bond length and strength are explained in terms of electronic configurations. In Chapter 5, molecular orbital theory is applied to the bonding of triatomic molecules, with its extension to the factors responsible for the determination of bond angles and molecular shapes. The valence shell electron pair repulsion (VSEPR) theory is also introduced to predict molecular shape. In Chapter 6, treatments of the shapes and bonding by VSEPR/valence bond theory and molecular orbital theories for NH_3, CH_4, BF_3, NF_3, ClF_3, B_2H_6, and ethane are compared.

The final chapter, Metallic and Ionic Bonding, is divided into two sections: The theory of the metallic bond is introduced in a general discussion of the stable form of the elements, and this is followed by a description of the energetics of ionic bond formation and the transition from ionic to covalent bonding.

The compact size and modest price of this volume should encourage the student to buy his/her own copy. Although the book was written for students, it should also serve as a refresher for medicinal chemists and other researchers who want to have a modern understanding of molecular structure and chemical bonding.

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Mass Spectrometry in Drug Discovery. Edited by David T. Rossi and Michael W. Sinz. Marcel Dekker, Inc., New York. 2002. viii + 420 pp. 16 × 23.5 cm. ISBN 0-8247-0607-2. $165.00.

Drug discovery is a multifaceted process that incorporates targeted research in areas such as natural product identification, chemical synthesis, ADME explorations, and biochemical and clinical investigations of mechanism, efficacy, and toxicology. Mass spectrometer techniques are critical for drug development because they provide accurate data for compound identification and low-level quantitation for many of these investigations. In this book, the authors have provided the reader with a clear description of why mass spectrometry has emerged as a leading technology in drug discovery. Four major sections furnish appropriate background material, instrument descriptions, experimental strategies, and selected applications.

Two brief initial chapters provide general background information for the major topics of the text, drug discovery and mass spectrometry. This introduction is followed by a well-written chapter on mass spectrometer instrumentation. I recommend this chapter as standalone reading for anyone interested in basic mass spectrometer operation. While almost all of the topics are covered well, emphasis is placed on state of the art types of ion sources, mass analyzers, and data acquisition techniques. Also on the list of required reading are the chapters on “The LC/MS Experiment” and “Sample Preparation and Handling”. The former chapter incorporates a thorough discussion of requirements for effective LC/MS analysis, including methods for LC separation and their effects on ESI and APCI ionization, and causes of ion suppression. Methods to reduce this problem are also addressed. The latter chapter covers techniques employed to reduce the complexity of biological samples prior to LC/MS analysis, including automated methods. The final section of the book groups six chapters describing applications with particular emphasis on methods used in drug discovery. These include chapters on combinatorial chemistry, drug transport, drug metabolism, and cassette dosing; mass spectrometer techniques for qualitative or quantitative analysis are integrated nicely into each discussion. An informative chapter on microdialysis/MS techniques and a quick look to the future of mass spectrometry in drug discov-

ery complete the contributions. Each chapter contains numerous up-to-date references, and an adequate subject index is provided.

In summary, the authors and editors should be commended for the thorough and cogent discussion of the selected topics. They have created a volume that should be required reading for any new investigator involved in modern mass spectrometry techniques and drug discovery.

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Peptide Antibiotics. Discovery, Modes of Action, and Applications. Edited by Christopher J. Dutton, Mark A. Haxell, Hamish A. I. McArthur, and Richard G. Wax. Marcel Dekker, Inc., New York. 2002. viii + 296 pp. 16 × 23.5 cm. ISBN 0-8247-0245-X. $150.00

This book is a collection of timely, well-written articles (chapters) that cover various families of antibiotic peptides and proteins. Microbes, plants, and animals biosynthesize peptides, which influence their own growth and environment through actions on surrounding flora (bacteria and other microbes). Humankind has benefited greatly from this natural phenomenon, from which some of the most successful antibacterial agents have been discovered (e.g., from Streptomyces). Given the emergence of pathogenic resistance and the renewed interest in developing new antibiotic drugs, this book should be of interest to pharmaceutical researchers in the area, including medicinal chemists and microbiologists and to peptide chemists as well.

Chapter 1 is an introduction to peptide antibiotics that nicely summarizes some key concepts and sets the stage for subsequent chapters. Chapter 2 is a well-written discussion of chemistry and synthetic approaches to complex antimicrobial peptides. The attention paid to solid phase synthesis is well-deserved, given the impact of Bruce Merrifield's initial work in the area of peptide synthesis, coupled with recent advances, some of which have been perfected recently during the evolution of solid phase organic synthesis.

The main body of the book is devoted to biosynthesis (sources), genetics, structural features, and function of peptide antibiotics. Chapter 3 covers lanthionine-derived bacterial peptides, including nisin and other members that have found use in agricultural settings. The discussion of mechanism of action is rather comprehensive in scope and is quite provocative. Chapter 4 describes bacteriocins, a diverse family of antimicrobial peptides produced by various bacteria. Chapter 5 covers cationic antimicrobial peptides, of which the cecropins (from cecropia moths) and defensins (from various fly species) are best known, along with proline-rich peptides (from honey bees) that are mainly active against Gram-negative bacteria. Some tertiary structural information is provided, which allows for a brief comparison among some of the peptide families. Chapter 6 describes mammalian antimicrobial peptides and primarily covers the diverse family of defensins. This reviewer found this chapter to be very interesting and wished for more coverage but was very pleased with the extensive reference listing.

Chapter 7, an impressive discussion of the exploitation of lantibiotics peptides for food and medical applications, covers the use of nisin mostly but does include other lantibiotics as well. Nisin has been used to preserve or process cheese and other dairy products and canned foods, and it is also effective in curbing toxin generation in fish, meats, and salads. Chapter 8 covers amphibian antimicrobial peptides, many of which have been isolated from the skins of frogs and are comprised of key D-amino acid residues. The chapter ends with a discussion of magainin and related peptides, which have been the subject of much publicity in recent years.

In closing, **Peptide Antibiotics. Discovery, Modes of Action, and Applications** is highly recommended to the researcher devoted to this area of research.

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Pharmaceutical Chemistry. Therapeutic Aspects of Biomacromolecules. By Christine M. Bladon. John Wiley & Sons, Inc., Chichester, West Sussex, U.K. 2002. xii + 221 pp. 17 × 24.5 cm. ISBN 0-4714-9637-5. $35.00.

This book is a compilation of a series of lectures given by the author that have been organized into chapters with supplemental references. It is thus in a form in which it can serve as a textbook for a course for graduate students in pharmaceutical sciences and/or for professional pharmacy students. The biomacromolecule categories included are peptides and proteins, oligonucleotides, and oligosaccharides, chemical classes that have the potential to lead to marketable drug products. Aspects of design and synthesis, including preparation by biotechnological approaches, are described.

There are six chapters, three appendices, a glossary, and an index. The first chapter is an introduction to the topics included in the book, with particular attention to endocrine and immunodeficiency disorders. Chapter 2 is "Endogenous Peptides and Proteins", and Chapter 3 is "Modification of Endogenous Peptides and Proteins". Chapter 4 is "The Immune System"; Chapter 5 is "Oligonucleotides; and Chapter 6 is "Oligosaccharides". The glossary is a very helpful compilation of the special vocabulary associated with the various macromolecules and with the biochemistry and physiology of the endocrine and immune systems. The individual chapters have helpful illustrations and tables to supplement the topics being discussed.

Particularly beneficial is the rather extensive listing of further readings at the end of each chapter. These

readings include textbook and review articles as well as selected research publications. These extend the depth of the topics discussed in the relatively brief chapters.

This paperback book is a very good value, and it would be a useful addition to the personal library of many biomedical and pharmaceutical scientists. It could also serve as a textbook or as supplemental reading for some graduate or professional courses. This book also should be in the holdings of academic and pharmaceutical industry libraries.

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