

Book Reviews

Medicinal Plants in Folk Tradition—an Ethnobotany of Britain and Ireland. By David E. Allen and Gabrielle Hatfield (Natural History Museum, London, and the Royal Botanic Gardens, Kew). Timber Press, Portland, OR. 2004. 431 pp. 9 1/4 × 6 1/4 in. \$29.95. ISBN 0-88192-638-8.

To describe this ethnobotany of Britain and Ireland as a compendium that “lists all the folk medical uses traced for plants growing wild in Britain, Ireland or the Isle of Man”, as the authors do in Chapter 2, is to fail to do justice to the enormity of the effort and commitment, extending over sixteen years, involved in bringing such a valuable compilation to print. The authors and their co-workers are to be congratulated for their perseverance, because the information they present is unique and hugely important. I have argued in the past that this type of information has as much cultural and scientific validity as that emanating from trendier ethnomedicinal studies from more exotic locations. This publication confirms my belief that all such information needs to be treasured, not only as a part of the historical record but also as a potential source of inspiration for new sources of bioactive molecules and, perhaps more importantly, in a European context as a justification of traditional use in the framework of the new European Union Directive on the licensing of traditional herbal medicinal products. This Directive, published in April 2004, establishes a new regulatory framework for such products and requires evidence that a particular medicinal plant has been used within the E.U. for a minimum of 30 years. Since some of the records (for Ireland at least) date back to 1834, e.g., David Moore’s “Botany of the County Londonderry”, this should not present huge difficulties in relation to the plants included in the 14 chapters into which the records are grouped.

The inclusion of two extensive indices, one dealing with the folk uses and the other with vernacular names, is also of value to those with an interest in the evaluation of the plants and their claimed uses. In this regard I tend not to agree with the authors when they state (p 25) that “the effectiveness or otherwise of folk medicine is not a profitable area for discussion”! Over the past few years, a number of final year pharmacy undergraduates at this School have undertaken detailed literature searches of plants listed by Moore and also by Moloney in his “Irish Ethnobotany” (1919) and referred to by the authors. Of the 69 medicinal plants listed by Moore, nearly two-thirds are the subject of monographs in the British Herbal Pharmacopoeia, and in many cases there is enough phytochemical and phytopharmacological evidence to suggest that the folk use is at the very least not irrational. Some reported uses, e.g., the use of a decoction of *Centaurium erythraea* “to destroy lice and cure the itch”, warrant more in-depth laboratory investigation.

Not surprisingly, this reviewer has a particular interest in the records relating to Ireland, and I am full of admiration for the efforts of Ms. Sylvia Reynolds, who assisted the authors in studying the extensive compilations in the archives of the Irish Folklore Commission now housed in University College Dublin. One surprising omission was the list of 83 plants used medicinally by the people of the Glens of Antrim in Northern Ireland recorded in the mid 1800s by Hugh MacDonnell as part of his “Philosophy

of Hugh MacDonnell”, perhaps because it is written in Irish. The importance of this manuscript lies in its uniqueness and in the fact that 36 of the plants are listed in the British Herbal Pharmacopoeia or in the Commission E monographs for uses that are in agreement with those recorded by MacDonnell. A detailed literature search found that some 22 plants lacked detailed scientific information, thus meriting further phytochemical and/or biological evaluation.

Allen and Hatfield are to be applauded for making the wealth of knowledge they have amassed so accessible to a wide readership. This book strengthens my belief that Moloney was totally correct to express the view “that a study of the Ethno-botany of the Celts allied with the Pharmacology of today may help at the same time the common cause of humanity”.

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Modern Practice of Gas Chromatography, 4th Edition. Edited by Robert L. Grob (Villanova University) and Eugene F. Barry (University of Massachusetts). Wiley Interscience, Hoboken, NJ. 2004. xi + 1045 pp. 16 × 24 cm. \$150.00. ISBN 0-471-22983-0.

Gas chromatography (GC) is undoubtedly one of the most widely used analytical techniques for the separation and analysis of volatile compounds. Yet comprehensive guides to contemporary GC practice have been surprisingly hard to find—until now. First, one thing the book is not: it is not a book in which you will learn theory and practical applications for GC method development. In fact, the book is aimed at those familiar with gas chromatography as a separation technique. While the first five chapters do give a complete introduction to gas chromatography, starting with theory, the pace is a bit fast for a real beginner. On the other hand, for someone who has had some prior experience with analytical chemistry, perhaps in another separation technique, these chapters would be an excellent way to learn serious concepts and approaches in gas chromatography. The book was written in a format that makes it easy to understand, with more emphasis on the practical side, rather than on theoretical/mathematical treatments. To me, that is the real strength of this book. It is chock-full of useful, carefully indexed (and carefully documented), real-world examples that can be used by any analytically literate chromatographer. In addition to serving as an invaluable reference for the experienced analytical practitioner, this book will provide a solid understanding of gas chromatography theory and basic techniques. Theoretical issues are explained without complicated equations and derivations and always in terms of how they relate to real-world practical operating principles. This new edition incorporates some of the most recent

developments in the field, including entirely new chapters on hyphenated techniques such as gas chromatography/mass spectroscopy (GC-MS), optimizing separations using GC, analysis by fast GC, and environmental and forensic applications of GC. It offers expanded coverage of instrumentation and fully updated information on sample introduction techniques (split/splitless injection, headspace, and SPME), detection techniques, and qualitative and quantitative analysis by GC. This book admirably achieves its aim and, with its wealth of information, critical evaluations, practical examples, and detailed experimental information, should be of value both to the newcomer to the field and also to more experienced chromatographers.

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Fortschritte der Chemie Organischer Naturstoffe/Progress in the Chemistry of Organic Natural Products. Volume 87. Edited by W. Herz (The Florida State University), H. Falk (Johannes-Kepler-Universität), and G. W. Kirby (The University of Glasgow). Springer-Verlag/Wien, Austria. 2004. viii + 262 pp. 16 × 23.5 cm. \$219.00. ISBN 3-211-02780-7.

The latest in a series of volumes of excellent review articles covers two areas of interest, cephalostatin analogue chemistry and siderophores produced by the bacterial genus *Pseudomonas*.

The first topic, "Cephalostatin Analogues—Synthesis and Biological Activity", coauthored by Prof. T. Flessner, Dr. R. Jautelat, Dr. U. Scholz, and Prof. Winterfeldt, is 80 pages in length (119 references) and covers the literature through 2002. The research described in the first review is focused on some work of the Winterfeldt group. The general introductory chapter outlines the discovery, isolation, and structural elucidation of the cephalostatins and, later, the ritterazines, all part of a general group of bis-steroidal pyrazines producing exceptional tumor cell growth inhibition in the National Cancer Institute's in vitro 60 human cancer cell line panel. As a consequence of their unique biological activities, still poorly understood, additional quantities are sought for extensive biological evaluations. Several research groups have become involved in synthetic approaches to the cephalostatins and analogues, and their work has been included and referenced. After the introduction, Chapter 2 covers strategies for synthesis of symmetrical pyrazines with subsequent desymmetrization and directed synthesis of unsymmetrical pyrazines including nonacyclic cephalostatin analogues and dienes. In Chapter 3, the A–D ring functionalization of the cephalostatin analogues is reviewed and includes some in vitro cancer cell line structure–activity data. Chapter 4 covers the spiroketal portion of the cephalostatin structure, and Chapter 5 provides a nice summary of the progress with synthetic analogues of the very complex cephalostatin structure in the decade following its discovery.

The second topic, "Siderophores of the Pseudomonadaceae *sensu stricto* (Fluorescent and Non-Fluorescent *Pseudomonas* spp.)", written by Prof. H. Budzikiewicz, includes 156 pages (527 references with literature coverage

through most of 2003). There are seven chapters as well as two appendices regarding bacterial species and culture collections. The references include books, chapters and reviews, along with primary publications. This section begins with interesting history about the bacterial genus *Pseudomonas* and discussion about iron supply for microorganisms. Chapter 2 goes into detail about the pyoverdinin series of compounds that are typical siderophores of the fluorescent pseudomonads, from detection of siderophore producing strains to nomenclature, production and isolation, structure determination by NMR and mass spectrometry, and synthetic methods, then on to the different metal complexes and pyoverdinin-mediated iron transport into the bacterial cell and more. Other siderophores of fluorescent pseudomonads are described, such as catecholate, lipopeptidic, salicylic acid, and other derived siderophores. Iron sequestering is mentioned briefly, and *Pseudomonas* in health, agriculture, and the environment round out the chapters provided. Generally, the review contains a wealth of references and a balanced presentation into the research on siderophores isolated from the bacterial genus *Pseudomonas*.

This book contains 63 illustrations; some are partly in color. The schemes and structures are well done. Regarding tables, those listing in vitro data in the first section on the cephalostatin analogues are a bit difficult to understand, and it would have been helpful if data could have been displayed in the same units. Although there are also some spelling errors and an occasional awkward sentence that should have been corrected at the editing stage, each section is an interesting journey into the two fields. Overall, the book contains reviews on two topics that should be of high interest for chemists, natural products chemists, and interdisciplinary scientists in biology and chemistry.

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Fermentation Biotechnology. ACS Symposium Series 862. Edited by B. C. Saha (U.S. Department of Agriculture). American Chemical Society, Washington, DC. 2003. xii + 287 pp. 16 × 23 cm. \$135. ISBN 0-8412-3845-6.

This volume is composed of seven symposium presentations and eight commissioned manuscripts related to a symposium organized by the ACS Division of Biochemical Technology in 2002 at the 224th National ACS Meeting in Boston, Massachusetts

Although the topics are relevant, covering a number of aspects in fermentation technology ranging from production of commodity chemicals through pharmaceutical intermediates and products, theoretical underpinnings of fermentation process control, and bioremediation and ending with a discussion of cGMP validation methods, the book is marred for the reader by significant lapses in copy editing. Spelling and syntax errors abound, and surprisingly for an ACS publication, there are varying renditions of typescript fonts (one of which makes the chapter on production of 5-aminolevulinic acid effectively unreadable). There are also pages with significant blurring of lines in a number of sections. When one adds to this differing font

sizes within the same chapter, this reviewer is surprised that the ACS Books quality control department permitted the book to be published in this condition.

Nonetheless, there are some excellent chapters, particularly those on lactic acid production by Thongchul et al. utilizing an ingenious fibrous matrix fermentation system to overcome oxygen limitations with *R. oryzae*, a good review by Shah on mannitol production, an excellent article on submerged fermentation of the mushroom *G. lucidum*, and an excellent though slightly dated discussion on the propagation of caprine endothelial cells by Moreira et al. as a basis for subsequent vaccine development. The paper by Nakata et al. was an excellent up-to-date exposition on the construction and use of shuttle vectors between *E. coli* and Corynebacteria species/strains that permitted enhanced production of amino acids. Finally, two articles on metabolic flux determinations as an aid to fermentation development by Zhu et al. and particularly by Shimizu were nice examples of well-written and readable reviews on this important aspect of fermentation process development.

The other sections were rather pedestrian compilations of data, mainly on commodity chemical production, with some having outdated references, even though the preface implied that these were all recent work.

Although as mentioned above, sections were difficult to read at times due to a lack of thorough copy editing, overall the book may be considered for incorporation in a library for groups interested in fermentative production of (mainly) chemical compounds rather than pharmaceuticals, though the price is rather excessive for the quality of the printing.

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Dictionary of Pharmacy. Edited by Dennis B. Worthen (Lloyd Library and Museum). Pharmaceutical Products Press, Binghamton, NY. 2004. xiii + 528 pp. 14 × 18 cm. \$39.95. ISBN 0-7890-2328-8 (soft).

As the name of this book implies, the *Dictionary of Pharmacy* is a general reference book intended mainly for beginning pharmacy students. However, it may also be of some use to entry-level students in the allied health sciences and pharmaceuticals and those interested in learning pharmacy terminology. It contains what seems like an eclectic mix of definitions pertaining to health insurance, the legal field, pharmacy calculations, compounding, medical conditions, pharmaceutical manufacturing procedures, equipment descriptions, chemistry, physics, and pharmacognosy. Definitions for some well-known compounds and botanicals such as ergotamine, hyoscyamine, capsaicin, morphine, cascara sagrada [sic], etc., are included. Selected historical figures and documents playing a role in the development of pharmacy and pharmacognosy are included such as Dioscorides, the Ebers Papyrus, and early educators in pharmacy, although coverage is not comprehensive. Several pharmacy-related societies, their founding dates, and names of distinguished members can be found sprinkled throughout the book as well. Chemists may cringe a bit at a few of the chemistry-related definitions, such as "amino group: basic radical containing nitrogen that is either

bound to one or two hydrogens, or to one or two organic groups that are not acyl groups", which tend to be more awkward than necessary, although most are accurate. However, for a beginning-level student searching for hard-to-find definitions for words such as antihidrotic, galenical, carminative, and pharmacognosy, it's not a bad starting point.

For those students and researchers constantly frustrated by reading clinical journal articles that use field-specific acronyms without defining them at the first instance they are used, this book provides relief in the form of several pages of definitions of common medical acronyms and abbreviations. It also includes a listing of accredited schools and colleges of pharmacy in the United States, national and state pharmacy associations, state boards of pharmacy, and Canadian schools and associations. The oath of a pharmacist, pledge of professionalism, code of ethics for pharmacists, and principles of practice for pharmaceutical care are included as well, plus tables of commonly used units and conversion factors. My favorite part is the six-page listing of Latin and Greek terminology commonly used by doctors when writing prescriptions. This list almost gives me a chance to decipher those little scraps of paper scrawled with unintelligible script from my physician...almost.

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Ecology, Genetics, and Evolution of Metapopulations.

Edited by I. Hanski and O. E. Gaggiotti (University of Helsinki). Elsevier Academic Press, Amsterdam. 2004. xix + 696 pp. 17 × 25 cm. \$54.95. ISBN 0-12-323448-4.

Metapopulation research is a field that has blossomed within the last 15 years (although the basic premise was introduced in 1970); it is based on the assumption that discrete populations exist within a landscape framework and these populations interact via gene flow and/or migration. The implications for ecology and evolution are significant, and at their core, the implications are equally important to natural products research. Specifically, the hierarchical analysis of metapopulation phenotypes such as bioactive natural products provides a means to understand the quantitative and qualitative changes in secondary metabolites found throughout the range of a species. That said, this volume may be of little interest to the readers of the *Journal of Natural Products*, since it focuses more on conceptual theory and less on detailed examples related to natural product variability.

Hanski and Gaggiotti have provided a complementary follow-up to the definitive predecessor *Metapopulation Biology* (1997) with expanded coverage of the evolution and genetics of metapopulations by some of the top names in this field. *Ecology, Genetics, and Evolution of Metapopulations* is essentially two books; the first half redefines the subject matter for an uninitiated audience, while the second half addresses fundamental questions in ecology, evolution, and genetics as they relate to metapopulation research. The fundamental information about metapopulations is outlined in Parts I (Perspectives on Spatial

Dynamics) and II (Metapopulation Ecology), but these are vastly revised sections with references as recent as 2004. In Parts III (Metapopulation Genetics) and IV (Evolutionary Dynamics in Metapopulations) the authors address material that was largely unknown and underrepresented in the 1997 treatise. Part V (Integration and Applications) provides 13 chapters detailing mechanisms of metapopulation dynamics in a variety of systems and the techniques to study these; this section may be too advanced for the casual audience, as it presumes an understanding of complex biological models/mathematics. Of particular interest to the readers of this journal are chapters by Keeling et al. and Antonovics on infectious disease and plant-pathogen metapopulation dynamics, and by Ouborg and Eriksson on plant metapopulation theory.

In summary, *Ecology, Genetics, and Evolution of Metapopulations* is a broadly encompassing, up-to-date overview of the field; as such, it will appeal to population biologists. It is well written and provides the basic tenets requisite for scientists interested in expanding their understanding of metapopulations. However, without some prior understanding of the implications for metapopulations to effect changes in natural products, it is unlikely the readers of this journal will find a direct link to their science in this volume.

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Studies in Natural Products Chemistry. Volume 28. Edited by Atta-ur-Rahman (University of Karachi). Elsevier, Amsterdam, The Netherlands. 2003. xiv + 797 pp. 6.5 × 9.5 in. \$406.00. ISBN 0-444-51415-5.

First published in 1988, the 28th volume of this series was released in 2003, and it covers a diverse range of topics in 15 chapters written by more than 40 authors. Each chapter presents a thorough review of the scientific literature of the subject matter, often accentuated by additional, interesting pieces of information. As just one example, in the opening chapter on "Bioactive compounds from the genus *Broussonetia*", we learn that, of this genus of more than 30 species, only three have been studied for their secondary metabolites, and yet more than 100 different compounds have been isolated.

As stated above, the opening chapter is an authoritative and well-written review of the genus *Broussonetia*, and the second and fourth chapters do the same for the genera *Licania* and *Gingko*, respectively. Another chapter provides an in-depth examination of the "Synthesis and modification of marcfortine and paraherquamide class of anthelmintics". The author has included some of the reasoning why certain classes of compounds and distinct synthetic routes were pursued over others, giving a more academic reader valuable insight into some of the challenges of industrial science. Acaracides of natural origin are covered, not only contributing information about their chemistry but also explaining their great need, given, for example, the detrimental acari have had on honey bees and apiculture.

This reviewer's favorite chapter covers the structure, occurrence, and bioactivity of plant polyphenols. It should

become required reading for any student of natural products chemistry, and it represents an excellent, quick reference for those of us who may have forgotten the structural subtleties of, for instance, a flavonol versus a flavanol. Other topics covered include chapters on retinoid chemistry, bioactive tetramic acid metabolites, chemistry and biological activity of isoprenylated flavonoids from moraceous plants and *Glycyrrhiza* species, CNS pharmacology of crocin, podolactones, antitumor activity of lipid A, prevention of chemotherapy-induced adverse reactions, biologically active triterpene glycosides from sea cucumbers, and sulfur-containing natural products from marine invertebrates.

To conclude, this volume presents information that should be of great interest to those in the fields of pharmacognosy, plant and marine natural products chemistry, synthetic medicinal chemistry, CNS and cancer pharmacology, among others, including possibly apiculture. A few typographical errors were noted throughout the text, although they were not significant enough to deter from the impact of the chapter. The scientific reviews are presented in an encyclopedic style, including information that is directly pertinent to the subject, as well as interesting side notes. The cost of more than \$400 may be prohibitive for most personal collections; however, it should at the very least become part of library anthologies, especially those of pharmacy schools and chemistry departments.

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Cinnamon and Cassia. The Genus *Cinnamomum*. Edited by P. N. Ravindran, K. N. Babu, and M. Shylaja (Centre for Medicinal Plants Research, Indian Institute of Spices Research, Providence Women's College, Kerala, India). CRC Press, Boca Raton. 2004. xv + 361 pp. 7 × 10 1/4 in. \$159.95. ISBN 3-415-31755-X.

Designed to be useful to students and research workers in the areas of economics and ethnobotany, agriculture, and the spice trade in general (i.e., exporters, processors, planters, etc.), this book represents the first monograph on the subject compiled by editors P. N. Ravindran, K. N. Babu, and M. Shylaja.

After a brief introduction to the history and position of cinnamon and its close relative cassia in the spice world, the reader is led in an orderly fashion through the botanical, chemical, pharmacological, and economic aspects of this important spice. The elaborate botanical description of cinnamon leaf and bark anatomy aptly demonstrates the attention to detail found throughout the text. Buried deep in the paragraphs of anatomical descriptors are helpful indicators for characterizing species and subspecies of *Cinnamomum*. For example, characteristic shapes of vascular strands in leaf petiole anatomy vary in different species of cinnamon. Perhaps more importantly, bark anatomical characteristics can provide a key for the identification of species when leaf material is not available. These distinguishing features are clearly delineated in the text. Furthermore, a table of microscopic characteristics

for economically important species (complete with hand-drawn illustrations of microscopic features) is included and makes a nice addition to the book.

Extensive details of crop improvement techniques and their results in the field provide a potentially useful reference to academic or business firms pursuing botanical studies or commercialization of cinnamon or cassia beyond the forest tree crop it currently represents. The cultivation and management, harvesting, processing, and quality assessment of cinnamon products are concise and informative sections. For example, International Standard Organization specifications (ISO #'s) for cinnamon are listed for reference along with commercial classification requirements of the products. This information, consolidated with other facts, makes it a very useful reference book.

The book also heavily details the chemistry in cinnamon and cassia species. Volatiles analyses from GLC work is demonstrated with representative annotated chromatograms and tables listing identified compounds complete with retention times and percent compositions. However, retention indices would likely better serve most users of this information. The authors recognize that even within a species (*C. verum*, for example) "...chemical differences between varieties coupled with organoleptic considerations should dictate a combination of geographic and botanical nomenclatures to indicate quality of the product". Many less-informed individuals will assume a species from a particular region or country will denote its quality. This demonstrates a clear understanding of a complex topic, and the theme is consistent throughout the book.

The remaining sections of the book detail the pests and diseases, pharmacology (including recent diabetes research with cinnamon) and toxicology, and the economic and marketing aspects of cinnamon and cassia. All are done with clarity and good attention to detail.

This book should easily meet the editors' expectations as a useful tool to students and researchers. Its comprehensive treatment of the subject matter in cultural, socio-economic, and specific technical terms also makes it a valuable addition to the bookshelf of all individuals involved with the spice trade.

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Organic Spectroscopic Analysis. By R. J. Anderson, D. J. Bendell, and P. W. Groundwater (University of Sunderland). Royal Society of Chemistry, Cambridge. 2004. vi + 176 pp. 19 × 25 cm. \$27.25. ISBN 0-85404-476-0.

This book is the 22nd and most recent volume of *Tutorial Chemistry Texts* published by the Royal Society since 2000. As with the other books in this series, it is aimed at undergraduate chemistry students, in this case those studying organic chemistry.

This book consists of six chapters covering the four major spectroscopic tools of the organic chemist, i.e., ultraviolet-visible (Chapter 2), infrared (Chapter 3), and nuclear magnetic resonance spectroscopy (Chapter 4), as well as mass spectrometry (Chapter 5). Each of these four chapters covers instrumentation, basic theory, applications, and

interpretation of data. The NMR chapter includes NOE, COSY, DEPT, HMQC, and HMBC, as well as a brief discussion of nuclei other than ^1H and ^{13}C and LC-NMR. The MS chapter discusses several ionization techniques (EI, CI, FAB, MALDI, ESI) and instrument types (magnetic sector, quadrupole, ion trap, TOF, ICR-FT) as well as GC-MS, LC-MS, and MS-MS methods. The first chapter covers the basics of the interaction of molecules with electromagnetic radiation and the concept and use of double-bond equivalents. The final chapter gives three elaborate structure problems requiring the coordinated use of all the spectroscopic methods. The other chapters also contain problems, some worked, to illustrate the concepts and methods being discussed.

The scope and level of this book is between that of a general organic chemistry text such as Clayden et al. (Oxford) and a specialized organic spectroscopy book such as Crews et al. (Oxford). While the latter would certainly be the choice of a practicing organic chemist or graduate student, its price would make it prohibitive as a supplemental text for an organic chemistry course. The text under review, however, sells for one-fourth the price, includes essentially all topics likely to be covered in such a course, and is thus ideally suited for this purpose. It also would be a useful supplement for a course in classic qualitative organic analysis. This book is a bargain that one seldom finds these days.

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A Textbook of Modern Toxicology, Third Edition. Edited by E. Hodgson (North Carolina State University). Wiley-Interscience, John Wiley & Sons, Hoboken, NJ. 2004. xxi + 557 pp. 17.8 × 25.4 cm. \$89.95. ISBN 0-471-26508-X.

Hodgson's *A Textbook of Modern Toxicology* is an excellent update to a standard college textbook in toxicology. This third edition continues to stress basic toxicologic concepts as well as environmental and occupational applications and, to a lesser extent, pharmaceutical ramifications. The toxicological implications of federal legislation are well covered with implementations from the Environmental Protection Agency (EPA) and the twin agencies of the Occupational Safety and Health Administration (OSHA) under the Department of Labor and the National Institute of Occupational Safety and Health (NIOSH) under the Center for Disease Control. While the Food and Drug Administration's classic involvement blocking thalidomide from coming to the U.S. market because of teratogenic limb reduction defects is covered, an updating on recent pharmaceutical adverse reactions, such as the cholesterol-lowering HMG CoA inhibitor cerivastatin's association with rhabdomyolysis, is not.

The public health tradeoffs for the use of toxics in health protection, such as chlorine for water purification, fluorine for reduction of tooth decay, and pesticides in mosquito control protection from West Nile virus, are not discussed. While carcinogens are mentioned, reviews of carcinogenicity in the reports of National Toxicology Program (NTP) of the National Institute of Environmental Health Sciences

(NIEHS) in the U.S. and internationally by the monograph reviews of the U.N.'s International Agency for Research on Cancer (IARC) are not.

Topics briefly covered in natural products chemistry include mycotoxins such as aflatoxins, veterinary concerns about toxic substances in livestock foods, food additives, and the GRAS (generally recognized as safe) list. However, those with serious interests in natural products chemistry, botanical chemistry, herbals (including dietary supple-

ments or complementary and alternative medicine, CAM) will need to seek other resources.

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