

Book Reviews

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BOOK REVIEWS

Transition Metals in Synthesis. P.J. HARRINGTON. Wiley-Interscience, John Wiley and Sons, Inc., 605 Third Avenue, New York, NY 10158. 1990. xvi + 484 pp. 18 × 26 cm. \$59.95. ISBN 0471-61300-2.

The book describes total syntheses that have incorporated a transition-metal-mediated transformation as a key step. Each chapter focuses on a different metal-mediated process and one or more syntheses which utilize the transition metal reaction. The fifteen chapters in the book are divided into 3 sections: (1) a brief description of the pharmacological significance of the targets, (2) an analysis of the organometallic method, and (3) the synthetic scheme(s).

In each chapter the in-depth coverage of the organometallic reaction is the strength of the book. The transition-metal-mediated reaction is discussed in detail, going beyond that material which is related to its use in the synthetic scheme. Many literature references are included in each chapter. The synthetic schemes at the end of each chapter carefully list all reagents, conditions, and yields. This is very useful.

One minor drawback of the book is the lack of retrosynthetic analysis of the target molecules in each chapter. The reader is immediately introduced to an organometallic method without any idea of where it fits in the overall scheme. It would have been appropriate to describe a retrosynthetic analysis prior to the description of the key organometallic transformation.

Overall, the book is well written. It will be very useful as a reference book for the synthetic chemist and as a textbook for part of a graduate course in a synthetic organic course or a more specialized graduate course which focuses on metals in organic synthesis.

MARIE KRAFFT, *Florida State University*

Bioorganic Photochemistry Volume 1. Photochemistry and the Nucleic Acids. Edited by HARRY MORRISON. Wiley-Interscience, John Wiley and Sons, Inc., 605 Third Avenue, New York, NY 10158. 1990. ix + 437 pp. 16 × 24 cm. \$59.95. ISBN 0471-62987-1.

Until now, the only comprehensive book on nucleic acid photochemistry was *Photochemistry and Photobiology of Nucleic Acids* (Shih Wang, Ed., Academic Press, 1976), a two-volume set that is long out of date and no longer in print. *Photochemistry and the Nucleic Acids*, written by leaders in the field, serves as an extensive and detailed update of Volume I (Chemistry) and Volume II (Biology) of that original monograph. Except for an entire chapter devoted to selected applications of nucleic acid photochemistry, discussions of the more biological aspects, such as photodamage repair and the mutagenesis, are interspersed throughout the text. The book begins with an impressive first chapter covering almost all aspects of nucleic acid photochemistry, followed by four shorter, more specialized chapters, and ends with a comprehensive index. Chapter 1, "The Photochemistry of Nucleic Acids" by Jean Cadet and Paul Vigny (272 pp., approximately 1000 references) covers all aspects of nucleic acid photochemistry, from model compounds to cellular nucleic acids, and could well have been published independently. The chapter begins with a short introduction on the photophysics of nucleic acids, including instrumentation, experimental methods, and excited state properties of nucleic acids at room temperature. It then deals with the direct effects of low intensity vacuum, far, and near uv light, as well as high intensity far uv light, on nucleic acids. The chapter ends with indirect effects of light, typified by Type I and II photooxidation reactions and psoralen photochemistry. Attention is also given to the biological effects of light and the analytical methods used to assay nucleic acid photodamage. There are enough structures and diagrammed mechanisms to whet the appetite of an organic chemist and more than enough references to immerse oneself readily in the original literature. In addition, many discussions give a sense of the historical development of the field and contain much interesting data that has previously only been available in abstract form. Chapter 2, "Photosensitized Reactions of DNA: Cleavage and Addition" by Irene Kochevar and David Dunn (44 pp., approximately 150 references) deals with the action of photoactive dyes, drugs, and endogenous cellular molecules on DNA. The chapter starts with a very brief discussion of the general types of mechanisms and intermediates involved in photosensitized DNA cleavage; this is followed by a review of mechanistic studies on a broad range of naturally occurring and synthetic photosensitizers. Though the structures of the photosensitizers are given, the chapter loses some appeal by being essentially devoid of diagrammed reaction mechanisms. Chapter 3, "Photoreactions of Nucleic Acids and Their Constituents with Amino Acids and Related Compounds" by Isao Saito and Hiroshi Sugiyama (24 pp., approximately 50 references) covers the photochemistry of model systems relevant to photo-induced nucleic acid-protein crosslinking. The chapter is

written from an organic chemist's point of view and is replete with structures and reaction mechanisms. Chapter 4, "Applications of Psoralens as Probes of Nucleic Acid Structure and Function" by Yun-bo Shi *et al.* (38 pp., approximately 50 references) primarily covers psoralen-based approaches developed by John Hearst's group for the study of RNA structure and RNA polymerase complexes. A small section is also included on psoralen-based spin probes for the study of nucleic acid dynamics. The bulk of the chapter, unlike the others in the book, requires a reasonable knowledge of biology and biological techniques, not to mention psoralen chemistry. Because it appears to have been written more for a molecular biologist than an organic chemist, many of the elegant chemical aspects of the work are not made readily apparent. Chapter 5, "4-Thiouridine as an Intrinsic Photoaffinity Probe of Nucleic Acid Structure and Interactions" by Alain Favre (48 pp., approximately 150 references) reviews the properties of 4-thiouridine that make it a useful photoaffinity probe for studying RNA structure. The photophysics and photochemistry of thiouracil derivatives and tRNA containing thiouridine are described as well as their photobiological effects. Methods for the incorporation of thiouridine into RNA for RNA-RNA and RNA-protein interactions are also covered.

This volume is highly recommended for both chemistry and biochemistry libraries and any individual working in an area related to nucleic acid photochemistry or photobiology. This volume is also recommended for anyone with a general interest in photochemistry or bioorganic chemistry, as it covers much new and fascinating chemistry and biology.

JOHN-STEPHEN TAYLOR, *Washington University*

A Guide for the Perplexed Organic Experimentalist. Second Edition. H. J. E. LOEWENTHAL and E. ZASS. John Wiley and Sons, Inc., 605 Third Avenue, New York, NY 10158, and Salle and Sauerländer, Frankfurt am Main, Germany. 1990. x + 239 pp. 12.5 × 19.5 cm. \$59.95. ISBN 0-471-91712-5 (JW) or 3-7935-5542-9 (S&S).

This little book is a revised and updated version of a book that was first published in 1978. The revisions are more than cosmetic: of the eleven chapters in the second edition, only seven were present in more or less the same form in the first edition. The second edition features two chapters on literature searching, one focussing on manual searches and a new chapter (written by Dr. Zass) on computerized searches. The remaining chapters deal with various aspects of laboratory work, from basic safety rules (a short but adequate chapter), through running small-scale reactions, to isolating the product. There are separate chapters on solvents, base selection, catalytic hydrogenation, and small-scale distillation, and the book concludes with chapters on keeping it clean and on bottling things up.

Overall, this is an excellent book which could be read with profit by all graduate students (and many postdoctoral associates) in organic and natural product research. It is full of practical wisdom culled from a lifetime of research experience, such as the suggestion of using a bent paperclip to stir an oil bath, and it is written in a relaxed yet trenchant style. Thus on the subject of crystallization, the author writes "This is where the men are separated from the boys . . . it was said of Adolf von Baeyer that his success was in large measure due to his large beard harbouring seeds of every compound he ever made. Beards are again in fashion—unfortunately that does not seem to have contributed to the experimental skill of the average young organic chemist." The chapter on solvents is particularly useful, with a helpful table of purification methods for common solvents.

This reviewer has two minor cavils with the book. In the first place, there is no chapter on keeping the laboratory notebook, which is a vital and often underrated part of the training of experimental scientists. Secondly, the publisher's decision to publish this as a hardback publication rather than the paperback version of the first edition means that a small but helpful book will be priced too high for wide dissemination among its prime audience.

DAVID G. I. KINGSTON, *Virginia Polytechnic Institute and State University*

Rodd's Chemistry of Carbon Compounds, Second Edition. Supplement to Volume IV. Heterocyclic Compounds. Six-membered Heterocyclic Compounds with a Hetero Atom from Groups IV, VI or VII of the Periodic Table. Edited by M.F. AMSELL. Elsevier Science Publishing Co., P.O. Box 882, Madison Square Station, New York, NY 10159. 1990. xvi + 640 pp. 15.5 × 23 cm. \$294.75.

Volume IA of the second edition of *Rodd* was published in 1964, and this book is a supplement to volume IV of that edition, covering work published up to 1986.

This volume, which has been written in its entirety by Robert Livingstone from the Polytechnic in Huddersfield, England, offers much of interest to natural product chemists, since it gives a broad coverage of the synthesis, isolation, and reactions of many groups of secondary metabolites.

The first chapter discusses six-membered ring compounds containing a single oxygen atom and covers benzopyrans, anthocyanins, coumarins and isocoumarins, chromones and their derivatives, and a large range of flavonoids and related compounds (xanthones, pterocarpanes, etc.). The second chapter, which deals with the same ring systems but containing hetero atoms other than oxygen, is obviously likely to be of less interest to readers of this journal.

The book has an excellent index giving full coverage to both the chemistry of the compounds and the species from which natural products have been isolated. The reader is directed to good review articles where these exist; the book is well-referenced and the literature coverage is broad.

I doubt that this volume will be widely bought as a reference book in its own right, but as an integral part of the on-going and excellent *Rodd's Chemistry*, it must find its way into library and other substantial collections.

J. MICHAEL EDWARDS, *University of Connecticut*

Phytochemistry Methods Frontiers. Edited by XORGE A. DOMINGUEZ S. *Revista Latinoamericana de Quimica*, Departamento de Quimica, ITESM, Sucursal de Correos "J", 64849 Monterey, N.L. Mexico. 1990. 329 pp. 20 × 27.5 cm.

Reading the preface created an initial impression that this might be a marginal book. While the frequency of typographical errors and the occasional improper sentence structure are disconcerting, the breadth and depth of this compilation remain quite evident throughout.

The range of topics, from such fundamental issues as botanical classification, chemotaxonomy, and biosynthesis through a series of chapters on major classes of natural products to the latest state-of-the-art issues, such as 2D nmr, biotechnology, and biotransformation, makes this book valuable as a reference work for experienced, practicing natural products chemists. It also has considerable potential as a teaching tool in a graduate curriculum.

It is difficult to select the most important chapters in this volume, since nearly all of them play a key role. Two chapters (1 and 3) on botanical and chemical approaches to taxonomy cover a topic not often encountered in reviews of natural products chemistry. There are reviews of flavonoids (chapter 4), iridoids (chapter 5), phorbol esters (chapter 7), alkaloids (chapter 11) and steroids (chapter 12). Biotechnological issues are covered in three chapters (8, 10, and 13), while biosynthesis is treated in chapter 2. Chapter 6 presents a variety of nmr experimental alternatives to the COSY experiment in well illustrated detail, while chapter 9 further shows the power of various one- and two-dimensional nmr techniques.

As indicated earlier, there are problems. In the flavonoid chapter, the authors are not associated individually with the four addresses offered and, while the uv and mass spectral discussions were particularly good, there is no mention of hplc or countercurrent chromatography in the sections on separation. In the iridoid chapter, Table 5 (nmr assignments of numerous iridoids) is poorly reproduced and difficult to read. No references are provided at the end of chapter 8, although reference numbers were given throughout the text. In chapter 12, two different structures were assigned to estradiol, one of them an incorrect structure. In general, more attention to proofreading could have eliminated many of the typographical errors.

On balance, however, this is a practical, useful reference; it may be underpublicized, but those who obtain a copy will use it extensively.

JOHN H. CARDELLINA II, *National Cancer Institute*