

Book Reviews

Drug-Membrane Interactions. Analysis, Drug Distribution, Modeling. Joachim K. Seydel and Michael Wiese. (Methods and Principles in Medicinal Chemistry, Volume 15). Wiley-VCH, Germany. www.wiley-vch.de. 2002. 349 pp. \$128.00.

It is extremely difficult at the present time to be working within the pharmaceutical sciences and not to need some knowledge of the activity of drugs at the cellular level, particularly in terms of interactions with cell membranes. However, the sheer breadth of considerations relevant to this field is perhaps daunting, with aspects of cell biology and physiology, physical chemistry, drug delivery and disposition, pharmacology, analytical chemistry, physical chemistry, and biophysics all being of relevance. This book therefore represents a very welcome and useful addition to the literature as the authors have sought to focus on those aspects of the subject that are particularly useful to the pharmaceutical scientist and to bring together these still-diverse concepts together in one reference source. Moreover, they have succeeded in producing a volume that is accessible to anyone with a basic background in pharmacy or medicine without trivializing the subject. Indeed, in the introduction Joachim Seydel implies that the book is aimed primarily at medicinal chemists; I would consider this to be too modest, as the book will also be of use to those working in the drug-delivery field as well as those interested in understanding the pharmacology of drugs at a cellular and molecular level. Similarly, the book also deals with whole-body issues, such as resistance to antibiotics and cytotoxic agents and the efficacy of drugs, such as those used to treat Alzheimer's disease, showing again the manner in which these interactions are of importance to every aspect of therapeutic efficacy.

The chapters are arranged in a manner that is in itself instructive. Chapter 1 gives a basic background to the subject, in particular over-viewing membrane physiology. This is of necessity more of a revision of likely prior knowledge on the part of the reader than an in-depth discussion of the latest thinking in the field, but as the purpose is to bring together the basic concepts relevant to the subject this level of treatment is appropriate. The second chapter discusses the use of oil/water partitioning, this in itself raising the issue of the extent to which simple models are of real benefit within the field. The opinion of the author may perhaps be summarized by the last sentence, stating that "... we should remember that membranes are not made of octanol and membranes are not uniformly made of one type of phospholipid." Clearly, it is necessary to consider real systems if at all possible and to do this we need an array of analytical methods that will enable study of such complex samples at a molecular level. To this effect, Chapter 3 then reviews some of the most important techniques used within the field, covering thermal, spectroscopic, and chromatographic methods. To cover in depth this range of methods in one chapter is an impossible task, hence the authors give a thumbnail sketch of the methods with references to where more information may be found. Having set out the background to the subject in terms of the basic physiology and the tools with which the systems may be studied,

the book begins in earnest to describe the current thinking with regard to the interaction of drugs with cellular membranes to increasing scale of scrutiny. Chapter 4 outlines the study of drug-membrane interactions at the cellular level, including discussion of the use of artificial membranes and cell lines as absorption models and the distribution within tissues and target organisms, such as the brain and bacterial cells, with consideration given to issues such as drug accumulation and toxicity. Chapter 5 takes these themes further into the realm of pharmacodynamics whereby the relationship between drug-membrane interactions and drug efficacy and resistance are explored. Both chapters serve to highlight the profound importance of the molecular interaction between drugs and biological membranes in the much wider context of therapeutic activity. The final chapter, written by Michael Wiese, takes these concepts in a highly interesting new direction by discussing the latest advances in computer modeling of phospholipids and drug-phospholipid interactions. Clearly, there is a long way to go before we can simulate the complexity of a complete membrane, but the chapter serves to clearly explain the impressive possibilities that are available at the present time, including, for example, the simulation of the action of pore-forming peptides and diffusion processes through ion channels.

Overall, this is a readable and informative text that serves to bring together the diverse considerations associated with drug-membrane interactions from a molecular to a whole-body scale. Indeed, the principal strength of the book is in the bringing together of the threads of a subject that is highly diverse, in so doing emphasizing the remarkable range of therapeutic considerations to which the topic pertains. I would anticipate that the book will be of interest not only to those working in the specific field of drug-membrane interactions but, perhaps more importantly, also to those whose work touches on aspects of the subject and who would appreciate a text that filled in the gaps in their knowledge.

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Pharmacokinetics in Drug Discovery and Development.

Ronald D. Schoenwald. CRC Press, Boca Raton, FL. www.crcpress.com. 2002. 426 pp. \$59.95.

This is an excellent book on pharmacokinetics for individuals in academia, industry, and regulatory agencies. It contains useful information for both experts and those who would like to become proficient in pharmacokinetics. It covers a broad range of topics in pharmacokinetics that are well organized by grouping 16 chapters into four sections: I. Basic Principles; II. Industrial & Regulatory Applications; III. Clinical Applications; and IV. Research Applications.

The first section consists of Chapter 1, Basic Principles, that introduces the reader to fundamental concepts of pharmacokinetics in an easy to read format and provides good references for further study. Section II on Industrial & Regulatory Applications contains four chapters, such as PK/PD approach (Chapter 2), Pharmacokinetics and Metabolism in Drug Discovery and Preclinical Development (Chapter 3), Phase I, II, and III FDA submissions (Chapter 4), and Bioavailability and Bioequivalence (Chapter 5).

Pharmacokinetic/Pharmacodynamic (PK/PD) concepts and their applications in different therapeutic areas are discussed in Chapter 2. This chapter would read better with a few illustrations/figures. Chapter 3 provides a brief overview of absorption, metabolism, toxicokinetics, and allometric scaling. Phase I, II, III, and FDA submissions are discussed in Chapter 4. This is a detailed and well-written chapter that would be very useful for industrial scientists involved in all areas of pharmaceutical product development. Bioavailability and bioequivalence of pharmaceutical products is reviewed in Chapter 5.

Section III provides a good overview of clinical applications of pharmacokinetics along with specific information about compounds in different therapeutic areas. This section includes general approaches to clinical pharmacokinetic modeling (Chapter 6); aminoglycosides and other antibiotics (Chapter 7); cardiovascular agents (Chapter 8); psychotropic agents (Chapter 9); theophylline (Chapter 10); and anticonvulsant agents (Chapter 11). Information on clinical PK/PD considerations, absorption, distribution, metabolism, excretion, disease state considerations, drug interactions, and dosing regimens of different drugs is presented in Chapters 7–11.

Research applications of pharmacokinetics in drug discovery and product development are presented in Section IV. Classic pharmacokinetic modeling (single, multiple, and non-linear compartmental models) is discussed in Chapter 12. An overview of noncompartmental modeling is presented in Chapter 13, and an overview of physiologically based pharmacokinetic models in Chapter 14. Population pharmacokinetics is discussed in Chapter 15 and modeling using a linear systems approach is described in detail in Chapter 16.

This book is recommended as an advanced pharmacokinetics textbook for students in the Pharm.D. and graduate school programs. It would also serve as a valuable source of information for product development scientists in the pharmaceutical industry.

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Laboratory Animal Medicine. 2nd Ed. James G. Fox, Lynn C. Anderson, Franklin M. Loew, and Fred W. Quimby, Eds. Academic Press, San Diego, CA. www.academicpress.com. 2002. 1325 pp. \$125.00.

This book comprises 32 chapters (1325 pages) that provide an introduction to the use and care of animals in bio-

medical research. The book focuses on the diagnosis, treatment, and prevention of diseases in animals that are used as subjects in biomedical research. The book has been well edited and contains a range of topics that together provide a concise overview of the area of laboratory animal medicine. Each chapter is clearly written by experienced authors. All contributors except one are from the United States. The volume includes chapters that discuss the historical use of animals in biomedical research, regulatory constraints, biology and diseases of laboratory animals, behavior of laboratory animals, experimental techniques, and design and management of animal facilities, among others. It contains chapters on fish, reptiles, and mammals.

The book provides useful reference material on topics relevant to laboratory animal research and medicine. It contains useful tables that summarize information and high-quality figures, each of which provide an improved insight into the material discussed in the text. The book would assist students of veterinary medicine or scientists that use animals in their research. It would be a valuable addition to the shelves of the institution library of any student or scientist working in this area, where it would be a frequently referenced volume.

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Melanoma: Biologically Targeted Therapeutics. Ernest C. Borden, Ed. Humana Press, Totowa, NJ. www.humanapress.com. 2002. 389 pp. \$115.

Melanoma is one of the most horrific and insidious of the cancers. It affects several hundred thousand individuals a year and typically has a very poor prognosis. But that is not what makes melanoma one of the most familiar of the cancers to the general population. It is the fact that this cancer can be readily seen, observed at its origin in the skin, and that individuals appreciate a lifestyle that can directly affect the frequency of this cancer. A huge industry has developed to protect individuals from harmful solar ultraviolet rays (only one of the potential risk factors); mirroring the understanding of the general population for both the causes and the outcomes of this cancer. Thus, in some ways, a text on melanoma should be thought of as something for the masses to read and digest. However, this text is not that kind of beast. This text is a compilation of the very latest in understanding this cancer from its origin to its treatment. Every aspect of this text, from its insightful authors, to its complete and up-to-date reference lists, to its high-quality figures, right down to its printing on acid-free paper, was a delight. Now I know saying that reading this book was a delight sounds a bit morbid, considering that its topic is about melanoma; a vicious cancer. Indeed, everyone I know seems to have lost a dear or close friend or relation to this cancer. This text, however, truly brings every component of this field together and provides an excellent reference tool for anyone working in this area. Too many

similar efforts miss this mark. Thus, I was delighted to see one that hit it so clearly.

The obvious goal for research into any area of cancer is to identify improved methods of treatment and the chapters in this text are clearly weighted in that direction. This text is very logically designed to bring the reader to a point where recent efforts in new treatments can be understood and appreciated. Initial chapters define the disease; its presentation and definitions for clinical staging. I found these initial chapters extremely useful in getting acquainted with current methods of detection, biopsy assessment, approaches to surgical management, the concept of sentinel lymph node analysis, proposed changes to the current methods of staging, various methods of pathological assessment, and prognostic variables. These early chapters set the stage nicely for those that follow, which focus on therapeutic approaches. I very much liked that this early section of the text did not contain the typical chapters on animal models of the disease. Dr. Borden kept the book focused on the human model (the only one that really counts) and avoided efforts to describe and characterize models that often have no ultimate correlation with clinical efforts. I had no problem making the jump from the information described in these first few chapters to their implications in the application and assessment of preclinical animal models of melanoma.

The biologic and targeted therapeutic approaches that comprise the remainder of the text deal primarily with the areas of immunology, chemotherapy, and angiogenesis as they relate to efforts to understand and treat melanoma. The set of chapters on immunologic approaches run the gamut from why these cancer cells can evade endogenous immune events to efforts of active vaccination using melanoma-specific antigens. Weighing tumor antigen options, evaluating the potential mechanism of immunological evasion, identifying the desired immune cell type for an effective response, and strategies to optimize immunization against selected antigens are all discussed. These chapters are followed by comments on the clinical efforts with two interleukins (IL), IL-2 and IL-12. In the case of IL-2, tremendous therapeutic potential has been observed in a limited patient population, whereas IL-12 has failed to deliver on its therapeutic promise to date. Interferons are another potential biotherapeutic for the treatment of melanoma. The conclusions of this chapter lead nicely into the following chapter, which highlights the improved therapeutic potential of standard chemotherapy agents when co-administered with interleukins and interferons.

The final portion of the book looks at drivers that make melanoma so dangerous; molecular events that stimulate uncontrolled cancer cell growth and nutrient supply to those cancer cells through the induction of neo-angiogenic events. Numerous drug companies are evaluating a plethora of new drug candidates that act to regulate such specific signal transduction pathways. These chapters provide an excellent framework from which to assess the potential for current and future agents to affect the growth of melanoma cells or melanoma tumors. Some of these classes of agents have already been examined and such outcomes are discussed. Indeed, targeting specific pathways associated with cell and tumor growth look quite promising and may provide near-term clinical benefit for treatment of melanoma.

In summary, I can whole-heartedly recommend this

book. The text is one of the Current Clinical Oncology series. Dr. Borden has delivered a book that adds significantly to this series and will also add to any library shelf. I consider it an excellent example of how an editor can orchestrate a clear theme while covering an entire field of study.

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Textbook of Receptor Pharmacology. Second Edition. John C. Foreman and Torben Johansen, Eds. CRC Press, Boca Raton, FL. www.crcpress.com. 2003. 288 pp. \$99.95.

This text is the second edition of a book that was used for undergraduate instruction at University College London for pharmacology and medicinal chemistry students. The editors have recruited a number of distinguished researchers from academics to contribute to this text. The text is organized into five sections. The first consists of one chapter dealing with drug-receptor interaction, the second consists of three chapters dealing with the molecular structure of receptors, the third consists of one chapter dealing with ligand-binding studies, the fourth consists of three chapters dealing with transduction, and the fifth consists of one chapter on receptors as pharmacological targets. Each chapter has homework problems and references to material for further reading. This organization is appropriate for an advanced text.

The chapters dealing with drug-receptor interactions and drug binding are very quantitative in their treatments. The other chapters are somewhat more focused on transmembrane receptors and include a range of topics from molecular structure to their genetic evolution.

The text is very well organized and the material presented in a very readable, but detailed, manner. It is advanced and, from this reviewer's experience, would not be useful for undergraduate instruction in college of pharmacy. It is a valuable source for academic and industrial medicinal chemists involved in developing drugs that target specific receptors and this reviewer recommends it highly. Its cost is modest, so the text should find its way into personal libraries.

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RT-PCR Protocols. Joe O'Connell, Ed. (Methods in Molecular Biology. Volume 193). Humana Press, Totowa, NJ. www.humanapress.com. 2002. 378 pp. \$99.50.

Reverse transcription defines the use of a ribonucleotide (RNA) sequence as a template for synthesis of a nascent

deoxyribonucleotide (DNA) sequence. RNA-based viruses use reverse transcription as a critical aspect of replication in DNA-based host cells and a variety of reverse transcriptase (RT) enzymes have now been isolated and characterized. Some of these enzymes have found their way into a variety of procedures where messenger RNA (mRNA) can be dramatically amplified *in vitro*. The power of such a technique, termed reverse transcriptase-polymerase chain reaction (RT-PCR), is three-fold. The first is that of incredible sensitivity. For the first time, trace amount of mRNA could be detected through the selective amplification of only a few copies of a particular ribonucleotide sequence. The second is that of specificity. By using two or more carefully selected primer sequences, absolute identity of a unique mRNA can be achieved. The third important feature of RT-PCR is that of flexibility. RT-PCR is a relatively simple technique that requires (besides sequence specific primers) an RT enzyme and a method of temperature cycling where annealed nucleotide duplexes can be separated for another round of synthesis. Such conditions require an RT enzyme and other materials in the mixture that are compatible with such temperature fluctuations, but in general, these few components constitute a relatively simple system. This is what allows RT-PCR to be applied in a tremendous array of applications that exemplify this flexibility.

A recent compilation of RT-PCR protocols by Joe O'Connell clearly shows the power of RT-PCR through repeated demonstrations of its simplicity, specificity, and flexibility. The various chapters in this book cannot really be considered as efforts from the greatest experts in the field. In essence, there really are very few current experts in the field. That is to say that the basic principles of RT-PCR have become incorporated into almost every laboratory actively pursuing some aspect of biological study. The chapters in this book instead describe a series of protocols that are creative, specific, and important applications of the basic principles of RT-PCR. Subtle modifications of the basic RT-PCR protocol can be noted in the protocols presented by these groups in the particular applications they describe. Thus, these chapters are presented by experts in forensics, cancer biologists, infectious disease experts, etc. and describe the nuts and bolts of performing RT-PCR under a variety of conditions for various applications. The methods described can be used to detect extremely low levels (femtograms) of mRNA or determine the distribution of a particular mRNA within a tissue or to quantitate the level of a particular mRNA; to name a few. Additionally, these chapters describe the addition of RT-PCR to other methods, such as laser-capture microdissection, microarray technologies, and high-performance liquid chromatography; again to name only a few. Such combinations result in extremely powerful techniques.

Dr. O'Connell provides an introductory chapter that brings a number of issues related to RT-PCR into focus. This introduction covers a number of basic aspects of RT-PCR, such as primer selection strategies, validation of products, etc., but at a cursory level. Each of these areas could easily have been expanded into separate texts in an effort for more complete coverage; something well beyond the intent of this compilation of protocols. Additional coverage of some of these topics is addressed by some authors with respect to their particular application. This organizational strategy makes the text more useful for someone already familiar with RT-PCR

and interested in expanding their expertise in new RT-PCR applications rather than for a beginner. Someone who wishes to use RT-PCR for the first time will certainly have access to very complete and useful protocols, but would probably not get a perspective of the basic issues involved in why these protocols use particular conditions or strategies that seem to deviate from the other RT-PCR protocols. This is the art of RT-PCR. Some authors (or should I call them artists) do address such issues to provide this additional step of education—others do not. Across the board, though, this is an excellent text that will hold a position on my bookshelf of easy access. In that regard, I might have preferred a ringed-binder format rather than a hard-bound text to make my frequent use of this text a bit more laboratory friendly.

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Polyesters I. Biological Systems and Biotechnological Production. Yoshiharu Doi and Alexander Steinbüchel, Eds. (Volume 3a of the series, Biopolymers. Biology, Chemistry, Biotechnology, Applications). Wiley-VCH, Germany. www.wiley-vch.de. 2002. 460 pp. \$220.00.

Biopolymers is a multivolume handbook that undertakes a comprehensive review on biopolymers covering the broad areas of properties, application, biodegradation, and modification and analysis. Polyesters I focuses on the occurrence of natural polyesters and on the biological systems that are able to synthesize these polymers.

Chapters 1 and 2 provide an overview on the various types of natural polyesters synthesized in plants, namely cutin and suberin. Cutin, which is the functional component of plant cuticle, the outer barrier of the plants, plays a major role in the interaction of plants with the environment, physical and biological. Microbes use cutin as a nutrient source and therefore cutin is involved in the pathogenesis of fungal diseases in many agricultural products, including foods. The major function is a barrier between the developing organs in the mesostemata regions, thereby allowing normal development. Cutin homopolymers can be used to produce liquid or solid polymers of controlled size that could find application as immunologically inert lubricants. Of particular interest to the pharmaceutical sciences in the area of drug delivery is the potential use of cutinase to modify polyester surfaces to increase hydrophilicity and improve wettability. Suberin, which is isolated from the cell wall of plants, can function as a diffusion barrier in wound healing of tissues and as an effective absorber of hydrophobic carcinogens.

Chapter 3 deals with the water-soluble aliphatic polyesters, poly(malic acid)s, whose high water solubility and biocompatibility make these polyesters good candidates as drug carriers and matrices for sustained release. Chapter 4 considers the microbial water-insoluble aliphatic esters (PHA), which, because of their biodegradability, have potential medi-

cal applications as surgical sutures, matrices for the slow release of drugs and scaffolds in bone growth and tissue healing. Chapter 5 covers the polyhydroxyalkanoates, which are complexed PHAs (cPHA) and fundamental constituents of all biological cells. Although of preliminary nature, the cPHAs have been linked to two major diseases, atherosclerosis and diabetes and there are efforts to use these agents as gene carriers for gene therapy.

Chapters 6 and 7 focus on PHA synthase and the synthesis and metabolic pathways of the PHAs. Such research may aid in the molecular breeding of transgenic plants. The next 5 chapters (8–12) deal with biotechnological processes by bacterial fermentation of the various PHAs and list potential applications resulting from biodegradability by microorganisms. Chapters 13 and 14 cover the *in vitro* synthesis of the PHAs using various enzymes and enzyme polymerization. These nonbiosynthetic pathways are viewed as potentially being more economical. Chapter 15 deals with the production of the PHAs on a larger scale in transgenic plants, which is also projected to be much more cost-effective than the fermentation processes.

Although the principal applications of the polyesters described in this book are for agricultural and environmental purposes, some pharmaceutical applications can include packaging materials for disposable products. The chemistry, purification techniques, and the biodegradation pathways illustrated for these polyesters are interesting and may have application to those polyesters that are used for medical and pharmaceutical applications. For the formulation scientists involved in dosage form development, I would not regard this book as essential. Those involved in the synthesis, characterization, and modification of polyesters would find several chapters of the book interesting.

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Reactions and characterization of Solids. Basic Concepts in Chemistry. Sandra E. Dann. Wiley-Interscience, New York, NY. www.wiley.com. 2002. 201 pp. \$34.95.

This book covers most of the basic topics in solid-state chemistry, such as crystallography and solid-state energetics. Even though the book covers so many areas in such a small book, it explains important definitions in solid-state chemistry very clearly in short paragraphs. For pharmaceutical compounds, polymorphism and crystal habit are often closely related to their bioavailability. The book describes such relationships using a number of examples. Frequently used compounds were employed to illustrate the main types of crystal structures. Solid-state energetics were introduced, for example, by constructing a thermochemical cycle for formation of potassium chloride from its elements and calculating its lattice energy. X-ray diffraction is one of the most widely used

methods in solid material studies, and a review of the technique will be highly useful for readers with various backgrounds. Some other methods that were briefly handled in the book are neutron diffraction, transmission electron microscopy, scanning electron microscopy, X-ray absorption spectroscopy, solid-state NMR, thermogravimetric analysis, and differential thermal analysis. It is widely accepted that various defects in drug crystals have significant effects on their physicochemical properties, such as dissolution rate. For this reason, a few types of defects, including Schottky defects, Frenkel defects, and (nonstoichiometry) extrinsic defects, have been explained briefly.

The book has been well organized to help readers really understand many topics. “Worked Problem” and “Problems” in the book were quite helpful in mastering each topic. In addition to “Aims” and “Summary of Key Points,” the book has many tables that summarize various types of inter-related information. All these features made the book easy to find different information. The book could have been even more useful to pharmaceutical scientists, if it focused more on organic compounds. Reading Chapter 4 on inorganic materials and Chapter 7 on superconducting compounds, however, will certainly make us appreciate different types of materials. Overall, this book should be very helpful for those who want to know about solid-state chemistry without previous exposure to the area.

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Interfaces, Adhesion and Processing in Polymer Systems. Spiros H. Anastasiadis, Alamgir Karim, and Gregory S. Ferguson, Eds. (Materials Research Society Symposium Proceedings. Volume 629). Materials Research Society, Warrendale, PA. www.mrs.org. 2001. 203 pp. \$77.

Polymers occur in many different states and their physical properties are strongly correlated with their conformations. This collection provides a comprehensive overview of recent developments in interfaces, adhesion and processing in polymer systems. Articles within this collection cover a broad range of topics typical of the symposium. They are well presented in short format, with emphasis on fundamentals, methods, and in-depth discussions. The book will be of interest to the polymer scientist, material technologist, and application engineer working in the field of polymer interfaces, adhesions, and thin films.

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DNA Arrays, Technologies and Experimental Strategies.

Elena V. Grigorenko, Ed. CRC Press, Boca Raton, FL, www.crcpress.com. 2002. 167 pp. \$119.95.

The congruence of technologies from several different fields has led to the development of microarrays as a powerful tool to study gene expression. In this book, the editor has attempted to provide an introduction to this rapidly developing field. The book will be useful for beginners who want to read about why microarrays are exciting to many researchers and will provide them with a good start to the technologies involved. Readers who are aware of microarray technology will however find the book lacking in many significant areas.

The components of microarray technology include:

- 1) microarray itself, which is a collection of several thousands of gene fragments on a suitable substrate like glass or nylon membrane
- 2) isolation and labeling of RNA from target samples
- 3) hybridization of the labeled RNA to the microarray
- 4) image analysis of the resulting hybridization profile
- 5) data analysis and mining for the identification of genes from the expression profiles
- 6) development of useful biological or medical insights from the study of a collection of genes.

In Chapter I, the authors have provided a quick overview of how microarrays are made, although this discussion is very skeletal and unlikely to be of use to anyone seriously contemplating making their own microarrays. Instead of using cDNAs made using polymerase chain reaction to represent different genes, the approach using representative oligonucleotides is discussed in Chapter III. There are many advantages to using oligos instead of cDNAs, the primary one being that cross hybridization events can be minimized with similar genes. Selecting a short oligo (25mer) to represent a specific gene is however not trivial and any and all such information if available is zealously guarded by companies or research groups. There is thus no specific information about oligo design in Chapter III.

The success or failure of the complex microarray experiment will in many cases hinge on the quality of the RNA preparation. In the chapter on electrochemical detection of nucleic acids (Chapter IV) the authors talk about a "magic" solution (no details given) which when added to a cell lysate renders the preparation ready for hybridization to an array of oligonucleotides. There is some helpful information about sample preparation in Chapter VI (microarrays in neurobiology). Overall, however, very little attention has been paid to this rather important step in microarray experiments. Experimental strategies to minimize cross-hybridization by careful control of the hybridization and wash conditions has not really been addressed anywhere in the volume. Perhaps more importantly, the similarities and differences between using optical (fluorescent) and radioactive markers for tagging the mRNA has not been dealt with anywhere in the book. I realize this is a bit unfair because I am not sure there is really a good answer right now in the literature—at the same time, I would have preferred to see the editors address this even tangentially. The analysis of images obtained after hybridization is complicated by the requirement of determining a background absorbance—this is mentioned briefly in Chapter 2 and in Chapter 7 but this is an area that could have been better addressed in more detail.

The mining of data from microarray experiments is covered in some detail in Chapter 6, which discusses the commercial program AnVil. The authors have done an excellent job of telling the reader as to why intelligent data mining approaches are required when dealing with microarray data but fail to educate the reader with anything really useful. There are frequent references to patented (or to be patented) techniques used in AnVil to better mine microarray data. Instead of being impressed with their apparent discoveries, I was left wondering as to what exactly they have done and why should anyone really use their program. Perhaps there is a need to be very selective about how they have gone about picking out gene/genes that could classify the cancer sets (AML vs. ALL) better than anyone else—but without the details, I am left wondering if they indeed have anything significant. For example, they claim that no one was able to generate a set of genes that could be the basis for clinical prediction of the outcomes of the two types of cancers mentioned. They claim to have "discovered" a set of 76 genes that could perfectly predict the cancer outcome. It would be useful to see what this set was. Just being able to "perfectly" predict the cancer outcome in the given set, however, is not by itself sufficient to be useful. They claim to have applied their methodology to new data sets derived from new patients but have not presented any information to suggest that their method is in fact better than what is in the literature. Data mining of microarray data is ripe for the development of new tools and the application of old tools to biological data—so it is possible that the authors have something very new, original, and useful—but the reader is left guessing as to why and how their approach may be better.

The book offers a limited view of microarray technology, including chapters on the basic technology of making the microarrays, issues in sample preparation and hybridization, and data analysis. I do commend the editors for attempting a difficult task in capturing what is a very fast-developing area.

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Mass Spectrometry and Hyphenated Techniques in Neuropeptide Research. Jerzy Silberring and Rolf Ekman, Eds. John Wiley & Sons, New York, NY. www.wiley.com. 2002. 558 pp. \$99.95.

With contributions from 21 authors and groups, this book provides a comprehensive and extremely up-to-date presentation of the use of mass spectrometry (MS) for analysis of peptides. In fact, inclusion of the phrase "Neuropeptide Research" in the title may be somewhat misleading as most of the chapters are of much more general interest.

To start Part 1, there is a delightful and insightful Introduction by Peter Roepstorff, entitled "Mass Spectrometry of Peptides and Proteins: a Personal Historical View." Here, progress in analysis of peptides by MS is summarized, covering the period of 1965 to the present. First of two chapters in

Part 1 is an extensive overview of neuropeptides by Fred Nyberg which includes biosynthesis and processing, receptors, function, and distribution, as well as methods for analysis, identification, and purification. In the second chapter, Ann Westman-Brinkmalm and Gunnar Brinkmalm discuss details of mass spectrometry instrumentation—ion sources, mass analyzers, and detectors, including all currently utilized, commercially-available configurations with standard and hybrid instruments.

Part 2, entitled “Hyphenated Techniques,” focuses on sample introduction methodology, with numerous examples from peptide analyses given. Included are chapters on MS using capillary and nano-liquid chromatography (M. Raida), capillary electrophoresis (M. Wetterhall, T. Johnson, and J. Bergquist), nano-electrospray (J. Kast and M. Wilm), laser-machined microdevices (Y. Lin, K. Tang, and R.D. Smith), microdialysis (P. Andr n, T.B. Farmer, and R. Klintonberg), biomolecular interaction analysis (D. Nedelkov and R.W. Nelson), and picoliter volume sample handling (D. Ericsson and J. Bergquist). In this section, both the principals of operation and practical applications are presented.

In Part 3, “Selected Applications in Peptide Research,” a number of topics are covered in more detail. These include peptide mapping (U. Hellman), electron-capture dissociation (R.A. Zubarev), synthesis of combinatorial peptide libraries (K. Rolka), Fourier transform ion cyclotron resonance mass spectrometry (K. H kansson, T.L. Quenzer, A.G. Marshall, and M.R. Emmett), peptide sequencing using *N*-terminal derivatization (D. Barofsky and T.-F. Chen), matrix-assisted laser desorption ionization tandem time-of-flight (MALDI-TOF/TOF) technology (P. Juhasz, J.M. Campbell, and M.L. Vestal), and quantitative analysis (J. Gobom and E. Nordhoff). As in Part 2, these chapters provide extensive background information on each technique, illustrated by practical examples from biologically relevant samples.

The last section, Part 4, named “Selected Applications in Biosciences,” focuses more on the results and less on techniques. However, invaluable, practical advice on sample handling and analytical strategies are also presented. In Part 4 the chapters deal with characterization of peptides bound to the rat class I MHC molecule RT1-A1 (R.C. Jones, J. Stevens, R.S. Bordoli, G.W. Butcher, E. Joly, and S.J. Gaskell), analysis of neuropeptides in cerebrospinal fluid and neural and neuroendocrine tissues (C.L. Nilsson), neuropeptide processing (P. Suder, A. Sciubisz, M. Smeluch, and J. Silberring), measuring neuropeptides in single cells (L. Li and J.V. Sweedler), and dynamics of cell nucleus/lymphocyte nuclei-associated peptides (J. Bergquist and R. Ekman).

Finally, there is an extremely helpful appendix, assembled by Agnieszka Sciubisz. Included in the appendix are the exact masses and isotopic abundances of elements, autolysis fragments of bovine and porcine trypsin, masses of common posttranslational modifications, masses and compositions of commonly occurring amino acids, amino acid mutation mass shifts, common human keratin contaminants, and PPG peaks used for calibration. At the end of the appendix is a selected list of internet addresses for websites pertinent to biological mass spectrometry. Most readers will likely be aware of the possibility that details in some of the urls might change, but they should be able to find any sites of interest based on the descriptions provided.

It should be clear from the above presentation that this

book covers far more than just neuropeptide research. It can more aptly be described as a book on the fundamentals of mass spectrometric analysis with selected applications from the neuropeptide arena. The figures, diagrams, and photographs are of uniformly high quality—enhancing the information content of each chapter. In addition, the wealth of citations at the end of each chapter can serve as a guide to the current and historical literature in this area. With clear and understandable sections on the basic principals of ionization, mass analysis, and detection, this book can certainly be recommended for readers who are new to biological mass spectrometry. But, it will also be of interest to more experienced scientists through its inclusion of state-of-the-art and cutting edge techniques in both sample preparation and instrumentation.

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Books Received

Biomimetic Systems

Electroactive Polymer (EAP) Actuators as Artificial Muscles. Reality, Potential, and Challenges. Yoseph Bar-Cohen, Ed. SPIE Press, Bellingham, Washington. www.spie.org. 2001. 671 pp. \$72.

Biomimetic Materials and Design. Biointerfacial Strategies, Tissue Engineering, and Targeted Drug Delivery. Angela K. Dillow and Anthony M. Lowman, Eds. Marcel Dekker, New York, NY. www.dekker.com. 2002. 679 pp. \$195.

Development of biomimetic systems, whatever the definition of “biomimetic” one would use, requires extensive collaboration among different disciplines. Biological systems have to be analyzed at the molecular and cellular levels by protein chemists and cell biologists to abstract the minimum steps and actions necessary to do an intended function. Those steps and actions have to be mimicked using artificial systems, and this requires collaborative participation by engineers, material scientists, polymer chemists, and computer programmers. All those scientists in different disciplines made integrated efforts to produce books that provide stepping stones for developing biomimetic systems. *Electroactive Polymer (EAP) Actuators as Artificial Muscles* focuses on mechanical aspects, while *Biomimetic Materials and Design* places heavy emphasis on biomaterials and their interactions with proteins and cells. The two books complement each other very well.

Chemistry and Biochemistry

Enzyme Kinetics: A Modern Approach. Alejandro G. Marangoni. John Wiley & Sons, Hoboken, NJ. www.wiley.com. 2003. 229 pp. \$89.95.

Enzyme Kinetics. Principles and Methods. Hans Bisswanger,

- Ed. Wiley-VCH, Germany. www.wiley-vch.de. 2002. 255 pp. 119 Euro.
- Stereochemistry*. David G. Morris. John Wiley & Sons, New York, NY. www.wiley.com. 2002. 169 pp. \$34.95.
- The Art of Chemistry: Myths, Medicines, and Materials*. Arthur Greenberg. John Wiley & Sons, Hoboken, NJ. www.wiley.com. 2002. 345 pp. \$59.95.
- Synthetic Applications of 1,3-Dipolar Cycloaddition Chemistry Toward Heterocycles and Natural Products*. Albert Padwa and William H. Pearson, Eds. John Wiley & Sons, Hoboken, NJ. www.wiley.com. 2003. 940 pp. \$100.
- International Resources Guide to Hazardous Chemicals: Manufacturers, Agencies, Organizations, and Sources of Information*. Stanley A. Greene. William Andrew Inc., Norwich, NY. www.williamandrew.com. 2003. 352 pp. \$195.
- Applied Sonochemistry. The Uses of Power Ultrasound in Chemistry and Processing*. Timothy J. Mason and John P. Lorimer, Eds. Wiley-VCH, Germany. www.wiley-vch.de. 2002. 303 pp. \$125.

Computational Chemistry

- A New Kind of Science*. Stephen Wolfram. Wolfram Media, Champaign, IL. www.wolfram-media.com. 2002. 1,197 pp. (+64 pp. for Index). \$44.95.

The author, who built a computer program *Mathematica*, shows that the essential features of complex behavior can be captured in something amazingly simple. There are countless examples showing that the various patterns in nature, ranging from simple to highly complicated, can be reproduced by simple computer programs (written in *Mathematica*). Those who deal with fractals and crystals may find this book invaluable.

- An Introduction to Computational Biochemistry*. C. Stan Tsai, Ed. Wiley-Liss, New York, NY. www.wiley.com. 2002. 368 pp. \$69.95.

Microfabrication and Nanotechnology

- Fundamentals of Microfabrication: The Science of Miniaturization*. Second Edition. Marc J. Madou. CRC Press, Boca Raton, FL. www.crcpress.com. 2002. 723 pp. \$99.95.
- MEMS and NEMS: Systems, Devices, and Structures*. Sergey Edward Lyshevski, Ed. CRC Press, Boca Raton, FL. www.crcpress.com. 2002. 461 pp. \$99.95.
- Handbook of Nanoscience, Engineering, and Technology*. William A. Goddard, III, Donald W. Brenner, Sergey Edward Lyshevski, and Gerald J. Iafrate., Eds. CRC Press, Boca Raton, FL. www.crcpress.com. 2003. 824 pp. \$149.95.
- The MEMS Handbook*. Mohamed Gad-el-Hak, Ed. CRC Press, Boca Raton, FL. www.crcpress.com. 2002. 1,368 pp. \$159.95.
- Microarray Analysis*. Mark Schena. John Wiley & Sons, Hoboken, NJ. 2003. 630 pp. \$89.95.

Every once in a while, the scientific community introduces a new terminology that represents a dominant science at the time. It seems that nanotechnology is the one that can represent our current fascination. Nanotechnology may include microfabrication (also called micromachining, micromanufacturing, or microelectromechanical systems

(MEMS)), nanofabrication, and nanochemistry (or molecular engineering).

Nanotechnology is not really an unfamiliar terminology for those in the pharmaceuticals and biomedical fields. They have used nanocrystals and nanosized micelles for increasing the solubility of poorly soluble drugs. Polymer chemists have been synthesizing nanosized dendrimers and nanoparticles. What is different here, however, is the ability to assemble much more complex devices using nanotechnology. The science of miniaturization reached a point where each atom can be manipulated. Nanotechnology is advanced enough to make nanorobots that someday can patrol through the blood stream to find bad cells to capture or kill. It is highly interesting to understand the current status of nanotechnology, and the books listed above all provide good background on nanotechnology.

For those who are not trained as engineers or have no background in integrated circuit design would enjoy *Fundamentals of Microfabrication: The Science of Miniaturization* by Marc J. Madou. The book with hundreds of figures, diagrams, examples and references makes it so easy to understand the principles behind nanotechnology. It is noted that the book also is very strong in its coverage on theories and on biomimetics. In short, the book is an excellent introduction on the topic of nanotechnology.

Handbook of Nanoscience, Engineering, and Technology deals with the same subject at a more molecular level with more mathematical treatment. The book still has chapters on biologically mediated assemblies and dendrimers, and it is for those who are heavily involved in nanotechnology. *MEMS and NEMS: Systems, Devices, and Structures* focuses even more heavily on modeling, simulation, and analysis. *The MEMS Handbook* provides very thorough handling of microfluidics. Liquid flows in microchannels have been important in developing diagnostic and analytical devices, and lab-on-a-chip devices. The chapter on microdroplet generators has direct application in the pharmaceuticals field in making microcapsules.

The concept of microarray analysis systems began with a realization that long oligonucleotides grafted on a glass substrate could be used for gene expression analysis by Mark Schena, who is the author of the book *Microarray Analysis*. *Microarray Analysis* is probably one of the most useful reference books for those in the pharmaceuticals and biomedical fields. It was written as a textbook that assembled huge amounts of data after explosive proliferation of the technology during the last decade. As the author pointed out, microarrays may be considered as the Noah's Ark of biochemistry, and this book provides a conceptual, experimental, and methodological foundation on modern microarray analysis necessary to enter the Noah's Ark.

Knowing what new technologies are available will make a big difference in advancing other fields that seemingly have little to do with nanotechnology and microarray analysis. For example, the approaches used in DNA grafting for microarray can be used to attach drug delivery nano- or micro-particles to the surface for controlled drug delivery. The two books, *Fundamentals of Microfabrication: The Science of Miniaturization* and *Microarray Analysis*, are highly useful in educating oneself for understanding and eventually utilizing the tools used in nanotechnology and microarray analysis to their own research.

Pharmaceutics

Surfactants and Polymers in Drug Delivery. Martin Malmsten. (Drugs and the Pharmaceutical Sciences. Volume 122). Marcel Dekker, New York, NY. www.dekker.com. 2002. 348 pp. \$165.

Radiation Sterilization for Health Care Products. X-Ray, Gamma, and Electron Beam. Barry P. Fairand. CRC Press, Boca Raton, FL. www.crcpress.com. 2002. 141 pp. \$99.95.

Cell Adhesion. Frontiers in Molecular Biology. Mary C. Beckerle, Ed. Oxford University Press, Oxford, United Kingdom. 2001. 403 pp. \$60.00.

Sittig's Handbook Toxic and Hazardous Chemicals and Carcinogens. Richard P. Pohanish, Ed. Noyes Publications/William Andrew Publishing, Norwich, NY. www.williamandrew.com. 2002. Volume 1: A-H. pp. 1-1298 pp. Volume 2: I-Z. pp 1299-2608. \$495/2 volume set.

Handbook of Drug Screening. Ramakrishna Seethala and Prabhavathi B. Fernandes, Eds. (Drugs and the Pharmaceutical Sciences. Volume 114). Marcel Dekker, New York, NY. www.dekker.com. 2001. 597 pp. \$195.00.

The Design and Conduct of Clinical Trials. Philip I. Good. John Wiley & Sons, Hoboken, NJ. 2002. www.wiley.com. 228 pp. \$64.95.

Handbook of Medicinal Herbs. Second Edition. James A. Duke with Mary Jo Bogenschutz-Godwin, Judi duCellier and Peggy-Ann K. Duke. CRC Press, Boca Raton, FL. www.crcpress.com. 2002. 870 pp. \$249.

Alkaloids. Nature's Curse or Blessing? Manfred Hesse. John Wiley & Sons, Hoboken, NJ. www.wiley.com. 2002. 413 pp. \$115.

Polymer Chemistry

Prediction of Polymer Properties. Third Edition, Revised and Expanded. Jozef Bicerano. Marcel Dekker, New York, NY. www.dekker.com. 2002. 756 pp. \$195.

Block Copolymers. Francisco J. Baltá Calleja and Zbigniew Roslaniec, Eds. Marcel Dekker, New York, NY. www.dekker.com. 2000. 584 pp. \$195.00

Handbook of Polyolefins. Second Edition, Revised and Expanded. Cornelia Vasile, Ed. Marcel Dekker, New York, NY. www.dekker.com. 2000. 1014 pp. \$250.

Handbook of Polymer Degradation. Second Edition, Revised and Expanded. S. Halim Hamid, Ed. Marcel Dekker, New York, NY. www.dekker.com. 2000. 773 pp. \$225.

Handbook of Radical Polymerization. Krzysztof Matyjaszewski and Thomas P. Davis, Eds. Wiley-Interscience, New York, NY. www.wiley.com. 2002. 920 pp. \$200.

Cradle to Cradle: Remaking the Way We Make Things. William McDonough and Michael Braungart. North Point Press, New York, NY. www.fsgbooks.com. 2002. 193 pp. \$17.50.

Surface Chemistry

Handbook of Applied Surface and Colloid Chemistry. Volumes. 1 and 2. Krister Holmberg, Ed. John Wiley & Sons, New York, NY. www.wiley.com. 2001. 591 pp. for Vol. 1, and 485 pp. for Vol. 2. \$600.00 for both volumes.

These two-volume books are unique in their organization of contents. In Part 1, each of 11 chapters deals with surface chemistry in a specific area. For example, Chapter 1 entitled "Surface chemistry in pharmacy" focuses on surface chemistry relevant to drug delivery, such as stability of dispersed systems. Each of the subsequent chapters deals with surface chemistry in food, agriculture, photographic technology, paints, paper, polymerization, etc. One of the topics in Part 2 on surfactants is hydrotropy, which has rarely been treated in other books. Part 3 describes various colloidal systems (e.g., solid dispersions, vesicles, and microemulsions) and layer structures (e.g., Langmuir-Blodgett films and self-assembled monolayers). Part 4 on phenomena includes wetting, foam breaching, and solubilization. The last part on analysis and characterization provides concise information on various experimental techniques.

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