and recrystallized from isopropyl ether as colorless needles.

Acknowledgment. This investigation was supported in part by a grant from the Ministry of Education, Sciences and Culture, Japan. The authors wish to thank Miss E. Manai for her technical assistance and Mrs. M. Ohe for elemental analyses.

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Book Reviews

Drugs and Central Synaptic Transmission. Edited by P. B. Bradley and B. N. Dhawan. University Park Press, Baltimore, London, and Tokyo. 1976. xiv + 391 pp. 16 × 24 cm. $49.50.

This text is a collection of papers presented at a symposium in Oct 1974, at the Central Drug Research Institute in Lucknow, India, entitled, "Use of Pharmacological Agents in the Elucidation of Central Synaptic Transmission". The book contains material covering a broad spectrum of information on central neurotransmitter systems and is a compilation of three reviews and 33 research articles.

The text begins with two excellent reviews, viz., microelectrophoretic principles and practice by D. R. Curtis and a discussion by E. Costa et al. on basic principles of mass fragmentography, steady-state kinetics, and neurotransmitter system dynamics. Both of these chapters present, in detail, the general concepts, and importance, of recent advances in methodology. D. R. Curtis discusses the use of pharmacological agents in microelectrophoretic investigations for elucidating specific mechanisms in the process of neurotransmission at discrete neuronal sites. In addition, the chapter presents both the technical advantages and disadvantages associated with these studies. Costa and his colleagues stress the importance of turnover dynamics in Chapter 2 on multiple ion detection studies of steady-state kinetics and neurotransmitter system dynamics. The basic principles of mass fragmentography are presented as well as data on neurotransmitter interactions, viz., cholinergic–noradrenergic, cholinergic–serotonergic, and cholinergic–dopaminergic relationships, in specific nuclei of the brain.

A review of the effects of drugs on monoamines in the central nervous system is presented by N. E. Anden in Chapter 3. This short but concise summary details dopaminergic mechanisms in the corpus striatum and limbic system and describes the serotonergic and noradrenergic processes in the spinal cord.

These three review chapters are well presented and are worthwhile reading for neuroscientists. The remaining 33 chapters deal with various topics without any logical sequence of presentation. This compilation basically includes recent laboratory findings and the chapters are written as basic journal research reports, including a short introduction, methods, results, and a discussion. The topics covered basically stress the use of drugs as tools for elucidating basic mechanisms. Practically all aspects of central neurotransmission are presented, including pharmacological, anatomical, physiological, biochemical, and behavioral information.

The title of the book, i.e., "Drugs and Central Synaptic Transmission", may be somewhat misleading, for the text is more accurately described by the title of the symposium. The book is not a general treatise on pharmacological aspects of central neurotransmission and perhaps was not meant to be. Specific chapters in the book may be useful as a reference to those involved in that particular area of research.

Vanderbilt University School of Medicine **Lynn Wecker**

Biological Aspects of Inorganic Chemistry. Edited by A. W. Addison, W. R. Cullen, D. Dolphin, and B. R. Jones. Wiley-Interscience, New York, N.Y. 1977. vii + 410 pp. 15.5 × 23.5 cm. $22.00.

This book presents the invited papers of a 1976 Symposium on the title subject. The program choices were well considered, so the book represents an interesting overview of some current topics in inorganic biochemistry. As with many published symposia the nature of the subject matter and the level of the presentations vary widely. Particularly noteworthy to the reviewer were Buckingham's chapter on hydrolases and Gray's article on protein electron-transfer mechanisms. Other topics include oxidative phosphorylation (Wang), zinc biochemistry (Vallee), iron–sulfur proteins (Holm), ionophores (Dunitz), B_{12} (Abeles), environmental aspects (Wood et al.), heme redox proteins (Williams), and two conspicuously abiological treatments of N_2 fixation (Shilov, Chatt). Proofing is unfortunately sparse. Gray's otherwise superb chapter is marred by a number of serious typographical errors (e.g., omission of exponential terms in equations).

It is disappointing that some mechanism was not provided for including some poster session material, as this material is often referred to in the main text.

Despite these minor criticisms, the overall quality of the volume is sufficiently high to justify its moderate price. It will serve as a valuable reference not only for specialists but also for those seeking an overview of some recent topics of bioinorganic interest.

University of Rochester **George McLendon**

Methods of Development of New Anticancer Drugs. USA–USSR Monograph. Edited by Joseph F. Saunders and Stephen K. Carter. National Cancer Institute Monograph No. 45. U.S. Government Printing Office, Washington, D.C. 1977. 262 pp. 22 × 28.5 cm. $9.50.

This monograph evolved from the USA–USSR Cooperative Agreement of 1972. The publication is for sale *only* by the

Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, with payment required in advance.

This book is a welcome document indeed which describes the experiences of both countries in the synthesis of potential antitumor agents and their evaluation for anticancer activity in a wide range of experimental systems and screening protocols. It is particularly useful for those scientists involved in this area of research who may need to be updated on the Russian work.

Part I of this monograph contains information regarding the development of the Cancer Chemotherapy Program of the National Cancer Institute of NIH. Of particular interest to medicinal chemists is the excellent chapter by Harry B. Wood, Jr., Chief, Drug Synthesis and Chemistry Branch, Division of Cancer Treatment, NCI. To date the amazing number of over 275 000 compounds with established structures has been tested in the antitumor screen through the National Cancer Institute. Included in this chapter are not only the names and structures of compounds with clinical activity which have come through the NCI program, but also these compounds have been grouped and discussed with regard to what is known regarding the mechanism of action. Perhaps of even greater interest is a comparable list of compounds (with structural formulas) of unique antitumor activity presently in preclinical development.

The chapters on screening and animal models are ably covered by such veterans as Goldin, Venditti, and Carter who have done much to develop the screening programs in this country over the years. Contained in the center of the book is a series of appendices beginning with "The Linear Array" which is carefully worked out in a series of decision networks, IIA, IIB, IV, V, and VI, which, like the theoretical industrial PERT chart, is a reminder of the intensely bureaucratic system created to move a potential drug toward clinical trial. How unbelievably slowly this monstrous system grinds is perhaps only understood by those medicinal chemists who have submitted compounds which have passed the first criteria for activity only to wait for years for something further to happen. Particularly helpful are the protocols for in vivo and in vitro screening contained in appendix III and the preclinical toxicology protocols in appendix IV. This reviewer was particularly impressed with the memorandum by Saul A. Schepartz on p 155 which states in effect that active compounds in the prescreen will now be tested against a spectrum of animal models of specific human tumors. This is indeed encouraging news and should greatly aid in selecting those antitumor agents of superior spectrum and activity.

Part II of this monograph contains data and methodology of the Soviet scientists. To those of us who recall Larionov and his outstanding work with sarcolysin and related alkylating agents of the peptide type, the historical chapter by Perevodchikova is especially appreciated and it reminds us that the Soviet contribution in this area is indeed no small one.

Of greatest interest to this reviewer was the section "Trends in Searching for Antitumor Compounds" by Maria N. Preobrazhenskaya, who is well-known for her work in the synthesis of nucleosides and nucleotides. The other chapters by Soviet scientists are well written and very interesting. Unfortunately, the editors apparently neglected to submit some of the "proof copies" to the original Russian authors since there are an inordinately large number of serious errors in the structural formulas, which may serve to confuse the reader more than help him. For example, on p 235 the formula for novembitol is shown as a cyclohexane derivative instead of a derivative of o-xylene. On pp 237–239, the aziridine and piperidine ring nitrogens are "outside" the rings and the free floating methylene and cyclopropyl groups are difficult, even for one experienced in this research area, to ascertain. On p 238 the formula for diiodobenzo-TEPA is garbled beyond recognition with two "CH" groups attached ortho to a benzene ring. Ftorafur, and tetrahydrofuryl derivative of 5-fluorouracil synthesized by Hiller in 1966 at the Latvian SSR Academy of Sciences, has received considerable clinical study, first in Russia and later in this country. Ftorafur is also a major product in Japan and has been used there with considerable clinical success. It is interesting that the attachment of the tetrahydrofuryl group to an active base simulating an analogue of deoxyribose was first reported in this country by Robins and co-workers [L. R. Lewis, F. H. Schneider, and R. K. Robins, *J. Org. Chem.*, **26**, 3837 (1961)] for 6-mercaptopurine. Unfortunately, this *very* active antitumor agent was shunted by the NCI system to category IVb and classified as an *analogue* of 6-MP with no further interest. We, of course, are now very much aware that the tetrahydrofuryl ring imparts to the base analogues, such as 6-fluorouracil, significantly different pharmacologic, biochemical properties and clinical effects as outlined by the Russian workers in this monograph. The structural formula for ftorafur is in error on pp 190 and 239; however, it is correctly depicted pp 34 and 199. Other erroneous structural formulas are to be found on pp 66, 185, 186, 190, and 200–202. Despite such errors, the excellent bibliography given by the Russian authors and the concise summary of Russian work are exceedingly useful. Indeed every medicinal chemist in cancer research in this country will wish to have access to a copy of this useful monograph. As expressed by Frank J. Rauscher in the closing paragraph of the foreward, "This monograph serves as an illustration of a significant, tangible product of American–Soviet cooperation on the problem of malignant neoplasia." Such a collaborative exchange between scientists of both countries has indeed been rewarding. Perhaps a similar exchange with Japanese investigators in cancer research may also span the language barrier and be equally beneficial to all concerned in man's fight against cancer.

Brigham Young University **Roland K. Robins**

Photochemistry. Volume 8. Specialist Periodical Reports. By D. Bryce-Smith, Senior Reporter. The Chemical Society, Burlington House, London. 1977. xi + 644 pp. 14 × 22 cm. $74.00.

This is the latest in a series of annual volumes reviewing the literature in the still expanding field of photochemistry. The literature covered here was published between July 1975 and June 1976 with the exception of one chapter. The breakdown of the volume is as follows: Part I on Physical Aspects of Photochemistry, including chapters on Developments in Instrumentation and Techniques (a 2-year review going back to July 1974), Photophysical Processes in Condensed Phases, and Gas-phase Photoprocesses; Part II on Photochemistry of Inorganic and Organometallic Compounds; Part III on Organic Aspects of Photochemistry (Carbonyl Compounds, Enone Cycloadditions and Rearrangements, Olefins and Related Compounds, Aromatic Compounds, Photo-reduction and -oxidation, Compounds with Heteroatoms other than Oxygen, and Photoelimination); Part IV on Polymer Photochemistry; Part V on Photochemical Aspects of Solar Energy Conversion; and Part VI on Chemical Aspects of Photobiology. The last section is being included for the first time in this series, but only two topics are covered: photosynthesis and vision.

These volumes have become indispensable to the practicing photochemist as critical guides to the literature of the period in question. The lag time between publication of the original paper and coverage in these volumes is about as short as is possible, compatible with the high quality of these volumes. Although most papers are summarized in one or two sentences, many papers are summarized and discussed in considerable detail along with tables, figures, and kinetic schemes. Structural formulas are almost inerringly accurate, at least in cases where this reviewer has read the original paper. The reviewers are obviously encouraged to be critical and to comment on the papers reviewed, which adds to the readability and value of these volumes. Considering the enormous activity in many fields of photobiology, it is rather a pity that the review was confined to only two topics, again based only on the 1975–1976 literature. The reviewers are all established investigators in their own right.

Medicinal chemists will not find too much of direct interest to them in this or other volumes in this series, unless they are involved in one way or another with photochemistry, e.g., use of photoreactions in synthesis, stability of pharmaceuticals to light, some aspect of photobiology. In such cases, they can readily find the portions of the volume of relevance to their own work through the detailed Table of Contents. There is no subject index, but there is an author index. If they simply wish to follow the progress in research in this field as an intellectual exercise, portions of the volume make for quite lively and interesting reading.

All chemistry libraries which have at least a pretense of completeness should have a copy of this volume and a standing order for future volumes in the series. Relatively few chemists with the exception of dedicated photochemists will want a personal volume, considering the cost. Personally, I frequently consult these volumes and benefit from copies in my private collection. The quality of the printing, reproduction of figures, and the paper itself is excellent, which is refreshing in these days of shortcuts and photoreplication. The senior reporter and his colleagues are to be congratulated on a demanding assignment in which a very high standard of performance has been set and consistently achieved.

New York University **David I. Schuster**

Encyclopedia of Chemical Technology. Third Edition. Volume 1. Edited by Kirk Othmer. Wiley-Interscience, New York, N.Y. 1977. xxix + 967 pp. 18.5 × 26 cm. $120.00. Subscription price $95.00.

Volume 1, the first of 25 volumes in this Third Edition of the well-known encyclopedia, appeared in Dec 1977 and covers industrial products, natural materials, and processes from A (abherents) to alkanolamines; additional volumes will be published at the rate of approximately four volumes per year. The Third Edition places emphasis to important present-day topics of concern to all chemists such as energy, health, safety, toxicology, and new materials. New features include the use of SI units as well as English units, Chemical Abstracts Service Registry Numbers, and complete indexing. (No index is included in Volume 1.)

Of particular interest to medicinal chemists will be the sections on alcohols, broken down into higher aliphatic (R. A. Peters), polyhydric (J. Weber and J. Daley), and polyhydric (sugars) (F. R. Benson). A heroic presentation of the alkaloids was attempted by G. A. Cordell in 60 pages, 536 references including a supplementary general reference list containing an additional 37 references. [Shamma's important treaties on the isoquinoline alkaloids (1972) is missing.]

Libraries that can afford the investment in this series would be well advised to make room for this valuable reference source.

Staff Review

Analysis of Drugs and Metabolites by Gas Chromatography–Mass Spectrometry. Volumes 2 and 3. By B. J. Gudzinowicz and M. J. Gudzinowicz. Marcel Dekker, New York, N.Y. 1977. Volume 2 (Hypnotics, Anticonvulsants, and Sedatives): viii + 493 pp; 15 × 22.5 cm; $45.00. Volume 3 (Antipsychotic, Antiemetic, and Antidepressant Drugs): x + 268 pp; 15 × 22.5 cm; $29.75.

These volumes represent a very comprehensive treatment of gas chromatographic and gas chromatographic–mass spectrometric analyses of important groups of drugs. Despite the preponderance of information in the literature, the authors have succeeded in reviewing virtually all of the pertinent papers through 1975.

Volume 2 is divided into three chapters with a total of 673 references. Chapter 1 is subdivided with a section on methods of isolating drugs from biological media and a section on the analyses of barbiturates. Chapters 2 and 3 deal with analyses of nonbarbiturate sedatives, hypnotics, and anticonvulsants. These include chloral derivatives, tertiary acetylenic alcohols, cyclic ethers, carbamates, ureides, piperidenediones, quinazolones, hydandoins, succinimides, and an extensive section on benzodiazepines. Volume 3 is divided into two chapters with a total of 329 references. The first chapter deals with antipsychotic and antiemetic drugs, including phenothiazines, butyrophenones, and thioxanthenes. Chapter 2 is devoted to antidepressants, particularly monoamine oxidase inhibitors and tricyclics.

Much of the analytical information is presented in tabular form and supplemented by figures and discussion. The bulk of this information concerns the following: drug nomenclature, structures, and physical constants; sample preparation procedures, including methods of extraction and derivatization; GC conditions, including carrier gas flow rates and temperatures; GC retention time data with a variety of liquid phases and solid supports; GC detector response factors for various compounds; makes and models of instruments employed; pharmacokinetic data; figures of typical chromatograms; and mass spectral data. A shortcoming of these volumes is the inclusion of too much information. Data have been taken directly from the referenced sources with little editing, which has resulted in the duplication of some material and the inclusion of some unrelated, unimportant, and obsolete information. In general, the authors fail to critically evaluate competing analytical methods. The organization of much of the material is difficult to rationalize. For example, the section supposedly devoted to isolating drugs from biological media (Volume 2) also contains several tables and a discussion of mass spectral data, as well as some discussion of mass spectrometric instrumentation. The section on antidepressants (Volume 3) also contains 15 pages of information (structures, molecular weights, and GC data) on pesticides, herbicides, and related compounds. That same section also contains GC data of various alkaloids. The organizational problems are not completely solved by the subject index, because of a lack of detail. For example, one subject ("Use of Internal Standards") heads a list of about 140 page numbers without the benefit of subheadings.

Despite the criticism that the most pertinent information presented in these two volumes should have been condensed into one smaller volume for purposes of clarity, ease of information retrieval, and cost, the authors must be commended. They have assembled a tremendous amount of information on the analyses of these particular drugs. Volumes 2 and 3, and undoubtedly succeeding volumes, will be valuable reference sources for those engaged in drug analysis.

University of Colorado **John A. Thompson**

Fluorine Chemistry Reviews. Volume 8. Edited by Paul Tarrant. Marcel Dekker, New York and Basel. 1977. viii + 206 pp. 15.5 × 23.5 cm. $29.50.

This volume continues the subject of organofluorine chemistry found in the preceding seven volumes and contains four chapters entitled "The Pentafluorophenyl Group: Effects on Reactivity of Organic Compounds" by Robert Filler (37 pp, 111 ref), "Ionic Addition Reactions of Halomethanes with Fluoroolefins" by O. Paleta (32 pp, 86 ref), "Halogen Derivatives of Group VIA Oxyacids" by Friedhelm Aubke and Darryl D. DesMarteau (45 pp, 165 ref), and "The Preparation and Reactions of Fluoromethylenes" by Donald J. Burton and Jerry L. Hahnfeld (69 pp, 290 ref). An author index and subject index are provided and all chapters are referenced to 1976 with an occasional 1977 citation.

Each of the four chapters is well written and of interest to medicinal chemists. However, to this reviewer, Chapters 1 and 4 seem to be most relevant to medicinal chemical research. For example, Chapter 1 considers pK_a values for fluorinated alcohols and σ constants for C_6F_5, C_6H_5, and CF_3 groups. Acidity and basicity of fluorobenzoic acids are also presented. Furthermore, topics include the biologically significant poly(fluoroaryl-α-amino acids) and certain fluorinated fluorene, benzofuran, and indole analogues. In addition to considerable other chemistry, Chapter 4 summarizes the preparation and synthetic utility of fluorochlorocarbene, fluorochloroylide, phenyl(fluorodichloromethyl)mercury, fluorobromocarbene, fluoroiodocarbene, and difluorocarbene. Chapter 2 summarizes the influence of fluorine on olefin addition reactions. The Prins reaction and Friedel–Crafts reactions serve as the basis for discussion of fluorine effects on the mechanism of reaction. Conclusions concerning such effects on reaction mechanisms are concisely discussed in Chapter 2. The monobasic, fluorine-containing oxy acids of the heavier group 6A elements, sulfur, selenium, and tellurium, are among those compounds found in Chapter 3.

Whereas this monograph involves the discussion of a specialized topic, it is clear that chemists interested in applying organofluorine chemistry to the study of biological systems could gain from reading this material. This reviewer found the monograph to be both interesting and informative.

The Ohio State University **Donald T. Witiak**