

## Book Reviews

**Annual Reports in Organic Synthesis—1983.** Edited by Martin J. O'Donnell and Louis Weiss. Academic Press, New York, 1984. xiii + 493 pp. 15 × 22.5 cm. ISBN 0-12-040814-7. \$29.00.

Despite staggering advances in computer technology, the overall task of keeping abreast of the synthetic literature is not an easy one for chemists today. Fragments of information pertaining to simple or sophisticated reactions of potential use are invariably scattered throughout an ever-increasing number of journals and publications. It becomes almost mandatory for chemists to read as many journals as possible to fish out relevant synthetic details and then to collate them into a suitable form to maximize their usefulness. This type of data gathering is time consuming and, perhaps, expensive for a researcher. Periodicals such as *Index Chemicus*, *Chemical Abstracts*, *Current Chemical Reactions* and others have attempted to address this problem; nonetheless, the details are not adequately compiled and classified to focus a given synthetic strategy. In this regard, the series of *Annual Reports in Organic Synthesis* provides a rapid and meaningful visual retrieval mechanism for synthetic as well as nonspecialist chemists. The series of 1983 has basically retained the format of the first edition of 1970, including the 47 primary chemistry journals, except the journal of *Steroids*, which was abstracted in the previous years.

The book, entitled *Annual Reports in Organic Synthesis—1983*, is concise, up-to-date, and well referenced. Just by referring to the extensive Table of Contents, the reader should have no difficulty in locating a new reaction of interest. The first chapter, "Carbon-Carbon Bond Forming Reactions", constitutes almost half of the book (229 pages), and the value of this chapter is enhanced by the citation of over 80 review articles. The applications of organometallics in synthetic chemistry are included by giving the source dealing with the annual surveys of various metals. The second chapter, "Oxidations", covers a broad spectrum of reactions in this category: C-O, C-H, C-N, amine, and sulfur oxidations along with oxidative-addition and cleavage reactions; however, there are no entries pertaining to phenol to quinone oxidation. The third chapter entitled "Reductions" cites examples with references for C-O, C-N, and C-C multiple-bond reductions. The section on hydrogenolysis of hetero bonds in 44 substrates ranges from simple R-OTs to complex molecules such as nucleotides and  $\beta$ -lactams. The fourth chapter, "Synthesis of Heterocycles", covers a variety of organic structures: oxiridines, furans, indoles, lactams, lactones, pyridines, pyrroles, and other heterocyclic systems. Lactams and lactones, structural units of biologically active molecules, justifiably occupy a major portion of this chapter. The fifth chapter, "Protecting Groups", deals with all important functionalities. Synthetic preparations involving functional group preparations, ring enlargement, and contraction are given in Chapter VI. The last chapter (VII) lists 50 miscellaneous review articles.

Despite several interesting reports on microbiological transformations on natural and synthetic substrates, the reviewer was disappointed by the inclusion of only one example of enzymatic hydrolysis (p 396). One reference to a review article on microbial hydroxylation of steroids was mentioned, presumably due to its appearance in a chemical journal. Surely, synthetic chemists would appreciate more information in this context. Likewise, chemical transformations of natural products appear frequently in biological, biochemical, and specialized journals such as the *Journal of Antibiotics* and the *Journal of Natural Products*. However, the lack of any entry under the section "Multistep Transformations" may lead some readers to the erroneous conclusion that research in this area is lacking.

The editors justify the exclusion of the subject index on the grounds of the cost of the book and the lead time for publication. Instead, 32 pages have been devoted to the Author Index. The reviewer could not find any utility of this index unless one is

familiar with the names and research endeavors of 1300 authors per se.

Overall, the quality of the presentation of experimental details on arrow heads between the reactants and products, yields under the structures of the reaction products, and the drawings of the structural formula are uniformly excellent, and the editors are to be complimented for their skillful organization of the text material. In short, the book provides useful material for synthetic and nonspecialist chemists. It should prove to be a valuable addition to the shelves of every scientific library in universities and research organizations. In view of the price (6¢ per page), researchers and graduate students of synthetic chemistry would benefit from a desk copy for quick reference.

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**Novel Biochemical, Pharmacological and Clinical Aspects of Cytidine Diphosphocholine.** Edited by Vincenzo Zappia, Eugene P. Kennedy, Bengt I. Nilsson, and Patrizia Galletti. Elsevier Science Publishing Company Inc., New York, 1985. xviii + 406 pp. 15 × 23 cm. ISBN 0-444-00967-1. \$78.00

For many years after Eugene Kennedy established the involvement of cytidine derivatives in the biosynthesis of phosphatidylcholine and -ethanolamine some 30 years ago, these compounds remained simply essential metabolic intermediates for the final step in the formation of these lipids through the enzymatic transfer of phosphoamine to diacylglycerol. The incorporation of phosphocholine into cytidinediphosphocholine (CDP-choline) is catalyzed by the enzyme CTP-phosphocholine cytidyl transferase, now known to be the rate-limiting step in phosphatidylcholine biosynthesis and to be regulated through the activation of the enzyme when it becomes associated with intracellular membranes.

In the early 1970s CDP-choline began to be used therapeutically for a number of pathological conditions, primarily involving the central nervous system. The rationale for this use was twofold: the role of this molecule as a precursor for the major membrane phospholipid with the possible potential for restoring membrane integrity and its ability to affect a variety of other physiological processes known to be impaired in the abnormalities under treatment.

It is both the role of the cytidine nucleotides in normal metabolism and their pharmacology and medicinal use that formed the focus of a meeting held in June 1984 in Sorrento, Italy. Thirty-four contributions to this international gathering by 118 authors from nine countries are collected in the volume under review. Since the meeting was held in Italy, it is not surprising that 13 of the papers are by Italian authors. The papers are grouped under five headings: general biochemical aspects; phospholipid biosynthesis and its regulation; metabolism of phospholipids in the lung and in the central nervous system; basic pharmacology and neurotransmitter metabolism; cerebral ischemia and physiopathological aspects; central nervous system pathologies and clinical studies. These titles give a good general idea of the breadth of the topics covered. The clinical conditions where CDP-choline has been used and sometimes found to be helpful include, in addition to cerebral hypoxia, Parkinson's Disease, spinal cord trauma, acute stroke, traumatic coma, concussive head injury, cerebral vascular disease, disturbance of consciousness, experimental atherosclerosis, myocardial infarction, and neonatal respiratory distress syndrome. Some of the chapters give a valuable background review of the present state of knowledge regarding the treatment modalities for a specific illness or injury with minimal reference to CDP-choline. The bibliography for most, but not all, papers includes references through 1983 or early 1984.

The length and quality of the contributions vary greatly as is usual in proceedings of a conference. Regrettably many imperfect expressions and some typographical errors of authors whose first language is not English were not corrected by the editors and are somewhat disturbing during perusal of the papers. More troubling is the production of the volume by photo offset from typescripts, some of which are quite pale and have been reduced to a size that makes reading uncomfortable; for some of the tables and figures a magnifying glass is helpful. Fortunately there are only few photomicrographs because their reproduction is poor. All of this makes the price of the book seem rather excessive.

The findings of even limited effectiveness of CDP-choline in reversing or controlling the deleterious consequences of a variety of conditions are highly intriguing and should be of interest to both basic scientists and clinicians. Unfortunately, the mechanisms by which the nucleotide exerts its salutary action is still quite obscure. The intact molecule does not penetrate into cells, and consequently the therapeutic activity must be ascribed to the breakdown products, cytidine 5'-phosphate and (phospho)-choline. The present volume should stimulate further research into the mode of action of CDP-choline in clinical situations as well as its role in the normal metabolic processes of the cell.

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**Phosphorus. An Outline of its Chemistry, Biochemistry and Technology. Third Edition. Studies in Inorganic Chemistry. 6.** Edited by D. E. C. Corbridge. Elsevier Science Publishers, New York 1985. x + 762 pp. 17 × 24.5 cm. ISBN 0-444-42468-7. \$157.50.

In the last 25 years our knowledge of phosphorus compounds has expanded so rapidly that it now constitutes a major branch of chemistry. The greatly increased academic interest in phosphorus compounds has been matched by a steady growth in the volume and diversity of their commercial application. In many ways phosphorus rivals carbon in its structural versatility, the general variety of its compounds, and its biochemical importance. The intimate involvement of phosphorus compounds in living processes is now well recognized, and modern biochemistry is dominated by phosphorus-containing proteins, nucleic acids, and energy-transfer compounds.

This book deals with all aspects of phosphorus chemistry: organic, inorganic, biochemical, physical, technical, and environmental. The third edition has been expanded by over 200 pages, and a new chapter on biochemistry has been added. New material has been incorporated in every chapter and the content updated to the end of 1984. There are completely new sections on proteins, cyanide compounds, diphosphenes, fertilizers, pesticides, selenium compounds, lead compounds, nonrigid molecules, and compounds with two connected P atoms.

This new edition will prove a valuable, comprehensive, and up-to-date introduction to the wide field of phosphorus chemistry.

Staff

**Selenium in Natural Products Synthesis.** By K. C. Nicolaou and N. A. Petasis. CIS Inc., Philadelphia. 1984. 300 pp. 16 × 23.5 cm. ISBN 0-914891-00-6. \$37.50.

For many years organoselenium chemistry was regarded as too specialized and consequently was largely ignored by organic chemists. Over the last 10 years or so, however, this situation has changed with the recognition that organoselenium reagents provide convenient routes to starting or intermediate materials for the synthesis of many natural products. These aspects and the importance of new organoselenium methodology are discussed in this book. The authors have directed it primarily to the synthetic organic chemists working on complex natural product synthesis. However, it should also be useful to carbohydrate chemists especially those working on stereoselective synthesis of sugars from noncarbohydrate precursors, as well as those interested in synthesis involving carbohydrate synthons. The variety

of synthetic conceptions and interesting reactions displayed in each chapter is an impressive tribute to the power of this modern and fascinating chemistry. It is a pity that this book does not include an index of the primary authors; however, it does contain a subject index.

New strategies presented in the eight chapters are clearly divided depending on the character of the reaction, which easily enables the appropriate search for the corresponding type of transformations. Also, each chapter contains a brief description of the title reaction and its exemplification, mainly from the field of natural product synthesis. Chapter 1 is devoted to a discussion of the application of various selenium reagents in natural product synthesis.

The second chapter is concerned with the selenium-mediated oxygenations including epoxidations and *vic*-hydroxylation of olefins. Chapter 3 covers the dehydrogenation reactions of various groups of organic derivatives such as carbonyl compounds, alcohols, and phenolic enones. The subject of organoselenium-mediated olefinations is discussed in Chapter 4, and Chapter 5 deals with organoselenium-mediated reductions. Chapter 6 outlines the reactions of selenium-stabilized carbanions with a variety of electrophiles.

Chapter 7 entitled "Organoselenium-Induced Cyclizations" discusses probably the most valuable modern ring-formation strategy to almost all fields of organic synthesis. Among these reactions are examples very useful for carbohydrate chemists, i.e. lactones, which can be considered as corresponding carbohydrate synthons. The number of illustrative examples is bound to promote the stimulation of new ideas and their possible application in synthetic carbohydrate chemistry, and this is one of the main targets of this book.

The last chapter, Chapter 8, is concerned with "Miscellaneous Applications of Selenium Compounds" to the synthesis of various classes of organic compounds, including sulfur and nitrogen heterocycles as well as selenium analogues of natural products. The key feature of the book, however, is that each approach is encapsulated in a flow chart of all the reactions used, with the reagents indicated on the reaction arrows. The text is nearly error free; however, a few errors are evident. The reference lists in every chapter are extensive (over 700 total references) and almost fully up to date (through the first half of 1983), but the numbering of the citations is sometimes not in the order in which they appear in the text; i.e., p 251, ref 5; p 171, lack of reference for eq 5.3. This is a minor but irritating imperfection that could have been avoided, but this criticism does not prevent highly recommending this book. Overall, the authors are to be congratulated on an excellent well-written concise book representing a valuable contribution to modern organoselenium chemistry, and it should be a handy reference book of this chemistry in organic synthesis.

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**The Chemistry of Natural Products.** Edited by R. H. Thomson. Blackie & Son, Ltd., Glasgow and London, distributed in the U.S.A. by Chapman and Hall, New York. 1985. xii + 467 pp. 15.5 × 23.5 cm. ISBN 0-412-00551-4. \$75.00

Dr. Thomson from the University of Aberdeen, himself an eminent expert on the chemistry of natural products, is to be complemented for an excellent coverage of the general field of natural products with this text. An expert British team of scientists covers the nine chapters: J. S. Brimacombe from Dundee University, "Carbohydrates"; E. J. Thomas from Oxford University, "Aliphatic Compounds"; T. J. Simpson from the University of Edinburgh, "Aromatic Compounds"; J. R. Hanson from the University of Sussex, "Terpenoids"; B. A. Marples from the University of Technology Loughborough, "Steroids"; B. W. Bycroft and A. A. Higton from the University of Nottingham, "Amino Acids, Peptides and Proteins"; I. R. C. Bick from the University of Tasmania, "Alkaloids"; J. B. Hobbs from the City University in London, "Nucleosides, Nucleotides and Nucleic Acids"; and A. H. Jackson from the University College at Cardiff, "Porphyrines and Related Compounds".

Natural products are classified in nine major groups with chapters that are well written and beautifully illustrated with formulas showing absolute configuration wherever known. Unfortunately structures of morphine and opium alkaloids are shown from a perspective different from that generally accepted. The literature is generally covered up to 1981 and summarized at the end of each chapter. An index is given at the end of the text. This book achieved its objective: it makes good reading for those genuinely interested in the chemistry of natural products, be it structure, biological activity, or elegant synthesis. There is no mentioning of Wiesner's elegant work on total synthesis of cardioactive steroids and digitoxin, Rice's total synthesis of morphine and opium alkaloids, or the Chinese antimalarial artemisinin. Complex structures and elegant synthesis are indicative of trends

in natural products chemistry today, prevailing over practical goals by far. It is hoped that a future volume will discuss in more detail natural pigments, fermentation products, marine constituents, and biologically active amines, topics now covered superficially under the appropriate chemical classification. Much work in these areas is being carried out in Pharmaceutical Industry and Research Institutions sponsored by government, with a considerable expenditure of manpower and resources. All in all, this is an excellent book, particularly suited for lecturers for preparing their courses and for students who have decided that their future will greatly be influenced by organic chemistry.

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