Book Reviews

The Biosynthesis of Aromatic Compounds. By Ulrich Weiss and J. Michael Edwards. Wiley-Interscience, New York. 1980. xiii + 728 pp. 23.6 × 15.8 cm. $29.50.

This book is an expansion of a chapter which was originally written in 1959 for a treatise which Marshall Gates was editing entitled "The Biogenesis of Natural Substances". This enterprise never came to fruition and various parts of this proposed book have subsequently appeared in other places (e.g., "The Biosynthesis of Steroids, Terpenes, and Acetogenins", by J. M. Richards and J. B. Hendrickson, 1964). The volume under review is an excellent survey of the various ways in which carbocyclic aromatic compounds are produced in nature. No attempt has been made to discuss the origin of aromatic heterocyclic compounds such as pyridines, thiazoles, or pyrimidines; however, quinones are included. The three major routes to aromatic rings are described in great detail. U. Weiss was personally involved (with B. Davis) in the pioneering work on the shikimate pathway to the aromatic amino acids, phenylalanine, tyrosine, and tryptophan. It was a pleasure to read an historical account of these discoveries. The experimental problems involved in the degradation of radioactive compounds are well described and discussed (e.g., page 51). The second pathway to benzene rings is from acetic acid via a polyketide, and many diverse aromatic compounds are formed by this route (naphthaquinones, xanthones, phenalenones, anthraquinones, tetracyclines, etc.). The third major class of aromatic compounds found in nature is terpenes, presumably derived from mevalonic acid. However, the origin of many of these compounds is presently speculative and not too much work has been carried out in this area. There is also a chapter on natural products of mixed acetate–shikimate origin, mostly flavanoids and related compounds. These compounds are formed from cinnamic acid or its hydroxylated derivatives and three acetate units. A notable exception, published too recently to be included in the present volume, is the formation of fungal flavanoids from benzoic acid and four acetate units [*J. Chem. Soc., Chem. Comm.*, 426 (1979)].

In the preface the authors apologize for the long time it took to bring the manuscript to publication, and literature coverage only through 1973 is claimed. However, in some chapters (e.g., the one dealing with prephenic acid) quite recent work on the synthesis of this compound by Danishefsky (1977) and Plieninger (1978) is referenced. In other places it is upsetting to read statements such as: "quite recent results have shown...", and then discover that the relevant reference is dated 1973.

The numerous structural formulas are well drawn, and few errors were detected. More stereochemical detail in some of these formulas would have been appreciated. I personally prefer to draw benzene rings with three double bonds in them, rather than as a hexagon containing a circle. However, these are minor points, and the book is strongly recommended to graduate students and to all those studying biosynthetic pathways. The book points to many unsolved problems of interest to biochemists and organic chemists. The price is quite reasonable.

University of Minnesota **Edward Leete**

Porphyrin Chemistry Advances. Edited by Frederick R. Longo. Ann Arbor Science, Ann Arbor, Mich. 1979. vii + 368 pp. 16 × 24 cm. $34.00.

The 26 chapters of this volume constitute a record of papers delivered at the 1977 American Chemical Society symposium on porphyrins which was held in Delaware. Its publication in 1979, some 2 years after the event, clearly sets a limit on its potential value to workers in this area, the more so as much of the contained subject matter had by then appeared in the regular academic journals. Additionally, in spite of the lengthy gestation period, there appear to be an unnecessarily large number of typographic and other errors, including several incomplete literature references.

It would be out of place to catalogue the chapter titles in this review, but some essays which stood out particularly were those on strati-bisporphyrins (an area which should see rapid development), on photosynthesis, and on metalloporphyrin stereochemistry. There are a number of articles of strong biochemical interest, including accounts of investigations on new conformational isomers of cobalamins, on the biosynthesis of uro'gen 111, on the oxygen affinities of hemo- and myoglobins, and on sirohydrochlorin.

The wide scope of this compendium should make it useful to the reader who requires a broad outline of near-current trends in porphyrin research, but he/she might profitably examine a library copy before considering its aquisition for their own shelves.

University of Dublin, Trinity College **David Grayson**

Topics in Carbon-13 NMR Spectroscopy. Volume 3. Edited by George C. Levy. Wiley-Interscience, New York. 1979. xii + 397 pp. 23.4 × 15.8 cm. $35.00.

This third volume continues the tradition of the high quality established by the first two monographs in the series. As the reader may recall, Volume 1, published in 1974, emphasized the physical chemical aspects of ^{13}C NMR spectroscopy and was directed toward the physical and physical organic chemist. Volume 2, which appeared two years later, covered topics of interest to the biochemist and the organic chemist. Volume 3 covers more diverse material and has offerings for the physical chemist, the organic chemist, and the biologist.

The past few years have witnessed only limited advances in the theory of NMR. However, they have seen considerable technological innovations, many of which have found their way in the commercial NMR spectrometers and have dramatically broadened the applications of this method in chemistry and biology. This trend which has made ^{13}C NMR one of the primary beneficiaries is reflected in the heavy emphasis this book places on methodology. Chapter 1 discusses the more important experimental advances which have already been or are currently being incorporated in the commercial instruments. This chapter, which is also the largest one in the book (100 pages), is quite unique in this respect. It is made up of eight different multiauthored sections and includes, among others, discussions on items such as small coils for NMR microsamples (J. Schoolery), the construction of a 22-mm high performance ^{13}C probe (A. Zens and D. Grant), two-dimensional ^{13}C NMR (D. Terpstra), and a new tailored pulsed excitation method (H. Hill). New advances have also allowed for the analysis of solid samples using ^{13}C NMR. Such advances, which include dipolar decoupling, magic angle spinning, and cross-polarization techniques, are described in two separate smaller chapters, one by J. Shaeffer and E. Stejskal dealing with synthetic polymers and one by D. Torchia and D. Vanderhart dealing with biopolymers such as fibrous proteins and model phospholipid membranes. In these chapters the authors show how the above techniques can be used to study the structure and the motions of the solid polymers. The remaining three chapters in the book review the literature in three different areas of ^{13}C NMR spectroscopy. The chapter by D. Wright, D. Axelson, and G. Levy covers the physical chemical applications of ^{13}C spin relaxation measurements. There is a discussion of the different relaxation mechanisms, followed by a description of how relaxation measurements can be used to study the molecular dynamics in simple and complex liquids. To date, our understanding of this difficult problem is by no means complete. The authors thus describe the recent advances in the theory of magnetic relaxation. They review the more significant work in this field and give a thorough list of references. One substantial chapter (92 pages, 362 references), carefully written by E. Eliel and K. Pietrusiewicz on the ^{13}C NMR of nonaromatic heterocycles, should please every heterocyclic chemist and many other organic chemists. The

plethora of examples which are discussed with considerable detail demonstrate how useful a tool ^{13}C NMR can be for the structural and conformational analysis of organic molecules. Finally, the last chapter by W. Moniz, C. Proanski, and S. Sojka describes the use of ^{13}C CINDP to study organic radical reactions. The book is generally well written and well printed. It does have its fair share of typographical errors and suffers from some of the usual liabilities of multiauthorship such as variation in style and depth of coverage. However, these are only minor drawbacks which should not stand in the way of recommending this book to every chemist who has any interest in ^{13}C NMR.

University of Connecticut **Alexandros Makriyannis**
Storrs, Connecticut

Annual Review of Pharmacology and Toxicology. Volume 20. By Robert George, Ronald Okun, and Arthur K. Cho. Annual Reviews, Inc., Palo Alto, Calif. 1980. vii + 691 pp. 16 × 23 cm. $17.00.

It is a delight to recommend this volume. Prior to commenting on its contents, I would like to mention that I was favorably impressed by characteristics such as continuation of the standard format; a reasonable size (the same height as my 5th Edition Webster's Collegiate Dictionary but thinner by about 1 cm); excellent contrast printing on smooth, white stock; only rare typographical errors; use of upper-case type for author or running title in the page headings; a generous subject index of 21 pages; and an author index which includes not only the authors of the various chapters in the volume (these names appear in capital letters) but also the authors of all literature cited. The use of this last bonus, however, will require puzzle-solving skills, since often only numbered references without the author's name appear on the text page one turns to. A final appealing aspect which is well worth considering is the price: almost 700 tightly packed pages for $17.00!

In 1978 some 50 scientists from a variety of fields were invited to contribute up-to-date material for this volume and many of the references cited date from 1977 and 1978 with a generous sprinkling of articles published in 1979.

In extent of coverage, the nervous system wins out with some ten entries ranging from enkephalin-like peptide SAR (J. S. Morley) and metal ion–opiate interactions (D. B. Chapman and E. L. Way) to central serotonin neuron pharmacology (R. W. Fuller) and informative papers on both myasthenia gravis (J. Lindstrom and P. Dau) and Huntington's disease (E. D. Bird).

Some of the entries are clinically oriented, for example, "Vasodilator Therapy for Chronic Heart Failure" (K. Chatterjee and W. W. Parmley) and "Assessment of Narcotic Antagonists in the Treatment of Opioid Dependence" (R. B. Resnick, E. Schuyten-Resnick, and A. M. Washton). Other papers can be identified as bench-oriented by inspection of the titles; examples here would be "The Electrogenic Na^+,K^+-Pump in Smooth Muscle: Physiologic and Pharmacologic Significance" (W. W. Fleming) and "Protein Phosphorylation Catalyzed by Cyclic AMP-Dependent and Cyclic GMP-Dependent Protein Kinases" (D. B. Glass and E. G. Krebs).

Unlike the volumes in the series of some 10 years ago and earlier, where attempts were made to cover broad areas such as cardiovascular pharmacology, most of the current entries are quite specialized, although in the table of contents they appear under the original general headings. For example, the one paper listed under Renal Pharmacology is titled "Drug Therapy in Renal Failure" (M. M. Reidenberg and D. E. Drayer). There are two papers of quite general appeal: "Information Retrieval in Toxicology" (H. M. Kissman) and the "Efficient Analysis of Experimental Observations" (W. J. Dixon).

Most of the papers have a summary section which permits the reader to come to grips quickly with the outlook of the authors and to decide whether in-depth reading of the article itself would be helpful for the reader's intent. Many of the authors use excellent charts or graphs to carry information visually, while in papers where there is a paucity of these, there are headings and subheadings done in paragraph form which make the reading quite easy. It was rare to find an article with fewer than 50 references in the bibliography, and many of the articles had 100, 150, and even 200 references.

Although the majority of papers are outside of my present scope of competence, there was a good sprinkling of papers which advanced my knowledge in areas in which I have maintained a general interest. In a field that I am more generally acquainted with, that of Cannabis, the paper "Potential Therapeutic Usefulness of Marihuana" (L. Lemberger) was both concise and comprehensive, and 1978 and 1979 references were included.

This fine volume also provides cumulative indices (contributing authors and chapter titles) for volumes 16 through 20 and will be useful to individuals who are looking specifically for up-to-date, comprehensive coverage in a relatively restricted area. For the general reader, interested in broad aspects of pharmacology, browsing among the titles and the articles will usually lead to the finding of worthwhile things one was not looking for. The historical contribution in this volume is by H. K. F. Blaschko and, since Chauncey Leake's death, E. L. Way has taken over the Review of Reviews.

This is a remarkable, high-class effort which belongs not only on reference shelves but also in the personal libraries of those pharmacologists who can afford its modest cost.

University of Wisconsin **Joseph M. Benforado**
Madison, Wisconsin

Rodd's Chemistry of Carbon Compounds. 2nd Edition. Volume IV. Part L. Edited by S. Coffey. Elsevier, Amsterdam, Oxford, and New York. 1980. xviii + 506 pp. $112.25.

The first edition of "Rodd's Chemistry of Carbon Compounds" was published between 1951 and 1962, Volume IV, Part C containing the material covered by Volume IV, Part L in the second edition being published in 1960. The first volume of the second edition was published in 1964 and further volumes have appeared at intervals, there being a few still awaited.

The aims of the new edition are the same as those of the first, i.e., "... to serve as a work of reference for the accumulated factual knowledge of organic chemistry and to give guidance to original sources and other literature for details beyond its scope". Thus, the series is of an encyclopedic reference nature rather than being a series of treatises on theoretical aspects of organic chemistry. Because of the multitude of publications which appear and the rapid advancement in knowledge, it is inevitable that a review series of this type must date quickly, but there is a need to have this factual knowledge readily available without recourse to the original literature; in this respect, the series is a very valuable one.

Volume IV, Part L contains four chapters. Chapter 57 (G. Shaw) deals with purines, thiazolopyrimidines, pyrazolopyrimidines, and triazolopyrimidines. Chapter 58 (D. S. Jones) covers nucleosides, nucleotides, nucleotide coenzymes, and nucleic acids. Chapter 59 (K. Ohta, R. Wrigglesworth, and H. C. S. Wood) covers pteridines, alloxazines, and flavins, and Chapter 60 (R. B. Herbert) deals with the biosynthesis of a wide range of plant alkaloids and nitrogenous microbial metabolites.

In Chapter 57 (115 pp) the section on purines is a revised form of that in the first edition with some newer information. However, it is surprising that in such a review published in 1980 containing over 1000 references there are more pre-1900 than post-1970 references (about 10% of the total). The section contains details of syntheses and properties of a number of individual purines, as well as indicating the general features of different types of substituted purine. However, there seems to be no mention of covalent hydration of and nucleophilic addition to purines, and the sections on purine spectra are brief. In the brief section on paper and thin-layer chromatography there is no mention of HPLC in which area much work has been done.

Three pages are given to thiazolo[5,4-*d*]pyrimidines and thiazolo[4,5-*d*]pyrimidines, and there are only 15 references, of which only three are more recent than the first edition. Further short sections (13 pages) refer to pyrazolo[3,4-*d*]pyrimidines, pyrazolo[4,3-*d*]pyrimidines, and *vic*-triazolo[4,5-*d*]pyrimidines (the 8-azapurines).

Although the coverage of the chemistry of the purines is good for a review of this length, more recent work could have been

included as well as further mention of the biological and pharmaceutical roles of the purines. The other sections (except for that on the 8-azapurines) contribute little to the book and there are other purine analogues as important but which do not seem to be covered in this series.

Chapter 58 (119 pp) covers the chemistry of nucleosides and nucleotides well in the space available. A short section on nucleotide coenzymes gives brief details of them, including some biochemical details, and includes a useful section on nucleoside diphosphate sugars. There is a good introduction to the nucleic acids.

Chapter 59 includes an adequate (38 pp) review of pteridine chemistry, but more space should have been allocated to this topic. A comprehensive review of pteridine chemistry has not been published for some time, and this would have been an opportunity for an up-dated account of rather longer than 38 pages. Further information on ionization, covalent hydration and nucleophilic addition and comparative reactivities of substituents at different positions could have been appropriate. This chapter contains a good short account of folic acid and of hydropteridines and an interesting section on the alloxazines and flavins which includes some details of their biosynthesis.

Chapter 60 (164 pp) is entirely different in character to the rest of the book, since it is devoted to the biosynthesis of plant alkaloids and nitrogenous microbial metabolites. It surveys (up to 1976) the extensive literature on the biogenesis of a wide range of such compounds, such studies having involved the feeding of radiolabeled precursors to plants and microorganisms. Perhaps too broad a spectrum of compounds has been attempted in this chapter and it may have been preferable to consolidate some of the data rather than to cover it in separate places. There are chapters devoted to particular groups of alkaloids in other parts of volume IV, Parts B, G, and H, for example. Nevertheless, this is a very good review of recent work in the field of alkaloid biosynthesis.

This book continues the good work of the "Rodd" series in providing a reference work embracing the field of organic chemistry, which contains more factual information than series such as "MTP International Review of Science" (Butterworths, University Park Press) or "Comprehensive Organic Chemistry" (Pergamon Press), but it is not as detailed as specialist series, for example, "The Chemistry of Heterocyclic Compounds" (Wiley-Interscience). Criticisms of this book are more of the style and format than on the content. The use of roman numerals for numbering formulas (each chapter section being numbered anew) is cumbersome and the placing of references in the text rather than collecting them at the ends of chapters and using suffix numbering makes using the book tedious. This is exacerbated by the use of "idem., loc. cit." and similar usage. As a result of such style, sentences can be long and disjointed, one sentence (p 19) taking 11 lines.

There are a number of typographical and other errors and some minor irritations in presentation. However, they are no more than one would expect in a book of this length and of this complexity. In general, within the scope of such a book, the authors have produced a good result.

Kingston Polytechnic, England **Derek T. Hurst**

Biopharmaceutics and Clinical Pharmacokinetics: An Introduction. 3rd Edition (Revised and Expanded). By Robert E. Notari. Marcel Dekker, New York. 1980. xii + 388 pp. 16 × 23 cm. $18.50.

This book provides a convenient beginning for the study of biopharmaceutics and pharmacokinetics. The first chapter, entitled "Bioavailability", is short, introductory in nature, and provides little information other than definitions. Chapter 2 begins the presentation of rate processes in biological systems. Passive diffusion systems of one, two, and three compartment open models are developed. Active transport of the Michaelis–Menten type is also described with discussion of the limiting cases of zero-order and first-order conditions. Chapter 3 continues and extends the development of pharmacokinetic principles. The concepts of biological half-life, volume of distribution, clearance, and the kinetics of absorption, metabolism, and excretion are detailed. Chapter 4 is devoted to biopharmaceutics. Topics included are gastrointestinal absorption of drugs and continuous blood level therapy by the methods of constant intravenous infusion or sustained-release oral dosage.

While the first four chapters are largely unchanged from the second edition, the fifth chapter begins the introduction of expanded and revised material. Chapter 5 covers dosage regimens, with special attention paid to dosing in renal failure and accumulation during repetitive dosing. Chapter 6 treats the pharmacokinetic aspects of structural modifications in the design of selected antimicrobials, aspects of oral bioavailability, and pharmacokinetics of prodrugs. Chapter 7, a new chapter over the second edition, introduces the clinical applications of pharmacokinetics. Particular attention is paid to pharmacokinetic drug interactions and to the clinical implications of the kinetics of selected drugs.

The author emphasizes that this book was designed as an introductory text and not as a review. The level at which the subject is treated is within the ability of the advanced undergraduate. Sample and practice problems are liberally supplied and represent a strength of the text. This book provides a well-organized approach for newcomers to the field or for those who only want a simplified treatment of the subject.

Northeastern University, Boston, Massachusetts **Joseph A. Grisafe**

Encyclopedia of Common Natural Ingredients Used in Food, Drugs and Cosmetics. By Albert Y. Leung. Wiley-Interscience, New York. 1980. xvi + 409 pp. 18 × 26.5 cm. $47.00.

The title of this work is a fair approximation of its content—a series of short monographs alphabetically arranged by the common names of the plant or animal sources contributing 310 of the approximately 500 natural products in current use. Much of the material dealing with these sources, the botanical descriptions, chemical composition, and folk medical use, is compiled from standard works. Supplemental literature references are generally recent. Most of the usual spices, as well as plants used in OTC formulations, are included; outright prescription drugs, e.g., *Digitalis*, *Rauvolfia*, are not.

Perhaps of principal interest to the medicinal, food, or cosmetic chemist, as well as to the toxicologist, are the many plant extracts still used (?) in the preparation of foods and beverages, e.g., Aloe, Asafetida, Aspidosperma bark. These are often used in concentrations between 0.001 and 0.005%, suggesting that many of our foods may be, in fact, homeopathic remedies! One would like to known why and to what extent such uses persist.

Cardamom is rendered "cardamon" (p 90) and though this has been used, the former is preferable. Civets are said to be "related to cats" (p 128); actually, they are closer to hyenas and are related to cats only in that both are carnivorous. In the review copy, pages 400 and 401 of the index were interchanged.

Northeastern University, Boston, Massachusetts **Robert F. Raffauf**

Books of Interest

Handbook of Drug Therapy. By Russell R. Miller and David J. Greenblatt. Elsevier/North-Holland. 1979. xxiii + 1126 pp. 14 × 21 cm. $25.00, paper; $37.50, cloth.

Drug Therapy Reviews. Volume 2. By Russell R. Miller and David J. Greenblatt. Elsevier/North-Holland. 1979. xiii + 515 pp. 16 × 23 cm. $28.00.

Advances in Chromatography. Volume 18. By J. Calvin Giddings, Eli Grushka, Jack Cazes, and Phyllis R. Brown. Marcel Dekker, New York. 1980. xiv + 292 pp. 15.5 × 23.5. $38.50.

Biochemical and Biological Applications of Isotachophores. Volume 5. Proceedings of the First International Symposium Baconfoy, May 4/5, 1979. By A. Adam and C. Schots. Elsevier Scientific, New York. 1980. vii + 278 pp. 17 × 25 cm. $58.50.