

## Book Reviews\*

**A Century of DNA. A History of the Discovery of the Structure and Function of the Genetic Substance.** By F. H. PORTUGAL and J. S. COHEN. The MIT Press, c/o Uniserv Inc., Littleton, Mass. 1977. xii + 384 pp. \$17.50.

This is a book about the history of physiological chemistry in its most intriguing aspect, the molecular basis of heredity. The slow and painful development of experimental facts and the ideas engendered by them are here presented in a comprehensive account for the first time. The account is enjoyably written and is scientifically sound and clear. The authors have put their own interpretations on many events and personal interactions, a circumstance which certainly makes the story more alive than a somber recitation of chronology, and, happily, they do not seem to have transgressed overly much against objectivity.

The pages are embellished with a large number of pictures of the principles in the long history of the subject, from Wilhelm His to Gobind Khorana. All sorts of tentative structural ideas are illustrated. There are fascinating quotations from letters, archives, etc., and a substantial section of references and notes. Although this book was written to provide perspective and an integrated view of where we are and how we got there, it also has reference value, which is enhanced by a good index. All in all, it is a delightful book, and one which can be appreciated by chemists who are in no way professionally concerned with its subject.

**Table of Isotopes. Seventh Edition.** Edited by C. M. LEDERER and V. S. SHIRLEY. Principal Authors: E. BROWNE, J. M. DAIRIKI, and R. E. DOEBLER. Wiley/Interscience, New York. 1978. xx + 9 + 1523 + 12 + 64 pp. \$40.00.

In addition to the authors listed above, A. A. Shihab-Eldin, L. J. Jardine, J. K. Tuli, and A. B. Buyrn contributed to this volume, which is a monumental compilation. Many changes have been made since the 6th Edition, and the data now appear in one gigantic table, arranged according to mass number. This is less intimidating than it might seem, for the table is preceded by an Isotope Index, which not only leads one to the correct page in the table, but gives the natural abundance and half-life for immediate reference. The table entries include an abundance of information, with mass-chain decay schemes, nuclear level schemes, thermal neutron cross-sections, etc., etc., and, of course, references. A series of Appendixes give constants and conversion factors, nuclear spectroscopy standards, atomic levels, data on absorption of radiation in matter, nuclear decay rates, theoretical nuclear level diagrams and nuclear moments.

The editors state that this volume will be the last in the series, which started in 1940, but that the project will continue in the new U.S. and international program for nuclear data compilation.

**Advances in Energy Systems and Technology. Volume 1.** Edited by P. AUER (Cornell University). Academic Press, New York. 1979. ix + 387 pp. \$32.50.

This book inaugurates an annual series, which, it is stated, "will highlight the most significant research advances of the year". Its scope includes scientific, engineering, and environmental aspects.

Volume 1 contains five reviews: Wind Power (by D. G. Shepherd); Fuels from Biomass (by W. Vergara and D. Pimentel); Geothermal Energy (by V. Roberts); Clean Fuels from Coal (by H. Perry); and District Heating with Combined Heat and Electric Power Generation (by R. H. Tourin). These are in general very broad reviews, and include much historical background and exposition of the pertinent philosophical, economic, and technical considerations. They thus do not correspond to the description quoted at the beginning of this review, although quite recent developments are indeed touched upon. This discrepancy may not be inappropriate in an initial volume, for such an approach provides valuable orientation to the subjects. On the other hand, this volume therefore cannot be regarded as representative of the series, the value of which will have to be judged from future volumes.

Only two of the chapters are of substantial interest to chemists:

Fuels from Biomass, and Clean Fuels from Coal. The former is more concerned with the economics of fermentation processes than with the chemistry as such, but the timely analyses of the costs of producing fuels from plant material are most valuable. The latter chapter covers a complex subject in an efficient way, and is useful as a unified treatment of the many ways in which gaseous or liquid fuels have been obtained from coal. Probably owing to the breadth of the subject, the chapter does not go into it in much depth. An idea of this may be gained from the fact that such important terms as "asphaltenes" and "pyrite" do not appear in the index.

This volume will certainly be a useful reference to those entering the field of energy sources, even if it does not at this stage offer much to the specialist.

**Molecular Spectra and Molecular Structure. IV. Constants of Diatomic Molecules.** By K. P. HUBER and G. HERZBERG (National Research Council of Canada). Van Nostrand-Reinhold Co., New York. 1979. xi + 716 pp. \$27.50.

This is a volume of critically compiled data, presented in tables and footnotes, "for all diatomic molecules and ions" (over 900 species). The tabulated information includes electronic states and their symmetry symbols, vibrational and rotational constants, internuclear distance, and observed transitions. In addition, footnotes give various interaction parameters, hyperfine structure constants, dipole moment, etc. The material included was compiled from the literature up to early 1976, with a 26-page appendix consisting of 1977 and additional 1976 citations.

Not only are nearly three times as many species reported on than in the 1950 edition, but the information about each is now more extensive and accurate.

**Physical Properties. A Guide to the Physical, Thermodynamic, and Transport Property Data of Industrially Important Chemical Compounds.** By *Chemical Engineering Magazine*. Edited by C. L. YAWS. McGraw-Hill Book Co., New York. 1979. 239 pp. \$39.50.

This is a book of graphs, beautifully printed in colors, for the purpose of presenting large amounts of physical data in easily assimilable, usable, and retrievable form. The substances covered range from certain elements (halogens, H<sub>2</sub>, O<sub>2</sub>, N<sub>2</sub>, He, Ne, Ar) and simple inorganic compounds (such as oxides of nitrogen, sulfur, and carbon, hydrogen halides, etc.) through simple hydrocarbons (such as propane, isobutene, the xylenes, etc.) to aniline and phenol. The graphs, which are large (one or two to a page), show plots vs. temperature for such properties as heat of vaporization, vapor pressure, liquid and vapor heat capacity, density, surface tension, viscosity, thermal conductivity, heat of formation, etc. References to sources are given, as well as equations for calculating values in situations where they cannot be satisfactorily extracted from the graphs.

The book is written primarily for chemists and engineers in the chemical process industries, for whom it should be a very useful handbook, but it would appear to be of substantial use to chemists more generally, especially because of its convenience.

**Kirk-Othmer Encyclopedia of Chemical Technology. Third Edition. Volume 5.** Executive Editor: MARTIN GRAYSON. Wiley-Interscience, New York. 1975. xxv + 880 pp. \$120.00.

The latest volume in this set covers subjects from Castor Oil to Chlorosulfuric Acid. It is actually a collection of rather substantial reviews, thirty in all, on such varied subjects as cellulose and its derivatives, ceramics, chelating agents, chemicals in war, chemotherapeutics, and chlorohydrins. They are freshly written and are not simply amended carry-overs from earlier editions. They include large portions of fundamental descriptive chemistry and are well supplied with figures, tables, and bibliographies.

The entries are contributed by many different authors, so it is not surprising that the quality of writing varies from smoothly professional to less than polished, and similar remarks could be made about the degree of sophistication of the treatment. There are errors, such as the name "dichloroazodicarbonamide" for "dichloroazodicarbonamidine", and some questionable statements, such as "Perchloric

\* Unsigned book reviews are by the Book Review Editor.

acid is more highly ionized in water than HCl, HNO<sub>3</sub>, H<sub>2</sub>SO<sub>4</sub> . . .". Organic chemists accustomed to using chlorosulfonic acid may be confused by the fact that this substance is described under "chlorosulfuric acid", with no acknowledgment of the other name until the fourth paragraph. However, on the whole, the quality, accuracy, and selection of the information is excellent, and recent important topics, such as phase-transfer catalysis, are included. The set is a most important acquisition for a technical library.

This volume is accompanied by a soft-bound separate index to Volumes 1 to 4. This is helpful, for it will be several years before the set is completed. Subscriptions to the entire set at a reduced price is believed to be still possible.

**Comprehensive Organic Chemistry.** Edited overall by Sir DEREK BARTON and W. DAVID OLLIS (in six volumes individually edited; see below). Pergamon Press, New York and Oxford. 1979. Vol. 1, 1227 pp; Vol. 2, 1329 pp; Vol. 3, 1323 pp; Vol. 4, 1228 pp; Vol. 5, 1205 pp; Vol. 6, 1628 pp. \$1250.00.

This work is an accomplishment of major magnitude which is not properly reflected in a review of conventional size; hence this review will be an exception to ordinary practice. This set is an effort to provide an overall survey of the state of organic chemistry at a level intermediate between the one-volume introductory texts and either encyclopedic works such as Rodd's "Chemistry of Carbon Compounds" or specialized monographs. Works of this nature existed for past generations of organic chemists, when the scope of organic chemistry was so much smaller than today, but even Paul Karrer's "Lehrbuch der Organischen Chemie," the last but long obsolete work that might qualify as an intermediate work of reference, was not quite up to the task of embracing all of the organic chemistry of its time. The gap has now been filled, and although the new work has shortcomings and will not please everyone, it cannot be denied that it is a truly remarkable effort and will be of enormous use.

Volume 1, edited by J. F. Stoddart, is divided into five sections: Nomenclature and Stereochemistry; Hydrocarbons; Halo Compounds; Alcohols, Phenols, Ethers and Related Compounds; and Aldehydes and Ketones. In this and the other volumes, the actual text is due to a variety of well-chosen contributors, most of whom, but by no means all, are from the British Isles. Some unevenness in style and in depth and breadth of coverage can therefore be expected. Since the main sections (e.g., Hydrocarbons) are divided into subsections by different authors, variations can be noticeable, but in view of the magnitude of their task, the editors can be forgiven for them.

Hydrocarbons are treated with thoroughness, 457 pp being devoted to them. Such subjects as cyclophanes, carbenes, arynes, exotic polycyclic systems, etc., are given their due. Excellent tables of physical properties, including heats of formation, are included. There are some minor lapses, such as the use of an incorrect name (4-(1-methylpropyl)nonane instead of 3-methyl-4-propylnonane) in, of all places, a discussion of nomenclature practice, the use of "peracid" instead of "peroxy acid", and the unfortunate perpetuation of the hopelessly misleading use of "carbonium" for CH<sub>5</sub><sup>+</sup> and derivatives (better called "alkanium", to avoid inevitable confusion with CH<sub>3</sub><sup>+</sup>). Factual material is generally very much up to date and complete, although there are some unjustified generalities regarding the Friedel-Crafts reaction. Preparation, reactions, properties, and natural occurrence or significance are given emphasis in rather steeply descending order. In fact, natural occurrence is very spottily covered, and, for example, the natural source of azulene is not mentioned, whereas the preparation of its much less significant 4,8-dimethyl-2-isopropyl derivative from  $\beta$ -vetivone is described.

Volume 2, edited by I. O. Sutherland, treats organic nitrogen and phosphorus compounds, and carboxylic acids and derived functions. The treatment of preparative methods is very thorough and up to date, but some of the sections on properties are disappointingly skimpy. The basicity of amines is discussed in detail, with full recognition of the impact of gas-phase protonation and ion cyclotron resonance on our understanding of the subject, but basicity is ignored when it comes to hydroxylamines. Fundamental physical properties such as melting and boiling points, solubilities, and molecular geometry receive little or no attention, but spectrographic properties are generally given more attention.

Volume 3, edited by D. N. Jones, devotes 488 pp to organic sulfur compounds, 51 pp to selenium and tellurium, 149 pp to silicon, 254 pp to boron, and 383 pp to organometallic compounds. The last subject

has become a vast one in recent decades, and it is a remarkable feat to present it in a comprehensive, orderly fashion in such limited space. Appropriate attention is given to metallocenes, to organocuprates, etc., and the emphasis is in accord with relative importance evident in the chemistry of today.

Volume 4, edited by P. G. Sammes, is entirely devoted to heterocyclic chemistry, which for the purpose at hand is essentially confined to aromatic or conjugated systems, and thus rings of five or six atoms. About half the volume, 604 pp, is devoted to nitrogenous rings, 182 pp to oxygen heterocycles, 172 pp to rings containing sulfur, phosphorus, selenium, etc., and 269 pp to "mixed" heterocycles, meaning those containing two or more different heteroatoms. This emphasis seems to be about right. Even the recently characterized arsenic, antimony, and bismuth analogues of pyridine are described. On the other hand, the emphasis on preparation and reactions is so great that properties have been inconsistently treated, and, for example, the boiling point of pyridine and the important fact that it is miscible with water are not given, although for pyrrole, solubility and boiling points are indeed mentioned.

Volume 5, edited by E. Haslam, is a treatise on Biological Compounds, a title apparently chosen to embrace natural products and aspect of biochemistry of direct interest to organic chemists.

The last volume requires special comment, for it is a mammoth index—actually, five indexes. The importance of indexing is especially great in view of the quantity of information included in the first five volumes. Access to specific compounds is provided by a formula index; it is large (ca. 20,000 entries). A subject index also includes compounds by name, as well as entries on classes of compounds, which are subdivided into preparation, properties, and reactions. A reaction index lists reactions by name or process. However, it is more than this bare fact implies, for the entries include the names of reagents used to carry out the reaction. These lead the reader to the reagent index, which is the biggest of the five. This is more than just an index to the book, for it contains references to primary and secondary literature not found in the five volumes of text. This is an innovation shared with the reaction index, which includes lists of review articles, and is a useful feature in its own right. It has also served to bring the work more closely up to date than would have otherwise been the case—some references as recent as 1978 are included. For review purposes, the index also serves to reveal gaps in the material covered in the series; for example, poly(tetrafluoroethylene) is not mentioned. The index itself is not without error; tetrodotoxin, for example, is listed as tetrodotoxin.

In summing up, one can say that the authors have taken on a gigantic task, and have brought it to a commendably successful conclusion, notwithstanding some significant shortcomings. The guiding policy has evidently been to play down mechanisms in favor of reactions, and to give little attention to substances and reactions of industrial importance, so not all readers will find the work useful to the same degree. One should be careful not to equate the word "comprehensive" in the title with "encyclopedic", for many things are not included, whether from purpose or oversight, but the work is fairly comprehensive in breadth. There does not appear to be a statement of when the authors closed their survey of the literature, unfortunately, but casual perusal suggests that it was in 1977.

This is an important work, and one that chemical libraries cannot afford to be without, for it promises to be highly useful, and there exists no similar, alternative work. The price, which approximates 15¢ a page, suggests that the publishers do not anticipate large sales to private individuals, but the convenience of having all this information at one's fingertips may tempt many chemists into personal purchase, especially in view of the fact that an option to pay in installments over a five-year period is offered.

#### NEW JOURNALS

**Polymer Degradation and Stability. An International Journal.** Edited by N. GRASSIE. Applied Science Publishers, England. Vol. 1, No. 1, February 1979.

**European Journal of Science Education.** Edited by K. FREY ET AL. Taylor and Francis Ltd., London. Vol. 1, No. 1, January–March 1979. Subscription price, \$50.00.

**Progress in Crystal Growth and Characterization. An International Review Journal.** Edited by BRIAN R. PAMPLIN. Pergamon Press, Oxford. Vol. 1, No. 3, 1978. Annual subscription price, \$137.50.

**Progress in Analytical Atomic Spectroscopy. An International Review Journal.** Editor-in-Chief: C. L. CHAKRABARTI. Pergamon Press, Oxford. Vol. 1, Nos. 1/2, 1978. 1979 subscription rate, \$52.00.

**Journal of High Resolution Chromatography and Chromatography Communications.** Dr. Alfred Hüthig Verlag, Heidelberg. Vol. 1, July 1978. Subscription rate, \$140 (for one year).

**Scientometrics. An International Journal for All Quantitative Aspects of the Science of Science and Science Policy.** T. BRAUN, Managing Editor. Elsevier Scientific Publishing Co., Amsterdam. Vol. 1, No. 1, September 1978. Subscription rate, \$76.00 including airmail postage.

**Enzyme and Microbial Technology.** CHRISTOPHER J. RAWLINS, Managing Editor. IPC Science and Technology Press Ltd., Surrey, England. Vol. 1, No. 1, January 1979, pp. 1-72. \$104.00, annual subscription.

**Molecular Movements and Chemical Reactivity as Conditioned by Membranes, Enzymes and Other Macromolecules. XVIth Solvay Conference on Chemistry.** Edited by R. LEFEVER and A. GOLDBETER (Volume XXXIX in the series *Advances in Chemical Physics*). John Wiley & Sons, Inc., New York. 1978. 346 pp. \$32.00.

This volume summarizes the proceedings of the XVIth Solvay conference on Chemistry held in Brussels, Nov 22-26, 1976. The stated emphasis of the conference was on structure-environment relationships that condition chemical reactivity in molecular and supramolecular assemblies.

The book consists of seven reports by distinguished researchers, six of which deal with applications of the main theme to enzymology and (synthetic and biological) membranes. The overview, outlining the roles of dissipative structures and far-from equilibrium situations in chemistry and biology, is provided in the initial chapter by I. Prigogine and R. Lefever. The remainder of the reports can serve as introductions to current research directions in topical areas such as synthetic enzymes (I. Klotz), structures and energetics of proteins and their active sites (I. D. Campbell, C. M. Dobson, and R. J. P. Williams), control of catalytic activity (G. G. Hammes), dynamics of biological membranes (H. M. McConnell), transport properties in artificial membranes (W. Simon), and synthetic membrane-bearing enzymes (D. Thomas). The reports are not intended as comprehensive summaries, but focus on the complexities in each area imposed by the size of the systems involved. Each work examines the balance of long- and short-range forces which result in the essential biological characteristics of regulation and adaptation to external conditions.

The chapters are well written and will provide a fascinating and useful guide for chemists and physicists broadening the scope of their interests, or for biological researchers seeking themes unifying their science. Of particular interest to this reviewer is the counterpoint provided by the extensive discussion section at the end of each report, which presents the complementary and occasionally contradictory views of other conference participants.

A minor criticism is that the 20-month delay between the conference and the publication of these proceedings has resulted in a work with few references since 1976. In fields as topical as the ones under consideration, the bibliography is thereby rendered somewhat incomplete. Otherwise, the work is appealing in concept, lucid in presentation, and accurate in focusing attention on some of the crucial problems in biochemistry and biophysics.

Richard Mendelsohn, Rutgers University

**Pyrolysis-Gas Chromatography.** By R. W. MAY (Home Office Forensic Science Laboratory), E. F. PEARSON, and D. SCOTHERN (Home Office Central Research Establishment). The Chemical Society, London. 1977. vii + 109 pp. \$14.40.

In many respects this little book is an excellent introduction to the growing field of pyrolysis, a growth reflected by the appearance in the spring of a journal devoted solely to pyrolytic techniques.

Chapter headings are: 1. Gas Chromatography; 2. Pyrolysis Apparatus; 3. Applications; 4. Identification of Peaks; 5. Standardisation in Pyrolysis-Gas Chromatography.

The strengths of the book are the well-written chapters covering a wide range of topics and an extensive bibliography, surveying the literature up to the early '70's.

A major weakness of the book is the gap in time between its preparation and publication. During this hiatus, several advances in the

art emerged: excellent interlaboratory reproducibility studies, as shown by the Correlation Trials of the Pyrolysis Sub-Group (London) and the ASTM; application of the technique in new areas of microbiology, medicine, drug identification, space exploration, textiles, soil, and geochemistry; reaction mechanisms; the powerful combination of capillary column gas chromatography and mass spectrometry.

Among minor omissions, the authors neglected to include the flame photometric in their discussion of detectors.

In summary, for someone attempting to get the "feel" of the technique, this book provides material which is equal to the task.

Eugene Reiner, Emory University

**Annals of the New York Academy of Sciences. Volume 313. Synthesis and Properties of Low-Dimensional Materials.** Edited by JOEL S. MILLER and ARTHUR J. EPSTEIN. The New York Academy of Sciences, New York. 1978. 828 pp. \$80.00.

This volume records the proceedings of a conference entitled "Synthesis and Properties of Low-Dimensional Molecules", held by the New York Academy of Sciences on June 13-16, 1977.

The conference provided a forum to accumulate, review, and examine the state of the art of low-dimensional materials and in particular pseudo-one-dimensional materials. The volume contains contributions from academic, governmental, and industrial inorganic, organic, polymer, physical, chemical, as well as solid-state laboratories. Many of the leading practitioners in this highly interdisciplinary field were present. The volume starts with a good introduction (by J. S. Miller) tabulating the chronology of selected landmark papers in the field (including a bibliography). The main body of the volume, which contains sixty papers, is divided into four parts: general papers, organic materials, inorganic materials, and covalent materials. Many papers are followed by brief discussions. An author index is included while a subject index is missing. On the whole, this volume contributes toward accomplishing a major objective of the conference, opening up lines of communication between traditionally segregated areas. It will be valuable to scientists interested and involved in low-dimensional materials.

Israel Agranat, University of Michigan

**Introduction to X-Ray Spectrometric Analysis.** By E. P. BERTIN (RCA Laboratories). Plenum Press, New York. 1978. viii + 485 pp. \$28.50.

Short courses and clinics for the nonspecialist have sprung up all across the U.S. The purpose of these sessions, which run from several days to about two weeks, is to bring scientists and technologists quickly up to date in a discipline related to their own. Many of these "students" are established in their own field, and wish to acquire a degree of sophistication in another area. Those schools which are successful are able to bring the members of the class from the beginner's level to the level of decision making, where they will be able to make efficient choices among experimental techniques and equip laboratories.

"Introduction to X-Ray Spectrometric Analysis" by Eugene Bertin is the offspring of such an X-ray summer course at Albany. The material presumes no training in the field of X-rays. Bertin covers the production, the dispersion, and the measurement of X-rays in a very clear fashion. There is occasionally a tendency (as in the description of incoherent scattering) to inaccuracy. This is probably just an unfortunate result of an attempt to oversimplify. Generally, however, the areas of greatest current interest, such as solid-state detectors and electron probe microanalysis, are well-covered, and a scientist who requires a working knowledge of X-ray fluorescence spectroscopy, and many of the operational specifics, will find this a very useful volume.

Gabrielle G. Cohen, State University of New York—Stony Brook

**The Siloxane Bond.** By M. G. VORONKOV, V. P. MILESHKEVICH, and YU. A. YUZHELEVSKII (Institute of Organic Chemistry, Academy of Sciences of the USSR, Moscow). Consultants Bureau, New York. 1978. xii + 493 pp. \$65.00.

This book is a tremendous compendium of information on the physical and chemical properties of the Si-O (siloxane) bond. No less than 3423 references are listed in the bibliography, which covers the literature up to the middle of 1974. Primary journals, reviews, and patents are covered. There is no index, but the Table of Contents is sufficiently detailed that one can quickly find information on a given topic.

The book is organized as follows: Chapter 1, Nature of the Siloxane Bond and Its Effect on the Structure and Properties of Organosilicon Compounds; Chapter 2, Oxygen Containing Organosilicon Complexes; Chapter 3, Cleavage Reactions of the SiOSi Grouping; Chapter 4, Polymerization of Cyclosiloxanes; Chapter 5, Cleavage Reactions of the SiOC Grouping; and Chapter 6, Cleavage Reactions of the Si-OH Bond. As can be gathered from the chapter headings, the book does not treat purely inorganic silicon-oxygen compounds except where these are directly concerned with organosilicon derivatives.

Chapter 1 is a good summary of structural and other physico-chemical data on compounds with Si-O bonds, including polysiloxanes. Chapter 2 has discussions of complexes with coordination numbers greater than 4 for silicon. The chapters which discuss cleavage reactions of the SiO bond are broken down according to cleavage reagent, and Chapter 4 is arranged according to polymerization mechanism (catalyst) and the effects of various variables. A great deal of new insight into the chemistry of reactive intermediates, e.g.,  $R_2Si=O$  (silanones), has emerged since 1974. Consequently, some of the mechanistic interpretations contained in the book might be revised in light of new knowledge. However, from a practical viewpoint, the book is a treasure chest of information on the physical properties and chemical transformations of compounds with Si-O bonds and is useful to beginner and expert alike.

M. D. Curtis, *University of Michigan*

**Marine Natural Products. Chemical and Biological Perspectives. Volumes I and II.** Edited by PAUL J. SCHEUER (University of Hawaii). Academic Press, New York, 1978. Vol. I: x + 308. \$29.50. Vol. II: xiii + 392. \$38.00.

These books are the first two volumes in what should be a very interesting and useful series. Volume I includes reviews on Dinoflagellate Toxins, Algal Nonisoprenoids, Algal Sesquiterpenoids, Terpenoids from Marine Sponges, and Uncommon Marine Steroids. Volume II covers Marine Carotenoids, The Sterols of Marine Invertebrates, Diterpenoids, Terpenoids from Coelenterates, and Applications of  $^{13}C$  NMR to Marine Natural Products.

All of the chapters are literature reviews. They are written by people actively engaged in marine natural products research and well known in their fields. All chapters are of high quality. Each is very well researched, organized, and written. All are up to date and new—not rehashes of reviews presented elsewhere. On the other hand, little or no original work is presented and there is generally little interpretation of the reviewed literature.

Yuzuru Shimizu has written one of the more enjoyable chapters. In very readable prose, he describes not only the isolation and characterization of several dinoflagellate toxins, but also mentions something about their pharmacology and public health aspects, and something about the organisms themselves as well. Goad's chapter on sterols and Tursch et al.'s chapter on terpenoids also go beyond strictly organic chemistry. Goad's review is oriented toward biosynthesis and comparative biochemistry, while Tursch et al.'s chapter contains sections on the origins, physiological activity, and ecological significance of coelenterate terpenoids.

Most of the reviews, however, emphasize structural organic chemistry, with long lists of compounds and reams of analytical data. These chapters are extremely useful to other natural products chemists but are not nearly as interesting to read. Editor Scheuer intimates that later volumes will contain more chapters with "biological perspectives". Perhaps in the future we will see reviews on such topics as fish attractants and repellents, sponge aggregation factors, the effect of environment on marine metabolites, the role of halogenated compounds in algae, or the effect of dissolved chemicals on the growth of lobsters.

All in all, these are excellent source books and I am looking forward to Volumes III, IV, V, . . .

Timothy R. Erdman, *Chevron Chemical Company*

**Progress in the Chemistry of Organic Natural Products. Volume 35.** Edited by W. HERZ (Florida State University), H. GRISEBACH (University of Freiburg), and G. W. KIRBY (University of Glasgow). Springer-Verlag, Vienna and New York, 1978. viii + 589 pp. DM 258.

The current volume of this prestigious series contains five reviews of areas of current interest to natural products chemists. Three of the reviews are concerned with plant phenolics, the remaining chapters

being devoted to 4-ylidenebutenolides and aroma constituents, respectively. Each of these reviews contains an excellent bibliography.

Neolignans are reviewed by O. R. Gottlieb (University of São Paulo) who has made a considerable contribution to the original research in this field. Neolignans are carefully defined in the chapter as dimers of propenylbenzene and/or allylbenzene with various oxidation patterns about the aromatic rings. Over 100 neolignans are tabulated and their chemistry is discussed in some detail. The chapter concludes with some interesting biosynthetic postulates.

The review (in German) of naturally occurring hydroxycinnamic and hydroxybenzoic acid derivatives by Von K. Herrmann (Technische Universität, Hannover) describes the esters, glycosides, and amides of these aromatic acids. Each compound is listed by its trivial and proper names together with the melting point, optical rotation, and source material.

The review of natural 4-ylidenebutenolides and 4-ylidenetronic acids by G. Pattenden (Nottingham University) covers the occurrence, synthesis, biosynthesis, and biological activity of these interesting though unfortunately named compounds. These two unsaturated lactone moieties occur in a wide variety of molecules and include highly unsaturated fatty acid derivatives, terpenoids, phenolics, and some simple mold metabolites, such as patulin. Both general and specific synthetic routes are well summarized. The section on biosynthesis contains the results of tracer studies together with some hypothetical pathways which are clearly indicated as such. The section on biological data is a little terse but these data are presumably difficult to obtain.

In his review of naturally occurring plant coumarins, R. D. M. Murray (University of Glasgow) has tabulated the trivial names, structures, molecular formulas, melting points, optical rotations, and sources of over 500 compounds. The inclusion of formulas and trivial-name indexes makes this a most useful compilation, but those requiring a critical discussion of the material will be disappointed.

The review of naturally occurring aroma components by G. Ohloff (Firmenich) contains a fascinating account of the volatile chemicals that combine to produce the characteristic odors of foods, drinks, and tobaccos. The chemical structures discussed include aliphatic alcohols, carbonyl compounds and lactones, monoterpenes, sesquiterpenes, and other molecules of terpenoid origin. This review is of great general interest to organic chemists as well as providing a source of data which would otherwise be difficult to find in the chemical literature.

D. John Faulkner, *Scrpps Institution of Oceanography*

**Advances in Organometallic Chemistry. Volume 17.** Edited by F. G. A. STONE (University of Bristol) and ROBERT WEST (University of Wisconsin). Academic Press, New York, 1979. xi + 511 pp. \$49.50.

The subtitle of this volume, "Catalysis and Organic Syntheses", accurately describes its contents. Ten chapters have been collected on the uses of organometallics in industrial processes and in the laboratory. Summary and review chapters on these very active areas of research are very welcome, particularly those of high quality which are characteristic of this series of "Advances in Organometallic Chemistry". Chapters on the industrially significant hydroformylation, Fischer-Tropsch reaction, nickel-catalyzed olefin oligomerization, methanol carbonylation, codimerization of ethylene and butadiene, and olefin metathesis are particularly valuable since they contain a wealth of information on current industrial processes from sources often not easily available to many organometallic chemists. These chapters concentrate on the most recent developments and do not overlap significantly with earlier reviews. Similar coverage of palladium-catalyzed reactions of butadiene and isoprene, synthetic applications of organonickel complexes, hydrogenation reactions, and hydrosilation complete the book.

Organometallic and industrial chemists, particularly, will find this volume of significant value in providing excellent summaries of several important areas of research in organometallic chemistry.

Richard F. Heck, *University of Delaware*

**Organic Liquids: Structure, Dynamics, and Chemical Properties.** Edited by A. D. BUCKINGHAM (Cambridge University), E. LIPPERT (Technische Universität Berlin), and S. BRATOS (Université Pierre et Marie Curie, Paris). John Wiley & Sons Ltd., New York, 1978. x + 352 pp. \$45.00.

This book was conceived at the EUCHEM Conference on Organic Liquids held at Schloss Elmau in April 1976. However, while a few of the shorter chapters may largely be based on conference lectures, many of the 30 contributors have covered areas much more extensively.

Of the 20 chapters, over half discuss techniques for studying organic liquid structure and dynamics: X-ray and neutron scattering, infrared and Raman, light scattering, picosecond laser techniques, electron and nuclear spin relaxation, and dielectric absorption. Separate chapters are devoted to studies of 1,4-dioxane and acetonitrile. A discussion of empirical solvent polarity scales is well done, but this information is readily available elsewhere. One of the longest chapters (by L. V. Woodcock) is concerned with computer simulation of molecular liquids, which certainly will be an important tool in future studies of the liquid state. Techniques for molecular dynamic and Monte Carlo methods, and applications to various types of liquids are discussed. An atom-pair approximation (W. Schröer and E. Lippert) to describe molecular environment is applied to hydrocarbons, chlorinated hydrocarbons, alcohols, ethers, and carbonyl compounds, and illustrated by the estimation of heats of vaporization, excess functions of mixtures, NMR solvent shifts, and heat capacities. Finally, there is a short but masterful chapter by A. D. Buckingham on the origin and magnitude of intermolecular forces, which provides some useful philosophy in addition to the discussion.

In some chapters this volume provides an introduction, in others a more complete discussion, and in all an extensive bibliography of the principal current techniques for studying liquid structure.

Richard Fuchs, *University of Houston*

**Primary Metabolism: A Mechanistic Approach.** By J. STAUNTON (Cambridge University). Oxford University Press, New York. 1978. xii + 177 pp. \$16.50.

The essential core of chemical reactions shared by most living organisms has been termed "primary metabolism" in contrast with side pathways that are unique to certain species. It is the latter "secondary metabolism" which provides the bulk of those compounds which we think of as natural products.

This book is not intended for students of biochemistry but serves primarily to lay the basic groundwork for an understanding of "Nature's strategy" in the synthesis and breakdown of cellular chemical constituents. The author has deliberately chosen not to discuss, except in a rudimentary fashion, the role of the various enzymes in regulating and controlling the direction of metabolite flow. However, by doing so he has been able to focus attention on the mechanisms utilized in the cell to elicit the chemical transformation required.

This book is a part of the Oxford Chemistry Series, edited by P. W. Atkins, J. S. E. Holker and A. K. Holliday.

John E. Stouffer, *Baylor College of Medicine*

**Secondary Metabolism.** By J. MANN (University of Reading). Oxford University Press, New York. 1978. x + 316 pp. \$23.50.

This volume provides a well-organized discussion of the probable biosynthetic routes to most of the different classes of natural products. Included are outlines of some approaches to the elucidation of metabolic pathways, and techniques employed, such as  $^{13}\text{C}$  nuclear magnetic resonance (NMR), are described. Detailed mechanisms are provided throughout. One of the features which makes this book attractive is the set of problems at the end of each chapter.

This book is a part of the Oxford Chemistry Series, edited by P. W. Atkins, J. S. E. Holker, and A. K. Holliday.

John E. Stouffer, *Baylor College of Medicine*

**Terpenoids and Steroids. Volume 8 (Specialist Periodical Reports).** Senior Reporter: J. R. HANSON (University of Sussex). Reporters: G. BRITTON, J. D. CONNOLLY, D. N. KIRK, B. A. MARPLES, T. MONEY, and R. B. YEATS. The Chemical Society, London. 1978. x + 301 pp. \$50.50.

This volume surveys the literature on terpenes and steroids from September 1976 to August 1977. The first part (terpenes, 208 pp) is divided into chapters on Monoterpenoids, Sesquiterpenoids, Diterpenoids, Triterpenoids, and Carotenoids and Polyterpenoids (but no chapter on sesterterpenoids). The chapters are further divided according to carbon skeleton, e.g., acorane, cadinane, germacrane, eudesmane, etc. Biosynthesis is no longer a separate chapter but is incorporated into the above chapters. The second part (steroids, 71 pp)

is divided into chapters on Physical Methods, Steroid Reactions (arranged according to type of reaction), and Partial Syntheses. An author index is provided but unfortunately no subject index. Thus types of reactions (in the first part), types of functional groups, or biological activities are difficult to locate. Otherwise, this is an excellent book and will be indispensable for libraries and research workers in this area.

Paul F. Hudrlík, *Howard University*

**Tetrahedron Reports on Organic Chemistry. Volume 4.** Edited by D. H. R. BARTON, J. E. BALDWIN, W. D. OLLIS, and T. STEPHEN. Pergamon Press, Oxford. 1978. 259 pp. \$55.00.

This book is a compilation of ten review articles previously published in *Tetrahedron* in 1977 and early 1978, on the following topics: the preparation of organofluorine compounds (M. Schlosser, 15 pp), palladium in organic synthesis (B. M. Trost, 35 pp), sulfone chemistry (P. D. Magnus, 27 pp), the synthesis of insect sex pheromones (C. A. Henrick, 45 pp), boraheterocycles (H. C. Brown and E. Negishi, 27 pp), the synthesis of polyketide-type natural products (T. M. Harris and C. M. Harris, 27 pp), elimination reactions of sulfilimines and related compounds (S. Oae and N. Furukawa, 9 pp), strategies in optical resolutions (S. H. Wilen, A. Collet, and J. Jaques, 12 pp), 1,3-dipolar cycloaddition reactions (R. A. Firestone, 31 pp), and the organic photochemistry of benzene (part III) (D. Bryce-Smith and A. Gilbert, 31 pp). Each review is individually paginated—a table of contents is included for each but no indexes are provided. At least half of the reviews have one or more tables reproduced directly from typescript, but their overall quality is quite high. As a synthetic organic chemist, I found the first four reviews, in particular, to be useful and stimulating. The seventh review, which compares the elimination reactions of sulfilimines, sulfoxides, and amine oxides, would have been improved by including selenoxides.

Since these reviews have already appeared in *Tetrahedron*, and since they are not arranged in collections designed to serve the needs of a particular audience, it is not clear for whom these books are intended. Few individuals are likely to pay this price for a book in which only a few articles are of direct interest. (An individual with broad interests who wishes to collect all of the reports in this series can obtain them more cheaply by subscribing to the journal.)

Paul F. Hudrlík, *Howard University*

**Molecular Structure and Bonding.** By BENJAMIN M. GIMARC (University of South Carolina). Academic Press, New York. 1979. ix + 224 pp. \$18.00.

This book is subtitled "the qualitative molecular orbital approach" and that phrase describes its thrust. It is primarily concerned with applications of the extended Hückel theory to rationalize the shapes of a wide range of molecules. The approach is essentially nonmathematical. There is a descriptive introductory chapter of only 22 pages serving to outline the principles and rules to be followed in using the qualitative MO approach to order energy levels and their changes upon altered molecular symmetry. The applications chapters begin with the simplest systems, the  $\text{H}_3$  and  $\text{H}_4$  activated complexes, and quickly move to discussion of hydrides of the types  $\text{AH}_2$ ,  $\text{AH}_3$ , and  $\text{AH}_4$ . There is a long chapter on nontransition element complexes of type  $\text{AB}_n$  (e.g.,  $\text{SF}_4$ ,  $\text{TeF}_5^-$ ). To illustrate the detail that is presented in text and table, one table lists 32 known  $\text{AB}_6$  halide molecules and ions containing 12 valence electrons. The last half of the book considers many other simple polyatomic molecules. The presentation includes numerous clear symmetry correlation diagrams and energy level figures. These usually include schematic representations for the molecular orbitals, with negative lobes shaded and nodes and orbital overlaps therefore very apparent. The bibliography contains several hundred references, with experimental and theoretical citations separated and ordered according to compound. In addition to clear discussion of the qualitative energy level patterns and molecular geometries, consideration is also given to finer details of molecular behavior. These include rationalization of potential energy barriers hindering internal rotation about a bond axis, and the intramolecular exchange of axial and equatorial atoms in appropriate molecules. In summary, the book presents a vast amount of information in a very concise form. It is thoroughly documented, well illustrated, and clearly written; it presents a good case for the usefulness of rationalizing, correlating, and predicting molecular shape and certain other properties using very simple theory.

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