Book Reviews

Bacteria in Biology, Biotechnology and Medicine, 6th Edition. By Paul Singleton. John Wiley & Sons Ltd., Chichester. 2004. ix + 559 pp. 7.5 × 9.5 in. $75.00. ISBN 0-470-09027-8.

The sixth edition of this splendid textbook does what it says on the cover: it aims to offer an insight into why bacteriology is one of the most exciting areas in modern science, giving the reader an interesting prospective on the roles bacteria play in industry and healthcare without assuming any prior knowledge of the subject.

Covering 16 chapters, the layout follows a logical progression from the basics of bacterial physiology including core aspects of cell structure, growth, differentiation, metabolism, and molecular biology. It then looks at applied aspects of genetic engineering, infectious diseases, food and water treatment, and bioremediation. By necessity, the broad spectrum of subjects covered sometimes results in a lack of detail, although the coverage given to molecular biology is unusually good. Inclusion of more traditional issues such as practical methods in microscopy, staining and taxonomy alongside recombinant DNA technology, and the emergence of pan-antibiotic-resistant "super-bugs" gives the reader an interesting perspective of bacteriology as an independent discipline.

The book has the unusual feature of citing seminal papers from primary literature at key points throughout the text, rather than a more fashionable reliance on web pages. Each chapter also has excellent cross-referencing, especially at the start of each chapter. It is concise, with clear text and diagrams; a glossary of terms is very welcoming. Quite simply, this is a superb textbook and a valuable resource for all those interested, as either students or potential users of the science.

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Freshwater Microbiology. By David C. Sigee (University of Manchester). John Wiley & Sons, Ltd., Chichester. 2005. xix + 524 pp. $7^1/_2 \times 9^1/_2$ in. $65.00 (paper). ISBN 0-471-48529-2.

The exploration of the microbial world is often hampered by the complexity of the natural communities in which these organisms reside. Outside of the laboratory setting, microorganisms exist in a dynamic environment in which the composite of all microbial life is the most influential force producing the observable community landscape. The author does an excellent job of capturing the interactive nature of the microbial community as the key controlling influence over the features of the aquatic environment. This book should be of interest to anyone desiring a deeper appreciation of freshwater microbial ecology.

Written as a detailed introductory text for advanced undergraduate and graduate student level audiences, *Freshwater Microbiology* consists of 10 chapters, including (1) Microbial diversity and freshwater ecosystems, (2) Freshwater environments, (3) Algae, (4) Competition for light, (5) Inorganic nutrients, (6) Bacteria, (7) Viruses, (8) Fungi and fungal-like organisms, (9) Grazing activities in the freshwater environments, and (10) Eutrophication. A theme evident throughout these chapters is that of the microbial community as part of the physical environment with several examples drawn from the primary literature. As evident from the list of chapter topics, the scope of this book is a unique and welcomed addition to the primarily taxonomic or ecological references currently available. Many sections include useful bulleted highlights emphasizing important points of reference. Numerous key literature references are provided; however, further efforts to expand this section and categorize references by topic would have been of great help to the novice reader. A helpful glossary provides a list of the most pertinent terms.

Readers of the *Journal of Natural Products* may be disappointed by the diminutive role that microbial natural products play in this book. A brief section in Chapter 10 does discuss a few examples of blue-green algal toxins and outlines an in vitro assay used by the author for detecting potential biological controls of algal blooms. Of greater use to the *Journal*'s readers will be the opportunity to explore the complex biological relationships in which microbes engage in their natural settings. Overall, this book provides a clear treatment of the ecological aspects surrounding the study of freshwater microbial systems, accentuated by a variety of figures, graphs, and tables, many reproduced from their original sources. This book will unlikely be of interest to the general chemistry community, but should appeal to those seeking an opportunity to contemplate the role that microbial natural products play in their native environment.

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Mechanisms in Organic Reactions. By R. A. Jackson (University of Sussex). Royal Society of Chemistry, Cambridge. 2004. vi + 199 pp. 12 × 24.5 cm. £14.95 (paper). ISBN 0-85404-642-9.

This is the 23rd book in a series of tutorial chemistry texts that concentrate on various topics typically taught in undergraduate science courses. The book contains seven chapters ranging from fundamental mechanism topics to more advanced discussion of cyclic transition states. Each chapter contains worked problems within the chapter and concludes with a set of problems that allows the reader to help solidify their knowledge on each topic, a modest list of references for further reading, and an answers to questions section. The stated goal of this series of books is to provide concise information on a given topic and to foster independent learning for the reader.

Chapter 1 is entitled "What is a Mechanism" and covers topics such as bond making and breaking, molecularity,

formulating mechanisms, and reasons why chemists study mechanisms. The chapter presents several diverse and broad topics in a condensed format that may necessitate that the reader possess a basic working knowledge of the material.

Chapter 2 is an ambitious chapter that tackles the potentially complex issue of kinetics and kinetic isotope effects. It is refreshing to see the topic of kinetic isotope effects being explored, although this topic is usually left for intermediate or advanced courses.

Chapter 3, entitled "The Transition State", is a logical progression from the kinetics chapter and covers wonderful topics such as the Hammond postulate, solvent effects, Hammett equation, and linear free-energy relationship (although the latter is not referred to as such). This chapter does a good job of presenting several interesting topics that will introduce the student to intermediate and/or advanced organic topics. The list of suggested reading would have been more complete had Carey and Sundberg's or March's Advanced Organic Chemistry books been included.

Chapters 4 and 5 really start to dig into the meat of organic chemistry with discussions on nucleophiles and electrophiles, respectively. The author does a good job of ensuring the link between these subject matters to acid and base theory. It was interesting to note the introduction and brief usage of proton and carbon NMR chemical shifts to enforce the idea of electron density. Several standard organic reactions and their mechanisms are covered in these two chapters.

Chapter 6 is dedicated to the discussion of radicals: their mechanism of reaction, detection by ESR and how it provides structural information, and radical polymerization. However, the usefulness of this chapter is obscured by a publishing error that has several pages from the table of contents, Chapter 1, and Chapter 2 inserted into it.

The final chapter, although hindered by the same problem of having parts of Chapter 2 inserted into it as well as missing the first few pages, introduces the concept of molecular orbitals and their application to cyclic transition states, rearrangements, and Hückel systems.

In conclusion, if a revised edition of this 23rd book in this series of tutorials becomes available, it will be suitable for students that want to refresh their knowledge of chemistry or want to prepare for an exam after being away from organic chemistry for several years.

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Structural Identification of Organic Compounds with Spectroscopic Techniques. By Yong-Cheng Ning (Tsinghua University). Wiley-VCH, Weinheim. 2005. xvi + 452 pp. 17.2 × 24.5 cm. £49.00. ISBN 3-527-31240-4.

As a teacher of courses on organic structure elucidation at both undergraduate and graduate levels, I am always interested to read new monographs on this subject and find new examples, distinct approaches to the theoretical explanation of organic spectroscopy techniques, and other useful information that can help students gain experience in organic structure analysis. Since the number of books dealing with this subject is not small, interested readers need to exercise caution in selecting a specific monograph that covers a sufficient number of topics in adequate depth and clarity, to avoid spending much time searching for specific information from multiple sources. In this sense, Professor Ning's book is interesting from the theoretical perspective.

The book is divided in three main topics: nuclear magnetic resonance, mass spectrometry, and infrared spectroscopy. Not surprisingly, four chapters (almost half of the book) are devoted to NMR topics, including an introductory chapter, followed by one chapter on ^{1}H NMR, one on ^{13}C NMR, and the last on two-dimensional NMR techniques. It was a pleasure to find an excellent theoretical background in NMR physical phenomena, but without an exaggerated amount of mathematical treatment. The NMR theory presented in the book is more in depth than I usually find, a positive quality of this monograph. Although the text explanations are rather brief, its logical style is easy to read and I believe that it could be very helpful for students searching for NMR theory applied to organic structure determination. This point is valid for the presentation of 2D-NMR pulse sequences as well.

The same approach is used to demonstrate several ionization techniques and ion analysis in mass spectrometry in the first chapter of the MS section, while the second chapter on MS is directed to the fragmentation of organic compounds and interpretation of mass spectra. Infrared and Raman spectroscopy is the subject of the last theoretical chapter. I was impressed with a quantum-mechanical explanation of infrared spectroscopy, a topic that I have not seen included in other books on organic structure determination.

To my surprise and disappointment, the practical approach to organic structure determination was of much inferior quality. In all the NMR spectra presented in the book there is no indication of the field frequency and solvent used to obtain the spectra. Some spectra are really very much out-of-date, with poor resolution and signal definition, e.g., the ^{1}H NMR spectra of Figures 2.18 (p 67), 2.21 (p 78), and 2.22 (p 81). There are no spectral examples to illustrate the concepts of chemical and magnetic equivalence, coupling constants, magnetic anisotropy, field effects, deuterium exchange, shift reagents, and homotopic, enantiotopic, and diastereotopic hydrogens. Specific chapter exercises are very limited in number. No exercises are offered at the end of the chapters about 2D-NMR techniques, mass spectrometry, and infrared spectroscopy. A final chapter on structure determination is given, with an introductory basic approach in solving structure determination. Nevertheless, the logic in discussing spectral interpretation is sometimes questionable. For example, in exercise 1 of this chapter the reader must deduce by himself/herself that the number of hydrogens was obtained from the ^{1}H NMR spectrum integration, which was not normalized. In the same example, carbonyl signals in both ^{13}C NMR and infrared spectra are superficially discussed in order to provide an argument for the structure proposed. The number of unsaturations deduced from the molecular formula led to a monocyclic compound, a feature that is barely explained. In example 2, the book provides a molecular formula that accounts for an index of hydrogen deficiency of 12, pointing to an "unknown compound with a complex structure". Rather than discussing the spectroscopic data to establish the structure of the compound, it is stated that "fortunately, there is only one natural product in data bank of natural products" that accounts for the collected data, and that structure is given. This is not a didactic approach to demonstrate how a structure can be

assembled from spectroscopic data. The subsequent examples are not discussed in an appropriate manner either. Consequently, the book suffers from a considerable weakness in the practical sense of interpreting spectra.

I can recommend the book only for those interested in a better understanding of the theoretical background of organic spectroscopy.

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An Introduction to Chinese Herbal Medicine. By Mark Wright. Greenbank Publications, Edinburgh. 2004. xxx + 536 pp. 8.5 × 12 in. $125.00. ISBN 0-9547334-0-1.

This introduction to Chinese herbal medicine has a unique set of goals. First, it specifically focuses on medicinal species within the Umbelliferae family and includes some of the more common Chinese medicinals such as dang gui (*Angelica sinensis*), chai hu (*Bupleurum chinense*), and chuan xiong (*Ligusticum sinense*), as well as uncommon species. It also attempts to bridge a gap between herbal medicine, botany, and phytochemistry, seeking a "rigorous botanical base".

The introductory chapters provide a historical overview of Chinese herbal medicine, the development of herbals (past and present), key concepts in Chinese medical philosophy, comparing and contrasting these with modern biomedical theory, and introductions to phytochemistry and pharmacokinetics. The second section of the text presents monographs on 26 Chinese herbal medicines, with much of the information cited as being based on the *Ben Cao Gang Mu* of Li Shizhen (1596), one of the most respected works of Chinese herbal medicine.

As for focusing on select Umbelliferae, the text mostly profiles relatively minor entries of Chinese materia medica, while including some primary Chinese medicinals such as dang gui. This is both a weakness and strength: a weakness, in that it is purposely narrow in its presentation of materia medica, and a strength, in that it can perhaps introduce readers to some relatively unknown medicinal plants. Regarding the medicinal information presented itself, it is difficult for those not schooled in the Chinese language to critique. An English translation of the *Ben Cao Gang Mu* (Luo 2003) provides much more medicinal information that would be of relevance to a Chinese practitioner than this text, e.g., four and a half pages versus half a page for chai hu. However, much of the information presented is not included in other commonly available texts and thus represents a unique contribution to the literature. There are inconsistencies in the translations between the two texts, but this is a typical and expected occurrence with translated works.

In regard to bringing botany to herbal medicine, my opinion is mixed. The botany section itself gives an excellent presentation and overview of the historical and scientific basis for plant identification and nomenclature. However, the author criticizes the use of pharmaceutical nomenclature in other works. He partly makes his case with a mistaken example of why he chose to use English instead of pharmaceutical nomenclature in stating that the use of Fructus Corni (= fruit of Cornus) is incorrect because the seeds should not be used. If the seeds were to be included in this medicine, the pharmaceutical name would have included the descriptor Semen (Latin for seed) rather than Fructus alone. Another value of pharmaceutical nomenclature is that, oftentimes, more than one species is used interchangeably with other species for medicinal purposes and the appropriate pharmaceutical nomenclature groups these together in a logical manner. For some entries, the author also flips between the use of the primary name used in the *Ben Cao Gang Mu* and the principle names in common use today (e.g., xiong qiong and chuan xiong for the rhizome of *Ligusticum sinense*). While generally tolerable, this, in conjunction with minor editing mistakes and a misapplication of a species with the wrong common name (e.g., *Angelica sinensis* incorrectly cited in the Introduction as du huo rather than as dang gui), takes away from the rigor sought by the author.

Overall, it is difficult to identify the appropriate readership for this text; being more scholarly and less practical in its approach, it lacks the breadth of materia medica, and yet it focuses too much on botany and phytochemistry to be regarded as a necessary text for practitioners. Its limitation in selecting only a few of the hundreds of medicinal Umbelliferae that occur in the Chinese material medica equally limits its value to those wanting to study the family. The phytochemistry section, which is more accurately a presentation of chemistry and pharmacology, should be of particular interest to those serious students who seek to understand traditional herbal medicine in biomedical terms, since the author provides some pharmacological discussions elucidating the mechanisms behind some traditionally recognized actions and effects, another unique contribution to the literature.

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Basic One- and Two-Dimensional NMR Spectroscopy, 4th Edition. By Horst Friebolin (Organisch-Chemisches Institut der Universität, Heidelberg). Wiley-VCH, Weinheim. 2005. xxiv + 406 pp. 6 1/2 × 9 1/2 in. $69.95. ISBN 3-527-31233-1.

This is the 4th edition of a familiar book in the spectroscopy field. It is evident that the author's objective was to write a comprehensive text for graduate students, although the book would also make an interesting reference for an organic chemistry library. As is usual for this class of books, the first chapters are designed to introduce the reader to the NMR world: magnetic resonance theory (Chapter 1), chemical shifts of the most common nuclides (Chapter 2), and the relationship between coupling constants and structure (Chapter 3). The following chapter presents systematic notation for spin systems with a helpful description of the graphics consequences. A strangely placed Chapter 5 goes through the diverse spin decoupling experiments, but it seems a bit advanced for inexperienced students and NMR users.

Chapter 6 provides a novel guide for the beginner to approach structure elucidation of real-world problems. Although some of the suggestions are not practical (for example, ^{13}C enrichment), the author tried to create a different approach for those making the transition between the analysis of ethanol NMR spectra and the elucidation

of a very complex molecule. After a brief presentation of relaxation mechanisms in the first pages, Chapter 7 completely covers this topic, including structural features that affect them.

Chapters 8 and 9 describe routine 1D and 2D NMR experiments. The text is focused on the pulse sequences, especially on the modification of macroscopic magnetization and population differences caused in each experiment. The quality of this material is diminished by the inconvenient distribution of figures throughout the text. Despite the sprinkling of nOe coverage throughout many of the chapter topics, Chapter 10 reintroduces the reader to this phenomenon, including the advantageous two-dimensional experiment.

Another attractive exposition is entitled "Dynamic NMR Spectroscopy (DNMR)" (Chapter 11). The length of the chapter and the depth of information are very unusual for a nonspecialized book. Useful examples are given of inter- and intramolecular dynamics, either for kinetic and mechanistic studies or for structural analysis of equilibrium species. Chapter 12 presents a very clear explanation of shift reagent phenomena. Here one can find practical applications for research and development of drugs, including the determination of optical purity. "Macromolecules" (Chapter 13) is the topic that introduces the most changes compared with the previous edition. However, the new information is restricted to a list of the most typical experiments used to elucidate large compounds, including the predicted chemical shifts of the nuclides that composed them.

The excellent choice of diverse and illustrative examples is one of the most valuable educational tools of this book. Those who have read any of the previous editions will find subtle but well-done modifications. Unfortunately, some illogical chapter sequences (e.g., "Double Resonance Experiments" in Chapter 5, while the nOe effect is placed in Chapter 10), as well as uneven topic coverage, reduce its value for use as a textbook.

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Traditional Medicinal Plants and Malaria. Volume 4. Edited by M. Willcox (Research Initiative for Traditional Antimalarial Methods, Oxford), G. Bodeker (University of Oxford, Medical School), and P. Rasoanaivo (Laboratoire de Phytochimie et de Pharmacologie Cellulaire et Parasitaire, Antananarivo, Madagascar). CRC Press, Boca Raton. 2004. xxi + 431 pp. 18.0 × 26 cm. $99.95. ISBN 0-415-30112-2.

This book is Volume 4 of a series entitled "Traditional Herbal Medicines for Modern Times", edited by R. Hardman. The book can be envisaged as the product of several years of efforts by the international research network "Research Initiative on Traditional Antimalarial Methods (RITAM)". The intention behind this book is to guide research activities in the area of plant-derived antimalarials with a clear emphasis on applied aspects. In accordance with this concept, many of the authors come from countries where malaria is a major problem.

The book is divided into six parts, with each part being subdivided into chapters written by different authors. Part 1, termed "Traditional Medicine and Malaria Control", deals with the historical background of traditional medicine in malaria control and its present implications. Limitations of current strategies, such as the development of resistance and the price of new drugs, are clearly outlined.

Part 2, "Case Studies of Plant-Based Medicines for Malaria", is divided into nine chapters, each dealing with a specific plant—*Chinchona* spp., *Artemisia annua*, *Dichroa febrifuga*, *Azadirachta indica*, *Cryptolepis sanguinolenta*, *Strychnos myrtoides*—or combination of plants, e.g., "Malarial-5", composed of *Cassia occidentalis*, *Lippia chevalieri*, and *Spilanthes oleracea*, developed in Mali, and Aysash-64, a mixture of four plants marketed in India. For each case historical background, chemistry, toxicology, clinical studies, and aspects of cultivation and harvesting are discussed. These examples clearly illustrate methodologies and limitations for the assessment of traditional antimalarial remedies.

In four chapters, Part 3, entitled "Ethnomedical Research", gives interesting incentives for ethnomedical research, e.g., to include social science expertise. Also, a priority list and guidelines for ethnomedical studies on traditional antimalarials are offered. Part 4 deals with laboratory methods to assess antimalarial and toxicological properties. The authors emphasize the importance of discovering new modes of action and considering all stages of the life cycle of the malaria parasite, albeit without going into great detail. Chapter 16 describes a stepwise procedure to evaluate traditional antimalarials, including a discussion of problems encountered. Part 5 of the book deals with aspects of clinical research, although very briefly (24 pages). Finally, Part 6 is concerned with vector control and repellence, again giving an overview of plants used for this purpose and guidelines for research activities on them.

An aspect not considered in depth, although it should be, is the quality control of phytopharmaceutical preparations, i.e., the standardized preparation of extracts and the phytochemical characterization of extracts. These issues are, however, of utmost importance if results of clinical studies are to be reproducible.

This book offers no strikingly new scientific knowledge in the area of plant-derived antimalarials. It is obvious that the authors' intention is not to win scientific merit, but to contribute with their efforts to the control of this devastating disease. They provide an outline of the status quo and give clear suggestions for further studies. This volume is thus highly recommended for research groups focused on antimalarials from traditional plant sources.

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Drug Discovery for Nervous System Diseases. By Franz F. Hefti (Rinat Neuroscience Corporation). John Wiley & Sons, Inc., Hoboken, NJ. 2005. vii + 319 pp. 7 × 10 in. $89.95. ISBN 0-471-46563-1.

This book presents a variety of thoughts directed toward the philosophical, scientific, and practical aspects of discovering drugs for central nervous system disorders. It is a book I enjoyed reading; it is both expression and science.

In the introduction, the author addresses much of the (perhaps unsaid) thinking of those of us engaged in the study of drug action on brain function. Writing from the

perspective of a pharmacologist, he argues that dissection of central nervous system function using pharmacological approaches is both a philosophical and medical engagement. To be able to manipulate consciousness and, more importantly, specific aspects of consciousness/response via small molecules has profound implications for the understanding of human nature. Agree or disagree, the arguments are thought-provoking.

Hefti succinctly identifies the discontinuity between "drug discovery" and "basic research". The two processes are not equivalent, engage different rules, and are directed toward often opposing goals. Hence, "drug discovery" looks solely toward identifying compounds with therapeutic potential, whereas "research" seeks to identify mechanism(s) or pathways of drug action. The author correctly points out that the rules of engagement for drug discovery are distinct from those routinely encountered in basic research laboratories.

"Drug Discovery" is divided into 15 chapters. Chapters 2−5 address pharmacological fundamentals of the drug discovery/development process (receptors, discovery routines, target selection, and neuroscience-specific problems). Each of the remaining chapters focuses on a specific disease category (as opposed to mechanistic target). Individual chapters are directed toward psychiatric disorders (schizophrenia, depression, anxiety; Chapters 6−8), mixed diseases (Alzheimer's and Parkinson's; Chapters 9, 10), and neurological disease (stroke, sleep, epilepsy, and pain; Chapters 11, 13−15). An additional chapter (12) addresses disabilities outside of these general areas (MS, Huntington's, Creutzfelddt-Jakob, ALS, and peripheral neuropathies).

"Drug Discovery" has two significant flaws, one of which the author admits as inherent to neuroscience research. Directly stated, the use of existing models has led to "me too" drugs and incremental advances in treatment. Although the author attempts to address this issue in each chapter with the introduction of novel approaches (genomic, proteomic targets), these attempts are generally weak and border on speculation. Second, attempting a comprehensive approach to the subject of CNS drug discovery resulted in accordingly diminished detail within individual chapters.

This book was intended "*for individuals who seek or have professional engagement in biotech and pharmaceutical companies, or in academic research groups involved in drug discovery research*". It is more appropriate, and would be excellent introductory reading, for graduate students or postdoctoral fellows interested in the pharmaceutical drug discovery process directed toward CNS therapeutics. It may be of use to more senior academics unfamiliar with pharmaceutical drug discovery and development. Notwithstanding these critiques, the introductions to each chapter are delightful reading in their approach to putting a human and historical face on CNS disorders and their treatment throughout the ages. It would be worth publishing these introductions as a separate short volume.

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