

11 is used as starting material. The reaction product was an oil, which was purified by chromatography on Florisil. Elution with 10% MeOH in CHCl_3 gave compound 2 as an oil (70%): MS, m/e 345 (M^+ , 100); $[\alpha]_{\text{D}} -99^\circ$; UV λ_{max} 278 nm (ϵ 569), 285 (586); IR (CHCl_3) 2920, 1620, 1580, 1425 cm^{-1} ; $^1\text{H NMR}$ (CDCl_3) δ 0.87 (t, 3, w- CH_3), 1.02, 1.33 (2 s, 3 each, CH_3), 2.41 (t, 2, benzylic), 2.51 (s, 3, NCH_3), 2.59 (m, 2, CH_2N), 6.01 (d, 1, aromatic), 6.14 (aromatic).

7 α -(Dimethylamino)hexahydrocannabinol (3). The preparation of this compound follows the procedure described above for the synthesis of 1, except that dimethylamine hydrochloride instead of methylamine hydrochloride is used as one of the starting materials. The reduction with NaBH_3CN is continued for 72 h rather than just 1.5 h. The reaction product was an oil, which was purified by chromatography on aluminum oxide "for dry column". Elution with 2% MeOH in CHCl_3 gave compound 3 (66% yield) as an oil: MS, m/e 359 (M^+); $[\alpha]_{\text{D}} -99^\circ$ (EtOH); IR (CHCl_3) 1625, 1570, 1030 cm^{-1} ; $^1\text{H NMR}$ (CDCl_3) δ 0.87 (t, 3, w- CH_3), 1.04, 1.36 (2 s, 3 each, CH_3), 2.34 (s, 6, CH_3NCH_3), 6.22 (1, aromatic), 6.27 (1, aromatic).

7 β -(Dimethylamino)hexahydrocannabinol (4). The preparation of this compound follows the procedure described above for the synthesis of 1, except that dimethylamine hydrochloride

instead of methylamine hydrochloride and the equatorial aldehyde 11 instead of 10 are used as starting materials. The reduction with NaBH_3CN takes 24 h rather than 1.5 h needed for compound 1. The reaction product was an oil, which was purified by chromatography on aluminum oxide "for dry column". Elution with 2% MeOH in CHCl_3 gave compound 4 (55%) as an oil: MS, m/e 359 (M^+); $[\alpha]_{\text{D}} -126^\circ$ (EtOH); UV λ_{max} 275 nm (ϵ 1325), 282 (1380); IR (CHCl_3) 1625, 1585, 1430 cm^{-1} ; $^1\text{H NMR}$ δ 0.86 (t, 3, w- CH_3), 1.04, 1.32 (2 s, 3 each, CH_3), 2.30 (s, 6, CH_3NCH_3), 5.79 (1, aromatic), 6.06 (1, aromatic).

Acknowledgment. N. Lewis¹⁶ was a recipient of a Lady Davis award during his stay as visiting professor from Ohio State University. We thank the Israel Institute for Psychobiology for partial support.

Registry No. 1, 91385-16-9; 2, 91385-17-0; 3, 91385-18-1; 4, 91385-19-2; 9, 51263-83-3; 10, 91385-20-5; 11, 91385-21-6; methylamine hydrochloride, 593-51-1; dimethylamine hydrochloride, 506-59-2.

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Book Reviews

Bioactive Carbohydrates: In Chemistry, Biochemistry, and Biology. By John F. Kennedy and Charles A. White. Halsted Press, New York. 1983. 331 pp. 16 \times 23.5 cm. ISBN 0-470-27527-8. \$79.95.

A major obstacle to anyone learning carbohydrate chemistry is the seemingly unrelated nomenclature and diverse structural types for this class of natural products. Appropriately, therefore, the first two chapters of this book, which is designed primarily as an introductory textbook, begins with a detailed, systematic presentation of the names for monosaccharides, oligosaccharides, and polysaccharides and carefully analyzes their stereochemical differences. The manner in which monosaccharides are bound together to yield oligosaccharides is well presented and the authors provide many structures in three-dimensional conformational drawings which is very helpful.

Chapter 3 discusses the primary, secondary, tertiary, and quaternary structures of polysaccharides and relates them to proteins. Reactions of carbohydrates are presented. Included is the oxidation of monosaccharides to aldonic and alduronic acids, which are carefully distinguished, reduction to alditols, and treatment with acid to produce furans and base to cause epimerization and aldose/ketose isomerizations. A discussion of the derivatization of monosaccharides begins with an indication that, due to the polyfunctional nature of carbohydrates, selective protection of various sites is necessary to affect an appropriate change selectively at another center. With this in mind, the formation of glycosides, ethers, esters, and cyclic acetals is described.

In Chapter 4 a good discussion of the isolation and purification of carbohydrates is given along with the use of hydrolysis, periodate oxidation (the Smith degradation), alkaline degradation, mass spectra, NMR spectra, electrophoresis, and chromatographic techniques for identifying carbohydrates. The use of enzymes in the structural analysis of polysaccharides is given together with an exhaustive table of the enzymes capable of performing these tasks.

The chemical and biochemical synthesis of monosaccharides forms the major portion of Chapter 5. In describing chain lengthening as a synthetic approach to monosaccharides, the Nef reaction (using nitromethane) and the Fischer-Killani reaction (via cyanohydrins) are presented. In degrading monosaccharides to other monosaccharides, the Wohl and Ruff degradations are

discussed. Epimerization of monosaccharides introduces another means of preparing these simple carbohydrates. The Fischer glycosidation and Koenigs-Knorr preparation of oligosaccharides are given, and a description of the biosynthesis of carbohydrates is extensive and well done.

A detailed presentation of monosaccharides appears in Chapter 6. In this chapter, acidic sugars (aldonic, uronic, and aldaric acids), sugar alcohols (alditols and inositols), aminosugars (including 2-amino-2-deoxy-D-glucose), deoxysugars, nitrosugars (which do not exist widely in nature but are useful in preparing aminosugars), halogenosugars, thiosugars, and unsaturated sugars are discussed.

Chapter 7 deals with naturally occurring disaccharides (sucrose, lactose, and the trehaloses) and trisaccharides (raffinose and melezitose). Also discussed are maltose and cellobiose, which are disaccharides resulting from the hydrolysis of the polysaccharides starch and cellulose, respectively. The breadth of the book is illustrated here with a mention of the use of cyclomaltooligosaccharides (i.e., cycloamyloses, cyclodextrins, etc.) to form inclusion compounds with small molecules and the use of these compounds in biochemical studies. An interesting immunological explanation is also given for the conversion of D-glucose to D-galactose in mammary glands for incorporation into lactose. The infant receiving the milk then converts the D-galactose back to D-glucose during digestion.

This is followed by an extensive presentation of polysaccharides (Chapter 8), beginning with the plant polysaccharides (starch, which is well described, and cellulose as homopolysaccharides and gums, mucilages, pectins, and hemicelluloses as heteropolysaccharides), algal polysaccharides, microbial polysaccharides (teichoic acids, cell wall peptidoglycans, extracellular polysaccharides, and Gram-positive and Gram-negative bacterial capsular polysaccharides), lipopolysaccharides, fungal polysaccharides, and animal polysaccharides (glycogen and chitin). Timely, from a medicinal chemistry point of view, is the discussion of the antigenic nature of the Gram-positive bacterial capsular polysaccharides and the lipopolysaccharides. Also contained in this chapter is a compilation of the less common monosaccharides found in bacterial polysaccharides.

In Chapter 9 the authors devote a great deal of attention, perhaps justifiably so, to glycoproteins and proteoglycans. An easily retained definition of each with an accompanying distinction between them is provided. Even though plant and algal glyco-

proteins are discussed, the section on animal glycoproteins (hormonal, serum and plasma, immunoglobulins, and blood group substances) is the most beneficial to the medicinal chemist. In this regard, good descriptions of the biological function of each class of compounds together with the problems and successes associated with their structural analysis using chemical and enzymatic methods are given. A discussion on the catabolism of glycoproteins and the relationship of glycoproteins to diseases (for example, mental retardation) are presented in this chapter.

The function of glycolipids (Chapter 10) is suggested to be based on much speculation but they may act as, for example, cell membrane carriers of carbohydrate moieties, membrane "modifiers", and mediators in the biosynthesis of proteoglycans. The authors then proceed to discuss animal glycolipids and their structures based on sphingosine, and related bases, and long-chain fatty acids. The relationship of the catabolism of glycolipids to lipidosis is well presented. A discussion of plant and algal glycolipids, in a sequence similar to the other chapters, is then adequately presented.

Chapter 11 deals with ribose and 2-deoxyribose as components of nucleic acids. Most of the discussion is a routine analysis of DNA and RNA and their functions in protein synthesis. The chapter finishes with several paragraphs on genetic engineering. The chapter is somewhat naively written and contains errors, maybe due to insufficient expertise in this area by the authors. For example, many double bonds are missing in Figures 11.2 and 11.4 (structures of the nucleic acid bases including the unusual ones in tRNA). In Figure 11.4, adenines are referred to as adenosines. The authors also state that the N-glycosidic bond in purines is to the N-3 atom of the base.

A cataloging of antibiotics is the focus of Chapter 12. It includes a convenient tabulation of the structures of the less common monosaccharides found in antibiotics before proceeding with presenting nucleoside antibiotics, antibiotics containing aromatic rings (for example, anthracyclines), the macrolide antibiotics, and the aminoglycoside antibiotics. The mechanism of action of these antibiotics is described.

The book concludes first with a chapter on the synthesis of derivatives of polysaccharides and uses of the resultant products in chromatography, immobilized enzymes, and immunoabsorbents. The final chapter (14) discusses the industrial applications (construction, packaging, food, fabrics, and pharmaceuticals) of polysaccharides and carbohydrate-containing macromolecules. This is followed by projected uses of these materials in, for example, the oil, food, pharmaceutical, and cosmetic industries.

The book fills a definite void in the chemical literature by providing a single, contemporary textbook on carbohydrates. The book accomplishes its goal of being useful to those contemplating research in carbohydrate chemistry or working in a peripherally related area. To be of value beyond the levels just described, however, the book would have to be more extensively referenced. Since, in some cases, the authors assume too much reader grasp of structural organic chemistry, the book would not be for the average undergraduate student. The book is generally error free (*vide infra*) but occasional ambiguities do occur, which, in a subject such as this where structures and definitions have subtle distinctions, such ambiguities are unfortunate.

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Small Ring Heterocycles. Part 2. Azetidines, β -Lactams, Diazetidines and Diaziridines. Edited by Alfred Hassner. Wiley, New York. 1983. xi + 656 pp. 17 x 24 cm. \$175.00.

The present volume is a continuation of the treatise on small ring heterocycles (three- and four-membered rings) of the A. Weissburger-E. C. Taylor series on the "Chemistry of Heterocyclic Compounds". It contains four chapters: "Azetidines", by James A. Moore and Rita Seelig Ayres (487 references); "The Synthesis of the β -Lactam Function", by Gary A. Koppel (302 references); "Four-Membered Rings Containing Two Nitrogen Heteroatoms", by Reinhard Richter and Henri Ulrich (287 references); and "Diaziridines, 3*H*-Diazirines, Diaziridinones and Diaziridinimines", by Harold W. Heine (272 references). The first chapter also

contains separate sections on azetidines (Dihydroazetes) and azetes and benzazetes. As the editor rightly points out, the voluminous literature on β -lactams, particularly pertaining to penicillin and cephalosporin antibiotics, necessitates the chapter on "Synthesis of the β -Lactam Function" (an excellent effort) apart from "Azetidines" and will require separate treatment of the β -lactam antibiotics. These chapters are highly effective in the stated objective of briefly reviewing the state of the art and presenting detailed reviews of research results since the first review on three and four membered heterocycles in this series was published in 1964. Like Part 1, each chapter of the current volume is a highly in-depth treatment of the title subject and contains a detailed table of contents, which is a valuable supplement to the subject index for quickly locating a particular topic of interest. The detailed author index and well-done structures and tables (which usually list yields) enhance the overall quality of this volume, which is excellent. Those involved in its preparation are to be commended for production of a quality work that will certainly be an essential reference for those in the field for many years to come.

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Handbook of Experimental Pharmacology. Volume 61. Chemotherapy of Viral Infections. Edited by P. E. Came and L. A. Caliguiri. Springer-Verlag, New York. 1982. xxv + 563 pp. 17.5 x 24.5 cm. ISBN 0-387-11347-9. \$169.00.

This recent addition to the numerous volumes of the Handbook is subdivided into three main parts. The first deals with models of pathogenesis of virus disease by the many types of viruses important in human disease. The other two major divisions are comprised of six chapters on antiviral agents that are clinically effective (Part A) and six chapters on compounds under study as candidate drugs or compounds used to elucidate mechanisms of virus replication (Part B).

In Chapter 1, J. Hay and M. J. Bartkoski, Jr. effectively combine a survey of current knowledge of viral structure and replication with information on the cause and outcome of viral infection in host animals. Pyrimidine nucleosides with selective antiviral activity are reviewed by P. H. Fischer and W. H. Prusoff in Chapter 2. In Chapter 3, N.-H. Park and D. Pavan-Langston concisely review the clinically efficacious purine nucleosides vidarabine and acyclovir. These discussions focus on the antiviral spectrum, mechanisms of action and clinical efficacy of these antiviral agents. Chapter 4, by J. L. Schulman, is a brief overview of amantadine with comments on its clinical efficacy. In a comprehensive chapter on "The Thiosemicarbazones", C. J. Pfau reviews the antiviral structure-activity relationships of various thiosemicarbazones. This chapter also contains a survey of the antiviral spectrum, effects on normal cells, mechanism of action, and efficacy in animals and man of selected thiosemicarbazones. The largest chapter, "Interferon and Its Inducers", is a contribution by P. B. Sehgal, L. M. Pfeffer, and I. Tamm that provides a comprehensive review of progress in this rapidly advancing field of biomedical research. H. Friedman and S. Specter address the use of immunotherapeutic approaches to antiviral activity in Chapter 7. The authors discuss the role of the immune response in controlling virus infections and the mechanism by which various agents enhance immunity. The use of guanidine as an antiviral agent and its utility in mechanism studies is summarized by D. R. Tershak, F. H. Yin, and B. D. Korant in Chapter 8. This is followed with a discussion by H. J. Eggers in Chapter 9 on recent developments re the antiviral activity of benzimidazoles with a major focus on 2-(α -hydroxybenzyl)benzimidazole. In Chapter 10, J. J. McSharry and F. Panic summarize a new class of antiviral agents, the aryl β -diketones. The antiviral properties of phosphonoacetic acid and its analogues are reviewed by L. R. Overby in Chapter 11. P. E. Came and B. A. Steinberg, in Chapter 12, have collected a variety of examples of natural substances in the plant, animal, and marine world that have antiviral activity. In the final chapter, C. Gurgo, S. Bridges, and M. Green focus on

the antiviral properties of the rifamycins, substances viewed as a potential source of antiviral agents.

Although not detracting significantly from the high quality of this volume, several chapters contain chemical structure errors. Incorrect structures include adenosine (p 118), quercetin (p 490), the side chain of EHNA (*E*-9-(2-hydroxy-3-nonyl)adenine hydrochloride) (p 122), and several structures on p 97, especially that of 5,6-dihydro-5-azathymidine. The chapters are generally well written and are extensively referenced, with a few citations as current as 1981. The volume contains a brief subject index complemented by a detailed table of contents. "Chemotherapy of Viral Infections" will serve as a valuable reference source to physicians, virologists, and especially to medicinal chemists interested in gaining a foundation in antiviral chemotherapy.

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Peptides: Structure and Function. Proceedings of the Eighth American Peptide Symposium, Tucson, Arizona, May 22-27, 1983. Edited by V. J. Hruby and D. H. Rich. Pierce Chemical Company, Rockford, IL. 1983. xxxi + 927 pp. 16 × 23.5 cm. \$57.00.

This volume represents the collected papers of the Eighth American Peptide Symposium, which was held in 1983. Attesting to the continued vigorous growth of interest in the chemistry and biology of peptides is that over 600 registrants from more than 20 countries attended this 6-day meeting and that there were about 250 papers and posters (about one for every two registrants). The papers spanned a full spectrum of disciplines, encompassing organic and analytical chemistry, biochemistry, biophysics, and pharmacology, and were arranged into major groupings based on topics. Thus, the volume is really divided into 10 sections that may be viewed as minisymposia unto themselves. The topics covered are as follows: new and improved methods of protection or deprotection in the synthesis, as well as semisynthesis, of peptides; studies on the biosynthesis and posttranslational processing (e.g., prohormone cleavage) of peptides; analysis of structural and conformational variables in the design of biologically active analogues of enkephalins, melanotropins, LH/RH, somatostatin, oxytocin, glucagon, angiotensin, bradykinin, and GH/RH; work on the behavior modulating action of neuropeptides such as ACTH, dynorphins, and substance P; the role of membrane-active peptides such as gramicidin A in ion channeling; the design of peptide inhibitors of renin, angiotensin-converting enzyme, and other proteases; recent advances in peptide purification and characterization, mainly involving HPLC; the application of NMR and computer graphics as tools to elucidate the conformational and dynamic properties of peptides; and finally, recent work of potential pharmaceutical importance involving peptide drugs. In keeping with the laudable goal of keeping the size and cost of the book within reasonable limits, contributed papers are no more than four pages in length and are reproduced from camera-ready copy. While this introduces unavoidable variability in typography and probably some loss of editorial quality control, it is amply offset by the extraordinary rapidity of production which made it possible for readers to have the volume in their hands in less than a year from the date of the meeting. The editors, organizing committee, and production staff deserve much praise for their effort, which meets the excellent standard set by the earlier volumes of this series.

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Principles of Receptorology. M. K. Agarwal, Ed. Walter de Gruyter, Berlin. 1983. 677 pp. 17 × 24 cm. ISBN 3-11-0095580. \$100.00.

This volume contains seven chapters on steroid receptors, a chapter on the vitamin D receptor, two chapters on adrenergic receptors, and a chapter on opiate receptors. The heavy emphasis on steroid receptors has resulted in a volume that will undoubtedly

be of great assistance to students and researchers in the steroid field, as well as to researchers from other fields who wish to quickly educate themselves as to the state-of-the-art in the steroid receptor field. In each chapter on steroid receptors, the authors have successfully reviewed classical steroid receptor physiology and pharmacology as a basis for interpreting the recent binding data. The result is a volume that accomplishes the task of bringing the research up-to-date in the complex field of steroid receptors.

The chapter on vitamin D receptors is a subvolume in itself (80 pages, 252 references) and is very well-written and well-organized. The author, Dr. John Eisman, covers the detailed methodological considerations, kinetics, hormone and receptor metabolism, biology of vitamin D, receptor pharmacology, autoradiography, receptor purification, clinical application, and the future of the research field.

The chapters on adrenergic receptors are well-written reviews on receptor regulation and the application of regulation to selected clinical problems, as well as an excellent chapter by Dr. Lee Limbird on the interactions of adrenergic receptors with adenylate cyclase. Finally, there is a chapter by Dr. Steven Childers reviewing the recent developments in the overwhelming field of opiates and opioid peptide receptors. This heroic task is succinctly accomplished, with the major discoveries reviewed in appropriate detail.

This is an excellent collection of reviews and the amount of work and time devoted to it by the editor and the authors is evident. However, it is a collection of reviews. This reviewer, upon reading the title, anticipated a textbook on receptors. Such a textbook would have a large, unified section on basic theory and methodology involved in studying receptors, followed by reviews of various receptors. While there are sections on principles and basic theory in this volume, they are brief and tend to oversimplify the issues involved. Therefore, this reviewer feels the title is somewhat misleading—"Selected Topics in Receptorology" may have been a more appropriate title.

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Biochemical and Clinical Aspects of Pteridines. Volume 2. Cancer, Immunology, Metabolic Diseases. Edited by H. Ch. Curtius, W. Pfeleiderer, and H. Wachter. W. de Gruyter, New York. 1983. xv + 435 pp. 17.5 × 23.5 cm. ISBN 3-11-009813-X. \$86.40.

Pteridines are pyrazinopyrimidines first isolated from butterfly wings. Three types of pteridine coenzymes are known: (1) tetrahydrofolates, the coenzymes for one carbon metabolism, (2) molybdopterin, the coenzyme for xanthine oxidase and nitrate reductase, and (3) tetrahydrobiopterin, the coenzyme for hydroxylation reactions involved in the synthesis of tyrosine, dopamine, norepinephrine, and serotonin. Although animals are not known to synthesize folates *de novo*, they can synthesize tetrahydrobiopterin from GTP. This volume records the proceedings of a workshop held in March 1983 which was mainly devoted to tetrahydrobiopterin derivatives. It is divided into six sections: (1) Chemistry and Analysis, (2) Biochemistry and Metabolism, (3) Pteridines in Immunology, (4) Pteridines in Cancer and other Diseases, (5) Tetrahydrobiopterin Deficiencies, Diagnosis and Therapy, and (6) Folate, Queuosine and Acrasin. It contains ample new material as compared with Volume 1 (1982). The most favorable aspect of Volume 2 is that it describes current studies in an area of great potential for the design of drugs to control Parkinson's disease, Alzheimer's disease, and many other neurological disorders known to be associated with low levels of tetrahydrobiopterin. It is also intriguing that high levels of compounds closely related to tetrahydrobiopterin, such as neopterin, are excreted during viral infections, in cancer patients, and preceding graft rejection. The least favorable aspect of Volume 2 is the lack of critical editing. For example, section VI 2 of M. Viscontini's interesting chapter on "Stereochemistry of Reduced Pteridines" contains so many misprints and misstatements that it is almost impossible to follow. Despite this shortcoming, and the variable quality from chapter to chapter, Volume 2 is recommended as a timely introduction to a group

of noteworthy substances whose biological activity includes a role as chemoattractant (acrasin) in slime molds. The potential relationship of biopterin derivatives to queuine, a 7-deazaguanine derivative which sometimes replaces guanine in tRNA, is also discussed. A subject index is provided.

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Journal of Chromatography Library. Volume 26. Chromatography of Antibiotics. Second, Completely Revised Edition. Edited by Gerald H. Wagman and Marvin J. Weinstein. Elsevier, New York. 1984. xviii + 504 pp. 17 × 24.5 cm. ISBN 0-444-42007-X. \$113.50.

This is a new, considerably revised and up-dated edition of an extremely useful book which first appeared in 1973, designed to aid in the identification and characterization of antibiotics. A practical working guide, it provides data on chromatographic media and conditions, solvents, detection methodology, and equipment and mobility of antibiotics.

This new edition is enhanced by the great increase in the number of antibiotics and derivatives included and in the number and variety of separation techniques and the inclusion of HPLC methods. The procedures are presented in a standardized, concise outline format with enough detail in most instances to carry out the separations without referring to the original literature.

A complete alphabetical index is included as well as a listing of antibiotics known as numbered compounds, which should enable one to locate specific systems rapidly.

Staff

Optical Resolution Procedures for Chemical Compounds. Volume 3. Alcohols, Phenols, Thiols, Aldehydes and Ketones. By Paul Newman. Optical Resolution Information Center, Manhattan College, Riverdale, New York. 1984. ix + 728 pp. 22 × 28.5 cm. ISBN 0-9601918-4-4. \$57.50.

For the past 12 years, with the assistance of a number of devoted students, Professor Newman has attempted to compile all of the optical resolution procedures published for both organic and inorganic compounds, starting with the first resolution by Louis Pasteur in 1848. The fruits of these labors will be found in this four-volume compendium containing several thousand resolution procedures of both organic and inorganic compounds divided into the following categories: Volume 1. Amines and Related Compounds; Volume 2. Carboxylic Acids; Volume 3. Alcohols, Phenols, Thiols, Aldehydes and Ketones; and Volume 4. Organometallic Compounds, Inorganic Compounds, Compounds Containing Hetero Atoms and Hydrocarbons.

At the beginning of each volume there appears a compilation of resolving agents that may be used to resolve a given class of compounds, together with their structures, melting points, specific rotations, and references to methods for their preparation or resolution. In several instances, the resolution procedure contains the methods for preparation of a new synthetic resolving agent.

Since the compounds are arranged in order of increasing number of carbons and hydrogens, with elements other than carbons and hydrogens arranged in alphabetical order, no index is necessary.

Editor's notes have been added where it was felt it would be useful to include additional information and comments. Where available, information concerning the optical purity of the resolved compound and the method used for its determination is given.

Resolution procedures originally published in English, German, French, Italian, and Spanish are reproduced as they appear in the literature. However, procedures in all other languages have been translated into English.

These volumes mainly contain resolution procedures that involve the formation of diastereomeric derivatives of the original mixture of enantiomers in solution, followed by their separation by fractional crystallization and isolation of the separated enantiomers. Also included, however, are a number of examples of resolutions by biochemical methods as well as a substantial

number of examples of resolutions using chromatographic procedures.

These volumes contain the most complete collection of resolving agents and specific rotation values of resolved compounds in the chemical literature. It is also the only collection of optical resolution procedures. Dr. Newman has provided an invaluable service to chemists confronted with the task of resolving chemical compounds. No chemical library should be without these volumes.

Staff

Protective Agents in Cancer. Edited by D. C. H. McBrien and T. F. Slater. Academic Press, London. 1983. x + 309 pp. 15.5 × 23.5 cm. ISBN 0-12-481770-X. \$29.00.

The use of agents to prevent or reduce cancer in animal models and possibly humans is now receiving a well-deserved objective evaluation by many scientists. This book, based on the proceedings of the second NCFR Cancer Research Association Symposium held at Brunel University in September 1982, is dedicated to this growing area of oncological research. The first book in this series "Free Radicals, Lipid Peroxidation and Cancer" was published in 1982.

The book is organized into four sections comprised of 15 chapters. Section I (Anticoagulants and Metastasis) describes animal models for metastasis, the effect of warfarin and coumarins on metastatic disease, and a very interesting chapter on manipulation of the arachidonic acid cascade for the control of metastasis. Section II (Antioxidants) reviews studies on vitamin E, resistance to lipid peroxidation by cultured neoplastic cells, DNA damage by indirect action, the role and effects of glutathione, and phenolic antioxidants. Section III (Vitamin C) describes the immunological activity of vitamin C conjugates of methylglyoxal and acetylacrolein and data from limited human testing. Section IV (Retinoids and β -Carotene) reviews briefly the chemistry, biology, and protective effects of these compounds.

References are cited through 1982, and there is a subject/author index. The chapters are followed by excellent discussion sections which are very informative, cite references, and are easily worth the price of the book.

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The GABA Receptors. Edited by S. J. Enna. The Humana Press Inc., Clifton, NJ. 1983. xvi + 341 pp. 16 × 24 cm. ISBN 0-89603-055-5. \$49.50.

This volume is a compilation of 11 review papers submitted by internationally recognized front-runners in the field of GABA receptor research. The book focuses most heavily on new contributions to the field since publication in 1979 of the last major summarizing volume, "GABA-Neurotransmitters: Pharmacological, Biochemical and Pharmacological Aspects" (Munksgaard, Copenhagen) to which many of the authors of the current volume also contributed papers. The most visible developments in this field since the earlier volume lie in two areas: (1) biochemical and pharmacological characterization of the receptor as part of a supramolecular complex that contains interacting GABA and benzodiazepine binding sites, a chloride ionophore, and a barbiturate site associated with the ionophore, and (2) subclassification of GABA receptors into two subtypes, i.e., the bicuculline-sensitive GABA_A site and the bicuculline-insensitive GABA_B site at which baclofen acts as an agonist. At least two-thirds of this volume (parts of seven chapters) is spent reviewing the literature in these areas, and unavoidably, there is considerable redundancy in the effort. Despite this, each author brings unique perspectives and valuable insights to his review while avoiding the usual tendency in such volumes to focus entirely upon his own work in the field. Consistent with its "summarization" format, there are few figures in the book, but it contains plentiful references to the recent literature (most since 1980). In fact, the book's greatest value lies in its organization and integration of a large, complex, and rapidly evolving body of information into comprehensive, digestible subunits.

There are chapters written by S. J. Enna, R. W. Olsen, J. F. Tallman, and G. Toffano that exhaustively review the recent biochemical and pharmacological literature on GABA binding, endogenous modulators of the receptor, and interactions between GABA and benzodiazepine binding sites. A chapter by G. A. R. Johnston similarly summarizes current studies on regulation of the GABA receptor by barbiturates, sedative-hypnotics, and anticonvulsant drugs. A thorough review of the structure-activity requirements of the GABA receptor, the GABA transport site, and the metabolizing enzyme, GABA-transaminase, is appropriately provided by P. Krosgaard-Larsen. Particularly insightful and excellent critical commentaries are contributed by J. P. Gallagher and P. Shinnick-Gallagher on electrophysiological studies of GABA-receptor complexes, and by N. G. Bowery on the current state of evidence for subclassification of GABA receptors into GABA_A and GABA_B subtypes (with possible subtypes of the GABA_A binding sites). Both reviews trace the historical development of these fields as well as bring the reader up-to-date in understanding the more recent work. Also of special interest are two chapters devoted to physiological and behavioral aspects of GABAergic systems. The review by J. Scheel-Krüger details the major shifts that have occurred during the past decade in our understanding of the functional role of GABA within the basal ganglia and a chapter by E. E. Muller and coauthors reviews the accumulated evidence for a physiological role of GABA as a regulator of hypothalamo-pituitary functions. The book ends with a chapter by P. L. Morselli and K. G. Lloyd that summarizes results of clinical studies with GABA agonists in various neurological and psychiatric disorders and offers renewed hope that development of new, specific, nontoxic GABA agonists may lead to improved treatment of some CNS disorders.

Overall, this book represents an excellent, comprehensive set of reviews of the recent literature on GABA receptor biochemistry, physiology, pharmacology, and medicinal chemistry. Its audience will include predominately neuroscientists and pharmacologists involved in GABA-related research or teaching. Although the specialized nature of the subject matter renders the book unsuitable for use as a general course textbook, it will continue to provide (for the next 5 years) an essential reference source in graduate teaching and GABA-related research.

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Control of Virus Diseases. Edited by E. Kurstak and R. G. Marusyk. Marcel Dekker, New York, 1984. xxi + 584 pages. 15.5 × 23.5 cm. ISBN 0-8247-7066-8. \$115.00

This book is an edited compilation of papers presented at the 4th International Conference on Comparative Virology, which had been organized by the International Comparative Virology Organization (ICVO). The conference was held in Banff, Alberta, Canada, in the latter part of 1982. The subject matter of the book is, for the most part, directed to those workers in the field of virology who are concerned with the epidemiology of virus diseases.

The book is divided into four sections dealing with (1) human, fish, animal, and mollusk diseases, (2) plant virus diseases, (3) defense mechanisms, prophylaxis, and control strategy programs, and (4) new developments in diagnosis and containment of viruses. A primary response the reader may get is an appreciation of the global outlook of the ICVO. One learns that some diseases, considered of little economic importance in some parts of the world, are still major problems in other less well-developed areas. For example, North American and European readers may not be generally concerned with poliomyelitis, because its incidence is so low. Nevertheless, the disease still presents public health workers with problems in many areas of the Middle East and the tropical zone of our planet. As a matter of fact, I learned that poliomyelitis eradication is to be a focal point of international discussion over the next few years, with the hope that every child in the world will be immunized.

The first two sections of this book deal in a similar vein with a wide array of subjects ranging from viral hepatitis in man through viral infections of octopods to arthropod, nematode, and

seedborne plant viruses. Although most of the chapters are brief, they are reasonably comprehensive and can supply the noninitiates with an appreciation of the problems encountered in that discipline. Most interesting to me as an animal virologist was the discussion of plant disease regulation mediated through a satellite RNA molecule, smaller than the viral genome, which may interfere with the growth of the plant virus. These RNA particles are much like defective interfering RNAs of animal viruses, but in contrast, the plant virus satellite RNAs lack nucleotide homology with the viral genome. Their origins are, therefore, unknown.

In the third section of this book, which deals with defense mechanisms, prophylaxis, and control strategy, emphasis is placed on natural resistance and the means of enhancing this resistance. The chemotherapy of virus diseases, while not given short shrift, is not dwelt on at any length, which, in view of the title of the book, may be misleading. In point of fact, a total of 11 pages (two chapters), including bibliographies, deal with the general subject of antiviral chemotherapy and a third chapter deals with one particular agent, (bromovinyl)deoxyuridine. The final chapter in the third section of this book deals with WHO and its plan for the control of virus diseases, listing virus diseases of global importance, diseases of a regional nature, and diseases restricted to circumscribed geographic areas. The chapter concludes with a discussion of new diagnostic methods, biotechnologies, technical cooperation, collaborative research, and other salient subjects concerning disease prevention.

The concluding section of the book is concerned with the diagnosis and containment of viruses. These chapters cover the use of the newest techniques, such as ELISA and the use of poly- and monoclonal antibodies, fluoroimmunoassay, and others. The last chapter of this book deals with virus containment and is valuable reading for anyone involved in any way with pathogenic viruses. The exposition is lucid and the need for care when handling viruses or clinical specimens is made abundantly clear.

The book is an interesting collection of papers, some of which are not affected by the fact that publication time has taken almost 2 years. By the same token, however, a delay of almost 2 years from presentation to publication does lessen the immediacy of some of the articles. Nevertheless, the list of contributors is top-flight and the material presented is worth reading. My biggest quarrel has nothing to do with the quality of the writing but rather with the price. One hundred fifteen dollars seems to be an exorbitant price to pay for this volume. The market for a book of this price must be severely limited, whereas a book selling in the \$40-50 range might find a wider audience.

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Topics in Stereochemistry. Volume 15. Edited by E. L. Eliel, S. H. Wilen, and N. L. Allinger. Wiley, New York. 1984. xii + 337 pp. 16 × 23.5 cm. ISBN 0471-88564-9. \$89.95.

Although modern stereochemistry constitutes a vast area without topical boundaries, there are few good monographs available in this field, and the best one of these, "Stereochemistry of Carbon Compounds" by E. L. Eliel (McGraw-Hill), is now over 20 years old. One of the stated objectives of this series is to help individuals maintain their awareness without having to read the massive amount of original literature dealing with significant developments in this area. In addition, the series is intended to delve into some topics in greater detail than is possible in standard texts. Individual chapters, as is customary in such series, are written by experts in the particular field and are intended to cover the subject in depth. As is to be expected, the results of such an endeavour must, of necessity, be somewhat uneven. There will be variations in presentation styles among different authors, and there will be differences in format required for the presentation of widely varying subject matter. In this regard, the present volume is no exception, although all four chapters are presented in textbook style aimed at the level of a sophisticated readership.

The first chapter (42 pages, 129 references) "Walk Rearrangements in [*n*.1.0] Bicyclic Compounds" (by F.-G. Klärner) deals with the migration of divalent groups such as CR₂, which form part of a three-membered ring, along the surface of a cyclic π-system. There are detailed discussions of a number of cyclopentadienoid and heterocyclopentadienoid systems which are readily convertible into [2.1.0]bicyclopentenes by photochemical electrocyclizations and which can then be induced to undergo walk rearrangements followed by thermal cycloreversions to afford rearranged cyclopentadienoid products. The vinylogous norcaradienes, as well as cationic [*n*.1.0]bicyclic compounds, are also covered. Since interest in this area has been greatly stimulated by the Woodward-Hoffmann rules for orbital symmetry control of pericyclic reactions, it is not surprising that most of the references come from the literature of the past two decades. This serves as a cogent example of the need for this series to aid researchers, teachers, and advanced students in keeping abreast of a rapidly developing area of interest.

The second chapter (156 pages, 359 references) "Stereochemistry at Silicon" (by R. J. P. Corriu, C. Buérin, and J. J. E. Moreau) is an outstanding review of all aspects of silicon stereochemistry. There is in-depth coverage of such topics as configurational stability, resolution, asymmetric synthesis, stereospecific synthesis, determination of enantiomeric purity and of configuration, stereochemistry of nucleophilic displacement, stereochemistry and mechanism of reactions with transition metals, and hypervalent silicon species. The coverage reflects the interests of the authors, who have made numerous contributions to the elucidation of reaction mechanisms in this area. In this reviewer's opinion, this chapter is destined to become a classic which covers the stereochemistry of silicon much in the way that the original monograph by Eliel covered the stereochemistry of carbon. If there were nothing else in this volume, this magnificent chapter alone would justify its publication.

The third chapter (54 pages, 199 references) "The Synthesis and Stereochemistry of Chiral Organic Molecules With High Symmetry" (by M. Nakazaki) deals with the numerous intriguing chiral compounds which possess symmetry elements other than a C₁ axis. By their very nature, most of the examples discussed are compounds of recent vintage which are of theoretical interest and there are very few examples from the realms of natural products or biological transformations. This reviewer is not comfortable with the term "high symmetry chiral" which the author proposes for all those molecules which lack any alternating axis of symmetry but possess some symmetry element beyond the C₁ axis inherent to all molecules. While it is clear that there is considerable confusion between the terms asymmetric and dissymmetric, it would seem that more suitable places for suggestions of terminology are bodies such as the appropriate IUPAC Committee. It should be remembered that this series is aimed at the nonspecialist, and such individuals may well be misled into believing this proposed terminology has gained official sanction.

The fourth chapter (69 pages, 175 references) "Stereochemistry of Biological Reactions at Prochiral Centers" (by H. G. Floss, M.-D. Tsai, and R. W. Woodard) is a clear and up-to-date discussion of the preparation, analysis, and stereochemistry of chiral malonates, phosphates, and methyl groups. These substances belong to the categories stereochemically classified as Xaaab or Xaabb, such that two substitution steps are required for their transformation into chiral entities and are therefore termed prochiral. There is considerable emphasis on enzymatic reactions, an area to which the authors have made numerous contributions. This chapter appears to be particularly up to date with a substantial number of references from 1981 and 1982. One

minor criticism of this chapter is the inclusion of a reaction scheme of planned research which has not as yet been accomplished. To a casual nonspecialist reader, the proposed approach to analytical methodology applicable to prochiral malonic acid may well appear as accomplished fact.

With the exception of the last chapter, there are not as many references to the most recent literature as has been the case in previous volumes, but that may reflect more on the unusual timeliness which has been a hallmark of this series in the past. A continuing minor annoyance in this volume is the use of on-line reference numbers, which are frequently poorly distinguished from compound numbers. Proofreading may not have been as thorough as has been the case in previous volumes, for some annoying typographical errors are very evident: Prof. Woodard's name is misspelled in the headings of all pages of the fourth chapter and the term "archiral" appears in a table of definitions in Chapter 3. There is a detailed table of contents at the beginning of each chapter, a subject index for this volume, and a cumulative topic index for all 15 volumes published to date.

When compared with the last volume of this series reviewed in this journal, the increase in price seems at first glance to be only a moderate 6% over the 2-year period; however, there has been a 33% decrease in the number of pages. Nevertheless, because of the outstanding reviews of silicon stereochemistry and of the chiral methyl group, this is a book which many researchers in medicinal chemistry will want to own. The stated objectives of this series have been particularly well met by this volume.

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Books of Interest

Insulin-Like Growth Factors. Somatomedins. Basic Chemistry, Biology, and Clinical Importance. Edited by E. Martin Spencer. Walter de Gruyter, Inc., Hawthorne, NY, 1983. xiii + 664 pp. 17 × 24 cm. ISBN 3-11-009562-9. \$109.00.

Branbury Report 15. Biological Aspects of Alzheimer's Disease. Edited by Robert Katzman. Cold Spring Harbor Laboratory, Cold Spring Harbor, NY, 1983. xiv + 495 pp. 16 × 23.5 cm. ISBN 0-87969-213-8. \$55.00.

Advances in Enzymology, Volume 56. Edited by Alton Meister. Wiley, New York. 1984. 520 pp. 16 × 23.5 cm. ISBN 0471-89012-X. \$50.00.

Advances in Neurology. Volume 40. Parkinson-Specific Motor and Mental Disorders. Role of the Palladium: Pathophysiological, Biochemical, and Therapeutic Aspects. Edited by R. G. Hassler and J. F. Christ. Raven Press, New York. 1984. xxxii + 579 pp. 16 × 24 cm. ISBN 0-89004-940-8. \$90.00.

Annual Drug Data Report. Volume 5. 1983. Edited by J. R. Prous. J. R. Prous Publishers, Barcelona. 1983. x + 432 pp. 17.5 × 23.5 cm. ISBN 84-300-9082-X. \$90.00.

Guide to Lehninger's Principles of Biochemistry. With Solutions to Problems. Author: Paul van Eijkeren. Worth Publishers, Inc., New York. 1984. x + 544 pp. 21.5 × 28 cm. ISBN 0-87901-178-5. \$14.95.

Monographs in Neural Science. Volume 10. Neuroreceptors in Health and Disease. Edited by J. Marwaha and W. J. Anderson. S. Karger AG, Basel. 1983. viii + 256 pp. 17.5 × 24.5 cm. ISBN 3-8055-3715-8. \$89.25.