resting force (4 g) and were allowed to equilibrate for approximately 1 h before exposure to drugs. Isometric contractions were recorded as changes in grams of force on a Beckman Dynograph with Statham UC-3 transducers.

Determination of Apparent Antagonist Dissociation Constants. Noncumulative contractile concentration–response curves for serotonin in the fundus and cumulative concentration response curves in the jugular vein were obtained by a stepwise increase in concentration after washing out the preceding concentrations every 15–20 min. Each agonist concentration remained in contact with the tissue for approximately 2 min and maximum response to each agonist concentration was measured. ED_{50} values were taken as the concentration of agonist that produced half-maximal contraction. After control responses were obtained, tissues were incubated with an appropriate concentration of buffer or antagonist for 1 h. Responses to serotonin were then repeated in the presence of antagonist. Concentration responses utilized only one agonist and one antagonist concentration per tissue. In general, successive agonist responses in the presence of buffer treatment were unaltered (average dose ratio was 1.28 ± 0.21 [8]).

Apparent antagonist dissociation constants (K_B) were determined for each concentration of antagonist according to the following equation:[10]

$$K_B = [B]/(\text{dose ratio} - 1)$$

where [B] is the concentration of the antagonist and dose ratio is the ED_{50} of the agonist in the presence of the antagonist divided by the control ED_{50}. Generally, parallel shifts in the concentration–response curves occurred in the presence of antagonists. These results were then expressed as the negative logarithm of the K_B (i.e., $-\log K_B$). Calculations were done as described previously.[11]

Cortical Binding to $5HT_2$ and $5HT_1$ Receptors. Brain tissue was obtained from 150–200-g male Wistar rats. The cerebral cortex was dissected, homogenized, and prepared according to the method described by Nelson, using a preincubation in buffer without added monoamine oxidase inhibitors in order to eliminate endogenous 5HT.[12] For receptor binding, an amount of membrane preparation equivalent to 250–350 mg of protein was used per sample in 1 mL of Tris buffer. The assay for 5HT binding ($5HT_1$ site) was done following the method of Bennett and Snyder[13] and that for spiperone binding ($5HT_2$ site) according to Peroutka and Snyder.[14] Nonspecific binding of [^{3}H]-5HT and [^{3}H]spiperone was determined in the presence of 10^{-5} M 5HT or 10^{-6} M lysergic acid diethylamide, respectively, and specific binding was calculated as the difference between total binding without added nonradioactive compound and the nonspecific binding. The IC_{50} values were determined as the amount of substance causing 50% inhibition of the specific binding with use of 10 different concentrations in the range of 10^{-9} to 10^{-4} M. The concentration of [^{3}H]-5HT (sp act. 17.6 Ci/mmol; Amersham Corp., Arlington Heights, IL) in each sample was 2.3–2.6 nM and that of [^{3}H]spiperone (sp act. 20 Ci/mmol; Amersham) was 0.5–0.7 nM. For 5HT, the IC_{50} at $5HT_1$ and $5HT_2$ sites was 4 and 5000 nM, respectively, and for spiperone, the IC_{50} at $5HT_1$ and $5HT_2$ sites was 400 and 1.0 nM, respectively.

Acknowledgment. We thank Dr. Michael Flaugh for preparing "medmain" and for helpful discussions, Dr. Norman Mason for determining the binding affinities to brain cortical membranes, and Jack Campbell and David Vogt for their expert technical assistance in performing the hydrogenation experiments. Finally, we thank Ann McKenney for her assistance in the preparation of this manuscript.

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Book Reviews

Annual Reports in Medicinal Chemistry. Volume 20. Edited by Denis M. Bailey. Academic, Orlando, FL. 1985. xiii + 352 pp. 17 × 25.5 cm. ISBN 0-12-040520-2. $35.00.

The 20th publication of *Annual Reports in Medicinal Chemistry* continues the traditionally high caliber of well-selected topics that reflect the major current areas of interest in medicinal chemistry in a concise, yet thorough, detailed and timely fashion. Clearly the editor and the contributing experts are to be commended for the continuation of the excellence and value of this series. For this reviewer, it is *the* most eagerly anticipated yearly publication in its field. This is because of the in-depth treatment afforded specialized areas coupled with a state-of-the-art reflection of therapeutic advances and the presentation of newer thought-provoking approaches to medicinal chemistry and directions toward the development of potential drug products.

The current volume continues the format of this established series. It consists of short, but comprehensive, thoroughly referenced chapters restricted to 10 pages or less, including references. Each of the chapters covers advances in the area since it was last reviewed in the series. The 32 chapters in this volume, as those in its predecessor, are grouped into seven sections: CNS Agents, Metabolic and Endocrine Function, Topics in Biology, Topics in Chemistry and Drug Design, and Worldwide Market Introductions. In addition to summaries of recent advances in the more stable fields of antianxiety, anticonvulsant, analgesic, dopaminergic, antihypertensive, pulmonary, gastrointestinal, and antineoplastic medicinal chemistry, an excellent balance has been achieved by introducing many highly specialized and newly emerging technologies that may provide a basis for future drug discoveries. Topics reviewed for the first time in the initial three sections of the book are as follows: "Cotransmitters in the CNS", "Antiglaucoma Agents", "Plasminogen Activators", "Determinants of Microbial Resistance to β-Lactam Antibiotics", "Quinolone Antibacterial Agents", and "Nonclassical Targets for Antibacterial Agents". The next three sections are all devoted to developing areas of science that may provide a basis for drug discoveries. These include chapters "Interleukin", "Growth Hormone Releasing Factors", "Platelet-Activating Factor" (a second update), "Luteininizing Hormone Releasing (LHRH) Analogues", "Sodium/Calcium Exchange and Calcium Homeostasis in Excitable Tissue", "Possible Roles of Protein Kinases C in Cell Function", "Neutrophil Elastase", "Sickle Cell Anemia", "Renin Inhibition" (a second update), "NMR Spectroscopy in Biological Systems", "Contrast Enhancing Agents in NMR Imaging", "Solid-State Organic Chemistry and Drug Stability", "Altered Drug Action in the Elderly", and "Strategies for Delivery of Drugs Through the Blood–Brain Barrier". The final section consists of one chapter, "To Market, To Market". This part, introduced for the first time in last year's volume, is a compilation (drug name, structure, country of origin, originator, country of introduction, distributor, trade name, a brief summary of properties, one or more references) of new chemical entities (NCEs) introduced in the world market in 1984. This summary reveals that NCEs for

human therapy introduced in 1984 were fewer in number (41), but similiar in breadth of application, to those in 1983.

As usual, this volume is prepared from "camera-ready" paper, but it is legible, neat, and relatively error free. Its timeliness is emphasized by the up-to-date references, many of which are 1985 citations. The book includes a remarkably adequate name and code numbers index, as well as cumulative chapter titles, keyword, and author indices. I believe a cumulative name and code number index, perhaps on a decenial basis, would also be useful. In summary, this book is recommended not only for medicinal chemists but for anyone having an interest in the development of new drug products. It is an invaluable reference source that merits a place on the desk of all such scientists.

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Biochemical and Clinical Aspects of Pteridines. Volume 4. Cancer Immunology Metabolic Diseases. Edited by H. Wachter, H. Ch. Curtius, and W. Pfleiderer. Walter de Gruyter, Berlin. 1985. xxi + 686 pp. 17.5 × 24.5 cm. ISBN 3-11-010182-3. $159.00.

This volume represents a collection of the papers presented at the Fourth Winter Workshop on Pteridines held Feb 23–March 2, 1985, in St. Christoph, Arlberg, Austria. The book is divided into six sections and represents an attempt, according to the editors, to establish "closer contact of the scientists who represent many different aspects ranging from basic pteridine chemistry to the various clinical implications of these molecules". The proceedings certainly support the view that this ambitious goal was at least partially realized, since a remarkable variety of subjects are dealt with in the book's six sections.

The first section, entitled "Chemistry and Analysis of Pteridines", includes eight papers dealing with various aspects of the chemistry of reduced pteridines, four of which are from the Pfleiderer laboratory. These papers represent a useful, albeit extremely limited, view of current progress in the chemistry of reduced pteridines of biological interest.

The second section, "Biochemistry and Metabolism of Pteridines", offers 13 papers dealing with several aspects of reduced pteridine biochemistry. The third section, involving tetrahydrobiopterin deficiencies, includes only two papers, but the fourth, "Pteridines in Immunology", has 19 papers dealing with a wide variety of aspects of the role of reduced pteridines in the immunological process. Particularly useful to the nonspecialist are the first two articles in this section, by Huber and Fuchs, respectively. The first represents an overview of the role that neopterin plays in the immune response, and the second is a thorough review of neopterin analytical estimation (with 87 references). These set the stage very nicely for the studies to follow, some of which represent very limited phenomenological studies involving a few patients.

The fifth section deals with pteridines in cancer and other diseases and consists of 10 contributions primarily involving tumors and acquired immunodeficiency syndrome (AIDS). The last section, appropriately entitled "Miscellaneous", consists of four papers describing aspects of pteridine chemistry that did not seem to be well placed in other sections of the text.

The book concludes with an author index and with a subject index. The former is extremely helpful and is, of course, relatively easy to do. The latter is somewhat limited, as might be expected in a book that requires early publication. Nonetheless, it is extremely helpful in getting back into the appropriate sections of the text. Where relevant, general topics such as "neopterin" are broken down in outline form into a large number of subset references to various portions of the text.

The book was apparently produced by a photographic process, and little attempt was made to provide a unified format or typeface throughout the volume. This does not normally present a problem except, for example, in the article beginning on p 403, which is so pale that it was actually quite difficult to read. An additional irritation was that an otherwise very good article was rendered quite difficult to read by virtue of switching pages 183 and 180 as well as pages 184 and 185. Most of the authors are not native English speakers, and this led to some departures from normally accepted English style, grammar, and syntax. However, at no place did this reviewer have any difficulty understanding exactly what the authors intended, so this must be regarded as presenting no substantial difficulty.

The lesson that seemed clear from review of the results of this symposium is that a great deal of information is being generated about the roles of reduced pteridines in biology, but at the moment the situation is very murky, especially in a clinical setting. There do not seem to be unifying hypotheses as yet concerning the biochemical and clinical roles of the pteridines dealt with here, but this book represents a useful report on current activities for the specialist. Particularly impressive throughout the book is the currency of referencing. Late 1984 and 1985 "in press" publications are listed throughout, so that the specialist will find many useful collections of references in this volume. The high price of this book would not normally enable the medicinal chemist to justify its purchase. For the research clinician, on the other hand, this represents a potentially very useful collection of current information on the role of pteridines in a variety of clinical settings.

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Progress in Medicinal Chemistry. Volume 22. Edited by G. P. Ellis and G. B. West. Elsevier, Amsterdam. 1985. v + 375 pp. 15 × 22 cm. ISBN 0-444-80668-7. $100.00.

The 22nd volume of this series contains seven distinct reviews on a wide range of subjects. Each of the chapters is written with a different approach and all are very informative. Especially helpful to the reviewer is an outline at the beginning of each of the chapters. Chapter 1 by U. Hacksell and G. D. Daves covers the chemistry and biochemistry of C-nucleosides and C-arylglycosides. These agents have shown impressive anticancer and antiviral activity along with antibiotic activity. Recent advances in these areas are reviewed and new advances in the synthesis of C-nucleosides and C-glycosides are described. Some biological test data is presented in tables which provides some helpful knowledge as to structure–activity relationships. Chapter 2 (P. Krogsgaard-Larsen, E. Falch, and H. Hjeds) offers a fascinating report on heterocyclic analogues of GABA. The early part of this chapter provides a nice review of the GABA system and problems that can arise with dysfunction. An extensive number of approaches to drugs that might provide pharmacological tools or possible therapeutic actions are presented. Some very interesting discussions on bioisosteric replacements and conformationally defined analogues relative to the GABA receptors are presented.

Chapter 3 by B. G. Main and H. Tucker provides an excellent review on one of the most important categories of drugs in recent years, the β-adrenergic blocking agents. The review covers material from 1977 and discusses the major advances made during this period. Structure–activity relationships and some quantitative aspects of SAR are covered. A host of different clinical applications are presented for β-adrenergic blocking drugs. Chapter 4 (H. P. Kock) is an extensive discussion on thalidomide. Although the author of this chapter indicates that thalidomide evokes visions of crippled children and a tragic chapter in drug therapy, this chapter points out some of the newer uses of the drug in experimental situations. Thalidomide is discussed in terms of curing a series of skin and bowel diseases and in the treatment of leprosy. This chapter provides some very interesting reading for those interested in thalidomide and newer analogues. Chapter 5 by H. Singh, A. S. Chawla, and V. K. Kapoor is a report on medicinal chemistry in India. This review illustrates some of the various areas of drug research that are being pursued in India. The short chapter seems out of place since all of the other chapters in this volume provide an in-depth discussion on a specific area of research, while this chapter covers a variety of different drug categories in a highlight fashion.

Chapter 6 (E. Masini, R. Fantozzi, P. Blandina, S. Brunelleschi, and P. F. Mannaioni) is a probe into the possible interaction of the cholinergic histamine release from mast cells. This section is dedicated primarily to understanding the physiological and pharmacological interactions between the cholinergic and hist-

aminergic systems. Some clinical implications and historical aspects of this subject are covered. The final chapter by A. J. Lewis, J. H. Musser, J. Chang, and P. J. Silver is on new approaches in the bronchodilator and antiallergenic therapeutic areas. This is a very informative chapter that discusses current treatments of asthma and some of the more recent information on various tissues that are involved or implicated in asthma. It also provides some insight into future directions for new drugs to be used in the treatment of asthma. The chapter includes a nice integration of a variety of future areas which may be useful in approaching the treatment of bronchial asthma, an area for which we still utilize symptomatic treatment.

The topics in this volume are of interest to medicinal chemists. Each chapter is well-referenced and there is an overall index to terms used throughout the volume. The material in the various chemical and therapeutic categories is highly recommended for those wanting to gain more insight in the subject areas. In summary, this volume continues to uphold the standards set by the previous volumes and should be a valuable addition to library shelves.

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Electrocatalysis for Organic Synthesis. By Demetrios K. Kyriacou and Demetrios A. Jannakoudakis. Wiley-Interscience, New York. 1986. x + 139 pp. 16 × 23.5 cm. ISBN 0-471-81247-1. $35.00.

The title of this book is somewhat misleading. There is indeed a short description at the outset of the essential principles underlying electrocatalysis, and a number of illustrative examples are given of electrocatalysis in organic chemistry. However, there are at least as many reactions discussed which are not electrocatalytic, but rather normal direct electrode processes. The book might be more accurately titled "A Brief Overview of Organic Electrochemistry". The operational term here, unfortunately, is "brief". In 139 pages, including references and index, it is impossible to present much more than a very sketchy description of a research area as large as organic electrochemistry, even when the view is restricted to its synthetic applications. An organic chemist whose interest is piqued by some of the reactions mentioned in this book will have to look elsewhere for details concerning the scope of such reactions and how to carry them out in the laboratory. I am afraid that for these reasons, I cannot endorse the book very strongly.

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The Pyrimidines, Supplement II. (The Chemistry of Heterocyclic Compounds. Volume 16). By D. J. Brown. Wiley, New York. 1985. xi + 916 pp. 16 × 23.5 cm. ISBN 0-471-38116-0. $195.00.

The principal author D. J. Brown is to be complimented on this second supplement on pyrimidine chemistry in the series *The Chemistry of Heterocyclic Compounds*, having written equally substantial works for the first supplement of 1970 and the original book of 1962. Literature published during the period 1968–1983 has been covered and is presented in essentially the same format as in the precious volumes. The text generally does not contain information already covered in the previous earlier works and requires the three volumes to be used together for a full coverage of any particular topic.

The bulk of the work is contained in nine chapters divided on a functional group basis, and these are preceded by an introductory chapter and two that highlight new or improved primary syntheses. The final chapter contains a useful new section reporting ^{13}C, ^{15}N and ^{14}N NMR studies on pyrimidines with accompanying data listings. In all, 13 tables have been integrated with the main text, six of which are extensions of tables in previous volumes.

The appendix consists of a single alphabetical list of some 7000 simpler pyrimidines, most of which were not recorded in the earlier texts. The presentation of the appendix in this way is a valuable improvement in that previously it consisted of many classified tables that made searches difficult. Although the limiting of the appendix list to the simpler pyrimidines results in the omission, for example, of reduced pyrimidines, pyrimidines with substituted phenyl groups, and barbituric acid derivatives with more than two carbons in a substituent at position 1, 3, or 5, some such arbitrary limitations are an inevitable necessity, given the considerable continued growth in pyrimidine chemistry. It would however have been helpful to the user if the basis of the selection could have been restated at the beginning of the appendix to save having to refer back to the original volume to discover this. Although certain types of compounds are absent from the appendix, they are appropriately discussed in the relevant chapters of the main text. The volume contains over 2700 references; there is a general index but no author index.

The work is a thorough, critical, and readable updating of pyrimidine chemistry and is to be commended.

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Advances in Pain Research and Therapy. Volume 8. Opioid Analgesics in the Management of Clinical Pain. Edited by Kathleen M. Foley and Charles E. Inturissi. Raven Press, New York. 1986. xxi + 466 pp. 16 × 24 cm. ISBN 0-88167-108-8. $98.50.

This volume presents the proceedings of a conference (held at Memorial Sloan-Kettering Cancer Center in New York City, July, 1983 (manuscripts updated to January, 1985) on the Clinical pharmacology of opioid analgesics used in the management of pain. The Conference was organized to identify and clarify current controversies surrounding the clinical use of opioids.

Following a brief, appropriate introduction by G. Wojta and a scholarly chapter entitled "Current Controversies in Opioid Therapy" by one of the editors (K.M.F.), the following themes are discussed: morphine; heroin/hydromorphone; meperidine/ketobemidone; methadone/levorphanol/oxycodone; narcotic antagonists and related drugs; buprenorphine; beta-endorphin/metkephamid/DADL-enkephalin; patient-controlled analgesic systems; opioid receptors; novel methods of administration; and pharmacokinetic–pharmacodynamic models.

In all, there are 43 presentations by eminent scientists in opioid research and therapy providing current, authoritative information and analysis on pain control (particularly in terminal cancer) including methods of administration and pharmacokinetic models. Also presented are detailed pharmacokinetic studies, bioavailability, CNS toxicity, drug–disease interactions and overall effectiveness of the above-listed drugs in relieving acute and chronic pain. Finally, novel methods of drug administration—chronic intrathecal; continuous, spinal narcotic infusion; intravenous infusion; epidural and sublingual—are discussed at length as are patient-controlled analgesic systems developed at Oxford and Uppsala Universities. A stimulating Chapter on "Opioid Receptors" appearing about the middle of the book should probably have come at the end. Thought-provoking discussions close out each chapter.

Minor criticisms are that chapter headings (Table of Contents) are not repeated in the text and that "opioid" and "opiate" are are used synonymously. Opiate denotes products isolated from the opium poppy or derivatives thereof. Opioids is an across-the-board term for morphine- and heroin-like analgesics.

This volume is superbly edited and the print is flawless. References are ample but not overwhelming. In conclusion, "Opioid Analgesics in The Management of Clinical Pain" is highly recommended reading for clinicians, clinical pharmacologists, and other researchers concerned with pain management, especially in the chronically ill.

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Fieser and Fieser's Reagents for Organic Synthesis. Volume 12. By Mary Fieser. Wiley, New York. 1986. 643 pp. 16 × 24 cm. ISBN 0-471-83469-6 (V.12). $47.50.

This latest volume in this well-known series covers reagent literature published from 1982 through 1984. As with previous volumes in this series, this book provides references to new reagents introduced during this period, as well as references to reagents included in previous volumes, focusing on reagents that open new vistas in organic synthesis. Included also in this volume is an index according to types, an author index, and a subject index.

Staff

Medicinal Chemistry. The Role of Organic Chemistry in Drug Research. By S. M. Roberts and B. J. Price. Academic Press, London, NWI 7DX. 1985. xix + 296 pp. 15.5 × 23.5 cm. ISBN 0-12-589730-8. $65.00.

This book is informative and interesting and provides an introduction and a review of select areas of Medicinal Chemistry. It is divided into 14 chapters, each about 20 pages, written by different authors. While there is considerable organic chemistry discussed in many of the chapters, "The Role of Organic Chemistry in Drug Research" may not be the most appropriate title. Of primary interest, most of the chapters deal with the thought processes that were involved in the discovery and development of a particular drug or a class of drugs. In addition, each of the chapters presents a historical background and a review of the biology of a drug or series of drugs.

Several chapters, such as those on contraceptive steroids, topical antiinflammatory steroids, β-blockers, and cephalosporin antibiotics, contain a considerable amount of organic chemistry related to a series of compounds. Others, such as that on salbutamol, also emphasize organic chemistry, but in this case, the chemistry is limited to an individual β_2-stimulant. Although the chapter on the antifungal agent ketoconazole presents minimal organic chemistry, it presents a very nice review on the development and SAR leading to a successful drug.

In addition to the above chapters, it was enlightening to read about the discovery of a variety of individual drugs—H_2-blocker, cimetidine; neuromuscular agent, atacurium; analgesic, buprenorphine; β-lactamase inhibitor, clavulanic acid; and schistosomicidal agent, oxamniquine.

The first three chapters review enzymes and receptors and discuss their structures and functions. Organic chemistry is not an important part of these chapters, but they do play an important role in introducing the reader to medicinal chemistry described in subsequent chapters.

In summary, the book is excellent. The chapters are well-written, a good length, and easy to follow. Naturally by it size, it is limited in detail and scope and many areas of medicinal chemistry are not represented. I highly recommend this book to novice and experienced medicinal chemists and even pharmacologists.

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Medicinal Plants in Tropical West Africa. Bep Oliver-Bever. Cambridge University Press. 1986. viii + 375 pp. 15 × 23 cm. $75.00. ISBN 0-521-26815-X.

Among the many compilations of the medicinal plants of western Africa, this one should occupy a prominent place on the bookshelves of scientists involved in the chemistry, pharmacognosy, and pharmacology of the medical lore of the region. In an attempt to separate the magic, ritual, and superstition which are often a major part of native healing, and to lend a degree of credibility to the reputed curative value of traditional herbal medicine, the author has selected not only the native plants for which some chemical and pharmacological data have been published but many familiar introduced species which have had similar medicinal uses in other parts of the world.

The arrangement of the material will be found useful: remedies are classified not on the basis of botanical affinities but on the basis of the organ systems on which they are presumed to act. The major chapters or subdivisions include plants acting on the cardiovascular system, the nervous system, those having antiinfective activity, those producing effects on the pituitary-adrenal axis, the sex and thyroid hormones, and, finally, those having hypoglycemic action. Entries for each species include local use and an introduction to the published chemistry and pharmacological activity of either extracts or the compounds which have been isolated from the listed species or closely related botanical relatives.

There is an extensive bibliography which, unfortunately, can be criticized for inclusion of relatively few citations less than a decade old. Nonetheless, the book will serve as an excellent introduction to the fundamental problems involved in translating traditional folk medicine into effective, low-cost health care in those areas of the world where it is clearly needed.

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Interaction of Steroid Hormone Receptors with DNA. Edited by M. Sluyser. Ellis Horwood, Chichester. 1985. 242 pp. 17 × 25 cm. ISBN 0-89573-366-8. U.S. $46.50.

Over the past quarter century our increased knowledge of the living organism has enabled us to create fundamental dogma in biology that stand as central to our science as do the laws of thermodynamics to the physicist. We now accept the notion of replication of genetic information and of the flow of information from DNA through RNA to protein. Yet there are innumerable individual aspects of transcription and translation that are not understood fully, especially those concerned with the overall control of gene expression.

The present book is an excellent attempt to provide an up to date review of one particular aspect of gene control: that of activation by steroid hormones. It is an interesting and important work for many reasons.

At the level of interaction of ligand and receptor binding, steroids are a classof ligand for which the structure is well-known (see especially Chapters 3 and 4). This is not always the case with small communicable hormones and morphogens. Further, it is clear from further chapters (e.g., the progesterone receptor, Chapter 5; the glucocorticoid receptor, Chapter 6) that our knowledge of the steroid *receptor* has advanced to a significant degree. Taken together, the binding of a characterized ligand and receptor is of greater interest to the stereochemist than the binding of uncharacterized molecules could ever be. By comparison, many cell surface recognition molecules (typically glycoproteins) remain of unknown composition although they promise to be of great interest in development.

In the present volume there is much that should appeal to the developmental biologist and also to those engaged in cancer research. Thus, from Chapters 1 and 4 it is possible to infer that our understanding of steroid binding might provide insight into possible methods of therapy for hormone-related tumors. Later in the volume (Chapter 9) we are provided with an excellent review of the action of an ecdysteroid hormone in *Drosophila*, apparently a good model for study of the control of gene expression. Still further chapters (4 and 7) concern the direct interaction of steroid receptors with DNA and chromatin; they might appeal in addition to the molecular biologist.

In many laboratories an immunological approach to receptor identification has been normal, but even the monoclonal antibody has its limitations when looking at ligand or receptor structure in the living cell. Thus, I am pleased to note the inclusion of a chapter (3) concerned with the use of physical methods to study ligand and receptor structure. I would have liked to see included a further article on the computer-aided simulation of tertiary structure in proteins; however, I accept that the latter subject is somewhat esoteric even today and that specialists in the field are few.

To conclude, the volume is well written and edited. The quality of reproduction of photographs is high, and the script is pleasant

to read. I suggest that this book is a worthy addition to any library.

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Annual Review of Neuroscience. Volume 9. Edited by W. Cowan, E. Shooter, C. Stevens, and R. Thompson. Annual Reviews, Palo Alto. 1986. viii + 531 pp. 16 × 23 cm. ISBN 0-8243-2409-9. $31.00.

The latest edition of the *Annual Review of Neuroscience*, Volume 9, is a good survey of a broad field. The editorial committee have selected a number of somewhat disparate topics that span this area with notable exceptions. The authors are well-respected authorities in their respective topics, and the individual sections are generally well written. The volume's principle shortcomings are its omissions. Other *Annual Reviews* are longer but with a more even distribution of topics. In contrast, the present volume is filled with material of questionable relevance to the medicinal chemist. Topics *not* covered in this volume include such noteworthy areas as NMR imaging, protein phosphorylation, and receptor purification/reconstitution. Instead, many of the chapters in Volume 9 may hold little interest to readers of this Journal.

Chapter 1 (S. Ullman) is a description of the application of artificial intelligence to the visual system. Algorithms are described for image analysis and motion perception. The chapter appears current with pertinent references for those interested in this topic.

Chapter 2 (M. J. Kuhar, E. B. DeSouza, J. Unnerstall) is about the applications of radioligand binding to the autoradiographic localization of neurotransmitter receptors. Recent advances in this field are mentioned that enable quantitative measures to be performed on the same tissue sections used for anatomical localization of these binding sites. The chapter contains sections on in vivo and in vitro labeling of binding sites with very helpful tabular presentations of the radioligands and their respective references.

Chapter 3 (J. W. Pritchard, R. G. Schulman) concerns the in vivo applications of NMR spectroscopy. This very powerful technique is reviewed with timely presentations of ^{31}P, ^{13}C, and ^{1}H spectroscopies. Newer methods for subtracting the proton signal of water are described that enable the in vivo quantitation of organic substances such as γ-aminobutyric acid. An additional chapter on NMR imaging would have been a good and complimentary addition to this volume.

Chapter 4 (L. Stryer) is an informative review on the biochemistry of the visual system with a focus on cGMP. This particular review will be most helpful for those who have not closely followed the developments in this area. Sufficient background material is presented to allow the reader to appreciate what follows. The complex interrelationships of the transducin cycle are revealed in a lucid and easily perceived manner. This chapter is a model among reviews.

Chapter 5 (K.-E. Kaissling) concerns the biophysics underlying olfaction in insects. Pheromone action and disposition and their relation to electrical potentials are described in detail. The chapter is detailed and comprehensive.

Chapter 6 (A. Georgopolis) is a very esoteric treatise on the mechanics of eye–hand coordination. Segments of this chapter, relating the effects of brain lesions to both components of reaching and the individual neurons that may mediate movement, may hold considerable interest to the neurologist.

Chapter 7 (C. J. Shatz, D. W. Stretavan) reviews retinal ganglion cell interactions during development. The review describes the organization and development of this system and the phenomena of selective ganglion cell death as a mechanism of neuronal organization during development. The topographic ordering of ganglion cell projections and the role of binocular competition in the segregation of ocular input are discussed.

Chapter 8 (G. D. Prell, J. P. Green) is a lengthy review on the existence of histamine in neurons, aside from mast cells. The chapter does, however, go to unnecessary length by including sections on second messengers and receptors that are neither terribly current nor relavent for this particular review. The immunohistochemical distribution of histamine fibers in the brain and the roles of histamine in invertebrates are also discussed. The chapter is nevertheless informative and replete with abundant references.

Chapter 9 (M. A. Tanouye, C. A. Lamb, L. E. Iverson, L. Salkoff) demonstrates the utility of *Drosophila* as a model system for exploring the molecular biology of ion channels. Various mutants, affecting particular ion channels, and the cloning of the genes for these channels are presented.

Chapter 10 (J. P. Schwartz, E. Costa) is a review of the applications of molecular biology to the study of neuropeptides. The subject matter will be of considerable interest to scientists interested in this field and can serve as a suitable primer for those aspiring to learn more of this area. A brief description of the biological methods precedes a longer section on various neuropeptides and their precursors that have been cloned. Hybridization methods for quantifying neuropeptide synthesis and qualitatively localizing peptide precursors in situ are also covered. The review drifts occasionally into jargon common to molecular biology but is otherwise well written. The topic of posttranslational modification of neuropeptides is covered in a later chapter.

Chapter 11 (R. P. Bunge, M. B. Bunge, C. F. Eldridge) reviews basal lamina production by Schwann cells and their role in neurite extension. Effects of modifications to basal lamina secretion on Schwann cell function are discussed in detail.

Chapter 12 (D. Lancet) regards vertebrate olfactory reception and is a suitable compliment to Kaissling's chapter (5) on invertebrate olfaction. The chapter begins with an anatomical descritpion of the components of the vertebrate olfactory system with a discussion of their function. Quantitative aspects of the sensory response are discussed in some detail. Odor quality, as produced by specific receptors, is mentioned, and a description of the biochemistry of odor recognition and olfactory receptor recognition is discussed.

Chapter 13 (G. E. Alexander, M. R. DeLong, P. L. Strick) reviews the various corticostriatal circuits in primates. Different connections of the basal ganglia with olfactory, motor, oculomotor, dorsolateral prefrontal, lateral orbitofrontal, and anterior cingulate cortical regions are covered. A discussion of the importance of these projections in different pathophysiological states follows and helps to explain the constellation of deficits that are often seen in cases of nigrostriatal degeneration (e.g., Parkinson's disease).

Chapter 14 (M. P. McCarthy, J. P. Earnest, E. F. Young, S. Choe, R. M. Stroud) reviews much of what is known about the nicotinic acetylcholine receptor. The organization of the receptor anatomically and biochemically is presented including the physical dimensions of the ion channel. Mechanisms of channel function are related to the electrophysiological and biochemical properties of agonist and antagonist binding. The location of binding sites is discussed. Receptor antagonists are discussed and should be of relevance to those interested in this area.

Chapter 15 (J. F. McKelvy, S. Blumberg) is about the post-translational processing of neuropeptides with special regard to their inactivation. As specific examples, the enkephalin and LHRH peptides are discussed with regard to the metabolism, the enzymes responsible, and the inhibitors of these enzymes. Biological events resulting from inhibition of the degratory enzymes are also reviewed. The review ends with a brief discussion of neuropeptide uptake and a section entitled *Future Directions of this Research*. The chapter should be very helpful for scientists attempting to modify the disposition of endogenous peptides.

Chapter 16 (T. J. Carew, C. L. Sahley) is entitled *Invertebrate Learning and Memory: From Behavior to Molecules*. Different types of invertebrate learning are described along with methods for their assessment. The review continues with the results of such studies in *Apis Melifera, Limax maximus, Pleurobranchia californica, Lymnaea stagnalis, Achatina fulica, Hirudo medicinalis, Schistocerca gregaria, Hermissenda crassicornis, Aplysia californica*, and *Drosophila melanogaster*.

Chapter 17 (D. L. Price) is a very up-to-date and comprehensive review on Alzheimer's disease. The review begins by covering the clinical portrait of the disorder and continues with a discussion of the different neuronal systems known to be affected in the disorder. The different structural abnormalities are mentioned

with regard to both their anatomical appearance and their biochemical composition, where known. A most helpful aspect of the review is a section discussing the different models for Alzheimer's disease with special emphasis on the behavioral, biochemical, and anatomical similarities to the human disease. Etiological factors and theories are discussed that include age, genetic factors, transmissable agents, toxins, trauma, and lack of trophic factors. This chapter will be most helpful for investigators interested in this disorder.

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Chromatographic Separations of Stereoisomers. By R. W. Souter. CRC Press, Boca Raton, FL. 1985. vii + 241 pp. 18 × 26 cm. ISBN 0-8493-6127-3. $79.00.

The chemist working in the field of chiral separations will have an enjoyable experience in reading the book by R. W. Souter *Chromatographic Separations of Stereoisomers.* It is a very nice presentation, with good editing, which makes the final book an exciting experience for anyone about to perform such chromatographic separations. The book appears at an excellent time because the separation of optical isomers (enantiomers) and related stereoisomers is being applied with increasing frequency. There is an increasing need within the pharmaceutical industry to produce enantiomerically pure drugs.

Thus, right from the start, the book appeared as a very practical entity, providing solutions to real problems and thoroughly covering the literature. There has long been a real need for this type of approach. To our minds, there is no other single text that provides such a practical, useful, and comprehensive review of the entire chromatographic literature related to stereoisomer separations.

In Chapter 1, definitions are provided of the terms stereoisomers, together with the importance of the assignment of optical configurations. The author also described the different techniques for resolution of stereoisomers and optical isomers, which were divided, quite naturally, into nonchromatographic and chromatographic approaches. The advantages and disadvantages of the various methods are adequately described.

Chapter 2 presents most of the GC methodology for stereoisomer separations. The indirect and direct methods (i.e., diastereomer formation vs. direct enantiomer resolution) are here discussed. One excellent attribute here is the emphasis on fundamental mechanisms of resolution and interactions between the solutes and the stationary phases in each approach. Beginning with the pioneering work of Gil-Av and Feibush, the author has reviewed earlier and present chiral phases, as well as methods for enantiomer resolution via GC.

Chapter 3 introduces the reader to the most advanced HPLC techniques for stereoisomer separations. Mechanistic aspects were emphasized, which really provided this text with a tremendous advantage. Thus, the reader is not forced into a certain way of thinking, but rather is free to choose mechanisms based on the interactions that take place on a particular stationary phase. Different types of chiral phases are presented and discussed, divided into two major classes: (1) bonded chiral phases; (2) chiral additives to the mobile phase. Another important aspect is the indirect resolution of enantiomers via diastereomeric compound formation, followed by chromatographic separation of these once-formed stereoisomers.

More and more researchers are interested in separating stereoisomers via other chromatographic techniques such as TLC, electrophoresis, and others. This is due to the basic simplicity, ease of use, and low cost, together with satisfactory results in terms of quantitation, reproducibility, accuracy, and reliability. Chapter 4 deals with such topics, again emphasizing the kinds of interactions that take place within each process.

In conclusion, Dr. Souter has brought us an important, practical text on how to perform separations of stereoisomers in a logical manner. We always start with the interactions between the solutes and stationary phase and then move to a choice of which phases will best separate a particular class of compounds. The book is, in addition, extremely useful in its synthetic discussions concerning the synthesis of different kinds of chiral phases for chromatography.

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Chemistry of the Monoterpenes: An Encyclopedic Handbook (Two Parts). By William F. Erman. Marcel Dekker, New York, Basel. Part A: 1985. xiii + 814 pp. 19 × 26 cm. ISBN-08247-1573-X. $72.50. Part B: 1985. xii + 895 pp. 19 × 26 cm. ISBN-08247-7312-8.

In the Introduction to this two-volume work on monoterpene chemistry, the author disavows any intention to present a comprehensive treatment of the subject and thereby snuffs out the faint hope raised by the subtitle *An Encyclopedic Handbook* that this might be a modern day version of Simonsen. In fact, the work is not a handbook at all, but primarily a detailed recital of the reactions and syntheses of various members of the most common classes of monoterpenes, with separate chapters being devoted to acyclic monoterpenes, monocyclic dimethylcyclohexane derivatives, *p*-menthanes, iridoids, thujanes, caranes and eucarvanes, bornanes and their rearrangement products, cannabinoids and related meroterpenoids, and pyrethrins. Two introductory chapters deal with biogenesis of the various classes and with the methods used to establish the absolute configurations of the most important compounds.

This arrangement makes for a certain amount of repetitiveness. And although someone who wants to be informed on work carried out before 1972 on interconversions, absolute configurations, transformations, and rearrangements of some of the more important types of monoterpenes will find the work useful, its chief drawback is its almost complete neglect of the literature since then. Even standard reviews of monoterpene chemistry such as those appearing in Volumes 3–9 and Volume 12 of *Specialist Reports on Terpenoids and Steroids* and more recently in *Natural Products Reports* are not brought to the attention of the reader. The lack of reasonably up-to-date coverage is particularly noticeable in the chapter on biogenesis, which contains no reference later than 1973, but also extends to later chapters on reactions and syntheses.

For information on naturally occurring monoterpenes, the author seems to rely on Devon and Scott's 1972 handbook (see for example his discussion of the nonoccurrence of *o*- and *m*-menthanes), and even though the work does not claim to be comprehensive, mention of thujaplicin derivatives and of the numerous halogenated monoterpenoids, some of them of new skeletal types, isolated from marine sources would have been appropriate. On the other hand, inclusion of the ionones and irones among the monoterpenes is almost certainly wrong.

The work would have benefited from closer editorial scrutiny. It is replete with grammatical mistakes, particularly ones involving lack of agreement of subject and verb, spelling errors (words like levorotatory and diastereomers are always misspelled as are names of some authors), umlauts are consistently missing, and typos abound. Author and subject indices appear at the end of Part B; the latter is mainly a compound index and seems to be unusually complete.

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Palladium Reagents In Organic Syntheses. Richard F. Heck. Academic, Orlando, FL. 1985. xx + 461 pp. 16 × 24 cm. ISBN 0-12-336140-0. $109.00.

The reader will find in this book a wealth of information on methods in organopalladium chemistry. The first in a series

entitled *Best Synthetic Methods* (A. R. Katritzky, O. Meth-Cohn, and C. W. Rees, Eds.), it has been designed mainly for synthetic chemists. Thus, topics have been selected primarily on the basis of preparative value and are treated accordingly; there is little detailed consideration of mechanisms, although the nature of each reaction covered is described in general terms. Representative experimental procedures are given, and selected examples of many reactions are set out in tabular form. Topics covered include isomerizations, rearrangements, oxidations, substitution and elimination reactions at allylic carbons, coupling reactions, dimerizations and oligomerizations, carbonylations, cyclopropanations, and reductions. Most of the procedures are for catalytic palladium reactions, although some examples of stoichiometric reactions are included. Also included are useful sections on the preparation of commonly used organopalladium reagents and on recovery procedures for palladium metal. The literature is surveyed to mid-1983 (509 references), and there is a comprehensive subject index. No author index is included. The organization of the book is clear, and the format is readable. Recommended.

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Books of Interest

Methods in Enzymology. Volume 122; Vitamins and Coenzymes, Part G. Edited by Frank Chytil and Donald McCormick. Academic Press. 1986. xxvi + 476 pp. 15 × 24 cm. ISBN 0-12-182023-X. $63.50.

Methods in Enzymology. Volume 123; Vitamins and Coenzymes, Part H. Edited by Frank Chytil and Donald McCormick. Academic Press. 1986. xxvi + 476 pp. 15 × 24 cm. ISBN 0-12-182023-8 $63.50.

Aromaticity. Edited by P. J. Garratt. Wiley, New York. 1986. xi + 313 pp. 16 × 24 cm. ISBN 0471-80703-6. $47.50.

Advances in Gene Technology: Molecular Biology of the Endocrine System. Edited by Puett, Ahmad, Black, Lopez, Melner, Scott, and Whelan. Cambridge University Press. 1986. xxv + 402 pp. 16 × 24 cm. ISBN 0-521-32658-3.

Biohalogenation: Principles, Basic Roles and Applications. Edited by S. L. Neidleman and J. Geigert. Halsted Press. 1986. 203 pp. 17 × 25 cm. ISBN 0470-2-285-8. $49.95.

Hormones, Receptors and Cellular Interactions in Plants. Edited by C. M. Chadwick and D. R. Garrod. Cambridge University Press. 1986. xii + 375 pp. 16 cm × 23 cm. ISBN 0-304261. $69.50.