

References and Notes

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Book Reviews

Biochemistry of Mental Disorders: New Vistas. Edited by Earl Usdin and Arnold J. Mandell. Marcel Dekker, New York, N.Y. 1978. xviii + 268 pp. 15.5 × 23.5 cm. \$29.50.

Each year the Intrascience Foundation conducts a symposium on a timely topic and awards a gold medal to a leader in the field. Individuals previously honored by the Foundation include Carl Djerassi, Russ Merrifield, Manfred Eigen, Bernard Brodie, Sol Spiegelman, and Donald Frederickson. In 1975 Professor Seymour S. Kety received the gold medal and the symposium dealt with "New Vistas in the Biochemistry of Mental Disorders". This book represents the proceedings of the symposium. An introductory chapter by Robert Felix, the first Director of the National Institute of Mental Health, reviews the dramatic changes in psychiatric research over the years and focuses on the crucial role that Seymour Kety played as the first scientific Director of the NIMH in fostering the rigorous, fundamental scientific endeavors which set the stage for the explosive growth in our understanding of brain function. The chapter by Seymour Kety summarizes his own investigations into brain blood flow and psychiatric genetics.

The majority of the book's chapters deals with a variety of basic and clinical approaches to mental illness. Floyd Bloom elegantly reviews "Modern Concepts in Electrophysiology for Psychiatry", focusing on his work mapping out the norepinephrine pathway with cell bodies in the locus coeruleus. Arnold Mandell's chapter deals with effects of drugs on serotonin metabolism in animal brain. William Bunney reviews his clinical research clarifying how drugs act in affective disorders. George Aghajanian writes of his pioneering work clarifying how psychedelic drugs act via serotonin neurons. The following chapter by William Dement summarizes both basic and clinical research relating to sleep, a condition which depends in part on the serotonin systems whose function has been clarified by Aghajanian. Other chapters on serotonin include one on animal effects by Mark Geyer and studies on levels of serotonin metabolites in spinal fluid of psychotic patients by Malcolm Bowers. Biological research in psychiatric patients is also highlighted by studies of lithium reported in chapters by Ole Rafaelsen and Lewis Judd as well as the elegant chapter on spinal fluid metabolites of biogenic amines authored by Frederick Goodwin.

Areas covered in this book represent a broad panorama of research focused upon the biogenic amines and conducted both in animals and man. This theme reflects the major thrust of most research in biological psychiatry. While a great deal is now known of how biogenic amines function as neurotransmitters in the brain

and how numerous psychotropic drugs exert their pharmacological effects by altering amine disposition, we still have yet to find the "cause" of any major mental illness in a specific biochemical defect.

The individual speakers at the symposium describe their most up to date research. Unfortunately, even though the book was produced by photocopy from the typed manuscripts, its publication still lags more than 2 years following the symposium. Nonetheless, the high quality of much of the research described in the book makes it a valuable volume for those interested in recent advances in biological psychiatry.

Johns Hopkins University

Solomon H. Snyder

Psychopharmacology of Thiothixene. By Thomas A. Ban. Raven Press, New York, N.Y. 1978. 236 pp. 15.5 × 24 cm. \$12.50.

Thiothixene is the Pfizer analogue of the phenothiazine derivative thioproperazine. Neither the latter compound, nor its structural relative, pipotiazine, was marketed by Rhone-Poulenc, developer of both compounds, nor has that company published on their pharmacology or clinical utility (the pharmacology and clinical use of the long-chain fatty acid esters of pipotiazine have been reported extensively). Thus, a strict comparison of these three structural analogues, pharmacologically and clinically, is not possible.

The motivation for the replacement of the phenothiazine heterocycle by the thioxanthine tricycle originated in the hope that such a substitution might result in an antipsychotic drug with a decreased incidence of extrapyramidal side effects in humans. While thiothixene has been shown clinically to be as effective an agent as chlorpromazine or trifluoperazine, it has no demonstrable superiority over those older drugs. Furthermore, its extrapyramidal side effects are quite general and severe and, in the one major study, were seen in 43% of 359 patients. In addition, the drug has already produced at least one case of tardive dyskinesia.

The literature up to 1975 (245 research papers; 43 reviews) on the synthesis, metabolism, biochemistry, physiology, pharmacology, and clinical applications of thiothixene comprises the scope of this monograph. The synthesis section can be faulted for its naivete and the extraordinary number of chemical errors and the incorrect use of language present on every page; certainly, the statements (p 17) "Thiothixene may be identified chemically by the orange color produced when 10 mg of the compound is

dissolved in 2 mL of sulfuric acid", (p 39) "Studies with radioactive isotopes in rats and dogs have shown that thiothixene is promptly absorbed...", and (p 43) "a highly specific and sensitive gas chromatographic assay for thiothixene determination, utilizing mass fragmentography" certainly indicate inadequate and unsophisticated editing.

The section on biochemistry relates to experiments that are pharmacologically oriented and it is not apparent why that material is separated physically out of the pharmacological part of the book. Finally, the largest portion of the monograph and certainly its most important, the clinical uses of the drug, is presented en masse, without even a semblance of critical appraisal. This omission is a serious fault, since there is general recognition that all of the currently available antipsychotic drugs have a utility in clinical practice; the major problems lie in developing a discriminating use of an individual drug and in the elimination of the insidious practice of polypharmacy in the treatment of human psychoses. This monograph does not contribute the resolution of that problem.

The Squibb Institute for Medical Research Harry L. Yale

Handbook of Experimental Pharmacology. Volume 47. Kinetics of Drug Action. Edited by J. M. van Rossum. Springer-Verlag, New York, N.Y. 1977. xvi + 436 pp. 17 × 25 cm. \$101.20.

This volume continues the comprehensive "Handbook" series which provides critical surveys of selected areas of pharmacology. The general theme of this book is an integration of drug transport through the body with the kinetics of drug-receptor interaction.

The first chapter by W. Scheler and J. Blanck, while titled "Physicochemical Fundamentals and Thermodynamics of the Membrane Transport of Drugs", deals extensively with physiologic permeants and membrane morphology as well. Chapter 2 by the late E. Krüger-Thiemer and Chapter 3 by J. M. van Rossum, C. A. M. van Ginneken, P. Th. Henderson, H. C. J. Ketelaars, and T. B. Vree review pharmacokinetics. Krüger-Thiemer's recapitulation of classical pharmacokinetics reflects his outstanding innovations in the field including the areas of multiple dosing and nonlinear kinetics and was updated by the editor with a variety of more recent data and citations. The portion by van Rossum et al. emphasizes the pharmacokinetics of biotransformation, is reasonably updated on use of clearance concepts, and covers particularly well the kinetics of capacity-limited drug metabolism. The remaining four chapters constitute 60% of the book and deal exhaustively with drug-receptor interactions. F. G. van den Brink extensively reviews equilibrium-type molecular pharmacologic models in common use including general concepts and numerical expressions of intrinsic activity and affinity. Chapter 5 contains "A Critical Survey of Receptor Theories of Drug Action" by D. MacKay and, among others, comprehensively examines the occupation theory and the rate theory of drug interaction in the direct environment of its receptors. "Drug-Receptor Inactivation: A New Kinetic Model" by R. E. Gosselin updates his hypotheses by tracing its antecedents and establishing relationships with alternative schemes. Chapter 7 by C. A. M. van Ginneken discusses the relevance of the kinetics of drug transport and drug-receptor interaction for the effect as a tissue-dependent function and includes a useful Appendix for employing La Place transforms in resolution of a kinetic receptor model.

The book is authored by many of the innovators who present a remarkable survey of kinetic models, theory, and equations from multiple viewpoints. Undeservedly missing is a review of the kinetics of drug action in man. Each chapter is amply endowed with simulations, illustrations, and references, and the book is well indexed in terms of subject matter and authors. The late Dr. Ekkehard Krüger-Thiemer would have been delighted with the dedication in part because of the high quality and content of the book. The volume will be a particularly valuable reference book in the area of drug-receptor theory, although its price may deter the acquisition and extensive use which it deserves from researchers in related fields.

State University of New York at Buffalo

William J. Jusko

Biological Oxidation of Nitrogen. Edited by J. W. Gorrod. Elsevier/North-Holland, Amsterdam. 1978. xv + 502 pp. 17 × 24.5 cm. \$58.00.

Sixty-three of the 65 papers which were presented at the Second International Symposium on the Biological Oxidation of Nitrogen in Organic Molecules are contained in this timely volume. The first symposium on this topic was held in Dec 1971 and it is interesting to note that, in spite of vigorous research activity, many of the perplexing problems of 1971 remain to be solved.

The book is divided into seven principal sections, the first of which is entitled "N-Oxidation of Aliphatic and Aromatic Amines". Eight of the 20 papers in this section are devoted to N-oxidation of amphetamine and related phenylethylamines. The complex problem of amphetamine metabolism continues to receive attention from a number of workers, some of whom have devised elegant experimental approaches to solving the mysteries of the multiple biotransformation pathways of this relatively simple molecule. Clearly, a number of questions remain to be answered before all interested parties will agree on the nature of the primary oxidation processes which are responsible for the production of amphetamine's various metabolites. An intriguing and unsolved question concerns the relative importance of the contributions of cytochrome P-450 dependent mixed function oxidases and flavoprotein amine oxidases to aliphatic amine N-oxidation. Progress in the understanding of aliphatic amine oxidations is further inhibited by the chemical and biological lability of the N-oxidized metabolites as well as by the technical limitations imposed by available analytical methods.

Also included in the first section of the book are four papers, including a literature review, on the metabolism of morpholine and morpholine-containing compounds. The subject of one interesting paper is a genetic defect in sparteine metabolism which apparently involves an inability on the part of certain patients to N-oxidize the compound while retaining the capacity for metabolic nitrogen oxidation of other drugs.

The second section contains six papers on the N-oxidation of heteroaromatic amines. The recent findings that N-hydroxylated products are important barbiturate metabolites are discussed. Many readers will be interested to learn that an N-hydroxylated derivative may be the predominant phenobarbital metabolite in man. The importance of metabolic N-oxide formation in the disposition of some of the therapeutically important 2,4-diaminopyrimidine inhibitors of dihydrofolate reductase is discussed as well as the N-oxidation of pyridines, nicotine, pyrroles, and indoles.

Only three papers are presented in the section entitled "Enzymology of N-Oxidation". These include a discussion of the role of cytochrome P-450 in the N- and ring-hydroxylation of 2-acetylaminofluorene, a brief paper on the relationships between the binding spectra and the metabolism of *N,N*-dimethylaniline, and a discussion by Gorrod of the current status of his pK_a concept in the differentiation of enzymic N-oxidation. Unfortunately, there are no papers in this section on the enzymology of the microsomal flavoprotein amine oxidase system.

The section on analytical techniques opens with a brief literature review of chromatographic methods used for the detection and quantitation of metabolic nitrogen oxidation products. This is followed by seven papers which cover the application of liquid chromatography, mass spectrometry, polarography, and chemical methods for the study of N-oxygenated substances. The area of analysis and purification of products of biological nitrogen oxidation is one fraught with problems due to the polarity and instability of many of these molecules. Liquid chromatography appears to offer advantages over several of the other currently used techniques, but the development of sensitive and convenient assays often poses a formidable challenge.

The "Toxicology and Pharmacology of N-oxidation Products" is the general topic of 13 papers. Calder et al. describe the synthesis of *N*-hydroxyacetaminophen and report that it is stable in solution at pH values below 7 and above 12 but that it spontaneously decomposes at pH 7-12. These data add further strength to the proposal that this hydroxamic acid is a reactive and toxic metabolite of acetaminophen. The reactivity of conjugates of arylhydroxamic acids, the relationship between aniline metabolism and ferrihemoglobin formation, acyltrans-

ferase-catalyzed mutagenicity of hydroxamic acids, and the CNS activity of N-oxygenated molecules are also among the various topics presented in this section. Other papers on the metabolism and toxicity of isoniazid, iproniazid, and phenacetin consist primarily of material which has been published in other symposia proceedings as well as in journals.

Also included in the toxicological section is a paper on cocaine-induced hepatic necrosis in which it is declared that "Cocaine can be oxidized at the nitrogen to yield a reactive intermediate metabolite. This bioaction (sic) to a reactive metabolite is the mechanism for cocaine-induced hepatic necrosis". Unfortunately, no direct evidence is presented to support the contention that either cocaine or norcocaine undergoes metabolic N-oxidation, and no evidence is presented for the chemical nature of the reactive metabolite.

There are four papers in the section on "Plant N-Oxidation Products". Two of them focus on the characterization of alkaloid N-oxides while a third one is a description of the biosynthesis of hydroxamate type siderophores. The N-hydroxylation of tyrosine, which is proposed to be an intermediate in the biosynthesis of the cyanogenic glucoside dhurrin, is the subject of the fourth paper on plant N-oxidations.

The final section entitled "Further Metabolism of N-Oxidized Products" is somewhat of a miscellaneous collection of nine papers on topics ranging from the photolysis of *o*-nitro-*N*-alkylanilines to the biological reduction of tertiary amine N-oxides. A report on the current status of research on nitroreductases would have been appropriate, but this subject was not included. A unique metabolic deamination of an imine derivative of anthracene is described by Hucker et al., and Rauckman et al. report on the mixed-function oxidase-catalyzed conversion of hydroxylamines to nitroxide radicals. The final paper in this section comprises a summary of the remarks made at a round table discussion on mechanisms of amphetamine deamination.

Overall, the book contains a wealth of up-to-date information on metabolic nitrogen oxidation. However, contributions from certain laboratories seem to receive a disproportionate amount of attention. For example, one person's name appears on five papers and the editor is author or coauthor of nine presentations. All four papers on morpholine metabolism emanate from a single laboratory. There is no subject index, and a certain amount of variation in format, along with a few typographical errors, detracts somewhat from the book's appearance. However, these deficiencies are easily ignored when the promptness of publication is considered. The publication of the proceedings within 6 months of the conclusion of the symposium is an unusual accomplishment for which the editor and publisher deserve congratulations. The dedication of the book to Professor Manfred Kiese, an important pioneer in research on biological nitrogen oxidation, is most appropriate.

University of Minnesota

Patrick E. Hanna

Reactions of Organosulfur Compounds. Volume 37. Organic Chemistry, a Series of Monographs. By Eric Block. Academic Press, New York, N.Y. 1978. xv + 317 pp. 15 × 22.5 cm. \$28.00.

This volume is no. 37 in a series of monographs on organic chemistry and provides an overview of current synthetic reactions utilizing organic sulfur compounds, with emphasis on theoretical and mechanistic aspects of these reactions as they are currently proposed. The book is based on the author's courses in advanced organic chemistry during the past 10 years and is designed to serve as a textbook for such a course in organic sulfur chemistry. It is admirably suited to this purpose. It is reasonably short and limited in coverage to certain areas of organic sulfur chemistry, presented in seven chapters: Introduction, Sulfur-containing Carbanions, Sulfur Ylides, Sulfur-containing Carbocations, Sulfur-containing Radicals, Organosulfur Carbenes and Carbenoids, and Pericyclic Reactions of Organosulfur Compounds. Such important areas as substitution reactions on sulfur, reactions of disulfides, sulfur halides, oxidation and reduction reactions of sulfur, sulfur-containing heterocycles, etc., have been deliberately omitted, as the author states in his preface, to keep down the length of the book.

The book illustrates the explosive growth of organosulfur chemistry in recent years. The first volume in English devoted exclusively to this area was probably that of Suter (1944), and the first International Congress devoted solely to organosulfur was held in 1951. The remarkable reactivity of organic molecules containing sulfur was recognized as synthetically useful by the early 1960's, and there has been enormous expansion of publication in this area since then. The present volume cites few references before 1970. In a bibliography of 41 books on organosulfur chemistry, going back to Suter in 1944, which the author supplies in an appendix, 27 have appeared since 1970 and 13 more since 1960.

This book will be a useful text for an advanced course in the subject and will provide research workers in the area a convenient source book for current references in the specific areas listed. The author has provided some tables of physical data on sulfur compounds in the appendices, which should also be useful to investigators in the field. The type is clear, and the structural formulas, of which there are many, are relatively free of error.

Indiana University

E. Campaigne

Aspirin and Related Drugs: Their Actions and Uses. Edited by K. D. Rainsford, K. Brune, and M. W. Whitehouse. Birkhäuser Verlag, Basel and Stuttgart. 1977. 117 pp. 17 × 24 cm. sFr. 35.00.

This book is a collection of 11 papers covering research on aspirin and other nonsteroidal antiinflammatory drugs in areas ranging from fundamental to clinical. The papers were originally presented at a symposium held in conjunction with the Physiology Section of the 47th Congress of the Australian and New Zealand Association for the Advancement of Science in Hobart, Tasmania, Australia, in May 1976, and are Supplement 1 of the series "Agents and Actions" (1976).

From the chapter list below, one may determine the range of subjects included. Several chapters may be of particular interest to the fields of clinical pharmacology, pharmacokinetics, and medicinal chemistry. Brune, Graf, and Rainsford use the pharmacokinetic approach to the understanding of the therapeutic effects and side effects of salicylates and other nonsteroidal antiinflammatory agents. The chapter by Graham et al. examines the pharmacokinetics of salicylate in rheumatoid arthritis patients and also compares the activity of aspirin and sodium salicylate in relieving the pain of rheumatoid arthritis. Whitehouse et al. explore the naturally occurring salicylates or derivatives and conclude that one of these compounds "offers considerable promise as a drug with full antiinflammatory and other therapeutic activities of aspirin but without the gastric ulcerogenicity found with aspirin." Also of interest to medicinal chemists is the chapter by Rainsford on the side effects from the use of aspirin and related drugs, in which he concludes: "it appears that modification of the acidic characteristics of the carboxyl group is one satisfactory way to modify the irritant actions of aspirin while still retaining full antiinflammatory potency." The holding of this symposium on aspirin in Australia is most timely; Duggan in his chapter reviews the evidence concerning an epidemic of gastric ulcer which began 30 years ago in young women in eastern Australia. This epidemic is associated with the regular use of aspirin, most often in the form of APC powders (aspirin, phenacetin, and caffeine preparations).

The book lacks both subject and author indexes. This slim volume (117 pages which includes 8 pages of title, preface, table of contents, and chairman Muirden's opening remarks) will be useful for those in the nonsteroid antiinflammatory field and appears well worth the relatively modest price.

Abridged chapter titles (authors) are Pharmacokinetics of Salicylates (Brune, Graff, and Rainsford); Antirheumatic Drugs which Increase Prostaglandin Synthesis? (Famaey, Fontaine, and Reuse); Actions of Anti-inflammatory Drugs on Smooth Muscle (Temple and McKnight); Pharmacokinetics of Salicylates in Rheumatoid Arthritis (Graham et al.); Aspirin Alternatives Derived from Biological Sources (Whitehouse et al.); Aspirin Side Effects; Biochemical Mechanisms of Gastrotoxicity (Rainsford); Gastric Ulcer, Aspirin Esterase and Aspirin (Landecker et al.);

Aspirin and Ulcers (Duggan); Interactions of Anti-inflammatory Drugs (Brooks et al.); Salicylate Toxicology (McQueen); Salicylate-Copper Complexes (Walker and Reeves).

University of Southern California

Glenn H. Hamor

Advances in Experimental Medicine. Volumes 86A and 86B.

Edited by Mendel Friedman. Plenum Press, New York and London. 1977. Volume 86A: Protein Crosslinking, Biochemical and Molecular Aspects, xix + 760 pp, 17 × 25 cm, \$59.50. Volume 86B: Protein Crosslinking, Nutritional and Medical Consequences, xx + 740 pp, 17 × 25 cm, \$59.50.

These volumes are an important contribution to a topic of great interest with endless possibilities. As noted in the preface crosslinking means the durable combination of distinct elements at specific places to create a new entity. Protein crosslinking leads to changes in chemical, physical, functional, nutritional, and biomedical properties. Scientists from many disciplines and countries were brought together at a symposium on this topic in San Francisco, Sept 1976. Their reports, in addition to those solicited from nonparticipants, make up these volumes. Volume 86A contains 43 papers and Volume 86B 39. The contributions are detailed and thoroughly referenced, and each begins with a useful summary. Each volume has its own subject index. An author index is not included.

A sampling of subjects covered will give some idea of the prodigious scope of the work. Disulfide bonds are discussed with regard to chemistry, evolution, protein denaturation, protein turnover in plants, insulin, wheat protein, bovine serum albumin, and hair. Other chapters cover crosslinking of ribosomes, antibodies, lectins, the thermodynamics of crosslinking, and new crosslinking reagents. Lysoalanine, $\text{HOOCCHNH}_2\text{CH}_2\text{NHC}-\text{H}_2(\text{CH}_2)_3\text{CHNHCOOH}$, which results when proteins are treated with alkali or heat, is thoroughly discussed. This is a topic of practical interest because heat and alkali are often used in food processing. Lysoalanine can cause kidney damage in rats and when it links proteins together it lowers their digestibility. Also well covered are the Maillard reaction in which reducing sugars react with proteins causing browning and deterioration of food quality and crosslinking in collagen and elastin in relation to aging.

Outstanding credit is due Mendel Friedman, not only for editing this fine work but also for the ten contributions from the Western Regional Research Laboratory on which he is an author.

Tufts University School of Medicine

Roy L. Kisliuk

Drug Fate and Metabolism. Volume 2. Edited by Edward R. Garrett and Jean L. Hirtz. Marcel Dekker, New York, N.Y. 1978. xiii + 382 pp. 15.5 × 23 cm. \$39.50.

This is the second volume of the series, "Drug Fate and Metabolism", which includes a discussion of various methods and techniques used in the study of drug metabolism. This volume, published in 1978, includes a discussion of five methods, namely, voltammetric methods, gas-liquid chromatography, stereochemical methodology, fluorescence spectroscopy, nonradioactive immunoassays, and analysis of glucuronic acid conjugates. Each chapter is well referenced with an extensive author and subject index included.

Chapter 1, "Voltammetric Methods", by J. Arthur F. de Silva and Marvin A. Brooks, consists of a review of the basic theory involved in voltammetric methods and the newer polarographic methods used for drug analysis in biological samples. Examples from the literature are clearly presented with figures and tables to demonstrate the utility of such methods in toxicological analysis, bioavailability, and pharmacokinetic studies, as well as in the identification of metabolites.

In Chapter 2, "Gas-Liquid Chromatography", by W. J. A. VandenHeuvel and A. G. Zacchei, the application of gas chro-

matography to drug metabolism studies is covered. A compilation of literature references to the GLC of various drugs is presented in one table. Another table includes derivatization approaches employed in gas-liquid chromatography for commonly occurring functional groups. A number of figures and other tables with references are presented to demonstrate the application of this method to selected drugs.

"Stereochemical Methodology", Chapter 3, by Bernard Testa and Peter Jenner is a presentation of approaches and problems encountered in studying stereoselectivity in drug metabolism. There is a discussion of the various factors influencing the apparent metabolic stereoselectivity of enantiomers as well as the analytical techniques utilized in the isolation and identification of diastereomers and enantiomers. Although some of the basic information was published by the same authors elsewhere, in this chapter they concentrate more on presenting the methods used in such studies. It is this presentation that makes the chapter highly interesting and a significant contribution to this series.

In Chapter 4, "Fluorescence Spectroscopy", Stephen G. Schulman and Datta V. Naik present a discussion of the theory of fluorescence spectroscopy and instrumentation used. Two tables compiling applications of this technique to a number of drugs with references are included. A section dealing with future developments in this area is most interesting and well presented.

Chapter 5 by Joseph Haimovich and Michael Sela is titled "Nonradioactive Immunoassays". Featured is a discussion of viroimmunoassay, enzymeimmunoassay, and other immunoassays with little application to drug metabolism. This is the shortest chapter in this volume and might not be of general interest, due to the elaborate procedures involved in using such techniques.

An excellent coverage of the different methods for assay of glucuronic acid conjugates appears in the last chapter, "Analysis of Glucuronic Acid Conjugates", by Jelka Tomšič. Discussion of the isolation and identification is skillfully presented. This chapter is well written and heavily referenced with tables; it is one of the best in this series.

This volume, as was the previous one, should be of significant value to any researcher actively involved in the field of drug metabolism and pharmacokinetics.

Northeastern University

Simon H. Kuttab

Books of Interest

Essays in Neurochemistry and Neuropharmacology.

Volume 2. By M. B. H. Youdim, D. F. Sharman, and J. R. Lagnado. Wiley, New York, N.Y. 1978. xii + 174 pp. 15.5 × 23.5 cm. \$19.95.

The Molecular Biology of Animal Viruses. Volume 2. By Debi Prosad Nayak. Marcel Dekker, New York, N.Y. 1978. vii + 467 pp. 15.5 × 23.5 cm. SFr 140.00. Volume 1: 1977, vii + 542 pp, 15.5 × 23.5 cm, \$49.75.

Review of Inhalants: Euphoria to Dysfunction. NIDA Research Monograph 15. By Charles Wm. Sharp and Mary Lee Brehm. U.S. Department of Health, Education and Welfare. 1977. xix + 347 pp. 14.5 × 23.5 cm. \$3.00.

Research on Smoking Behavior. NIDA Research Monograph 17. By Murray E. Jarvik, Joseph W. Cullen, Ellen R. Gritz, Thomas M. Vogt, and Louis Jolyon West. U.S. Department of Health, Education and Welfare. 1977. xi + 383 pp. 14.5 × 23.5 cm. \$3.00.

Myoglobin (Colloquium on Myoglobin in Brussels, May 22, 1976). By A. G. Schneck and C. Vandecasserie. Université Libre de Bruxelles. 1977. 209 pp. 16 × 23.5 cm. 540 FB.

General Virology. Third Edition. By S. E. Luria, James E. Darnell, Jr., David Baltimore, and Allan Campbell. Wiley, New York, N.Y. xiv + 578 pp. 18.5 × 26 cm. \$19.95.