

Book Reviews*

Bioanalytical Chemistry. By S. R. Mikkelsen (University of Waterloo) and E. Cortón (University of Buenos Aires). John Wiley & Sons, Hoboken. 2004. xvii + 361 pp. 16 × 24 cm. \$99.95. ISBN 0-471-62386-5.

This book is intended by the authors to be a concise text, suitable for advanced undergraduate students, covering the diverse methods in the area of bioanalytical chemistry. The first chapter covers various techniques for quantitation of nucleic acids and carbohydrates. The next five chapters describe proteins in their diverse functions. Three chapters are dedicated to enzymes, beginning with the basics of nomenclature, kinetics, and enzyme inhibition, followed by methods to quantify enzymatic activity and finally immobilized enzymes. The next two chapters cover antibodies and immunoassays. Electrophoresis techniques, such as zone electrophoresis, isoelectric focusing, and capillary electrophoresis, are discussed. The latter chapters of the book discuss centrifugation, chromatography, and mass spectrometry techniques. The final chapter is dedicated to assay development and validation. It discusses fundamental topics such as precision, accuracy, limit of detection, etc.

The major strengths of this book are that it is clearly written and concisely presents both the theory and practical aspects of each technique. Important basic concepts are introduced, and the relative strengths and weaknesses of techniques are discussed. At the end of each chapter are a half dozen or so questions for students to test their understanding of the material. Answers are provided at the end of the book. Also at the end of each chapter are excellent lists of references to the primary literature and other more in-depth sources for further study.

A significant weakness of the book is that it has a poor index (a little over four pages for a 361 page book). For example, the (arguably) single most commonly performed procedure, the protein determination, cannot be found in the index. In the table of contents, it is placed under the rubric “Spectroscopic Methods for Matrix Characterization”. Nevertheless, once you find your method of interest, whatever it may be, it is covered clearly and concisely. *Bioanalytical Chemistry* is available either as a hardcover or as an e-book in portable document format (PDF), which can be viewed using Adobe’s Acrobat Reader freeware. An advantage is that Acrobat’s robust search function can be used to compensate for the anemic index of the hardcover. Unfortunately, the book is not currently available in paperback form. Both the e-book and the hardcover are the same price.

Overall, I found this book to be an excellent, concise secondary resource on a wide variety of analytical techniques.

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Medicinal Herbs. A Compendium. By B. Gehrmann (Einhorn-Rats Pharmacy, Husum), W.-G. Koch (Wartburg Pharmacy, Hamburg), C. O. Tschirch (Gode Wind Pharmacy, Hamburg), and H. Brinkmann (Klinikum Nord, Hamburg). Haworth Press, Inc., Binghamton. 2005. xii + 228 pp. 15 × 21 cm. \$29.95. ISBN 0-7890-2531-0.

This compendium provides a concise, user-friendly overview of 200 medicinal and cosmetic plants. Every monograph consists of a one-page summary of the plant, starting with the common English and Latin names. The reader will find information about indicated use, dosage, duration of use, contraindications, adverse events and interactions, and other comments on efficacy, safety, and particular risks. There is also a valuable pictogram system that gives additional information on things such as the ideal time to take the herbal preparation, interactions with drugs, potential reactions after exposure to sun and precautions to be taken during pregnancy, and possible allergic reactions, to name a few. The dosage is specified for each type of use (internal, external, and local) and the preparation of tea or macerate described in detail.

I strongly recommend this compendium for its clarity and conciseness and for the information that is not provided elsewhere, such as specifics regarding the time to take the herbal preparation (before, during, or after a meal). It is an essential book for pharmacists, health practitioners, and herbalists, as well as anyone interested in medicinal plants who is looking for a quick reference on the fundamentals, e.g., the dosage. As a compendium for professionals, a pocket format would have been ideal. I noted that some North American plants are missing, for example, *Echinacea purpurea* roots, *Echinacea angustifolia* roots, and *Scutellaria lateriflora* herb. An extended version with those plants would be greatly appreciated. For a future version, I would also suggest an index, which would link the disease to the plants used to treat the condition.

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*Unsigned book reviews are by the Book Review Editor.

Biochemical Targets of Plant Bioactive Compounds. By Gideon Polya (La Trobe University, Melbourne). Taylor & Francis, London. 2003. xii + 847 pp. 7 × 10 in. £121.00. ISBN 0-415-30829-1.

This book appears to be the culmination of a long and determined effort to compile all available information of the mechanism of action of “bioactive” plant metabolites and, as such, contains a wealth of information for anyone in the field of natural products.

The first chapter contains a brief introduction to the organization and scope of the book and its tables before launching into a long sequence of short descriptions of various categories of plant metabolites (alkaloids, phenolics, terpenes, and “other”). These four groups are then divided into numerous subcategories of classes of compounds, some commonly recurring and others of rather limited occurrence. Chapter 2 is a condensed primer on basic biochemistry.

The remaining twelve chapters each provide a brief introduction to a molecular or biochemical target class, followed by tables of compounds active at targets in that class. The tables are mostly natural products, but include some synthetic compounds that act on those targets as well. Many table entries have interesting historical, ethnobotanical, and pharmaceutical notes for certain compounds. For all the individual entries in this text, I could find only one obvious duplication; surprisingly, only two pages separated them. Lacinilene C 7-methy ether is listed in Table 4.4 under alkaloids and again under terpenes, with essentially the same text.

There are three drawbacks to this book. The first is that there is very little information about the potency of most of the listed compounds. The second is that there are no references to the primary literature on these compounds; thus, one would still have to search the literature to find details of the biochemical activity. There are so many moderately to weakly “active” compounds in the literature that a lot of fruitless searching would be conducted, even after consulting this book. Finally, the printed version of such data condemns it to be out of date not long after publication. It now seems much more appropriate and useful to develop searchable electronic databases to provide such information; such databases can be updated routinely or periodically, at much less cost than printing a new edition of a book. While much of the data reported in this compilation can probably be found in databases such as NAPRALERT, the author has done an admirable job of compiling and condensing an enormity of chemical, biochemical, and pharmacological data.

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Capsicum. The Genus *Capsicum*. Edited by Amit Krishna De (Indian Science Congress Association, Calcutta). Taylor & Francis, London. 2003. xix + 275 pp. 7 × 10 in. \$129.95. ISBN 0-415-29991-8.

This is the 33rd volume in the series of books on Medicinal and Aromatic Plants—Industrial Profiles. The book contains sixteen chapters dealing with a wide range of topics on the subject of the genus *Capsicum* (family Solanaceae) and should hold the interest of professionals and nonprofessionals in areas such as agronomy, biochemistry, botany, chemistry, pharmacognosy, and taxonomy.

Chapter 1 (52 refs) gives a historical and botanical narrative of *Capsicum*. Students of botany will welcome a review of the taxonomy along with a fairly detailed descrip-

tion of specific domestic species. Although no official references are cited, Chapter 2 presents extended information about the exports of chili, chili oil, and chili oleoresin from India to various countries. The chapter’s title is confusing (“A glimpse of the world trade in *Capsicum*”) since the material focuses exclusively on exports from India.

Chapter 3 (114 refs) is an ambitious chapter that discusses several topics including chemical composition, various analytical techniques and methods for determination of pungent constituents, and development of standards for testing. Because of the vast amount of information included within the chapter, familiarity with the specific topic may be required in order to fully understand the material. However, the large number of references helps to amend this obstacle.

Chapters 4 (70 refs), 5 (20 refs), and 6 (146 refs) all discuss the biosynthesis of capsaicin, but from different vantage points. Chapter 4 provides a concise discussion of the pungent constituents and their analyses via gas and liquid chromatography. Chapter 5 relates phenolic intermediates to the biosynthesis of capsaicinoids in the style of a journal article, and Chapter 6 discusses the biosynthesis of capsaicinoids and carotenoids while reviewing the more industrial aspects of genetic engineering, downstream processing, and biotechnology of *Capsicum*.

The next six chapters address various aspects associated with growing, cultivating, post-harvesting, and storing *Capsicum*. Chapter 7 (57 refs) provides a good overview of irrigation requirements and requisite water quality. The relatively large number of references for this chapter provides ample reading for further investigation. Chapter 8 (12 refs) briefly reviews the cultivating and processing practices specific to India. Chapter 9 (25 refs) discusses the issues of *Capsicum* production and preservation in Hungary; since Hungary is on the northern border of the growing area, this chapter addresses issues germane to this climate. Chapter 10 (54 refs) and Chapter 11 (84 refs) describe the procedures for the post-harvest and processing of *Capsicum*, as well as the oleoresins. Chapter 11 provides a wider variety of topics associated with post-harvesting and includes several illustrations and flowcharts of the entire process. Finally, Chapter 12 (55 refs) finishes this process by discussing the storage requirements of *Capsicum* chilies and seeds. Chapter 15 (37 refs) provides a nice overview of fruit color as related to growing conditions, storage, and pigments.

Chapter 13 (15 refs) examines the safety regulations and hygienic concerns of paprika powder, while Chapter 14 (16 refs) provides a logical follow-up by providing a brief summary of adulterants, contaminants, and pollutants found in *Capsicum*.

The book ends with Chapter 16 (108 refs) summarizing the biochemical and chemical work being done with capsaicin, as well as its promise as an analgesic and anti-inflammatory agent.

In conclusion, the 33rd installment of this series of books will be valuable to laypersons and professionals with an interest in *Capsicum*. The repetition of some material between chapters provides readers with different perspectives on these topics. The book achieves nicely its goal of reviewing topics on *Capsicum* that are literally “field to fork”.

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More Practical Problem Solving in HPLC. By Stavros Kromidas (Consultant, Saarbrücken). Wiley-VCH, Weinheim. 2005. xv + 294 pp. 17 × 24 cm. \$70.00. ISBN 3-527-31113-0.

This book, the second volume in an HPLC problem solving series by the author, is comprised of a collection of useful tips for the practice of analytical HPLC. Each tip is presented as a problem or question that may arise in a chromatographic analysis and is answered in a brief one- to four-page discussion, usually accompanied by chromatograms, tables, or helpful figures. Responses to the questions posed are thoughtful, concise, and practical. The text is not overburdened with theory, but rather is conveyed with a refreshing degree of humor and wit, making the text highly readable.

The first of two sections discusses column hardware and stationary phases, including the application of polar bonded phases for separations involving ionizable compounds. This leads into a chapter on mobile phase buffers, with thoughts on the drawbacks of buffer usage, how changes in pH affect a separation, and how manipulation of pH can be used to separate mixtures of acidic and basic compounds. The next chapter covers method optimization, describing systematic approaches to developing a mobile phase gradient aimed at reducing analysis time while maintaining good resolution. Chapters devoted to troubleshooting and general HPLC wisdom finish the section, providing insight into topics such as ghost peaks, peak tailing, column regeneration, system cleansing, dead volume effects, and the use of methanol versus acetonitrile in reverse phase HPLC.

The second section consists of invited contributions covering aspects of LC-MS coupling, micro- and nano-LC, and quantification. Although not as well developed as the previous section, the information is practical and timely, as more laboratories acquire LC-MS instruments and micro-/nanoscale separations systems. LC-MS topics include mobile phase and modifier compatibility with the API interface, application of electrospray (ESI) and atmospheric chemical ionization (APCI), MS as a quantification tool, and common contaminants that affect LC-MS chromatograms and spectra. The importance of optimizing hardware configuration and operating parameters is emphasized in micro- and nanoscale systems. This chapter also provides information for those seeking to make the transition from analytical scale to micro-/nanoscale HPLC. The final segment contains an in-depth discussion on parameters that influence chromatogram integration, finishing with examples of the internal, external, and standard addition methods of quantification.

Thanks go to the author for sharing a quantity and depth of knowledge that can be obtained only from decades of work immersed in the field. The text will be readily comprehensible by those familiar with HPLC terminology or having previous experience with operating chromatographic hardware. Criticism of this book is minimal and is confined to a shortage of indexing, making it difficult to use as a reference manual. This book would be of greatest benefit to those who work hands-on with HPLC equipment on a daily basis, including workers in analytical laboratories, pharmaceutical companies, GMP and QC facilities, and university research groups.

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A Guide to Understanding Dietary Supplements. By Shawn M. Talbott (University of Utah). The Haworth Press, Inc., Binghamton. 2003. xxv + 713 pp. 6 × 8.5 in. \$69.95. ISBN 0-7890-1456-4.

This book opens by describing the creation of DSHEA, the realm of entities covered by this legislation, and its operational field of limitations. Since dietary supplements are a significant part of daily life for many people and because this field is changing rapidly, the book should be interesting reading for those unfamiliar with this aspect of the “birth” of the supplement industry. The author then goes on to describe an idealized model of how new dietary supplements would be discovered, based on the drug discovery/development model used in the pharmaceutical industry. While this approach is used by relatively few within the supplement industry, most companies do not put the type of resources necessary to compete in the area of pharmaceutical sophistication, including ADME/PK, toxicology, pharmacology, and mechanism of action studies prior to product launch. A good description of the business and practical aspects relevant to selection and commercialization of a new supplement is provided and will allow insight into the many decisions necessary in putting forward a successful new dietary supplement. Helpful hints on deciphering the labeling commonly found in the commercial products will also be useful to readers looking for guidance.

The book then switches gears and provides summaries, in the form of chapters, of various market/therapeutic areas, including weight loss, sport supplements and ergogenic aids, energy level boosters, bone health, joint health, mood and brain health, heart health, immune support, antioxidant protection and eye health, gastrointestinal health, male health, female health, cancer support, and diabetes support. Within each chapter, typical ingredients, their corresponding “function” within the specific therapeutic area, dosage, and references are described. This is useful for those trying to understand why a particular supplement manufacturer may have those ingredients in the formulation.

One drawback is that, generally, the supportive data for each of these ingredients are not provided in direct reference form, nor are they described in enough detail to determine their usefulness. Overall, the author has done an excellent job of pulling together the components of a wide range of ingredients, therapeutic areas, and literature to make this a strongly recommended volume for purchase by scientists working in the area, as well as by those who take supplements on a daily basis and would like to understand better what it is they are ingesting.

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Ginger: The Genus *Zingiber*. Medicinal and Aromatic Plants—Industrial Profiles, Volume 41. Edited by P. N. Ravindran (Centre for Medicinal Plants Research, Kerala, India) and K. Nirmal Babu (Division of Crop Improvement and Biotechnology, Indian Institute of Spices Research, Kerala, India). CRC Press, Boca Raton, FL. 2005. xix + 552. 18 × 26 cm. \$129.95. ISBN 0-415-32468-8.

Ginger is the rhizome of *Zingiber officinale* Roscoe, a perennial herb in the tropical monocot family Zingiberaceae. It is one of the mostly widely grown tropical spice and medicinal crops. This encyclopedic volume consists of 17 chapters covering its botany, agronomy, processing and marketing, chemistry, pharmacology, and culinary uses. There is an obvious focus on the production, marketing, and uses of ginger in India; 21 of the 32 contributors list their affiliations with Indian institutions.

Ginger is of unknown geographic origin and is not known outside of cultivation. Propagation is exclusively vegetative, using rhizome “seed” pieces. The sterility of the plant is the key feature of its biology. Favorable mutations can be fixed rapidly, but the lack of sexual recombination is the major obstacle to crop improvement, particularly breeding for improved disease resistance. The multiple causes of sterility—including heterostyly, embryo sac degeneration, and pollen sterility—are probably consequences of thousands of generations of vegetative propagation.

The majority of the chapters deal with agronomic issues, including production practices, harvesting, bacterial diseases, and fungal diseases. Ginger is a shade-loving crop that apparently performs well in agroforestry and intercropping systems. One curious contradiction noted is that rotation of ginger with solanaceous crops is discouraged because of shared diseases, yet intercropping with peppers is a common practice.

The chapters on chemistry, pharmacology, and medicinal uses focus on the essential oils and oleoresin, particularly the principal constituents of the latter, the gingerols and shogaol, whose anti-inflammatory and antinauseant activities have been well studied. The pharmacology chapter by H. Kimura et al. points out that two commonly used forms, dried ginger and steamed (and dried) ginger, differ in the ratio of gingerols to shogaol, since the steam processing results in dehydration of the gingerols. Extracts of the two forms have different effects on prostaglandin-induced contractions of mice mesenteric veins: gingerols increase these contractions, but shogaol decreases them. The authors hypothesize that gingerols activate COX-1 but inhibit COX-2, while shogaol strongly inhibits COX-2 activity.

The book ends with a short chapter on other species of the genus *Zingiber*. Many of these species, as well as other species in many other genera in the Zingiberaceae, have demonstrated anti-inflammatory activity, associated with a variety of active compounds. Understanding what common structural elements of these compounds might be responsible for the activity could go a long way toward development of safer, effective COX-2 inhibitors. This volume is comprehensive, informative, and well edited, with only rare typographical errors or bibliographic omissions—a good addition to the literature on spice and medicinal plants.

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Mouse Models of Human Cancer. Edited by Eric C. Holland (MSKCC). John Wiley & Sons, Hoboken. 2004. xi + 474 pp. 22 × 28.5 cm. ISBN 0-471-44460-X.

This book provides a sweeping overview of modeling neoplastic disease in rodents. The text is well organized and easy to understand, even for those unskilled in the development and application of mouse models. Grouped into five major sections, (I) Mouse Handling and Engineering, (II) Organ Site-Specific Mouse Models of Human Cancer, (III) General Issues in Cancer Biology, (IV) Imaging Technologies, and (V) Preclinical Trials, the text covers issues from introductory concepts in animal handling to drug development models. The editor assembled a diverse group of contributors (>60) representing academic, government, and commercial expertise. This wealth of experience contributes to a text with diverse views, which coalesce around the concepts of humane animal care and use (reduce, refine, replace).

This text is a valuable resource to those seeking to understand issues associated with mouse models. The early chapters provide the novice investigator with an excellent understanding of health and pathology issues associated with rodent models. This is an important, and often overlooked, aspect of rodent models, as the quality of a model is only as good as the quality of animal used to create it. The overview of technology and science involved in developing transgenic rodent models for neoplastic disease is well written and easily understood. The chapters devoted to the major cancer organ sites are broadly inclusive and provide an excellent understanding of the disease events occurring in humans and how they relate to current mouse models. For those seeking options in these scientific areas, this text provides an excellent starting point from which to pursue further literature searches.

As the text progresses, it provides an overview of other issues including the importance of genetic background on transgene expression and the resulting phenotypes. The chapter on metastasis may be of greatest significance to those attempting to develop therapeutic modalities since most cancer deaths are a result of metastatic rather than primary tumor lesions. The genetic events known to modulate metastasis, as well as the transgenic models now available to measure the impact of these events, are well described and presented in easy to follow tabular formats.

As the text advances toward preclinical modeling of potential therapies, it provides a description of imaging technologies currently applied to the field. This includes bioluminescent imaging with its exquisite sensitivity and magnetic resonance imaging, a modality that can be directly correlated with human clinical management options. The Preclinical Trials section contains overviews of pharmacokinetic models and preclinical trial design and analysis issues. These chapters assist the reader in understanding how properly conducted efficacy studies maximize the information gained while minimizing the number of experimental animals required.

This text is well written and easy to read and contains multiple color plates that augment the reader's ability to visualize the issues being discussed. Overall, this book is a valuable addition to the shelf of those currently modeling human cancer, particularly if they teach graduate students or are involved in drug discovery and development efforts.

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Tea: Bioactivity and Therapeutic Potential. Edited by Y. Zhen (Chinese Academy of Medical Sciences and Peking Union Medical College, China). Taylor & Francis Publishers, London and New York, 2002. xii + 267 pp. 17 × 25 cm. £72.99. ISBN 0-415-27345-5.

Tea has been one of the most popular beverages in the world for centuries, and its widespread use in Asian countries dates back thousands of years. Recently, the benefit of drinking tea has gained more attention as part of an overall lifestyle for healthy living and for potential medicinal values. It is indeed no exaggeration to state that tea drinking is an international pastime. What is tea then? Is it a beverage or is it a functional drink whose effects go beyond simple quenching of thirst?

In *Tea: Bioactivity and Therapeutic Potential*, part of the Medicinal and Aromatic Plants book series published by Taylor & Francis, many leading authorities from China discuss various aspects of what becomes tea, from botanical classification of tea plants, to the chemical constituents of tea and their variations from preparation/fermentation processes, to biological activities and pharmacological effects of tea, including antimicrobial, antitumor, anticarcinogenic, and cardiovascular effects, as well as tea's role in traditional Chinese medicine preparations.

A majority of reports on tea's chemical composition and functional effects are focused on the nonvolatile constituents. The water-soluble polyphenol content, including catechins, in tea apical shoots is the major determinant of tea quality. In Chapter 4, Zong-mao Chen et al. give an informative summary on the color and taste of prepared tea and their association with the chemical content of catechins in green tea, and oxidative catechin products, theaflavin and thearubigin, in processed black tea. Other components, such as chlorophyll, carotenoids, amino acids, carbohydrates, minerals, and enzymes occurring in minor amounts, are also discussed. In addition to the oft-mentioned nonvolatiles, there are several hundred volatile compounds identified from fresh tea leaves, and the extraction process and roasting of tea leaves greatly affect the flavor and aroma of the finished product, as the chemical composition changes during the manufacturing process. In Chapter 4, the aroma characteristics of various tea, including green tea, semifermented tea (e.g., oolong), black tea (e.g., Garjeerling), as well as specialty teas (post-fermented and smoked teas), are discussed in connection with their chemical constituents. In the main part of the book, Chapters 6 through 11, biochemical, cellular, and pharmacological effects of tea are well researched and presented. Although a large body of research evidence is based on the activity of catechins, especially epigallocatechin gallate (EGCG), epigallocatechin (ECG), epicatechin (EC), galocatechin (GC), and catechin (C) itself, some research is conducted on tea extracts, with green tea extracts being more effective than black tea owing to the higher content of catechins. The pharmacological properties of caffeine are also discussed in the context of its effects on various diseases and cellular enzymes. These well-referenced and -researched discussions and the information therein should be viewed objectively as they are, as continued research is still needed to further validate some of the claims or even conflicting information.

This book is a well-organized and superbly researched publication well suited for researchers engaged in further studying the biochemical basis of the functional effects of tea extracts or components and for healthcare professionals who are inclined to use traditional medicinals as adjuvant therapy or promoting healthy living. Tea aficionados will

also find part of this book an easy read in learning the botanical classification and the technical art of tea processing. As a widely accepted popular drink, tea can also be found in a number of newly developed commercial products, including cosmetics, aimed at health conscious consumers. Although presently available scientific evidence is clearly supportive of tea's health benefits, tea is not an eternal cure-all, and not all teas are equally effective in modulating biological functions. Furthermore, it should be pointed out that some of the data are based on historical recordings and ethnopharmacological information. The spiritual side of tea drinking as it relates to well-being and state of mind also needs to be taken into consideration. Nonetheless, given the proliferation of high caloric, high sugar content drinks being touted to the consumers, it is also gratifying to see an increasing interest and general knowledge in tea drinking for those who have or wish to adapt to a healthy lifestyle.

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Handbook of Industrial Mycology (Vol. 22 in the "Mycology Series"). Edited by Zhiqiang An (Merck Research Laboratories). Marcel Dekker, New York. 2005. xvi + 763 pp. 19 × 27 cm. \$225.00. ISBN 0-8247-5655-X.

This book closely follows two others in the same publisher's Mycology Series, namely, *Handbook of Fungal Biotechnology*, 2nd ed. (Vol. 20) and *Fungal Biotechnology in Agricultural, Food, and Environmental Applications* (Vol. 21), both edited by D. K. Arora (2003). The series began in 1980 and now includes several second editions. Fortunately, although there is minor overlap in content between the present volume and Vol. 20 (i.e., chapters on secondary metabolite gene clusters and genomics), each book is relatively discrete in coverage, despite the lack of an obvious difference between the terms "fungal biotechnology" and "industrial mycology". The focus here is on industrial and medical applications of fungal secondary metabolites, mostly excluding enzymes. As such, this book is certainly important for readers of this journal with an interest in exploiting fungi for their chemical talents. Volume 22 also shares some thematic overlap with Vol. 8 in the series, *Molecular Industrial Mycology: Systems and Applications for Filamentous Fungi*, edited by S. A. Leong and R. Berka (1990). The older book is half the length of the present tome.

The *Handbook of Industrial Mycology* includes 26 chapters divided into eight sections, with the first four sections the longest. The first section, "Mycology, Industrial Mycology, and Fungal Biology", includes five chapters that provide a historical context to industrial mycology and some biological aspects germane to their use in industrial fermentations. These include an overview of biological activities, a review of regulation of morphogenesis and development, and a somewhat misplaced chapter on *Agrobacterium*-mediated transformation. The second section includes six chapters on "Fungal Secondary Metabolites Discovery". An overview of the use of fungal germplasm in drug discovery and industry is followed by a primer on secondary metabolite isolation and structural elucidation, a chapter on using chemotaxonomy and DNA-based methods for dereplication prior to screening, and a chapter on

screening itself. The third section concerns "Biosynthesis of Fungal Secondary Metabolites", with seven chapters dealing with genetic and biosynthetic aspects of particular metabolic groups produced by different fungi. The fourth section, on "Fermentation, Strain Improvement and Bio-conversion", includes a chapter on each of the topics in the subtitle, but the chapter on fermentation focuses on one metabolite produced by one fungus. The final four sections deal with "Metabolic Engineering" (two chapters, including a timely chapter on metabolomics that is already being widely cited) and single-chaptered sections on "Heterologous Protein and Enzyme Expression in Fungi", "Mycotoxins", and "Fungi in Biological Control". The latter two sections seem somehow isolated in this volume, although both chapters consider secondary metabolites that are related to those discussed elsewhere and produced by some of the same fungi. Overall, there is a heavy emphasis on genetic techniques and secondary metabolism, but little attention paid to fungal physiology, which, at least in the academic world, seems to be a disappearing field. The qualities of the print, writing, and editing in this book are good, with exception of several figures (especially in the metabolomics chapter) that are too small to be comprehensible.

What is a handbook? One imagines a reference including comprehensive methods, and text to put these methods in

context, but not detailed academic reviews. From this standpoint, this book is uneven, with some chapters providing detailed methods and others being traditional academic reviews. Obviously, it is impossible to encapsulate any field in one book, and this is an observation rather than a serious criticism. However, from the contents of this book, with its vision of genomics and high-throughput screening, it is clear that there are emerging bottlenecks that those involved in microbial biotechnology need to consider. These are the efficient isolation of a large number of diverse microorganisms, efficient and miniaturized methods to preserve these microorganisms, methods to maximize metabolite production, and the need to automate all these processes so that mycologists can keep up with the throughput enabled by modern screening technologies. These basics of microbiology have not changed much in recent decades. The clever people involved in robotics and miniaturization should turn their attention to these tasks.

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