Book Reviews

The Eicosanoids. Edited by Peter Curtis-Prior (Cambridge Research Institute and Anglia Polytechnic University, UK). John Wiley & Sons, Chichester. 2004. xx + 634 pp. 9 × 11 in. $350.00. ISBN 0-471-48984-0.

By definition, the eicosanoids comprise the C20 fatty acids and their derivatives: the cyclooxygenase-derived prostaglandins, 5-lipoxygenase-derived leukotrienes, and all other lipoxygenase and cytochrome P450 products. This new tome on the eicosanoids is presented in 10 major sections with about five chapters in each. The 10 sections cover the following: biosynthesis and metabolism; analytical methods; biochemical and molecular pharmacology; immunology, endocrinology and metabolic regulation; inflammation; circulatory system; digestive system; nervous system; reproductive system; and conclusions and correlations. Each section is introduced by an opening chapter outlining perspectives on the topic. It is emblematic of the overall tone of this book that seven of these sections include in their perspectives chapter title "Perspectives and Clinical Significance of Eicosanoids in...".

Some fields of biology are dominated by or revolve around the basic science of the enzymes (the P450 field comes to mind), while others are driven by practical developments and translational research. The eicosanoid field belongs in the latter category, with the dominant forces concentrating on the physiology and pharmacology of the enzymes, their products, and the receptors. Viewed in this context, this new edition of *The Eicosanoids* is well representative of the field, with ensuing positive and negative connotations. The book is very strong on the physiology, has a fair representation of medicinal chemistry, and is relatively weak on enzymology and protein biochemistry.

With 57 chapters to choose from, each by different authors, there is a wealth of reviews by authorities in the field, giving the reader many excellent overviews of topical areas of eicosanoid research such as COX-1 and COX-2, their involvement in numerous physiological and pathological states, NSAID and Coxib inhibitors, the leukotrienes, PG and LT receptors, and their antagonists. This reviewer appreciated the chapter by Sampson and Holgate on a long-standing enigma of the eicosanoid field, the phenomenon of aspirin-induced asthma, and the review of the complexities of the gastric involvement of both cyclooxygenases by Peskar. Pharmacologists and medicinal chemists will appreciate such extensive reviews as the biochemical and molecular pharmacology of eicosanoids by Khanapure and Letts (including over 350 references) and of eicosanoid antagonists by Yasui and Arimura (250 references). Unfortunately, an otherwise excellent review on synthetic eicosanoids had a "bad hair day" between exiting ChemDraw or whatever program the author used and entering the graphics compilation of this book; it is quite a distraction just to look at the distorted structures.

Most of the chapters include substantial reference lists, with typically 50−100 citations. These serve the reader well on the historical development and fundamentals of each topic. They are not so up-to-date, however, as 2002 is the most recent citation and several chapters have no references to the year 2000 or beyond. One chapter lists the most recent citation as 1991, suggesting that it might have been written around 1993; more to the point, in revisiting an old and now discarded hypothesis on PGA_2 as a natural antihypertensive agent produced by the kidney, it is plainly misleading. The editor should have had this chapter brought up to date with respect to prevailing hypotheses and current references.

Probably the main lack of emphasis with relevance to readers of the *Journal of Natural Products* is that there is not one enzyme structure to be found in the book, this despite the massive efforts in protein structure−function studies inspired by the X-ray crystal structures of COX-1 and COX-2. It is hard to think of a better example of how well an X-ray structure explains the workings of a complex enzyme than is the case with the cyclooxygenases. Yet these structures are not featured, nor are any others. There are simple cartoon figures of COX enzymes in a few chapters, but nothing that takes a close and detailed look at structure−function. Similarly absent are the structures of lipoxygenases, the modeling studies of eicosanoid-metabolizing P450s such as thromboxane synthase and PGI_2 synthase, and structure-directed insights based on the known topology of GPCRs.

In sum, this is a strong compendium on the physiology, pharmacology, and medicinal chemistry of the eicosanoids up to 2002. It is weaker on the biochemistry and molecular biology. With a $350 price tag and not a color illustration to be had, this seems truly targeted as a work for the reference library, and not the office bookshelf.

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Mushrooms. Cultivation, Nutritional Value, Medicinal Effect, and Environmental Impact, 2nd Edition. By S.-T. Chang and P. G. Miles (Chinese University of Hong Kong and State University of New York, respectively). CRC Press, Boca Raton. 2004. xx + 451 pp. 18.5 × 26 cm. $159.95. ISBN 0-8493-1043-1.

Sometimes a good book raises questions and stimulates controversy. This text does all that and more. A second, updated edition in the iconic CRC style, it contains 22 individually referenced chapters on nutritional attributes, medicinal value, a detailed overview of fungal biology, and specific cultivated mushrooms, including *Agaricus, Lentinula, Volvariella, Pleurotus, Dictyoptera,* and *Ganoderma lucidum*, a medicinal mushroom.

Of particular interest to the natural products chemist will be descriptions and references on dietary supplements and hematological, antiviral, antitumor, and antioxidant effects of mushrooms and mushroom natural products. The tonic properties of *Ganoderma* (Reishi) and its extracts are shown, at least in part, to be due to a family of more than 150 lanostane triterpenoids, some with demonstrable cytotoxic, platelet aggregation inhibitory, antihypertensive, and hypoglycemic activities. The polysaccharide fraction of *Ganoderma* is also included for its immunostimulatory

properties. Mushrooms remain a relatively untapped source of new bioactive compounds.

A recurring theme of this text is that mushrooms provide quality protein and other dietary nutrients. Mushrooms can be cultivated on a large scale using many lignocellulosic materials presently considered waste biomass. Hence, in a world of dwindling natural resources and expanding populations, edible mushrooms are a renewable, sustainable resource that can begin to solve some of the world's most vexing problems. Encouragingly, production of edible mushrooms has increased 12% per year over the last four decades.

Mushrooms have only been cultivated for fourteen centuries. The authors present not just the "hows" but the "whys" of cultivation, at times in exhausting detail. Many recipes for different compost formulations, often species-specific, are included. Little known facts include the myriad diseases that cultivated mushrooms can fall prey to, including viruses, bacteria, insects, nematodes, and other fungi. Extracts of the neem tree containing azadiractins are used to control damage to mushrooms caused by the larvae of a sciarid fly.

This book contains a useful glossary and generous index. Given that mushrooms can be so colorful and visually appealing, I was disappointed that the text contains only one color plate, which includes photos of the authors, along with diminutive images of the subject matter. I bring to the readers' attention the authors' differentiation of "nutraceutical" from "nutriceutical", an exercise that left me confused. With respect to *Ganoderma* products, the authors recommend standardization, without stipulating to what measure the extracts ought to be standardized. Undoubtedly Reishi is a popular and profitable tonic, but some of the authors' recommendations for industrial manufacturing quality practices could only be accomplished on pharmaceutical-grade profit margins and budgets, i.e., double-blind clinical trials and lab tests to determine effective dosages for particular health problems.

If you are a mushroom enthusiast, you must have this complex book. It would also serve admirably as part of a graduate level mycology course.

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Biotechnology and Biopharmaceuticals: Transforming Proteins and Genes into Drugs. Edited by R. J. Y. Ho and M. Gibaldi (University of Washington). Wiley-LISS, New York. 2003. xvii + 556 pp. 7 × 10 in. $83.95. ISBN 0-471-20690-3.

This book is intended to provide a broad overview of the modern development of drugs from biotechnology. The editors separate their subject into three sections: (1) transforming proteins and genes into drugs; (2) therapeutics based on biotechnology; and (3) future directions. In addition, there are also 94 pages of appendices covering information on drug nomenclature, dosage forms, and pharmacokinetics. Unfortunately, the opening chapters (1−3) are poorly referenced and offer some questionable assertions ("traditional drugs are not derived from living sources") and omissions (no role for the government in "applied research: developing molecular entities for therapeutic use"). In contrast, the other chapters in the opening section on Technologies and Processes in Drug Development (Chapter 4) and Pharmacology, Toxicology, Therapeutic Dosage Formulations (Chapter 5) are very informative and will be interesting to the intended readership of pharmacists and medical professionals.

The second section of the book is separated into chapters based on therapeutic class (hormones, antibodies, enzymes, etc.) and is made up primarily of monographs on various drugs. This information is similar to that published regularly by Dr. Gibaldi in his continuing series *Gibaldi's Drug Therapy* and again will primarily be of use to pharmacists. The final section of the book discusses future directions in biopharmaceutical development including pharmacogenomics, advanced drug delivery systems, and gene and cell therapy. This section, like the first, is somewhat poorly referenced, with the exception of a subsection on gene therapy by contributor Sean Sullivan.

This book seems to be of two minds; the first and third sections are very different from the second and the extensive appendices. Its strength is its monographs on biopharmaceuticals, which will be of some use to pharmacists and other health professionals. The authors make extensive use of sidebars in both the first and third sections of the book, which allows them to develop certain points outside of the main narrative. Although they use this technique to good effect, overall these sections are not particularly informative or well referenced. This book could be of interest to pharmacists and health professionals but will probably be of little use to research scientists.

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A Fragrant Introduction to Terpenoid Chemistry. By Charles S. Sell (Quest International). The Royal Society of Chemistry, Cambridge, UK. 2003. xvii + 410 pp. 6 × 9 in. £49.95. ISBN 0-85404-681-X.

The title of this book leads one to assume that it is devoted to terpenes prominent in the fragrance industry. Most of the compounds discussed in this book are used in fragrances, and two of the chapters (9 and 10) are devoted to the fragrance industry. For the most part, however, this book is devoted to the chemistry of a number of mono- and sesquiterpenes. The author takes a historical look at terpenes that have some importance in fragrance chemistry. Each relevant terpene chosen by the author is briefly described by citing its original source(s) and historical use. Then, the original chemistry of the molecule is discussed in great detail. Nestled in each chapter is a lesson in basic organic chemistry. The author also provides a number of problems for a student to undertake in each chapter (answers are given in the back). The preface of the book suggests that it is aimed at undergraduate, post-graduate, and professional chemists. Although it is somewhat narrow in scope, I would classify this book as somewhere between a textbook and a reference book for students of terpene chemistry.

The first two chapters are devoted to the fundamentals of terpene chemistry. Chapter 1 discusses very basic terpene chemistry, such as the isoprene rule, classification, and extraction. The second chapter provides an introduction to terpene biosynthesis.

Chapters 3−5 are devoted to monoterpenes. The author divides the terpenes into linear/monocyclic (Chapter 3),

menthol and carvone (Chapter 4), and bicyclic monoterpenes (Chapter 5). In Chapter 3, terpenes associated with fragrances (e.g., citral, myrcene) are discussed from their historical structure elucidations to their synthesis and interconversions. Chapter 4 gives a basic outline of isomerism in organic chemistry and gives an in-depth review of menthol and carvone chemistry. While Chapter 5 is titled "Bicyclic Monoterpenes", it really provides the text's longest lesson in organic chemistry (as well as problems), devoted to carbocation rearrangements. There are also a few pages dedicated to higher terpene skeletons that are formed through carbocation reactions.

Chapters 6 and 7 are devoted to fragrant terpenes that come from wood sources. Both these chapters detail a number of syntheses of important terpene skeletons derived from wood sources. Great detail is given in discussing each synthesis, as well as providing in-depth organic chemistry lessons on unique rearrangements and reactions. A nice historical view of the Marshall synthesis of vetivone is presented, as well as the author's personal views on comparing the Marshall and Stork syntheses.

Chapter 8 is devoted to important terpenes isolated as degradation products. These include amberine and other compounds isolated from the whale intestinal product ambergris, and various terpenes isolated as degradation products of carotenoids. A brief discussion of the chemistry of vision is presented in the context of the latter.

Chapters 9 and 10 are devoted to research and development and the industrial production of fragrances. Chapter 9 provides a basic lesson on the economics and business of synthesizing and producing fragrant chemicals. It gives a brief insight into the production of some of the basic terpenes commonly used in the fragrance industry. Chapter 10 discusses approaches to finding new fragrances and offers support for both random testing (a combinatorial approach) and natural product discovery. A discussion of design through computational and statistical methods is also offered. The final sections of Chapter 10 give details of terms and experimental approaches used by the fragrance industry.

Overall all, I found this book very enjoyable to read. The synthesis examples were selected because they represent compounds important to the fragrance industry and, at the same time, exemplify fundamental organic reactions rooted in terpene chemistry. The historical presentations were enlightening, and I particularly enjoyed the author's personal perspectives at the beginning of each chapter. The only shortcoming of the book is to define its niche in the chemistry community. This book is definitely not a text on recent syntheses of terpenes. I would not recommend it as a textbook, except for a special topics course, because of its narrow focus; at the same time, its lack of breadth limits its usefulness as a reference book. That said, it is wonderfully written and interesting reading. Only the poor performance of the dollar against the pound sterling would prohibit its inclusion in my personal library.

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Drugs of Natural Origin. A Textbook of Pharmacognosy. 5th Edition. By Gunnar Samuelson. Swedish Pharmaceutical Press, Stockholm. 620 pp. 17 × 25 cm. $70.00. ISBN 91-9743-184-2.

This edition of Samuelson's text continues the phytochemical biosynthetic organization and quality of the previous editions. Extensive revisions are to be found in Chapter 7 dealing with polyketide, mevalonic acid-isopentenyl diphosphate, and non-mevalonic acid (deoxyxylulose) product pathways. Also included is an extensive treatment of polyketide synthase presented via a modular explanation. Numbered among many examples are excellent descriptions of the macrolides, including telithromycin, the avermectins, rapamycin, and tacrolimus. At 221 pages, this chapter constitutes a significant portion of the text.

Alkaloids are described in the second largest chapter, organized by heterocyclic system. Biosynthetic explanations are briefly mentioned for many compounds. Sprinkled throughout the chapter are select examples of therapeutic use supported occasionally by snippets of ethnobotanical information. Other strengths for the text include its readability, lack of structure or textual errors, excellent photographs that accompany several sections of the text, and reasonable cost.

Some of the shortcomings of the text are a direct result of its strength—the aforementioned phytochemical biosynthetic focus. Overall, therapeutic information is sparse. Chapter 12, entitled "B-Vitamin Complex", is almost exclusively concerned with B_{12} biosynthesis, reserving only one paragraph for the other B vitamins. There is no mention of antibodies or monoclonal antibodies, an explosive natural products area, save mention of the former as capable of being produced by plants. This reviewer would like to have read a more extensive treatment of marine natural products relating them to new drugs such as *Conus* toxins and "Prialt"-(ziconotide) or k-carrageenan (Caraguard) for preventing HIV transmission. The coverage of carbohydrates, both simple and complex, could be increased substantially. The chapter on "Natural Products Derived Biosynthetically from Amino Acids" presents a fine description of ribosome inactivating proteins (RIP toxins, i.e., ricin, *Amanita* toxins, viscumin, etc.) and a few plant-derived digestive proteins (papain, ficin, bromelain) but omits the life-saving "clot-busters" (streptokinase, urokinase, tPA and its derivatives) completely. The discussion of vitamin D (Chapter 7) contains nothing about its key role in calcium regulation, its metabolites, or available analogues, nor mentions 1,25 $(OH)_2D_3$, which is produced by *Solanum malacoxylon*.

This text should be of value to both undergraduates and graduate students and should be in the libraries of colleges and universities offering courses in the areas of pharmacognosy, biochemistry, and ethnobotany.

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Pioneering Research: A Risk Worth Taking. By Donald W. Braben (Venture Research International Ltd. and University College, London). John Wiley & Sons Inc., Hoboken. 2004. x + 198 pp. 8 × 5.25 in. $39.95. ISBN 0-471-48852-6.

This is a book about major scientific breakthroughs. The author, a physicist with extensive experience in science policy, discusses the risks and rewards of scientific research. Dr. Braben and his group, Venture Research International, are based in the UK, but their territory covers the world, and their ideas are applicable internationally.

This is a very scholarly work covering the highlights (well, it is only 198 pages) of five million years of history of doing things differently, and in its simplest interpretation, it is a vindication of the individual thinker. Written in an engaging style, the discussion starts by very broadly addressing the history and use of dissent and risk and how this has played a profound role in the development of the sort of society in which we now live, with all its bells and whistles. The arguments that individual dissent is a positive attribute are taken further, especially in the area of science and technology. The discussion advances into the bureaucratic issues of the day, which for the most part rule the current funding environment, and includes chapters on research and prosperity, as well as ideas for trying to return to a more productive era of scientific advance.

Throughout the book many interesting ideas are discussed, but my favorite chapter is the last, containing a description of how Dr. Braben had the opportunity to lead the Venture Research Unit, whose goal was to support exploratory breakthrough research with the financial backing of BP. The group's purpose was to find and provide support for research that might lead to a revolution in understanding, rather than to fund predictable incremental advances.

The process and criteria of selection are described in detail; briefly, it places more emphasis on interacting with the researcher and less on a formal project with identifiable milestones and involves developing a high degree of trust between the researcher and the venture group. This appears to be a unique system for funding research and the only one of its kind available to anyone with the right set of ideas and personality, whatever his/her affiliation or background.

The results so far are provided in Appendix 1, where there is a summary of the 26 groups funded as of 1990. This includes chemistry Professor Steve Davies at Oxford, who, through work supported by the group, founded Oxford Asymmetry, which was valued at more than 200 million pounds on the London Stock Exchange in 1998. This reviewer hopes that the book represents but a progress report on the group's activities and that they are able to obtain another round of financial support; it will be interesting to see how this experiment plays out.

In Appendix 2, the group's ideas and concerns are summarized in a letter, signed by twenty leading scientists and engineers, submitted to *Nature* and *Science*, but unpublished. This is worth reading, and for those who would like a preview, it can be seen at http://www.es.ucl.ac.uk/people/braben/Forum.html.

Pioneering Research: A Risk Worth Taking is recommended to those involved in science management and policy making, students interested in the history of major advances in understanding, and even those interested in the rewards of professional risk taking.

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200 and More NMR Experiments: A Practical Course, 3rd Edition. Edited by S. Berger and S. Braun (University of Leipzig). Wiley-VCH, Weinheim, Germany. 2004. xv + 838 pp. 17 × 24 cm. $89.95. ISBN 3-527-31067-3.

The third edition of this book on NMR spectroscopy contains 44 additional experiments, bringing the total to 206. Each experiment is described in the same format as the previous two editions, consisting of eight sections entitled purpose, relevant literature, pulse scheme, acquisition parameters, processing, results, comments, and observations. The majority of the new experiments described in this edition are pulse sequences that utilize gradients. These include a 1,*n*-ADEQUATE, an HMSC (a combined HMQC/HMBC), a sensitivity enhanced HSQC, an adiabatic HSQC, and three diffusion-edited experiments (DOSY, INEPT-DOSY, DOSY-HMQC). Of particular interest to the natural products chemist concerned with determining relative stereochemistry are the inclusions of pulse sequences for experiments that provide carbon−proton coupling constants (HETLOC, α,*β*-SELINCOR-TOCSY, gradient selective HETLOC, and gradient selective-*J*-resolved HMBC).

There are several other useful changes in this edition. The book now includes a chapter on protein NMR spectroscopy, consisting of 20 experiments that provide an overview of the basics of 3D NMR. To make it easier for the reader to find the appropriate experiment for a particular situation, the authors have provided an appendix where all the experiments described in the book are classified into sections such as calibration, solvent suppression, spin coupling, dipolar coupling, and standard organic experiments. Another handy appendix has been added that includes NMR assignments (^{1}H, ^{13}C, $^3J_{HH}$) for the widely used standards strychnine and ethyl crotonate. For the latter, proton−carbon coupling constants are also provided, but they are surprisingly missing for strychnine. Finally, it is worth noting that the changes are not limited only to the new experiments, as in many cases an updated list of references has been added to the older sections.

Overall, the book is an excellent text that would clearly be a valuable addition to the library of anyone interested in NMR spectroscopy. It is a concise reference guide that contains the practical knowledge needed to perform most basic NMR experiments. There are a few areas where the book could be improved though. First, the section entitled "Glossary and Index" is really only an index. An actual glossary with definitions would improve the book. Also, for several experiments the explanation of how to interpret the resulting spectra is weak. Annotating the NMR spectra given as examples would in many cases ameliorate this problem and make the book even more useful as a laboratory text.

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Chromatography. Concepts and Contrasts. 2nd Edition. By James M. Miller (Drew University). John Wiley and Sons, Inc., Hoboken, NJ. 2005. xxvi + 490 pp. 6 × 9^1/$_2$ in. $94.50. ISBN 0-471-47207-7.

The second edition of the book *Chromatography Concepts and Contrasts* states that it is geared toward a third year undergraduate level of understanding of chromatography and chromatographic concepts. While the intent of this book is for an undergraduate class in chromatography, it should also be of general interest to natural products

chemists as a source of references for chromatography. The book contains many excellent chapters that are reader friendly and many useful, up to date references. For the reader interested in chromatographic theory and mathematical derivations of chromatography, there are many examples and equations. The book offers the reader an introduction to chromatography and discusses physical and chemical interactions and limitations, different chromatographic modes, gas chromatography, and capillary electrophoresis. The major emphasis of the book is geared toward liquid chromatography, theory, and detection modes.

Interestingly enough, the book starts out with a chapter relating to industrial and governmental practices with regard to analytical chromatography. This particular chapter seems to be out of place; it would seem better placed at the end of the book. However, this approach does introduce the reader to chromatography and how it is related to governmental agencies. The author provides a brief view of method development, validation, and transfer. Of particular interest for those chromatographers who have to perform chromatography under governmental regulations are the many excellent references and web site addresses.

The author does make a glaringly incorrect statement on page 1 that "chromatography is undoubtedly the most important procedure for isolating and purifying chemicals". While this statement is "undoubtedly" biased by the author's background in chromatography, there are numerous other procedures equally important in the isolation and purification of chemicals.

There are several statements in this book that appear to be the author's feelings toward chromatography and are unwarranted in a textbook such as this. As an example, in Chapter 4, the author states that solvent/stationary phase selection is often guesswork, but then the author goes on to present work and cite references that present just the opposite opinion. Another example is in Chapter 15, Chiral HPLC−Choosing a CSP. The author states that exactly how chiral stationary phases work is not known. Again, this statement is incorrect. There have been numerous studies and manuscripts for the past 15 years describing chiral separations and the chemical interactions that allow for chiral separation. As in the other case described above, the author then goes on to provide references that show the statement is incorrect.

Chapter 8 is an excellent chapter on liquid chromatography in columns. This may be the most useful chapter for natural products chemists, as it discusses the modes, types of stationary phases, instrumentation, method development, and special topics.

Overall, the book would be a good addition to the library of a natural products chemist or others involved in the separation of organic compounds.

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