Chapter 1 provides a brief review of the history of controlled drug delivery and of the challenges which lie ahead. Chapters 2−6 deal with Intracellular Delivery and Targeting. Chapter 2 deals with the problems inherent in the intracellular delivery of peptides and proteins and reviews the major advances to date. Chapter 3 describes the characteristics of liposome- and recombinant virus-mediated DNA delivery into cells. Chapter 4 discusses progress in preparing targetable polymeric drugs from the standpoint of polymer chemistry. Chapter 5 discusses methods for altering the design, formulation, and surface modification of biodegradable colloids to achieve site-specific drug delivery following intravenous administration. Chapter 6 discusses strategies for site-specific delivery to the gastrointestinal tract.

Chapters 7−9 are grouped in a section entitled Self-Regulated Drug Delivery. Chapter 7 discusses feedback-controlled drug delivery in which implantable devices release a drug in response to a specific external molecule, e.g., the release of insulin in response to circulating blood glucose levels. Chapter 8 discusses stimuli (e.g., pH, chemical, temperature, polymer, electric field, etc.) sensitive drug delivery. Chapter 9 focuses on sensocompatibility, i.e., design consideration for minimizing the in vivo degradation of biosensors, e.g., the glucose sensor for long-term feedback-controlled insulin delivery.

The next major subdivision of the book (Chapters 10−14) is entitled Delivery of Peptide and Protein Drugs. Chapter 10 highlights the key formulation and processing issues involved in the pharmaceutical manufacture of injectable protein products. Chapter 11 discusses the physical and chemical instability of peptides and proteins. Chapter 12 examines the fundamentals of controlling the release of stable therapeutic peptides and proteins and vaccine antigens from polymeric implants. Chapter 13 discusses the use of polymeric microparticle delivery systems for the oral delivery of vaccines. Chapter 14 discusses the complexities of developing sustained or controlled-release delivery systems for proteins for use in animals.

The next section of the book entitled Tissue Engineering and Gene Therapy comprises Chapters 15−18. Chapter 15 discusses the use of microencapsulation within a synthetic polymer to protect mammalian cells from the immune system to enable them to be transplanted to correct a disease state. Chapter 16 discusses the major issues related to tissue engineering and how cells and matrix (carrier) materials can be integrated to create functional tissue replacements. Chapter 17 reviews plasmid- and retrovirus-based methods for gene transfer and the implantation of cells encapsulated in a semipermeable barrier. Chapter 18 discusses two methods for delivering ribozymes into cells: (a) ribozyme expression vectors and (b) complex formation with poly-L-lysine or $H1^{(-)}$-histone.

The next major subdivision of the book encompasses Chapters 19−24 and is entitled New Biomaterials for Drug Delivery. Chapter 19 reviews several aspects of the pseudo-poly(amino acid) polymers derived from naturally occurring amino acids. Chapter 20 reviews transductional protein-based polymers: polymers composed of repeating peptide sequences which can undergo transitions between their gel and elastomer states and their gel−plastic states. Chapter 21 describes procedures for producing protein polymers and illustrates how control of their structure can influence their biological properties. Chapter 22 is concerned with the biological effects of two types of synthetic polymers (i.e., polyanions and polycations) that have a specific intrinsic therapeutic activity. Chapter 23 is a review of methods for the design of a biomaterial that is elastomeric and biodegradable and can provide controlled release of drug for combating restenosis of metallic stents. Chapter 24 provides an overview of "intelligent" polymer−biomolecule systems, i.e., systems that exhibit relatively large and sharp physicochemical changes in response to small physical or chemical stimuli, and also biological stimuli.

Chapters 25−27 constitute the next major subdivision of the book entitled Modeling of Controlled Drug Delivery. In Chapter 25 the importance of mathematical modeling in the design of self-regulated drug-delivery systems is emphasized and illustrated with examples. Chapter 26 again emphasizes and illustrates the importance of mathematical models in the design and optimization of controlled-release drug-delivery systems. Chapter 27 focuses on the use of computers to simulate controlled release at the molecular level in order to facilitate the design of such systems. Molecular dynamics simulations involving synthetic polymers are emphasized.

The last major subdivision of the book is entitled Regulatory Issues. Chapter 28 summarizes the history and current status of the FDA regulations related to drug product development with emphasis on how these regulations apply to controlled-release dosage forms. Chapter 29 summarizes how both pharmacokinetic and pharmacodynamic considerations are important in the approval process for controlled-release dosage forms.

All of the chapters are well-written and current, and in several cases obviously represent the unique expertise and insights of the authors. As stated by the editor in the preface, "The goal of this book is to combine in one place new information on diversified subjects related to the development of future controlled drug delivery systems." I feel that the editor has achieved this goal admirably and has produced a book that will be a valuable edition to the libraries of pharmaceutical and medical scientists, engineers, cell biologists, and students engaged in the design and development of future controlled-release drug delivery systems.

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Studies in Natural Products Chemistry: Volume 18, Stereoselective Synthesis (Park K). Edited by Atta-ur-Rahman (University of Karachi, Pakistan). Elsevier: Amsterdam and New York. 1996. xiv + 1094 pp. $603.50. ISBN 0-444-82458-8.

This is the 18th volume of this series (since 1988) edited by Professor Atta-ur-Rahman and is the 11th with the subtitle of *Stereoselective Synthesis*. This volume contains 20 chapters, 7 of which are more concerned with structure and biological activity than synthesis. Not surprisingly for such a compilation, the breadth and depth of coverage vary considerably from chapter to chapter. Some chapters are primarily a review of the author's work in the area while others provide a broader review of the subject area. This difference is easily noticed in the first two chapters.

The first chapter by Leo Paquette titled Strategies for the Stereocontrolled *De Novo* Synthesis of Natural Products is a review of Paquette's stereocontrolled syntheses of nine different natural product types. Although this type of review provides easy access to several excellent synthetic studies, it is material that could be located easily by a search for papers by Paquette. In contrast, the second chapter, A Historical Perspective of Morphine Syntheses by Tomas Hudlicky *et al.*, provides a review of the many published total syntheses (or approaches to total synthesis) of this important molecule. The key steps in the various approaches are discussed, and a graphical synopsis of the syntheses is presented. This type of compilation provides insights and references that a reader would find quite difficult to obtain on their own. In addition to the normal bibliography, Hudlicky provides a listing of 355 dissertations that cover morphine synthesis.

Other chapters that present an overview of recent synthesis studies from the author's laboratories include New Developments in the Synthesis of Polyketides and of Chiral Methyl Groups by J. Mulzer, Total Synthesis of Bioactive Natural Spiroethers, Tautomycin and Oscillatoxin D by A. Ichihara, H. Oikawa, and H. Toshima, and Studies on the Absolute Configuration of Some Liverwort Sesquiterpenoids by M. Tori. The chapter on Structure Elucidation and Synthesis of the Lignans from the Seeds of *Hernandia ovigera* L. by M. Arimoto, H. Yamaguchi, and S. Nishibe covers structural studies and some synthetic studies with an emphasis on work by the authors.

The chapters which provide a broader review of synthetic studies in the area are Total Stereoselective Synthesis of Acetogenins of Annonaceae: A New Class of Bioactive Polyketides by B. Figadère and A. Cavé, The Synthesis of Nonactic Acid—Its Derivatives and Nonactin Itself by I. Fleming and S. K. Ghosh, Aza-Annulation of Enamine Related Substrates with α,β-Unsaturated Carboxylic Derivatives as a Route to the Selective Synthesis of δ-Lactams and Pyridones by J. R. Stille and N. S. Barta, Selective Reactions and Total Synthesis of Inositol Phosphates by Y. Watanabe, Synthesis of Phytosphingolipids by T. Kamikawa, and When Two Steroids are Better than One: The Dimeric Steroid-Pyrazine Marine Alkaloids by A. Ganesan.

Chapters which emphasize structure and biological activity more than synthesis include Bioactive Gymnemic Acids and Congeners from *Gymnema sylvestre* by S. B. Mahato, Theory of the Origin, Function, and Evolution of Secondary Metabolites by C. Christophersen, The Celastraceae from Latin America: Chemistry and Biological Activity by O. Muñoz and A. G. Gonzalez *et al.*, Structural Chemistry of

Glycolipids from Fungi and Protozoa by E. B. Bergter and M. H. S. Villas Boas, Potential Bioactive Conformations of Hormones of the Gastrin Family by L. Moroder and J. Lutz, Human IgG1 Hinge-Fragment as a Core Structure for Immunogens by L. Moroder, G. Hübener, and M. Gemeiner, and ^{13}C-NMR Spectroscopy of Coumarins and their Derivatives: A Comprehensive Review by B. Mikhova and H. Duddeck. The chapter titled New Developments in Brassinosteroid Research by G. Adam *et al.* covers some recent synthetic studies, but emphasizes structure and metabolism of these compounds.

The book was prepared from camera-ready copy provided by the authors, but all figures and structures are well done, and the slightly different formats are not a distraction. The index provides a reasonable mechanism to find the various compound classes, but is of very limited utility otherwise. Most authors do not provide a table of contents that would make browsing (and reading) easier. This volume provides excellent chemistry covering a broad range of natural products topics presented in an attractive, readable format. However, the ability for this type of volume to meet the needs of organic chemists interested in natural products is reduced dramatically because of the high cost of these volumes. Few libraries are likely to order this series automatically (neither the library at my institution nor the library at another nearby major research institution possess all volumes in this series), and faculty are likely to request purchase of such an expensive volume only if it includes a review of particular importance to their research.

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Handbook of Nanophase Materials. Edited by Avery N. Goldstein (The Dow Chemical Company). Dekker: New York. 1997. vii + 369 pp. $165.00. ISBN 0-8247-9469-9.

The *Handbook of Nanophase Materials* edited by Avery Goldstein is a careful collection of topics on nanophase materials, a rapidly evolving field especially over the last decade as new experimental techniques and simulation methods have been developed suitable for short length and time scales. Nanophase materials are considered by many as a new state of matter, with some materials exhibiting unique properties (e.g., magnetic, mechanical, optical, reaction, etc.) which are simply not an interpolation between simple molecules and the bulk. From a scientific point of view, the way molecules self-organize themselves at short length scales to eventually form bulk materials can provide invaluable insight into the growth mechanisms. From a technological point of view, nanophase materials have tremendous promise for opticoelectronics, enhanced magnetic storage, adsorption, and catalytic applications, with the appealing feature of tuning their sizes and shapes down to the atomic level for molecular control of the aforementioned properties.

With the tremendous progress over the last few years on our understanding of nanophase materials and their potential for numerous applications, there is definitely a need for such a handbook, especially for people entering this field, as a large collection of various topics is covered. Despite the rapid evolution of research, most of the selected chapters contain many up-to-date citations, which makes the handbook a valuable source of information.

The first part of the handbook is focused mostly on materials synthesis and potentially interesting properties, whereas the second part focuses more on materials characterization. Many deposition techniques are covered including sol−gel, electrodeposition, molecular beam epitaxy, and plasma-assisted deposition. In addition, a variety of materials is discussed including metals, polymers, ceramics, semiconductors, glasses, zeolites, colloids, and metal oxides. Several articles give an excellent background and review on the state-of-the art of a specific subject (e.g., the papers on molecular beam epitaxy, sol−gel, and electrodeposition, to mention a few), whereas other articles focus more on the specific work of the author.

While experimental techniques for different materials and properties measurement are discussed throughout the handbook, there is unfortunately little attention to theoretical work (with a few brief exceptions such as on damage modeling in Chapter 2). With the advent of computer power, molecular and quantum based simulations have become a powerful tool in exploring structures and properties of nanophase materials. In fact, much of our current understanding on nanoclusters comes from theoretical work. Inclusion of a few selected papers would have definitely given a much broader view to a reader about recent theoretical advances.

While some of the contributors refer to current problems and possible future trends and needs in this field, it would have been valuable to see more comments along these lines. Also, it would have been valuable to include more articles from industry, and address questions regarding the potential for short term commercialization of new techniques, how much industry has been affected by the revolution of nanophase materials over the last several years, and how large the market of nanophase materials is. Such issues would add another important facet to the handbook, especially for engineers working in this field.

In summary, I believe that this handbook is a collection of many interesting articles which most people working on nanophase materials would find worth looking at. Its real strength lies in providing a survey of various topics, deposition and etching techniques, materials, and characterization methods with up-to-date references in most cases.

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Progress in Ion Exchange: Advances and Applications. Edited by A. Dyer (University of Salford, U.K.), M. J. Hudson (University of Reading, U.K.), and P. A. Williams (North East Wales Institute, Wrexham, U.K.). American Chemical Society: Washington, DC. 1997. xii + 498 pp. $174.00. ISBN 0-85404-791-3.

This book contains a diverse collection of papers on ion exchange processes. Divided into five parts the papers cover novel materials and novel applications, ion chromatography and electrophoresis, resins as biosorbents, ion exchange for environmental cleanup, and ion exchange in inorganic materials and its theory. Each part is highlighted by a plenary paper that presents a topical review of the area.

The most striking aspect of the book is its wide variety of applications. Papers on the synthesis of novel nanocomposite materials, new inorganic ion exchange materials for iodide, and the application of anion exchanges as phase transfer catalysts are just some of the topics covered in the novel materials and applications portion.

Topics covered on ion chromatography include new column design, possible applications of capillary ion electrophoresis in the power industry, and a review of the current status of the determination of inorganic anions. Other sections contain papers on ion exchange in the pharmaceutical industry and bioproduct purification, and a large number of contributions highlight the application of ion exchange to the environmental cleanup of radioactive materials and heavy metals.

The final section of this book contains a number of papers on the theory and mechanism of the ion exchange process. These include the application of solid-state NMR to facilitate understanding of the unusual selectivities of tin and titanium antimonates, simulation of multicomponent ion exchange dynamics, and suggestions for consistent ion exchange nomenclature.

In summary, this book contains a collection of papers on the ion exchange processes that cover topics from theoretical to practical applications. It would serve as a reference text for a chemist wanting a current review of the field of ion exchange. The authorship of the papers is limited to mainly European scientists and contains no contributions from prominent U.S. researchers, which omits a significant body of current research in this area.

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