

- IUPAC-IUB as found in *Biochemistry*, 14, 449 (1975), and *Biochem. J.*, 126, 773 (1972). Other abbreviations used are: Asp[N(CH<sub>3</sub>)<sub>2</sub>], N<sup>4</sup>,N<sup>4</sup>-dimethylasparagine; DMF, dimethylformamide; Me<sub>2</sub>SO, dimethyl sulfoxide; LC, liquid chromatography.
- (2) D. W. Urry and R. Walter, *Proc. Natl. Acad. Sci. U.S.A.*, 68, 956 (1971).
  - (3) R. Walter in "Structure-Activity Relationships of Protein and Polypeptide Hormones", M. Margoulies and F. C. Greenwood, Eds., Excerpta Medica Foundation, Amsterdam, Vol. 1, 1971, p 181.
  - (4) R. Walter, I. L. Schwartz, J. H. Darnell, and D. W. Urry, *Proc. Natl. Acad. Sci. U.S.A.*, 68, 1355 (1971).
  - (5) R. Walter, *Fed. Proc., Fed. Am. Soc. Exp. Biol.*, 36, 1872 (1977).
  - (6) N. R. Krishna, R. Rowan, D. H. Huang, R. Walter, and J. D. Glickson, *Biophys. J.*, 24, 791 (1978).
  - (7) R. Walter, *Proc. Int. Congr. Endocrinol., 5th, 1976*, 2, 553 (1977).
  - (8) St. Guttman and R. A. Boissonnas, *Helv. Chim. Acta*, 46, 1626 (1963).
  - (9) P.-A. Jaquenoud and R. A. Boissonnas, *Helv. Chim. Acta*, 45, 1601 (1962).
  - (10) V. du Vigneaud, G. S. Denning, S. Drabarek, and W. Y. Chan, *J. Biol. Chem.*, 239, 472 (1964).
  - (11) R. Walter and I. L. Schwartz, *J. Biol. Chem.*, 241, 5500 (1966).
  - (12) R. T. Havran, I. L. Schwartz, and R. Walter, *J. Am. Chem. Soc.*, 91, 1836 (1969).
  - (13) S. Hase, I. L. Schwartz, and R. Walter, *J. Biol. Chem.*, 15, 126 (1972).
  - (14) J. M. van Rossum, *Adv. Drug Res.*, 3, 189 (1966).
  - (15) R. Walter, G. Skala, and C. W. Smith, *J. Am. Chem. Soc.*, 100, 972 (1978).
  - (16) M. Bodanszky and V. du Vigneaud, *J. Am. Chem. Soc.*, 81, 5688 (1959).
  - (17) A. S. Dutta and J. S. Morley, *J. Chem. Soc. C*, 2896 (1971).
  - (18) G. Jäger, W. König, H. Wisman, and R. Geiger, *Chem. Ber.*, 107, 215 (1974); J. J. Nestor, Jr., M. F. Ferger, and W. Y. Chan, *J. Med. Chem.*, 18, 1022 (1975).
  - (19) G. L. Stahl and R. Walter, *J. Med. Chem.*, 20, 492 (1977), and methods cited therein.
  - (20) P. Holton, *Br. J. Pharmacol. Chemother.*, 3, 328 (1948); R. A. Munsick, *Endocrinology*, 66, 451 (1960).
  - (21) W. Y. Chan, M. O'Connell, and S. R. Pomeroy, *Endocrinology*, 72, 279 (1963).
  - (22) R. Walter and M. Wahrenburg, *Pharmacol. Res. Commun.*, 8, 81 (1976).
  - (23) J. M. Coon, *Arch. Int. Pharmacodyn. Ther.*, 62, 77 (1939); "The Pharmacopeia of the United States", 18th revision, Mack Printing Co., Easton, Pa., 1970, p 469; R. A. Munsick, W. H. Sawyer, and A. B. van Dyke, *Endocrinology*, 66, 860 (1960).
  - (24) W. H. Jeffers, M. M. Livezy, and J. H. Austin, *Proc. Soc. Exp. Biol. Med.*, 50, 184 (1942); W. H. Sawyer, *Endocrinology*, 63, 694 (1958).
  - (25) "The Pharmacopeia of the United States", 18th revision, Mack Printing Co., Easton, Pa., 1970, p 771.
  - (26) R. Walter, C. W. Smith, P. K. Mehta, S. Boonjarern, J. A. L. Arruda, and N. A. Kurtzman, in "Disturbances in Body Fluid Osmolality", T. E. Andreoli, J. Grantham, and F. C. Rector, Jr., Ed., American Physiological Society, Bethesda, Md., 1977, p 1.
  - (27) H. Zahn and E. Rexroth, *Z. Anal. Chem.*, 148, 181 (1955).
  - (28) D. H. Spackman, W. H. Stein, and S. Moore, *Anal. Chem.*, 30, 1190 (1958).
  - (29) S. Moore in "Chemistry and Biology of Peptides", J. Meienhofer, Ed., Ann Arbor Science Publishers, Ann Arbor, Mich., 1973, p 629.
  - (30) S. Moore, *J. Biol. Chem.*, 238, 235 (1963).
  - (31) J. Matsoukas and D. Theodoropoulos, *Org. Magn. Reson.*, in press.
  - (32) E. Kaiser, R. L. Colescott, C. D. Bossinger, and P. I. Cook, *Anal. Biochem.*, 34, 595 (1970).
  - (33) H. C. Beyerman, C. A. M. Boers-Boonekamp, and H. Maassen van den Brink-Zimmermannova, *Recl. Trav. Chim. Pays-Bas*, 87, 257 (1968).
  - (34) G. W. Anderson, J. E. Zimmerman, and F. M. Callahan, *J. Am. Chem. Soc.*, 86, 1839 (1964).
  - (35) J. Kovacs, G. L. Meyers, R. H. Johnson, R. E. Cover, and U. R. Ghatak, *J. Org. Chem.*, 35, 1810 (1970).
  - (36) R. H. Sifferd and V. du Vigneaud, *J. Biol. Chem.*, 108, 753 (1935).
  - (37) F. Weygand and G. Zumach, *Z. Naturforsch.*, 17, 807 (1962).
  - (38) M. Manning, T. C. Wu, and J. W. M. Baxter, *J. Chromatogr.*, 38, 396 (1968).
  - (39) D. Yamashiro, *Nature (London)*, 201, 76 (1964); D. Yamashiro, D. Gillessen, and V. du Vigneaud, *J. Am. Chem. Soc.*, 88, 1310 (1966).
  - (40) R. Walter, B. M. Dubois, and I. L. Schwartz, *Endocrinology*, 83, 979 (1968).
  - (41) W. Y. Chan and V. du Vigneaud, *Endocrinology*, 71, 977 (1962).
  - (42) J. Rudinger and I. Krejci *Experientia*, 18, 585 (1962).
  - (43) W. Y. Chan and N. Kelley, *J. Pharmacol. Exp. Ther.*, 156, 150 (1967).

## Book Reviews

**Serotonin in Health and Disease. Volume II. Physiological Regulation and Pharmacological Action.** Edited by W. B. Essman. Spectrum Publications, New York, N.Y. 1978. 443 pp. 16 × 23.5 cm. \$37.50.

The first volume in this series described the availability, localization, and distribution of serotonin. In this, the second volume, a physiological role of serotonin in a number of systems is assessed together with relevant drug action.

The first four chapters are concerned with "Thermoregulation", "Early (Prenatal and Perinatal) Development", "Rhythmicity and Periodic Functions of the Central Nervous System", and "Regulation of Sleep". These chapters provide most readable reviews and are concerned with relevant drug action on serotonin as a secondary consideration. Chapter 5 surveys the drugs affecting serotonin. Most of the agents covered in this chapter are already mentioned in the previous chapters and it is difficult for any author to achieve a novel approach in such familiar territory.

Nevertheless the review is concise, interesting, up-to-date, and includes details on the latest serotonin reuptake inhibitors. Chapter 6 is entitled, rather inappropriately, "Clinical Pharmacology of Serotonin". In reality, the chapter relates to a potential relevance of serotonin to antidepressant, minor tranquilizer, central stimulant, anorectic, and narcotic action. The chapter comprises only 25 pages which necessitates a concise but superficial approach. The conclusion to this chapter remains an exercise in bland semantics which is perhaps inevitable. Both Chapters 7 and 8 are essentially concerned with the role of serotonin in drug addiction with respect to chronic opiate action and alcoholism. Both chapters are well written and informative. While the selection of topics for inclusion in this book may be questioned, the text should prove interesting and useful to both the casual and serious reader.

University of Bradford

Robert J. Naylor

**Advances in Prostaglandin and Thromboxane Research.** Volume 3. Edited by Claudio Galli, Giovanni Galli, and G. Porcellati. Volume 4. Edited by Flavio Coceani and Peter M. Olley. Raven Press, New York. 1978. Volume 3: xii + 206 pp. 15.5 × 23.00 cm. \$22.00. Volume 4: xv + 412 pp. 15.5 × 23.0 cm. \$35.00.

These two volumes, unlike the first two members of the series, review specific areas of prostaglandin and thromboxane research. Volume 3, entitled "Phospholipases and Prostaglandins", examines three aspects of the relationship between the C<sub>20</sub> fatty acids and the enzymes which initiate their biosynthesis. The first quarter of the book, which reviews the structure and function of the phospholipases, focuses on the X-ray crystallographic and biochemical characterization data to elucidate the identity of active-site residues, substrate preferences, and the interfacial activation of the enzymes. The second section contains articles that review the cellular and subcellular distribution and activity of the phospholipases in a variety of tissues, such as liver and brain. The last half of the volume is devoted to the role of phospholipases in the biosynthesis of prostaglandins and thromboxanes and particular emphasis is placed upon the involvement of the enzymes and the products in producing platelet aggregation.

"Prostaglandins and Perinatal Medicine", Volume 4, originates from a symposium held in Toronto, Canada, in March 1977. The subject matter of the symposium centers on the tissue levels and actions of prostaglandins in the fetus, the newborn, and the mother. The general role of prostaglandins is divided into specific areas which include "Biosynthesis and Metabolism", "Action on Organogenesis", "Central Nervous System", "Systemic and Pulmonary Circulation", "Placenta and Umbilical Vessels", "Labor and Delivery", and "Ductus Arteriosus". In general, each section briefly reviews the role of prostaglandins in that particular area, the effects of synthetase blockers, clinical applications in perinatal care, and concludes with a short discussion or summary.

Those who are seriously involved with prostaglandin research will find that these two volumes are worthwhile additions to their library. Otherwise, the subject matter of Volume 3 will appeal primarily to pharmacologists and biochemists, while Volume 4 is targeted to investigators in pediatrics and perinatology. Medicinal chemists will find little in either volume that is of general interest.

*Northeastern University*

**Robert N. Hanson**

**The Chemistry of Our Environment.** By R. A. Horne. Wiley-Interscience, New York. 1978. ix + 869 pp. 18.5 × 26 cm. \$27.50.

This is more a book about the environment than a book about chemistry, but this is not criticism because Horne has done a beautiful job of gathering and critically evaluating a prodigious amount of information to produce this textbook (or source book) for students of environmental studies.

The book covers, in turn, the five major environmental zones (exosphere, lithosphere, atmosphere, hydrosphere and biosphere) and the chemical interactions between these zones. Individual chapter topics are: cosmic origin and distribution of the elements, solar system, chemical composition of the earth, exploitation of mineral resources and abuse of the earth, atmospheric chemistry, air pollution chemistry, fresh-water chemistry, marine chemistry, role of water in our total environment, composition and structure of the biosphere, chemistry of life, man's perturbation of the biosphere, and four concluding chapters on the interzonal chemical interactions. Each chapter has a bibliography and list of supplemental readings. There is an exhaustive subject index, an author index, and an appendix comprised of 31 supplementary tables.

Horne's style is arresting yet pleasurable and pellucid, and, as promised in the preface, the book is provocative as well as instructive. But Horne never lets his opinions, of which there are many ("there is no longer any room for the isolated savant"; "the women's liberation movement has probably given more real hope to the future of our environment than have all the environmental protection laws together"), cloud the facts. Topics are covered harmoniously and in depth, and each chapter is fully loaded with

diagrams, charts, figures, and tables. Environmental case histories hammer home important points (e.g., uranium mine tailings as a cheap source of landfill and concrete mix leading to very high levels of radioactivity in local towns; cloud seeding experiments as the possible cause of the 10-in. rainfall and catastrophic flood in Rapid City in 1972). Numerous attempts to control the environment that have backfired are cited (e.g., the Aswan High Dam in Egypt and the many resulting ecological disruptions along the Nile). Horne keeps the material interesting (e.g., the enormous weight of water behind a dam may cause earthquakes; the blue haze of heavily forested mountain areas may be due "to airborne wax particles ejected by the tips of pine needles when exposed to electrical potential gradients"; "the eerie will-of-the-wisp may be due to the combustion of bacterially produced phosphine in stagnant swamp waters"). Reference to the primary literature is always given.

The major disappointment is that coverage generally ends in 1972-1973, with the later chapters having a few 1974 references, in spite of the 1978 publication date. This is unfortunate in view of the exploding nature of environmental chemistry. Thus, topics such as ozone depletion, water chlorination and chloroform formation, and (especially) chemical carcinogenesis are covered inadequately. In some cases, the information is erroneous, e.g., the statement that the herbicide 2,4,5-T is teratogenic when, in fact, it has been known for at least 5 years that the real culprit is a tetrachlorodibenzodioxin impurity. In general, the organic chemistry is given short shrift. Although organic structures are shown (numerous errors), very little associated chemistry is illustrated or discussed. This may reflect the author's physical chemistry background. In addition to many errors in chemical structures (e.g., cyclamate, vitamin D, estrone, mirex, LSD, psilocybin, tyrosine, tryptophan, and others), there are a number of misspelled words (I noted two dozen in a fast reading, some appearing more than once) and some more serious errors such as "nitrate" instead of "nitrite" in two places on page 487. However, all things considered, this book is an excellent introduction to the field and certainly can be used by students at all levels, even those with little or no college chemistry.

Horne concludes the final section, "Will Earth Survive?", with a cogent discussion of population control. He adopts the polemical notion that the world's exploding population—7 billion by the year 2000—is "the cause of most of our environmental and social problems" and "it is without the slightest doubt the most grave problem confronting the human race". I agree.

*Dartmouth College*

**Gordon W. Gribble**

**Introduction to High Performance Liquid Chromatography.**

By R. J. Hamilton and P. A. Sewell. Chapman & Hall and Wiley, New York. 1977. x + 183 pp. 16 × 24 cm. \$20.00.

High performance liquid chromatography (HPLC) is rapidly becoming a routine method for the separation of mixtures of nonvolatile compounds. As such, HPLC is increasingly being used by "nonchromatographers", i.e., by researchers who may have had minimal exposure to liquid chromatographic theory but are interested in developing a usable, efficient separation for their particular research problem.

Researchers who need a clear, direct introduction to the most salient features of liquid chromatographic theory and practice will find "Introduction to High Performance Liquid Chromatography" well suited to the task.

The book is divided into eight chapters. The first two chapters do an admirable job of rapidly bringing the reader into the mainstream of chromatographic theory. By necessity, some of the mathematical and scientific derivations of several important equations are too brief; however, adequate references are given for those interested to research the major ideas further.

Chapter 3 is devoted to a review of available equipment. The major types of pumps and detectors are reviewed, although in most modern LC instruments, there is apt to be little choice of pump or detector design. However, because the technique is developing so rapidly, almost any review is out of date before it is published.

Chapters 4 and 5 review the stationary and mobile phases, respectively. The brief review of column packing techniques

should prove helpful to the researcher who is dismayed by the high cost of factory-packed columns, although the packing of efficient microparticulate columns remains somewhat of an art. If there is a shortcoming of the book, it is probably the failure to emphasize the tremendous impact which microparticulate, chemically bonded reversed-phase packings have had on HPLC. It is the development of these packings as much as any other factor, which has helped to encourage the use of HPLC on such a wide variety of compounds. Also, it is unfortunate that some space was not devoted to ion pairing, since this technique, already widely used, promises to become even more important in the future.

The chapter on preparative LC is welcome, and will probably be of major interest to the synthetic chemist who will want to separate milligram quantities of compounds from complex reaction mixtures.

The final chapter on applications is an admirable attempt at an impossible task. Even a review article in a journal seems to be outdated just as it comes into print. Therefore, it should not be surprising that most of the references presented in the applications section are somewhat antiquated. The researcher would do well to go directly to the literature for current applications.

In summary, Hamilton and Sewell's book should be a useful text for the researcher who needs a concise introduction to the rapidly growing field of HPLC. Those involved in research concerning HPLC theory will probably find the book inadequate.

University of Rhode Island

Phyllis Brown

**Terpenoids and Steroids. Volume 8.** Edited by J. R. Hanson, Senior Reporter. The Chemical Society, Burlington House, London. 1978. ix + 301 pp. 14 × 22 cm. \$50.50.

Volume 8 of this excellent series continues the organizational format of its predecessors, in which the compounds are organized along structural lines and a complete author index is provided. This volume maintains the standards set in earlier reports, where broad coverage is combined with condensation and with critical evaluation. Part I, on terpenoids, demonstrates that isolation work in the field continues to yield novel compounds and that the synthetic challenges which these pose are met with continuing ingenuity. The syntheses and reactions of steroids continue to be important medicinally and also to provide information of general significance in organic chemistry. The chemist whose primary interest is in synthesis will find the sections on physical methods highly rewarding, since they demonstrate the scope of present physical techniques as applied to compounds he is already concerned with. All in all, this volume is just as worthwhile as its predecessors and will be just as much consulted and perused.

Staff

**Cell Membrane Receptors for Drugs and Hormones: A Multidisciplinary Approach.** Edited by R. W. Straub and L. Bolis. Raven Press, New York. 1978. xv + 356 pp. 15.5 × 24.0 cm. \$32.00.

The structure and function of cell membranes represent an almost limitless field of scientific research. The concept of the cell membrane as simply a structural barrier to separate the intracellular from the extracellular environment is obsolete. We now realize that the membrane is a complex and dynamic structure. The molecular elements residing within the membrane actually play a major role in forming and maintaining the differences between the intracellular and extracellular environment. The discovery of hormone and neurotransmitter receptors, transport proteins, ionic channels, and the interactions of drugs with these sites represents a rapidly evolving and exciting field of biological research.

This volume provides a panorama of the research on membrane receptors. Sections are devoted to the following themes: "Membrane Structure and Receptor Identification", "Kinetics of Binding of Drugs to Receptors", "Receptors for Neurotransmitters", "Hormone Receptors", "Drugs and Toxic Receptors in Membrane Permeability Controlling Sites", and "Drug Receptors and Transport". Although the section titles cover

a wide variety of membrane receptor topics, some sections are not as thoroughly covered as others. The section on hormone receptors contains five chapters covering such topics as receptor-adenylylase coupling mechanisms, localization of binding sites, and intracellular transport of hormones after receptor binding. The section entitled "Drug Receptors and Transport" contains 12 chapters dealing with transport proteins and the interaction of drugs with these sites. These two sections are the strongest in the book. On the other hand, the section on "Kinetics of Binding of Drugs to Receptors" contains a single chapter, "Noise: a Tool for Drug Receptor Investigation" by Dr. D. Coulquhoun. While the chapter is excellent, the topic is a specialized one. There is certainly more to drug-receptor kinetics than "noise".

The chapters are mostly specialized and detailed reviews of individual laboratory efforts, although there is a short review of muscarinic cholinergic receptors by Dr. Robert Purves. There are materials and methods sections in many of the chapters with detailed discussions of the technical aspects of the experiments performed. The problem with this approach is that if the reader is not acquainted with the history and development of the field the particular topic being discussed loses its relevance.

The reference sections are highly variable, ranging from a low of 9 references in the chapter on "Coupled Lithium-Sodium Changes in Bovine Red Blood Cells" to a high of 109 references in the chapter "Light Microscopic Localization of Gonadotrophin Binding Sites in Ovarian Target Cells".

This reviewer would recommend this book to researchers interested in detailed treatment of hormone-target tissue interactions and the interaction of drugs with ion-transport mechanisms. This book is also useful as a general reference for membrane-associated phenomena. It is not recommended for the reader interested in a review of neurotransmitter receptors, as only the muscarinic receptor is reviewed and this review is contained in nine pages.

University of Toronto

Milt Titeler

**Chemistry and Biochemistry of Amino Acids, Peptides, and Proteins. Volume 5.** Edited by Boris Weinstein. Marcel Dekker, New York. 1978. xi + 355 pp. 15 × 23.5 cm. \$39.50.

This series consists of authoritative reviews on assorted topics designed to stimulate interaction between chemists and biochemists. The present volume contains six reviews. The late Beatrice Kassel summarizes the intriguing field of "Protein Inhibitors of Nonproteolytic Enzymes". Inhibitors of nucleases and amylases are emphasized. Nuclease inhibitors are important in regulating gene expression. Cereal amylase inhibitors do not inhibit amylases from the same source but do inhibit insect amylases and are therefore postulated to serve as protection against insect attack. Inhibitors of adenylylase, cyclic AMP dependent protein kinases, and many other enzymes are briefly discussed. F. J. Darfler and A. M. Tometsko provide a thorough review of photoaffinity labeling in which compounds react reversibly with a target in the dark and irreversibly in the light. A wide variety of binding sites such as are found in enzymes, hormone receptors, and transport proteins may be labeled using this technique. B. Halpern reviews aldehyde and ketone condensates as protecting groups in peptide synthesis. R. Smeby and S. Fermandjian suggest a likely conformation of angiotensin II in solution based on a wide variety of physical and chemical studies. They also offer a detailed and reasonable hypothesis on how this hormone interacts with biological receptors. N. Benoiton describes the chemical synthesis and substrate activity of *N*<sup>ε</sup>-methyllysines which occur naturally in histones. M. Wallis discusses in depth the structure and biological activity of pituitary growth hormone, prolactin, and related hormones. Determination of the nucleotide sequence for rat growth hormone mRNA led to deduction of the amino acid sequence of the hormone by reference to the genetic code. This approach also led to the discovery of pregrowth hormone and preprolactin. Editor Weinstein has assembled a timely and stimulating volume.

Tufts University School of Medicine

Roy L. Kisliuk

**Carbohydrate Chemistry. Volume 10. Specialist Periodical Reports.** By J. S. Brimacombe, Senior Reporter. The Chemical Society, Burlington House, London. 1978. xiii + 524 pp. 13.5 × 21.5 cm. \$64.00.

This report, which reviews the 1976 literature in carbohydrate chemistry, continues to maintain the high standards set by its predecessors. The senior reporter and six other reporters have again accomplished the difficult task of providing a comprehensive coverage of the literature in this field. Over 3000 articles are cited, and the reporters have done a superb job of abstracting their important points. Part I of this review ("Mono-, Di-, and Tri-saccharides and their Derivatives"), by J. S. Brimacombe, R. J. Ferrier, J. M. Williams, and N. R. Williams, surveys synthetic methods, physical methods of structure determination, and separatory and analytical methods. Organic formulas, composed by Wright's Symbolset method, are generously used. Part II ("Macromolecules"), by B. J. Catley, J. F. Kennedy, and R. J. Sturgeon, surveys complex polysaccharides, glycoproteins, and glycolipids, enzymes which utilize complex carbohydrates as substrates, and methods for the synthesis and chemical modification of complex carbohydrates. In keeping with the format of past reports, there is an extensive, well-organized table of contents and an author index, but there is no subject index.

*University of Minnesota*

Gary R. Gray

**The Chemistry of the Tetracycline Antibiotics. Volume 9. Medicinal Research Series.** By Lester A. Mitscher. Marcel Dekker, New York. 1978. ix + 330 pp. 15.5 × 24 cm. \$34.50.

This book is the ninth volume in Marcel Dekker's "Medicinal Research Series", which is edited by Gary L. Grunwald. In it, Professor Mitscher has provided a concise but comprehensive review of the chemistry of the tetracyclines. He is a particularly suitable person for this undertaking because of his experience in the pharmaceutical industry and his expertise in such diverse areas as microbial taxonomy, fermentation, isolation and structure elucidation, spectroscopy, and synthesis. The book is significant not only because it summarizes and interprets the important discoveries and brilliant accomplishments, such as structure elucidation and total synthesis, but because it points the way to possible new areas of research in the tetracycline field.

In the book there are nine chapters and an appendix that lists United States patents on tetracyclines. Chapter 1 provides an orienting survey, including historical development, structures and nomenclature, in vitro and in vivo testing data, clinical testing, the role of tetracyclines in medicine, safety, mode of action, bacterial resistance, biopharmaceutics, and nonclinical uses. This chapter affords an excellent overview of the biological effects of tetracyclines, although persons unfamiliar with microbiological assays might have difficulty with certain tables. Chapter 2 guides the reader nicely through the complexities of tetracycline fermentation and isolation. The author relies heavily on the patent literature, but he is mindful of the limitations on its reliability. In Chapter 3, the fascinating story of tetracycline biosynthesis is revealed, with emphasis on the importance of blocked mutant studies. Spectroscopy and analysis are treated competently in Chapter 4. Chapters 5 through 8 are concerned with the complex and remarkable chemistry of tetracyclines: degradative studies, structure elucidation, chemical transformations including the preparation of novel analogues such as minocycline and doxycycline, and total synthesis. Some of our most outstanding organic chemistry has been done in these areas and the account is worth reading by everyone. Chapter 9 details the chemistry of natural

products related to tetracyclines, including chelocardin, chromocyclomycin, pellaromycin, and viridicatumtoxin.

Although it has been reproduced directly from camera-ready typed manuscript and illustrations, the book has a pleasing appearance and is easy to read. It does contain some errors. The following list contains only those errors which might cause some confusion to the reader. In Table 1-1 on page 8, Tofranil should not be in the list of antibiotics. Hydroxyl groups are misplaced in structure 8 for oxytetracycline on page 98 and a 4-hydroxyl group was left out of structure 35 on page 179. On page 201, it was stated that the Tscherniac-Einhorn reaction involves an *N*-hydroxyimide. This should read *N*-hydroxymethylimide. Structures 103 and 104 on page 205 should have 6-OH rather than 6-CH<sub>3</sub> groups, and the compounds in Table 6-6 on page 206 should be 103 and 104 rather than 99 and 100, respectively. The pentacyclic compound 108 on page 206 should have a CH<sub>2</sub>S bridge. Finally, on page 254 the compound named  $\beta$ -carboxamidoethyl acetate should be ethyl carboxamidoacetate.

The above listing of errors should not be construed as an indication that the book is unsatisfactory. On the contrary, the author has done a highly commendable job of presenting a wealth of complicated material in a clear and precise manner. "The Chemistry of the Tetracycline Antibiotics" is recommended not only for the specialist in antibiotics but for all medicinal and organic chemists. It has much for us to learn and enjoy.

*The University of Arizona*

William A. Remers

### Books of Interest

**Advances in Enzymology. Volume 48.** By Alton Meister. Wiley, New York. 1979. 452 pp. 16 × 23.5 cm. \$27.50.

**Cyclic Nucleotides, Phosphorylated Proteins, and Neuronal Function. Volume 1.** By Paul Greengard. Raven Press, New York. 1978. x + 124 pp. 14.5 × 21.5 cm. \$12.00.

**Clinical Biochemistry. Volume 1. Analytical Aspects.** By David L. Williams, Ronald F. Nunn, and Vincent Marks. William Heinemann Medical Books Ltd., London. 1978. 490 pp. 22.5 × 28 cm. \$25.00.

**Brain Mechanisms in Memory and Learning (From the Single Neuron to Man).** By Mary A. B. Brazier. Raven Press, New York. 1978. xv + 400 pp. 16.5 × 24 cm. \$30.00.

**Principles of Organic Stereochemistry. Volume 6.** By Bernard Testa. Marcel Dekker, New York. 1979. xiii + 248 pp. 15 × 23 cm. \$14.50.

**Introduction to Bioinstrumentation.** By Clifford D. Ferris. The Human Press, Clifton, N.J. 1978. xiv + 330 pp. 15.5 × 23 cm. \$15.50 (paperback) or \$20.50 (hardcover).

**Mode of Action (of Autonomic Drugs).** By Budh Dev Bhagat. Graceway Publishing Co., Flushing, N.Y. 1979. vi + 170 pp. \$17.50 (paperback) or \$21.50 (hardcover).

**The Pineal. Volume 3. 1978. Annual Research Reviews.** By Russel J. Reiter. Eden Medical Research, St. Albans, Vermont.

**Prolactin. Volume 6. 1978. Effects and Clinical Significance. Annual Research Reviews.** By David F. Horrobin. Eden Medical Research, St. Albans, Vermont. 1979. 152 pp. 14 × 21.5 cm. \$18.00.