

Book Reviews*

Industrial Microbiology and the Advent of Genetic Engineering. A Scientific American Book. W. H. Freeman and Co., San Francisco. 1981. 108 pp.

A group of articles reprinted from recent years of "Scientific American", dealing with recombinant DNA and related subjects.

M. C. W. Smith

The Analysis of Dietary Fiber in Food. Edited by W. P. T. James (Addenbrookes Hospital, Cambridge, England) and O. Theander (Swedish University of Agricultural Sciences, Uppsala, Sweden). Volume 3 of "Basic and Clinical Nutrition". Edited by W. P. T. James, R. H. Herman, and G. A. Bray. Marcel Dekker, Inc., New York. 1981. x + 276 pp. \$35.00.

This book summarizes a meeting that was held in December 1978 in Cambridge to discuss the results of an analytical exercise in the comparative analysis of fiber in foods. The authors of 14 of its 15 chapters describe the analytical approaches taken and results obtained from the analysis of a common series of food samples that were provided by the Dunn Nutrition Unit in Cambridge. The 15th chapter is a summary of the discussion session.

Clearly this book is of value to those interested in the analysis of dietary fiber. However, the volume would be of greater value if an index were provided.

William C. Kuryla, Union Carbide Corporation

Pesticides Studied in Man. By W. J. Hayes, Jr. (Vanderbilt University). Williams & Wilkins, Baltimore, MD. 1982. xiv + 672 pp. \$90.00.

This is another "classic" that should be on the bookshelf of anyone who has an interest in the field of toxicology and health effects of agricultural chemicals. Thirteen chapters cover the following topics: inorganic and organometal pesticides; pesticides derived from plants and other organisms; synergists; propellants, solvents, and oil insecticides; fumigants and nematocides; chlorinated hydrocarbon insecticides; organic phosphorus pesticides; carbamate pesticides; nitro compounds and related phenolic pesticides; synthetic organic rodenticides; herbicides; fungicides and related compounds; and miscellaneous pesticides.

While this volume is not without a few mistakes (such as the error in the structure for carbamates—p 439), it is highly readable and quite complete. The index is excellent.

William C. Kuryla, Union Carbide Corporation

Pesticides Analytical Methodology. Edited by J. Harvey, Jr. (E. I. DuPont de Nemours & Co.) and G. Zweig (Environmental Protection Agency). American Chemical Society, Washington, D.C. 1980. x + 406 pp. \$38.00.

This 20-chapter volume is a compilation of papers presented at a symposium sponsored by the Divisions of Pesticide Chemistry and Analytical Chemistry at the 178th Meeting of the American Chemical Society in September 1979.

The chapters cover a wide range of analytical techniques as well as reflecting the recent trend of methods development in pesticide residues analysis. The first seven chapters, almost one-third of the volume, deal with various aspects of high-performance liquid chromatography (HPLC). Chapter 1 presents metabolism studies, with primary emphasis on radiochromatographic techniques. Chapter 2 describes the designs of automated systems for sample treatment. Two articles discuss HPLC separation: Chapter 3 on the evaluation of column performance and Chapter 4 on the improvement of mobile-phase selectivity in reversed-phase chromatography. Three articles are devoted to the detection technique: electrochemical detection at the picomole level, with discussions on the phenolic and aromatic amine residues (Chapter 5); a comparison of precolumn and postcolumn fluorogenic labeling (Chapter 6); and the fluorescence and UV detection of various pesticide residues in agricultural products as separated on a bonded CN polar phase (Chapter 7).

Thin-layer chromatography (TLC) is discussed in three articles. Chapter 8 describes in situ fluorometry for quantitative analysis. Chapter 9 compares the use of several precoated high-performance TLC plates. Chapter 14 describes in detail the quantitative TLC procedures for forensic investigation of pesticide residues in human organs.

A column cleanup procedure using a new large-pore-size silica gel in

an automated continuous flow system and Pye moving wire detector is reported in Chapter 11. Advances and applications of chemical derivatization are systematically discussed in Chapter 12. A desk-top computer network directly interfacing with liquid scintillation counters is described in Chapter 16. Other important techniques reported in this volume are Fourier transform infrared spectroscopy (Chapter 17) and negative-ion mass spectrometry (Chapter 19).

Methodologies for two specific groups of compounds are presented: 2,3,7,8-tetrachlorodibenzo-*p*-dioxin in human milk (Chapter 15) and organotin residues in agricultural products (Chapter 20). In both articles, mass spectrometry is used for the determination. Assessment of pesticide residues in the air near agricultural treatment sites is described in Chapter 10 and that of human exposure in Chapter 13. One article, Chapter 18, reviews the immunochemical technology for pesticide analysis. (It is fitting that this excellent review is dedicated to the memory of Dr. C. D. Ercegovich.)

This volume has covered quite adequately the latest analytical techniques. The articles are necessarily concise, but the presentations are clear and well written. Most of the papers report the recent experimental works by the authors who are the leading active researchers in the field of pesticide analysis. This reviewer feels that the organizers of the Symposium as well as the authors have done an excellent job in providing this volume, which should be a useful timely reference for the practicing pesticide analyst. It is also interesting to note that perhaps gas chromatography may have been considered as a "maturing" field; this technique, per se, is not included in this volume.

Han Tai, University of Southern Mississippi

Advances in Heterocyclic Chemistry. Volume 30. Edited by A. R. Kartzky. Academic Press, New York and London. 1982. ix + 408 pp. \$76.50.

This volume continues the pattern of providing some chapters on subjects not reviewed before and some that bring contributions in earlier volumes up to date. One of the new chapters deals with a new set of ring systems, the heteroadamantanes (T. Sasaki). The systems included range from simple aza-, oxa-, and thiaadamantanes to those with several heteroatoms and two or more different heteroatoms. The other three new topics are on reagents for heterocyclic synthesis: Azodicarbonyl Compounds (C. J. Moody); Sulfur Transfer Reagents (M. Davis); and Transition Organometallic Compounds (J. L. Davidson and P. N. Preston).

Photochemistry of heterocyclic compounds has grown so much from the time when it was reviewed in one chapter that it now requires two chapters to bring it up to date. The first, on nitrogenous heterocycles (S. T. Reid), appears in this volume. Furan chemistry (F. M. Dean) and Selenophenes (A.-B. Hörnfeldt) are brought abreast of the times in the two remaining chapters.

The Plastically Crystalline State (Orientationally Disordered Crystals). Edited by J. N. Sherwood (University of Strathclyde). John Wiley and Sons, New York. 1979. xxvi + 383 pp. \$48.95.

Molecular solids featuring a relative ease and high degree of deformability were first classified as "cristaux plastiques" by Timmermans in 1938. Materials exhibiting such behavior had typically globular shaped molecules with a significant degree of orientational disorder. The present work focuses on recent developments in the relatively new and growing field of plastic crystal research. The book is the first devoted to this topic and serves to update the state of the art since the 1959 Oxford Conference. Editor and contributor Sherwood has done a fine job with coverage and integration of objects; particularly noteworthy are the several chapters on scattering methods and spectroscopic techniques. The usefulness of the book is enhanced by the uniform, careful editing of all chapters. It contains an informative table of contents as well as both a compound and a subject index. Eleven contributors, each writing in his area of expertise, provide the following ten chapters: The Crystal Structure of Some Plastics and Related Crystals (W. J. Dunning); Lattice Defects, Self-Diffusion, and the Plasticity of Plastic Crystals (J. N. Sherwood); Diffuse X-ray Scattering by Orientationally-Disordered Crystals (R. Fourt); Dielectric and Acoustic Studies (R. A. Pethrick); NMR Studies of Plastic Crystals (N. Boden); Rayleigh and Brillouin Scattering from Plastic and Related Crystals (A. J. Hyde); Infrared and Raman Studies of Molecular Motion in Plastic Crystals (R. T. Bailey); Neutron Scattering Studies of Plastic Crystals (A. J. Leadbetter and R.

*Unsigned book reviews are by the Book Review Editor.

E. Lechner); Correlation of Dynamic Observations of Molecular Motion in Plastic Crystals (R. A. Pethrick); Theoretical Aspects of Solid Rotator Phases (A. Huller and W. Press).

The approach of each chapter is to critically assess the experimental techniques, quality of data, and current theoretical understanding. Also, frequent indications of directions for future work, for example, the use of neutron elastic scattering to separate out the superposed diffuse scattering from orientational disorder and thermal motion, are given. Readers will not only derive an appreciation of the dynamics of reorientation and order-disorder phase transitions for these special materials but much of the discussion is relevant to workers in other, more established fields such as defect studies of molecular solids and orientation of liquid crystals.

E. L. Thomas, *University of Massachusetts*

Biosynthesis of Natural Products. By Paolo Manitto (University of Milan). Halsted Press, John Wiley & Sons, New York. 1981. 548 pp. \$114.95.

This text was written, as the author points out in his preface, for chemistry and biology undergraduates and graduates who are interested in chemical aspects of secondary metabolism. The author also points out several limitations to his book including the absence of coverage of the biosynthesis of alkaloids and for the most part antibiotics because of the need for brevity. The majority of the book is devoted to examinations of the biosynthesis of polyketides, terpenes, steroids, and shikimate derived natural products of plant and animal origin.

The first three chapters are introductory and cover primary and secondary metabolism and enzyme reactions. The treatment of basic biosynthetic pathways and techniques and enzyme reactions and kinetics in these chapters is well done. The remainder of the information found in these chapters (cell structure and primary metabolism) could have been omitted or shortened. The audience that the author is trying to reach should already be familiar with these subjects and by omitting them here more space would have been available for discussion of the major topics of the book.

Subsequent chapters cover in detail the main biosynthetic topics of this book. Here the author uses primarily well-drawn schemes to illustrate general and specific enzymatic transformations. Since plant-derived natural products are the compounds covered extensively, most of the biosynthetic information is derived from incorporation studies with ^3H - or ^{14}C -labeled precursors; however, little information is provided on the specific chemical degradations used to extract the biosynthetic conclusions. No information at all is provided on the use of stable isotopes in conjunction with NMR as a tool to elucidate pathways to the selected bacterial and fungal secondary metabolites mentioned in the text. The author overcomes these omissions and others in two ways—references and appendices. He lists a number of pertinent references at the end of each chapter. Unfortunately, although the references are numbered, they are not cited in any way in the text. The appendices, also, provide additional details and references on enzyme reaction mechanisms, stereochemistry, carbocations, and isotope effects that are not found in the text.

Overall, this text provides adequate information for the basic framework around which a course on natural products biosynthesis can be built. Its high price will, however, ensure that the book will not reach the audience for which it was intended.

Milton J. Zmijewski, Jr., *University of Utah*

The Pyrazines. By G. B. Barlin (The Australian National University). John Wiley & Sons, New York. 1981. xxi + 687 pp. \$150.00

The history of pyrazines began in 1855 with the preparation of tetraphenylpyrazine and has grown to such a size that this comprehensive treatise includes 1753 references (to as recent a date as 1980). As is customary in this series ("The Chemistry of Heterocyclic Compounds" under the general editorship of A. Weissberger and E. C. Taylor), the emphasis is on the descriptive chemistry, especially synthesis and reactions. Tables are extensive. Pyrazines bearing the principal functional groups are included, as are the N-oxides. A short chapter is devoted to ionization and spectra. A major part of the book consists of a set of "systematic tables" of simple pyrazines, in which melting or boiling points are given and references are cited.

Digestion of the information in this book demands unusual fortitude, for many entire pages are filled with nothing but names of compounds with reference numbers, arranged in continuous lines rather than in tabular columns. Another feature making for difficult reading is the almost complete lack of equations; only structures of individual compounds are shown. Fortunately, the subject index appears to list every compound mentioned in the text, enabling specific information to be retrieved.

The chapter on reduced pyrazines is stated to be "a summary of earlier reviews and more recent literature", but its format does not satisfactorily

convey a general picture of the chemistry of the systems considered. The reactions of the important class, piperazine-2,5-diones, for example, are presented in less than three pages, without generalizations or equations, and such a fundamental reaction as hydrolysis is not even mentioned.

In spite of these shortcomings, one can appreciate the enormous amount of effort required to compile this book, which is certain to be an important reference source for many years to come.

Organic Reaction Mechanisms. 1980. Edited by A. C. Knipe and W. E. Watts. John Wiley & Sons, New York. 1982. 718 pp. \$166.00.

Once again the literature on mechanisms of organic reactions has been summarized for a recently past year (December 1979 to November 1980) and, wonder of wonders, the editors have succeeded in keeping the book down to distinctly fewer pages than the previous year's volume.

This is the sort of book that deserves firm encouragement, for it performs a most useful service by making it possible for its users to keep abreast of the virtual tidal wave of new literature. The subject of mechanism is one that is particularly difficult to retrieve by conventional index devices, but not only is the subject material of this book arranged logically by type of reaction or intermediate, in 14 chapters, but there are substantial subject and author indexes.

The editors express their concern about the price of the books of the series and state that they nevertheless do not intend to sacrifice quality. Perhaps this is a suitable occasion to consider the possibility of sharpening the precision with which the material to be included is selected. Up to now, a large amount of information has been included in which the primary thrust is not mechanistic, so long as it may be considered in some way relevant to mechanism studies. The line between descriptive and mechanistic chemistry may be drawn with some latitude as to placement, and one might justifiably relocate it if economic pressures become too severe.

Food and Flavours. Part A. Introduction. Edited by I. D. Morton and A. J. Macleod (Queen Elizabeth College, Kensington). Elsevier Scientific Publishing Co., New York and Amsterdam. 1982. viii + 472 pp. \$117.00.

It is unusual to find a book on this sort of subject written by authors who have chemical sophistication. It is thus satisfying to read the sound natural product chemistry and analytical chemistry presented here. In seven contributed chapters, one learns about the sensory basis of taste and smell, the analytical methods applied to flavors, the occurrence and nature of the sulfur compounds that are surprisingly important to flavor, pyrazines in flavor, lipid degradation, etc. A whole chapter is devoted to the Maillard reaction, a name reaction unfamiliar to most organic chemists, although it was first reported in 1912. It is the reaction of amines with aldehydes and ketones (generally sugars) that takes place in complex ways when foods containing protein and pyrazines have been found among the products and it is important in flavor development.

In the extensive lists of references, the authors treat the reader to the luxury of having the titles of the articles as well as the conventional citation. A particularly enjoyable one is, Another catty odour compound causing air pollution.

Further volumes are promised. It is to be hoped that the publisher will include running headings on the pages; their absence in this volume is an irritating inconvenience.

The Chemistry of Amino, Nitroso, and Nitro Compounds and Their Derivatives (Supplement F to The Chemistry of Functional Groups). Edited by S. Patai. xiv + 1438 pp. \$322.50.

This supplementary work, bound in two parts, relates to two separate original volumes and in addition includes some subjects not belonging strictly within the named rubrics. In 28 chapters by 37 contributors, much of the original work of 1969 and 1970 is brought essentially up-to-date (the terminating dates for review of the literature are not stated, but the editors' preface is dated July 1981). The chapters are mostly completely new topics, rather than extensions of the earlier chapters, and thus serve to fill in gaps in the coverage of the earlier works. The number of functional groups treated for the first time in this series is substantial: nitrones, nitroxides, nitrosamines, enamine, and ynamines. The chapters devoted to them are selective rather than general in their emphasis, however, and aspects reviewed elsewhere in the recent past are generally not covered. Thus, for example, whereas the structure and reactions of nitrones are thoroughly discussed, their synthesis and medicinal chemistry are not.

The quality of this important series is maintained, in both content and production, and this supplement should have a claim of high priority on the budgets of chemistry libraries. It seems rather a pity, however, that the somewhat disparate subjects of amines on the one hand and nitro and nitroso compounds on the other are mingled when they could have been organized into two more homogeneous volumes.