

## Book Reviews

**Handbook of Medicinal Herbs, 2nd edition.** By James A. Duke. CRC Press LLC, New York. 2002. xviii + 870 pp. 7 × 10 in. \$249.95. ISBN 0-8943-1284-1.

The second edition of *Handbook of Medicinal Herbs* is a complete reinvention of the original book published in 1985. The format has evolved from colloquial but detailed descriptive writing on 365 plants to a very systematic inventory of more than 800 medicinal herbs. The new edition is organized by the common names of the plants rather than the scientific names in the original, making this book much more immediately accessible to most readers without a background in botanicals. In addition to the common U.S. herbs of commerce, there is ample representation of African, Ayurvedic, and Chinese medicinal herbs not found in many other standard references.

Due to the highly systematic presentation of information on each herb, the introduction is essential reading prior to use of the body of the text. This makes for interesting reading as the author peppers the introduction with some personal philosophies about herbal medicine garnered from years of experience in the field. Duke explains the rationale of his rating system, and he also describes and compares many of the herbal reference books and pharmacopoeias he cross-references throughout the text.

In the original book, one could expect to find an account of the historical and modern uses of each herb, details of preparation, bits of interesting, sometimes esoteric information, and specific phytochemical constituents along with a note on any known toxicity. The new edition abandons the descriptive style for a more consistent format of up to six subheadings: Synonyms; Activities; Indications; Dosages; Contraindications, Interactions and Side Effects; and Extracts. The section on each herb is headed by its common name, its scientific name with the botanical authority, and a general safety rating. The Activities and Indications sections are simply listings of biological activities and medical indications qualified by the level of evidence and a citation for each. At first glance, this type of organization appears daunting, but with some orientation and a bit of persistence, it is quite straightforward. Those familiar with Duke's Phytochemical and Ethnomedical Databases at [www.ars-grin.gov/duke](http://www.ars-grin.gov/duke) will undoubtedly be more at home with the systematics used in the book, as they are quite similar.

The parsed and objective format is one of the aspects of the 2nd edition that makes it a good top-line reference book for researchers or for medical professionals. This format makes it relatively easy to get a quick snapshot of the activities and applications of a particular herb. The reader is also provided with a reference for further information; however, it should be noted that most of the citations are to other books, so the reader is still left a few steps away from the primary literature. Dosage recommendations of many different authorities are presented for each herb. Contraindications and adverse events are covered through compilation of numerous authorities along with some synthesis by the author of the various cautions. One of the consequences of this format is that the reader is made aware of the negative aspects of an herb in descriptive detail, while the known or potential positive aspects are quite encrypted in the systematic coding.

The omission of the descriptive text and detailed phytochemical information for each herb saves a great deal of space, but will be a significant loss for some readers. For phytochemical and biological activities, Duke directs the interested reader to his extensive USDA database (free access), where the long lists of constituent chemicals can be displayed. The searchability of this database for plant compounds and biological activities makes it a handy companion to the book.

*Handbook of Medicinal Herbs*, 2nd edition, is an excellent general reference text for medically pertinent information on over 800 herbs. It is less valuable for readers seeking specific details about phytochemical content and biological or clinical activities. The book is recommended for every medical library and keenly interested medical professionals. Due to the substantial difference in content from the original edition, the 2nd edition would best be treated as a supplement to the 1st edition rather than a replacement for it.

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NP030706H

10.1021/np030706h

**Taxus. The Genus *Taxus*.** Edited by Hideji Itokawa and Kuo-Hsiung Lee (University of North Carolina, Chapel Hill). Taylor and Francis, London and New York. 2003. xiii + 447 pp. 17 × 24.5 cm. \$145.00. ISBN 0-415-29837-7.

Taxol is one of the most important anticancer drugs to have been developed over the last twenty years, and it has been reviewed on many occasions with varying emphases and degrees of coverage. The fact that it is a chemically complex natural product drug whose clinical uses are still being explored has made all of the reviews covering its occurrence, chemistry, biology, and clinical use very much works in progress, since new findings are continually being reported, especially in the clinical area. The present book, which is also Volume 32 of the series *Medicinal and Aromatic Plants—Industrial Profiles*, attempts to present a comprehensive account of the genus *Taxus*, and to a large extent it succeeds admirably. One caveat is that coverage is confined to the taxoid constituents of the genus; the not insignificant nontaxoid constituents (Appendino. *Nat. Prod. Rep.* 1995, 12, 349; Parmar et al. *Phytochemistry* 1999, 50, 1267) are not covered.

The volume begins with an introductory chapter (18 pp) by H. Itokawa, which reviews the history of the discovery of taxol and surveys its isolation and structure elucidation. The author makes the interesting point that the discovery of taxol was significantly assisted by the selection of *T. brevifolia* as the source plant, since this species contains almost no cardiotoxic taxine alkaloids. Had the work been attempted on another species, it is possible that the cytotoxicity assays used to follow the fractionation would have led initially to these toxic alkaloids, resulting in abandonment of the work. The chapter also contains a

useful discussion of the best way to represent the taxoids on paper and concludes that none of the methods in present use are completely satisfactory. A new and improved representation is then proposed, which does indeed appear to address the major limitations of the present representations; this representation is then used in most (but not all) of the following chapters. The one error noted is the statement (repeated in Chapter 4) that "The crystal structure of taxol has not yet appeared"; this will come as a surprise to Mastropaolo et al., whose crystal structure of taxol was published in *Proc. Nat. Acad. Sci. U.S.A.* **1995**, *92*, 6920! Curiously this work is correctly cited on p 370 by the same author.

The second chapter (16 pp), by U. Sankawa and H. Itokawa, provides a short but useful survey of the biosynthesis of taxoids.

The next chapter (44 pp), by H. Itokawa, provides a comprehensive listing of the taxoids isolated from the yew. It is a measure of the continued activity in this field that this chapter, with its listing of over 400 taxoids, has at least 100 entries more than the previous comprehensive review (Baloglu and Kingston. *J. Nat. Prod.* **1999**, *62*, 1448).

Chapter 4 (55 pp), by M. Oyama and H. Itokawa, provides information on physical methods used in the identification of taxoids. Unsurprisingly, the emphasis is on NMR spectroscopy, and the chapter contains tables giving the complete  $^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of approximately 50 taxoids. Unfortunately the structures of these compounds are separated from the tables, which makes them a bit awkward to use, but nevertheless these tables are a very useful feature of the book.

The importance of taxol as a drug, coupled with its relative scarcity, has driven major efforts at taxol production by plant tissue culture methods. Much of this work has been done in the People's Republic of China, and Chapter 5 (17 pp) by K. Takeya provides a tabular summary of the various methods that have been used. The coverage is broad and includes the Chinese literature and several patents, but the chapter does not provide much in the way of guidance as to which of the several methods gives the highest yields of taxol. This is probably because of the proprietary nature of the commercial work, but it is nevertheless frustrating to a chemist not to know the "yield" of a "reaction".

Chapter 6 (28 pp) by Y. Kikuchi and M. Yatagai is a report of the authors' own work on the commercial production of taxoids, complete with experimental details. Unlike most of the other chapters, it is thus not a review of the topic, and as such it seems out of place in a book such as this. It does however provide the interesting information that one hectare of 10-year-old seedlings of *T. cuspidata* could yield 1 kg of taxol.

Chapter 7 (34 pp), by M. Kozuka, S. Morris-Natschke, and K.-H. Lee, discusses analytical aspects of taxoids. This subject is interpreted broadly, and methods used for large-scale isolation and separation (including chemical methods) are summarized. The emphasis in the analytical section is on HPLC methods, which are covered thoroughly, but other chemical and biological methods are also discussed briefly.

The organic and medicinal chemistry of taxol is covered in the next three chapters. Chapter 8 (32 pp), by H.-K. Wang, H. Ohtsu, and H. Itokawa, covers the chemistry of taxol. The coverage is eclectic, with some reactions, such as acylation, oxetane ring opening, epoxide formation, rearrangement reactions, photochemistry, and side chain formation, discussed, while other reactions, such as oxidation and reduction, are omitted. A major omission is the

lack of coverage of methods for attaching the C-13 side chain to a protected baccatin III. The section on side chain formation focuses primarily on unusual side chains and does not even mention the  $\beta$ -lactam method, which is at the heart of most semisynthetic processes for taxol. This chapter thus has some interesting stuff in it, but it is somewhat incomplete.

The next chapter by Z. Xiao, H. Itokawa, and K.-H. Lee (53 pp) is on the total synthesis of taxoids. Early synthetic approaches are described briefly, and three total syntheses of taxusin are then described fully, with complete synthetic schemes. The chapter concludes with complete descriptions of the six total syntheses of taxol; the  $\beta$ -lactam method is presented without comment as a footnote to the Holton scheme. This chapter contains a wealth of synthetic detail and is a handy reference for anyone desiring a comprehensive account of synthetic approaches to taxol.

At 89 pages, Chapter 10 by X. Wang, H. Itokawa, and K.-H. Lee is the book's longest chapter, and it covers the structure-activity relationships of taxoids. This very valuable chapter provides a systematic coverage of the effects of structural modifications at various positions on the activity of taxol and provides extensive tables of activity data to add substance to the general discussion of structure-activity relationships (SAR). In addition to its discussion of SAR, the authors also discuss several different water-soluble prodrugs of taxol and then go on to summarize photoaffinity labeling studies of the tubulin binding site and conformational studies of taxol in the solution phase and in its tubulin-bound state. This chapter will be very useful to anyone involved in the medicinal chemistry of taxol, and no doubt it will justify the purchase of the book for many people.

The next chapter, by D. T. Brown (49 pp), discusses preclinical and clinical studies on taxol. This is also a very useful chapter, as it summarizes information that is scattered throughout the medical literature, and it provides several tables summarizing the results of clinical trials, as well as sections describing the various toxicities associated with these drugs. The clinical guidelines for the use of the taxoid drugs in the U.K. are given; these are that either paclitaxel or docetaxel should be used as second line treatments of advanced breast cancer and that paclitaxel and platinum combination therapy should be the first line treatment for ovarian cancer following surgery.

The book concludes with a short (7 pp) chapter by I. Hook and D. Dempsey on the paclitaxel content of yews in Ireland. Like chapter six, this chapter describes the authors' experimental results, and it seems out of place in this book.

This book is nicely produced and provides both name and subject indexes. Its literature coverage appears to extend to 2001, since no 2002 references were noted. Although it has some uneven chapters, overall it can be warmly recommended to anyone interested in taxol and its chemistry, since it provides a comprehensive overview of its subject that cannot be duplicated by any of the recent review articles on the subject.

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NP030710T

10.1021/np030710t

**Herbal Medicine: Chaos in the Marketplace.** By Rowena K. Richter. Haworth Herbal Press, Binghamton, NY. 2003. xvii + 220 pp. 21.3 cm × 15.5 cm. \$19.95. ISBN 0-7890-1620-6 (paper).

The author of this policy analysis of herbal regulation has three long-range goals for changes in the way herbs are regulated: (1) to minimize harm caused by dangerous products, (2) to increase the medical and economic benefits of the use of herbs, and (3) to rationalize herb regulation in the United States on the basis of scientific evidence. A good overview of the regulatory history of the Food Drug and Cosmetic Act and how herbs have been classified by regulators is given. The situation in the United States is contrasted with the Canadian, German, French, and British systems, and a number of elements worthy of adoption in the United States are highlighted. This is followed by several case studies, which are summaries of the scientific evidence for safety and efficacy of the important herbs St. John's wort, ginkgo, echinacea, ephedra, and comfrey.

It is a lost opportunity that there are no case studies of particular companies, though perhaps the fact that most companies are privately held would make it difficult to obtain useful information. Firms in the herb industry vary a great deal in how they choose products, what mix of products they provide, the style of marketing used (direct, MLM, mass market, and health food channels), and of course, in their attention to the quality of products they produce. An analysis of the chain of supply from grower and collector to consumer would have been enlightening. Also, the distinctions between herb and nonherb supplements such as concentrated extracts, pure compounds, hormones, and animal products are not addressed. Some, though not all, of the problems in the supplement industry are related to the very broad definition of supplement in the current law, which permits marketing of almost any type of natural product not already approved as a drug. If the scope of the market were solely crude plant materials and primary extracts, the task of regulation would be more straightforward.

The author describes clearly the boom and bust cycles that occur for specific herbs as marketing drives increased sales until adverse effects are publicized, at which time sales plummet and a new herb *du jour* is selected for promotion. Befitting her graduate training in both business and public health, the author attempts to develop recommendations for how the U.S. regulatory system could be transformed to a more rational process. These include formation of an expert panel on botanicals with a clear mandate and the authority to make authoritative scientific judgments on safety and efficacy, with required post-marketing pharmacovigilance for high-risk products, the compilation of pharmacopoeial monographs as standards for product quality and disease claims (similar to the German Kommission E), establishment of a botanical OTC approval process that encourages innovative products, and better education of health professionals in botanicals and herb-drug interactions.

This will be an informative book for those seeking to understand the current regulation of herbs. Appendices include the full text of the Dietary Safety Health and Education Act of 1994 (DSHEA), the 1998 Canadian policy recommendations for natural health products, a list of acronyms, and chapter notes citing sources. While its dry style makes for slow reading, most of the important points are covered, and its currency is good for such a fast-changing field. If the author is not to be just a voice crying

in the wilderness for regulatory reform, what must follow is a source of political momentum to drive that reform.

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NP030711L

10.021/np0307111

**Handbook of Pharmaceutical Biotechnology.** Edited by J. P. Rho and S. G. Louie (University of Southern California). Haworth Press, Inc., Binghamton, New York. 2003. xi + 192 pp. 6 × 8½ in. \$59.95 (hard). ISBN 0-7890-0152-7. \$34.95 (soft). ISBN 0-7890-1635-4.

This short paperback book of 192 pages has major shortcomings. Perhaps the primary problem is that, in the rapidly advancing field of biotechnology, there are no references given that are younger than 1999 and there are few that recent. In this arena, changes are extremely rapid; for a paperback book entitled "A Handbook" one would expect it to be no more than a year late in references. As an example of such "age" problems, in the chapter on gene therapy, no mention is made of the problems that arose in gene therapy in 2000–2001. Second, almost without exception, different chapters are written by members of the same department. As far as the reviewer can determine, some have little direct experience in biotechnology. In such a handbook, one would expect chapters by biotechnology experts, particularly as all authors are based on the west coast of the United States, close to major biotechnology companies.

As far as the contents of chapters are concerned, they appear to be selective listings, under headings that are comparable to those used by the Physician's Desk Reference, or Martindale's Pharmacopoeia, of materials that either are/were in clinical usage or at some stage have been in clinical trials. Such information can be found easily in either of the two compendia referred to above. Definitely missing are thorough discussions of the role(s) of biotechnology in advancing drug entities, or why biotechnology should be used to produce a given set of materials. Although much larger in concept, examples of such a handbook would have been an updated version of Atkinson and Mavituna's 1991 Biochemical Engineering and Biotechnology Handbook, concentrating on pharmaceutical production, or of Glazer and Nikaido's 1995 Microbial Biotechnology, again concentrating on pharmaceutical production. I would not recommend this volume for other than a cursory foray into this very important arena.

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NP030712D

10.1021/np030712d

**Vetiveria.** Edited by Massimo Maffei (University of Turin). Taylor & Francis, London, 2002. viii + 191 pp. 17.5 × 25.0 cm. \$96.00. ISBN 0-415-27586-5.

*Vetiveria* is the 21st volume in a series of books on medicinal and aromatic plants. This nine-chapter book

covers the biology, ecology, geography, chemistry, industrial applications, and history of this unique grass (*Vetiveria zizanioides*). Chapters were written by plant biologists, land reclamation experts, biotechnologists, and proponents of *Vetiveria* grass development.

In Chapter 1, the editor provides a brief but well-written history and distribution of the plant throughout the world. Included in this chapter are the current and past uses of the plant from an economic standpoint. Chapter 2 provides an in-depth history of the anatomy and biochemistry of the plant. There is an extensive review of the experimental data used to determine the photosynthetic mechanism (C4) of the plant. Chapter 3 provides the reader with historical as well as technological aspects of exploiting this plant for economic development. This chapter describes a number of uses for the plant and covers its use for animal feed and construction material, as well as the harvesting of vetiver oil. A good deal of practical information is available on the planting, cultivation, and storing of the plant and plant products. Chapter 4 covers the chemistry of vetiver oil and will be of interest to anyone studying the secondary metabolites of this plant. An impressive array of terpenoid compounds has been identified (77 compounds). The authors provide excellent references and structural information on these compounds in a nicely organized table. Chapter 5 (4 pages w/o references) provides a brief review of the Cameroonian uses of the plant for human medicine.

Chapter 6 provides information on the utilization of *V. zizanioides* in land reclamation and preservation. The

plant's tolerance of metal pollutants is well covered. Chapter 7 covers the technological aspects of cultivating the plant in vitro and should provide valuable practical information on the "tricks" to good laboratory cultivation. Chapter 8 is written by the European and Mediterranean Vetiver Network and offers arguments for the economic benefits of the plant. It covers virtually all potential and current uses of the plant and plant oil. The final chapter covers the use of the plant for its ecological advantages in soil preservation and wastewater treatment and suggests some new uses of the plant to alleviate some of the damages caused by floods and fires.

The book is well referenced, and all figures, tables, and photographs are printed in a clear and consistent manner throughout all nine chapters. There is some redundancy in this book, particularly with chapters involved in the economic uses of the plant. The introductions to each chapter are often similar. This book should be included in the libraries of anyone interested in the utilization of plants for human benefit.

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NP0307136

10.1021/np0307136