

BOOK REVIEWS

USAN and the USP Dictionary of Drug Names. Edited by MARY C. GRIFFITHS, CAROLYN A. FLEEGER, and LLOYD C. MILLER. United States Pharmacopeil Conventions, Inc., 12601 Twinbrook Parkway, Rockville, MD 20852, 1983. 640 pp., 21 x 28 cm. \$45.

This reference tool lists all the U.S. Adopted Names (USAN) for drugs for the period June 15, 1961, when the USAN program began, through June 15, 1983. It also lists all international nonproprietary names (INN) published by the World Health Organization since the start of the INN program in 1953 through 1982. There are more than 18,500 entries, most of them illustrated with structural formulas. Indices include an index of CAS Registry Numbers, an Index of NSC Numbers, a list of USAN, USP, and NF Names listed by pharmacological categories, and a list of molecular formulas.

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Guide to the Prices of Antiquarian and Secondhand Botanical Books (1979-1982). Flowering Plants. Edited by L. VOGELZANG, Rijksherbarium, Leiden. Boerhaave Press, P.O. Box 1051, 2302 BB Leiden, The Netherlands, 1983. xii+760 pp., 17 x 25 cm. Dfl 85 (approx. \$35).

This book concludes a two-volume series on the prices of botanical books. Like its predecessor [reviewed *J. Nat. Prod.*, **45**, 512 (1982)] it records the prices paid for antiquarian and secondhand botanical books during a specified time period, in this case 1979-1982. Prices are expressed in U.S. and in German currency (DM), and a helpful, additional feature is a list of some 75 dealers specializing in these books.

This volume will prove indispensable to any serious collector of botanical books.

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Microbial Transformations of Bioactive Compounds, Volumes I & II. JOHN P. ROSAZZA, College of Pharmacy, University of Iowa. CRC Press, Inc., 2000 N. W. 24th Street, Boca Raton, FL 33431. 1982. Vol. I, 132 pp., Vol. II, 185 pp. 18x26 cm. Vol. I=\$46, Vol. II=\$64.

Microbial Transformations of Bioactive Compounds is published in two volumes, Volume I comprising 133 pages and Volume II, 185 pages. It is surprising that these two rather slender volumes could not have been printed in one volume with consequent savings in cost. The editor, Dr. John P. Rosazza, is a well-known expert in this field. As might be expected from multi-authored reviews, the treatments are uneven in quality.

Volume I consists of five chapters dealing, respectively, with the historical development of microbial transformations, methodology involved in microbial transformations, microbial transformations of antibiotics, industrial hydrocarbons, and prostaglandins. The chapter on microbial transformations of antibiotics by Marshall and Wiley is outstanding. The chapter on microbial transformations of hydrocarbons by C. T. Hou reviews a subject which does not receive frequent consideration in a thorough manner. The chapter by Goodhue on methodology, while elementary from a specialist's viewpoint, provides useful information to nonspecialists and students.

Volume II also contains five chapters dealing with transformations of drugs; of xenobiotics by intestinal microflora; and transformations of alkaloids, cannabinoids, and pesticides. The chapter on drug transformations by Smith and Rosazza is excellent, and in contrast to some of the other reviews, deals with much of the original work by the authors and their collaborators. Transformations of drugs by intestinal microflora has been frequently reviewed, but similar transformations of xenobiotics are less well-known, and some interesting information is presented succinctly by Goldman. The review on transformations of alkaloids overlapped somewhat with some compounds discussed previously by Smith and Rosazza; the text was too sketchy, relying heavily on tabular data. However, the literature was well-covered.

The chapter on cannabinoids by Robertson was interesting but may not appeal to a wide group of readers. The compounds and yields found to date in this area are disappointing. This review provides a good comparison between mammalian and microbial transformation products. Transformation of pesticides, by Bollag, is a topic that has not been extensively reviewed previously and is covered thoroughly.

Microbial Transformations of Bioactive Compounds will be of interest to both specialists and non-specialists. It will be of interest to see how the impact of biotechnology will affect future developments in this field.

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Molecular Structure and Conformation. Progress in Theoretical Organic Chemistry, Vol. 3. Edited by I.G. CSIZMADIA, Department of Chemistry, University of Toronto. Elsevier Scientific Publishing Company, P.O. Box 211, Amsterdam, The Netherlands, and 52 Vanderbilt Avenue, New York, NY 10017. 1982. 17×25 cm. 344 pp. \$102.50.

This volume of *Progress in Theoretical Organic Chemistry* examines a number of recent advances in structure and conformation. The topics covered are: I. "Structural Consequences of Hyperconjugation," by L. Radom (61 pp, 64 refs); II. "Quantative Orbital Analysis of the Conformational Preferences in Methyl Derivatives," by F. Bernardi and A. Bottoni (54 pp, 40 refs); III. "The Nonclassical Polyhedral Organic Molecules and Ions," by V.I. Minkin and R.M. Minyaev (66 pp, 40 refs); IV. "Correlation Energy as a Stabilizing Factor in Molecular Structure," by M.A. Robb (32 pp, 40 refs); V. "Analytical Equations for Conformational Energy Surfaces," by M.R. Peterson and I.G. Csizmadia (72 pp, 130 refs), and VI. "Quantum Chemical Studies on the Mechanism of Enzyme Action," by G. Naray-Szabo and T. Blaha (62 pp, 192 refs).

The most interesting chapter to readers of this journal will be Chapter VI, in which Naray-Szabo and Blaha examine studies that have used molecular orbital and molecular mechanics calculations to model active sites and rationalize enzyme action. The examples cited include serine proteinases, papain, lysozyme, carboxypeptidase A, and a number of metalloenzymes. They conclude that calculational methods can be used to advantage in helping to gain an understanding of many molecular features that are important in the understanding of enzymatic reactions.

This volume should be of interest to organic chemists and biochemists who wish to obtain an overview of the application of computational methods which are becoming useful in explaining many structural and reactivity features of organic compounds.

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Total Synthesis of Natural Products: The Chiron Approach. STEPHEN HANESSIAN. Pergamon Press, Maxwell House, Fairview Park, Elmsford, NY 10523. 1983. vii+291 pp. 23×15 cm. \$20.00 (paperback).

This monograph constitutes Volume 3 of the Organic Chemistry Series initiated in 1982 by Pergamon Press under the series editorship of J.E. Baldwin (Oxford). This volume, like its predecessors, was generated by direct reproduction of the author's typescript, allowing an economical and timely publication.

The author has produced a scholarly, up-to-date, and copiously referenced set of sixteen chapters in which the use of "chirons" (chiral synthons) derived from readily available natural products is explained, first in concept, then in practice. Although amino acids, terpenes, and hydroxy acids (e.g., lactic and tartaric acids) are mentioned in this context, the detailed discussion is focused on carbohydrates as chiral building blocks—an area in which the author's laboratory has played a key role. More than 400 literature citations extend through early 1983, and a useful index of chiral starting materials, reagents, and reactants is included.

The book is organized into four parts, commencing after a general introductory chapter. Parts one and two deal respectively with "basic concepts" and "design," each in one chapter. The first of these briefly outlines carbohydrate reactivity based on steric, stereoelectronic, and conformational considerations. Symmetry relationships and end-switching gambits for converting "natural" sugars to unnatural derivatives are exemplified. Part two describes three types of target molecules which can, in principle, yield to the chiron approach—those which have "apparent-," "partially hidden-," or "hidden carbohydrate-type symmetry." Part three (Chapter 4), entitled "Discovery," provides guidelines for locating apparent and disguised carbohydrate portions within the target (e.g., the "rule of five") and elaborates upon the steric, stereoelectronic (anomeric), and conformational biases indigenous to carbohydrates. The fourth part comprises Chapters 5-16 and is the main substance of the text. This part, entitled "Execution," is subdivided into the three degrees of carbohydrate-type symmetry described above and is further subdivided into various groups of acyclic, carbocyclic, heterocyclic, and macrocyclic targets. In Chapters 5-15, there are detailed over 100 syntheses of natural products from carbohydrate-derived chirons in schematic form with accompanying analysis and discussion. Finally, Chapter 16 briefly discusses potential uses of evolving computer-assisted methods for implementing the chiron approach.

The author gives a balanced view of this approach to synthesis, pointing out the danger of choosing carbohydrate starting materials which must be too extensively defunctionalized to reach the target. He also points out a lack of rigor in some current usage of the terms "chiral" and "synthon."

Aside from a few typographical errors and some unnecessarily abstract conceptual schematics, the book is highly readable and admirably accomplishes its goals. Most students and practitioners of organic synthesis would benefit from reading this book, and its reasonable price should ensure its inclusion in many personal libraries.

STEVEN D. BURKE, *University of South Carolina*

Pharmacognosy. G.E. TREASE and W.C. EVANS. Bailliere Tindall, One St. Anne's Road, Eastbourne, BN21 3UN. 1983. viii+812 pp. 16×24 cm. \$55.00.

I was most impressed by this book; possibly in part because the last edition with which I had experience was the ninth (1967), and there has been an almost revolutionary change in context since that time, but not entirely. The book gives a rather complete picture of pharmacognosy, covering the many facets of the discipline in a clear, forceful, scientific, and understandable way—everything from classification and microscopy of powdered vegetable drugs to computers. The topics we all expect are found in the book, but often in conjunction with new and up-to-date sections more usually to be looked for in specialized monographs. For example, in part three of the book which is entitled "From Plant to Pharmaceutical," there are not only chapters dealing with biological and geographic sources of drugs, factors involved in the production of drugs, deterioration of drugs, commerce and quality control, and pharmacological action, but also chapters concerning genetics, tissue culture, and plant growth regulators. Each chapter ends with some suggested further readings, generally review articles, some with 1982 dates. Within the text there are also many references to recent primary publications. Another section which was very well done is part four of the book, which concerns itself with phytochemistry; some of the botanical and chemical characteristics of both flowering and nonflowering plants are discussed at some length, again much contemporary chemotaxonomic information, and many references. The chapter on phytochemical research would make a very good introduction at the graduate level: it covers extraction and purification, tracer techniques, basic and secondary metabolism, and the techniques used to study biosynthetic pathways, microbial bioconversions, and aberrant synthesis. There is also an interesting chapter by Paul Dewick on tumor inhibitors from plants.

Two areas that I feel are given rather short shrift are those dealing with vitamins (five pages) and antibiotics (two pages); in the former case, even the structures of folic acid, B₆, and B₁₂ are not given, so brief is the coverage, and no comment is made on the biochemical significance of any of the vitamins. As to the latter, it seems strange to omit possibly the most economically significant and therapeutically interesting group of natural products from a book on pharmacognosy, especially from one which offers us an albeit excellent twenty-five page chapter on Plants in Alternative System of Medicine. The balance seems very wrong.

These last comments notwithstanding, I would still recommend this book most strongly for both graduate and undergraduate students. Even at \$55, it is a book that should at best be in the library of every School of Pharmacy and laboratory with interest in natural products.

J. MICHAEL EDWARDS, *University of Connecticut*

The Total Synthesis of Natural Products, Vol. 6. JOHN APSIMON. John Wiley & Sons, 605 Third Avenue, New York, NY 10158. 1984. xi+291 pp. 16×23.5 cm. \$44.00.

Thirty-five years ago, the synthesis of a complex natural product was a marvel to be wondered at. Today, total syntheses pour out unceasingly. *Synthetic Pathways* listed over 50 in its June–October issues, while *Heterocycles* faithfully records each month the new naturally occurring heterocycles that have been isolated and those (a smaller number) that have been synthesized. ApSimon's volumes provide an excellent way of getting a good picture of the synthetic work done in specific families of compounds. Volume 6 contains five chapters which continue coverage given in Volumes 1 and 2. The topics are the total syntheses of aromatic steroids (1972–81 Taub), genes (a continuation to 1982 of the chapter on the synthesis of nucleic acids in Volume 2 by Narang, Sung, and Wightman), triterpenes (1973–81 by ApSimon, Fyfe, and Greaves), carbohydrates (1972–81 by Zamojski and Gryniewicz), and pyrrole pigments (1973–80, by Jackson and Smith). The chapters are organized along the same lines as the earlier reviews, thus facilitating reference back.

The synthesis of estrone still attracts much attention. The main development over the past ten years has been the orthoquinodimethane approach. The chapter on genes describes the most dramatic advances. This is not a surprise since the corresponding chapter in Volume 1 ended with the first synthesis of a gene. Progress in triterpenes has been slow. The orthoquinodimethane approach has also been used in

this area and Ireland, one of the early workers in the field twenty years ago, is still very active. The chapter on carbohydrates is the longest in the book and reflects the large number of chemists interested in these compounds. Finally, the pyrrole pigments attract many workers. To some extent, the great activity in this field must have been sparked by Woodward's work on chlorophyll and Vitamin B₁₂.

The individual chapters are well-written and give a thorough coverage of their subjects. Taub's was particularly well-done. The chapter on genes became heavy going, towards the end, to a nonspecialist in the field. Perhaps one would be well-advised to read the preceding chapter in Volume 1. Although the text of the carbohydrate chapter was well-done, the diagrams were very badly placed: one was continuously having to turn forward to find the corresponding diagrams. Surely this should have been avoided.

In spite of all our progress, there are, except perhaps in genes, few really significant breakthroughs described in this volume. To a large extent, we still follow in the pathways laid down by the great masters (Woodward, Stork, Johnson, and Corey) during the late 1940s to early 1960s. As appears inevitable in most multi-authored books, the coverage is three to four years behind. However, the volume keeps up the high standard of its predecessors and will surely be in every chemistry library. Its price, by today's standards, is not unreasonable for personal ownership.

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Biology and Chemistry of Plant Trichomes. ELOY RODRIGUEZ, PATRICK L. HEALEY, and INDIRA MEHTA, editors. Plenum Press, 222 Spring St., New York, NY 10013. 1984. vii + 255 pp. 25.5 × 17 cm. \$39.50.

The biological and chemical properties of plant trichomes are of great importance as the epidermis of plants is where the action is in many coevolutionary relationships. The editors of this volume have attempted to bring together available literature related to this subject. Various chapters touch on the anatomical, developmental, systematic, ecological, and chemical nature of trichomes. The structure and ultrastructure of plant trichomes is introduced by H. Dietmar Behnke. The structure, development, and composition of trichomes of *Cannabis sativa* is treated by P.G. Mahlberg, C.T. Hammond, J.C. Turner, and J.K. Hemphill. The systematic implications of flavonoids secreted by plants (primarily ferns) is authored by E. Wollenweber. R.L. Peterson and J. Vermeer discuss the histochemistry of trichomes. The cellular basis of trichome secretion is covered by W.W. Thomson and P.L. Healey. The ecology and ecophysiology of leaf pubescence in North American desert plants is the topic of a chapter by J. Ehleringer. Probably the most outstanding chapter is that by R. Croteau and M. Johnson which deals with the biosynthesis of terpenoids. The final chapter by R.G. Kelsey, G.W. Reynolds, and E. Rodriguez is very helpful as examples and references for many types of chemically mediated coevolutionary interactions are compiled. The book is indexed.

After reading the volume, the reader may feel that there are many points not treated or treated in an abbreviated manner. In large part, this probably reflects the gaps in our knowledge on this subject. Hopefully, this work will spark further studies in this interesting area.

The book is well-written, relatively free from typographical errors, and contains a lot of information not readily available elsewhere. It will be a worthwhile addition to the libraries of phytochemists, ecologists, plant anatomists, and pharmacognosists.

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The United States Pharmacopeia, 21st revision. *The National Formulary*, 16th edition. By authority of the United States Pharmacopeial Convention, Inc. Prepared by the Committee of Revision and published by the Board of Trustees, 12601 Twinbrook Parkway, Rockville, MD 20852. 1984 (Official from January 1, 1985). lviii + 1683 pp. 8.5 × 11.5 cm. \$155.

This is not only the largest *USP-NF* ever, monographing more drug substances and drug products with more technologically advanced requirements than any previous edition, it is also a slim shadow of the official compendia yet to come. When the Pharmacopeial Convention confirmed in 1980 that the Committee of Revision should attempt to include, by 1990, monographs for all drug entities and, to the extent possible, all drug products marketed in this country, an unprecedented expansion was foreordained.

Persons unfamiliar with recent developments in the American official drug compendia need to recognize that the *USP-NF* represents a consolidation of two formerly separate volumes devoted to drug standards. For reasons associated more with tradition than with logic, both names have been retained. The scope of the *USP* is restricted to drug substances and dosage forms; the *NF*, to pharmaceutical ingredients. If an article is both a therapeutic agent and a pharmaceutical ingredient, it is included in the *USP*. The therapeutically significant natural drugs (belladonna, digitalis, ergotamine tartrate, hydrocortisone,

opium, penicillin G potassium, and rauwolfia serpentina, for example) are thus found in the *USP*; many others (such as, agar, cinnamon, glycyrrhiza, starch, and the volatile oils) are monographed in the *NF*. A combined index facilitates use of both sections.

Individual monographs arranged in alphabetical order are typically comprehensive. In the one titled "Rauwolfia Serpentina," the drug is first defined (unfortunately, the name of the genus from which it is derived is misspelled), its reserpine-rescinnamine-type alkaloid content is specified, then information is presented on packaging and storage, reference standards, botanic characteristics, loss on drying, microbial limit, acid-insoluble ash, stems and other foreign organic matter, chemical identification (two chromatographic methods are utilized), and, finally, assay. The monographs on other vegetable drugs are similar.

Although some of the foreign publications devoted to drug standards have shown considerable improvement in recent years, the United States is indeed fortunate in having the best drug standards and the best compendial presentation of them of any nation on earth. The *USP-NF* is not just highly recommended, it is a must for anyone dealing with, or requiring information about, the standards of quality of medicinal agents.

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The Organic Constituents of Higher Plants, 5th Edition. TREVOR ROBINSON. Cordus Press, P.O. Box 587, Amherst, MA 01059. 1983. iv+353 pp. 22×28.5 cm. \$14.75.

This volume is a revised and expanded edition of earlier editions by the same author; the 4th edition was reviewed in this journal in 1981 [*J. Nat. Prod.*, **44**, 629 (1981)]. The author states in his preface that the purpose of the book is to provide a summary of the major classes of organic natural products, primarily for the benefit of botanists and pharmaceutical chemists. Detailed discussions of such things as structural elucidations and biosynthetic pathways are thus not included, but the author does summarize a large amount of information on a wide variety of natural products in an economical and effective way. A particular strength of the book is its thorough and recent documentation; of the 2400 references in the book, 700 are new to this edition.

This volume can be recommended to all scientists interested in natural products as a valuable overview of and introduction to the literature.

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