

ion-exchange column (HCO_2^- form, 0.8×28 cm) maintained at 37°C and eluted with a linear gradient of water (270 mL) and a mixture of 250 mL of ammonium formate plus formic acid (final molarities 2 and 2.6 M, respectively). Fractions (7.5 mL) were collected at a flow rate of 1.5 mL/min and monitored by UV at 290 nm. Fractions 26–28 were combined and lyophilized several times to eliminate the volatile buffer. This procedure afforded 0.420 g (31%) of pure TAD according to HPLC, NMR, and elemental analysis.

Method B. TRMP (1b; 0.27 g, 0.72 mmol) was dissolved in formamide (3 mL) and added to a solution of 2c (0.7 g, 1.43 mmol) in pyridine (50 mL). The resulting solution was concentrated in vacuo and dissolved in 6 mL of dry pyridine. Silver nitrate (0.91 g, 5.36 mmol) was added, and the mixture was stirred for 36 h. After the addition of water (70 mL), H_2S was bubbled into the reaction mixture, and the black precipitate that formed was removed by filtration. The filtrate was lyophilized, and the resulting syrupy liquid was diluted with 5 mL of water and applied to a column of Bio-Rad AG1-X2 (HCO_2^- form, 100–200 mesh, 1.5×5 cm) and eluted with water (50 mL), followed by 2 M ammonium formate (50 mL). The ammonium formate fraction was lyophilized several times, redissolved in water, and precipitated with ethanol. The precipitate that formed was saved, and the filtrate was concentrated and treated again with ethanol. The combined precipitates (0.325 g) were chromatographed on a Hamilton HA-X4 column as in method A to afford 0.08 g of TAD, which eluted as a single peak. An extra 5 mg of TAD was obtained from a third precipitation of the mother solution, bringing the total yield to 0.085 g (16%); negative-ion FAB mass spectrum, m/z (relative intensity) 760 (M^+ , glycerol - H, 1.8), 668 ($\text{M} - \text{H}$, 100), 426 (34), 419 (30), 408 (7.3), 401 (7.1), 346 (13), 339 (11).

Anal. Calcd for $\text{C}_{19}\text{H}_{29}\text{N}_8\text{O}_{14}\text{P}_2\text{S} \cdot 2.5\text{H}_2\text{O}$ (monoammonium salt): C, 31.14; H, 4.51; N, 15.30; P, 8.47; S, 4.37. Found: C, 31.16; H, 4.63; N, 15.67; P, 8.53; S, 4.14. These results were reproducible and are consistent with the monoammonium salt of TAD. The remaining phosphate anion must accordingly form an inner salt with a basic amino group of either TR or adenosine.

4-Carboxamido-2-(2',3'-isopropylidene- β -D-ribofuranosyl)thiazolyl(5 \rightarrow 5')adenosine Pyrophosphate (3b). Compound 1d (0.030 g, 75 μmol) was treated with the adenosine phosphoromorpholidate 2b (0.048 g, 65 μmol) and tri-*n*-octylamine (0.0266 g, 25 μmol) in an analogous manner as in the synthesis of TAD. The reaction mixture was kept for 2 h at 60°C and overnight at room temperature. It was then diluted with water (20 mL), treated with sodium acetate (0.022 g), and extracted twice with ether (2×20 mL). After lyophilization, the aqueous layer afforded a yellowish solid, which was purified by passing it through a Hamilton HA-X4 (HCO_2^- form) column in the same manner as for TAD, to afford ITAD (11.4 mg) as a white solid. Progress of this reaction was followed by HPLC monitoring of the peak with retention time of 16 min. Other peaks with retention times of 14 and 15 min corresponded to TAD and P_1, P_2 -di(adenosine-5')pyrophosphate, respectively. Treatment of ITAD (2 mg) with 10% acetic acid for 25 min at 70°C afforded 1.7 mg of a white fluffy solid after lyophilization. This material was identical with TAD according to chemical, spectral, and biological criteria.

Registry No. 1a, 60084-10-8; 1b-2 NH_3 , 85221-10-9; 1c, 60084-11-9; 1d-2 NH_3 , 85221-11-0; 2b *N,N'*-dicyclohexyl-4-morpholinecarboxamidine salt, 24558-92-7; 2c, 57816-25-8; 3a, 83285-83-0; 3a- NH_3 , 85221-12-1; 3b, 85221-13-2; IMP dehydrogenase, 9028-93-7.

Book Reviews

Chemical Approaches to Understanding Enzyme Catalysis: Biomimetic Chemistry and Transition-State Analogs.

Edited by B. S. Green, Y. Ashani, and D. Chipman. Elsevier Scientific Publishing Co., Amsterdam. 1982. xv + 355 pp. 17 \times 24.5 cm. ISBN 0-444-42063-0. \$100.00.

This volume contains the Proceedings of the 26th OHOLO Conference held in Zichron Yaacov, Israel, on March 22–25, 1981. The primary objective of this conference was to bring together those researchers who are trying to understand how enzymes function, those who are trying to imitate enzyme-like catalysis using simple organic or inorganic models, and those interested in the design and synthesis of transition-state analogues. The book contains 25 papers by some of the leading scientists in the areas of enzyme catalysis, biomimetic systems, and transition-state analogues. Some of the topics of potential interest to medicinal chemists include concertedness and enzyme catalysis (Jencks), asymmetric reaction with chiral bridged 1,4-dihydropyridines (Kellogg), stereochemistry and thermodynamics in alcohol dehydrogenase (Benner and Stackhouse), stereochemical principles in the design and function of synthetic molecule receptors (Laidler et al.), biomimetic reactions inside the channels of the choleic acids (Leiserowitz et al.), models of the receptor sites of enzymes (Wulf and Sarhan), space and directionality in bioorganic chemistry (Menger), models for reactive intermediates or transition states of biological interest (Martin and Ross), organophosphorous inhibitors of acetylcholinesterase as transition-state analogues (Ashani and Green), mechanistic studies and transition-state analogue inhibitors of alkyltransferases (Coward), stereochemical aspects of micelle-catalyzed esterolysis (Moss and Lee), binding forces in lysozyme catalysis (Chipman and Schindler), correlation of X-ray structures of serine proteases with their catalytic activity (Warshel et al.), functionalized cyclodextrins as artificial enzymes (Tabushi), distortion and purification with transition-state analogues (Wolfenden and Andersson), structure-reactivity rela-

tionship in the cyclodextrin-catalyzed hydrolysis of oxazolones (Daffe and Fastrez), hydroxo complexes of Hg^{2+} chelates that mimic the active site of carbonic anhydrase (Werber), and enzyme-like activity of macrotricyclic ammonium salts (Schmidtchen).

An extremely useful feature of this book was the inclusion by the editors of the discussion that followed each presentation at the conference. These discussions were very informative and often thought provoking. This volume would be a useful addition to any academic or industrial library.

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Molecular Enzymology. By Christopher W. Wharton and Robert Eisenthal. Halsted Press (a Division of Wiley), New York. 1981. ix + 326 pp. 15 \times 21 cm. ISBN 0470-27152-3. \$46.95.

The text is directed at biochemistry or biology students who have had basic biochemistry and chemistry and who wish to deepen their understanding of enzyme kinetics and the chemical basis for enzymatic reactions. The sections on kinetics appear to be adequate; the discussion of chymotrypsin seems thorough and up-to-date. However, the chemical discussions tend toward the superficial, even for a nonchemical audience, and there are shortcomings that cast doubt on the usefulness of the book. The transition-state free energy is derived from the rate constant at a given temperature via the Eyring equation; it is the enthalpy of activation that is derived from the temperature dependence of the rate constant (p 2). The free energy vs. reaction coordinate diagrams are drawn with straight lines and sharp breaks, depriving the student of the intuition about energy surfaces. The derivation of the Eyring equation (pp 4–5) is obscure, since the factor kT/h

appears from nowhere. The brief discussion on proton-transfer reactions should have stated that protons may be transferred faster than diffusion allows due to the Grotthuss mechanism and the "flickering clusters" (p 7). The meaning of a transiently sp^3 hybrid (p 16) is obscure—the tetrahedral intermediate has sp^3 bonding to the central carbon during its lifetime. The pK_a values for the acids corresponding to the anions reflect the capacity of the anions to accommodate charge, a property that is often correlated with leaving ability. The discussion of the Hammett equation is unclear: the σ should have been defined with an equation (p 27). One sentence ("a different reaction, solvolysis of *tert*-cumyl chloride, has been used to define σ^+ ") should have been used to show that other substituent constants could also be defined. The interesting comparison between the first and second dissociation constants of fumaric and maleic acids would have been strengthened by (a) an explicit statement about the "special" stability of the maleic acid monoanion and (b) a formula illustrating the monoanion. The purpose of Figure 3.4 is not clear, nor are the complex diagrams for the X-ray structure of lactic dehydrogenase (pp 68–71) of much use, given the brief discussion in the text. The mechanism for the $ROH + NAD^+$ reaction is written as established (p 105), and this is certainly not true—in fact, although we know quite a bit about the enzyme active sites for NAD enzymes, we still do not understand the catalysis.

The admirable aim of the book, giving practitioners in biochemistry and biology a better understanding of the chemical basis of the reactions they use, is fulfilled incompletely, perhaps because the subject requires a book of the length of "Enzymatic Reaction Mechanisms" by C. Walsh for thorough discussion.

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Trace Substances and Health. A Handbook. Part II. Edited by P. M. Newberne. Marcel Dekker, New York. 1982. viii + 175 pp. 16 × 23.5 cm. ISBN 0-8247-1850-X. \$27.50.

This is the second, and presumably last, volume in this series dealing with natural and man-made chemicals that eventually become a part of the human body and that may have beneficial or detrimental effects on health and longevity. Professor Newberne is eminently qualified to contribute and edit this series dealing with environmental toxicology and pathology, having spent most of his professional career at MIT researching some of the very areas discussed in this series. Part II contains four separate chapters, each written by a recognized expert in that field and each thoroughly researched and referenced. Thus, the chapters and their authors are: (1) "Nitrates and Nitrites in Foods and Biological Systems", by P. Newberne; (2) "Nitrosamines", by A. E. Rogers; (3) "Plant Toxins", by A. R. Mattocks; and (4) "Seafood Biotocicants", by J. C. Wekell and J. Liston. Each chapter is devoted to a discussion of the background of the trace substances in question; its uses, if any; toxic effects in man and animals; mutagenic/carcinogenic properties, if any; and, in too few cases, detection and analysis. The chapters are all quite well written, they are very thorough in their discussions, references are extensive and up-to-date, and chemical structures, even chemistry, are at times presented. There is no question that these are discussions of environmental toxicology areas, and not necessarily analytical toxicology subjects.

One of the major, perhaps long-standing, problems in environmental toxicology, in general, has been the question of chemistry, chemical analysis, and toxicological properties of various endogenous or exogenous chemicals. In general, most toxicologists are not analytical chemists, nor are most analytical chemists the least bit toxicologically oriented. At times, but usually not, toxicologists will collaborate with or at least consult with their analytical chemistry colleagues on matters related to their own toxicology research/studies. Unfortunately, there are numerous toxicological studies and reports that contain little, if any, chemical analysis of those trace substances or samples being related to health effects in man. These perhaps important correlations between chemical analysis and environmental toxicology and pathology are not addressed in Prof. Newberne's handbook,

nor are they addressed in most publications devoted to toxicology areas.

Nevertheless, the current text is useful, once we assume that the references on which it is based are scientifically valid. The areas discussed are of current intense interest and scientific controversy, and thus these reviews serve the useful function of bringing us all up-to-date with the existing literature. There is a great deal of useful and usable information presented, and thus each chapter is a very useful introduction or review of the individual topics. I would have preferred to see a more rigorous and critical appraisal of the existing literature, rather than just a summary and compilation of what has presumably been done and is currently known in each subject area. In many toxicology areas, many disturbing questions still linger, despite long and intense years of study and great expenditures of government or private funds. To some extent, more confusion than clarity has resulted from these intense studies, in part because the scientific approaches employed have never been completely rigorous and/or entirely valid. This has indeed been very unfortunate. If environmental toxicology is to earn the respect of being a reputable science, then clearly it simply must apply all of the same scientific approaches and controls that are already employed in sciences such as chemistry, physics, geology, etc. Hopefully, this will not be too long in coming.

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Metal Ions in Biological Systems. Volume 14. Inorganic Drugs in Deficiency and Disease. Edited by Helmut Sigel. Marcel Dekker, New York and Basel. 1982. xxi + 360 pp. 15.5 × 23.5 cm. ISBN 0-8247-1569-1. \$57.50.

Previous volumes of this series are concerned with the chemistry, properties, and structure of metal complexes of biologically important molecules and the systems in which they function in living organisms. Volume 14 considers the use or involvement of metal ions as drugs in deficiency or disease states. The role of metal ions in drug activities has been investigated seriously since the pioneering work of Adrien Albert in the 1940's, but definitive evidence linking drug action to trace metal ions has been difficult to achieve. The present volume describes the present state of knowledge regarding the use of metal ions or complexes as drugs in the case of zinc, copper, iron, gold, and lithium.

The individual chapters are very well presented and provide much information on metal ion involvement in disease states. An introductory chapter describes drug-metal ion interactions in the gut and is concerned with drug absorption interactions with metal containing antacids or metal salts. A chapter on zinc deficiency and its therapy considers a variety of zinc-related disorders, such as liver disease, gastrointestinal disorders, neoplastic diseases, burns and skin disorders, impaired wound healing, renal disease, genetic disorders, and sickle cell disease. This is followed by a discussion of the pharmacological use of zinc, with particular reference to sickle cell anemia and rheumatoid arthritis. A chapter on the antiinflammatory activities of copper complexes is particularly well done and presents the case for involvement of copper in drugs not only for rheumatoid arthritis but also for gastric ulcers, cancers, and anticonvulsant activity.

The chapter on iron-containing drugs is concerned with anemias and iron overload, as well as with the role of iron-containing proteins. Gold complexes and their role in asthma and tuberculosis and their antimicrobial, antitumor, and antiarthritic properties are presented. A well-documented discussion of metal ions, particularly zinc, and chelating agents in antiviral chemotherapy is provided, followed by a discussion of the possible role of metal ions in the action of hallucinogenic drugs. The final chapter presents a review of current research and interpretation on the use of lithium in psychiatry.

Following the format of the series, there is both an author and subject index, which cover 45 pages. This volume should be of particular interest to medicinal chemists and pharmacologists, as well as to biochemists and those interested in metal ion complexation. Several of the chapters provide treatments not readily

found elsewhere, and this volume should certainly be available in all libraries with medicinal chemical holdings. The editor and authors are to be commended for particularly useful and well-presented discussions.

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The Biosynthesis of Secondary Metabolites. By R. B. Herbert. Chapman and Hall, London. 1981. ix + 178 pp. 14.5 × 22 cm. ISBN 0-412-16370-5. \$13.95 (paperback), \$29.95 (hardback).

One of the major achievements in the past 20 years in natural products chemistry has been the elucidation of the precursors and biosynthetic pathways to many groups of secondary metabolites. The diversity of structures from such a small group of primary metabolites and the molecular acrobatics that occur in the various pathways are quite amazing. For those who have not been exposed to this wondrous chemistry, Richard Herbert's book provides a very good introduction. For those who do have a background or interest in this area, this book represents a pertinent and concise summary of a very wide range of biosynthetic pathways. In fact, it is the only contemporary book that attempts such breadth of coverage.

After a brief introductory chapter, there follows a chapter on the techniques of biosynthetic studies. The very brief section (less than a page) on the isolation and use of enzymes in biosynthesis is disappointing, particularly considering the recent advances that have been made in alkaloid biosynthesis using cell-free and isolated enzyme systems.

Chapters 3 through 6 deal successively with the polyketides, terpenoids, shikimic acid products, and alkaloids, and the final chapter deals with the biosynthesis of microbial metabolites containing nitrogen. Overall, even though discussion is inevitably brief, clarity has been maintained and the diagrams, although very small, are well presented. References are given at the end of each chapter to the primary and secondary literature.

Dr. Herbert is clearly a purist as far as alkaloids are concerned: "Basic nitrogenous metabolites isolated from plants are called alkaloids." Because of this, the distribution of material between Chapters 6 and 7 is somewhat artificial, for example, under piperidine alkaloids, one finds the acetate pathway (coniine), the nicotinic acid pathway (dioscorine), and the lysine pathway presented in Chapter 6, and a similar group of biosynthetic origins in Chapter 7. One would have preferred an approach where the natural origin (plant, animal, marine, fungal, and bacterial) could have been ignored, allowing the biosynthetic origin from a particular amino acid to become the basis for an organizational format. But this is a minor criticism of what is a very good presentation of a tremendous amount of information.

The book is strongly recommended for graduate students in natural products chemistry and for faculty giving a course dealing with the biosynthesis of natural products. Every chemistry library should have at least one copy.

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Therapeutic Selectivity and Risk/Benefit Assessment of Hypolipidemic Drugs. Edited by G. Ricci, R. Paoletti, F. Pocchiari, and D. Poggiolini. Raven Press, New York. 1982. xxi + 329 pp. 16 × 24 cm. ISBN 0-89004-649-2. \$39.00.

This book consists of 54 short (2–10 pages) articles on the clinical efficacy and pharmacokinetics of various drugs currently in use for the treatment of hyperlipidemia. Although the main emphasis is on clinical properties, a few reports are included on animal pharmacology and toxicology. The drugs reported include clofibrate and its analogues gemfibrozil, bezafibrate, fenofibrate, simfibrate, and etofibrate (a nicotinic acid ester), other agents such as cholestyramine, DEAE-dextran, probucol, tiadenol, nicotinic acid, and its ester sorbinic acid, the naturally occurring substances carnitine, sulfomucopolysaccharides ("heparinoids"),

and polyeneoyl phosphatidylcholine, as well as chenodeoxycholate and ursodeoxycholate, bile acids used to dissolve gallstones and which exhibit triglyceride-lowering activity. The opening section contains some useful and at times controversial criteria for treatment of hyperlipidemia. This is followed by short reviews and original clinical studies conducted in North America and Europe.

Many of the reports concern drug effects on levels of cholesterol and triglycerides associated with the various plasma lipoproteins. A few others describe effects on plasma-free fatty acids, glucose tolerance, biliary lipids, platelet function, lipolytic enzymes, and various atherosclerosis parameters in man and laboratory animals. No studies are presented on drug effects on apolipoproteins or cholesterol turnover.

As would be expected in a book of this nature, the style is rather uneven. Some reports include detailed clinical data, while others merely outline the results. Relatively few articles contain summaries or conclusions. However, the wealth of information presented overrides the book's minor deficiencies. The bibliographies are adequate, with references included to 1981. This book would be of interest to pharmacologists, cardiologists, and other physicians and investigators involved in the management of hyperlipidemia.

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Annual Drug Data Report. Volume 3. 1981. Edited by J. R. Prous. J. R. Prous, S.A., Barcelona, Spain. 1981. 355 pp. 17 × 24 cm. ISBN 84-300-5054-X. \$85.00.

The aim of these annual reports has been to provide an up-to-date reference tool for rapid and basic consultation by researchers concerned with the chemical and biological aspects of drugs and other substances of pharmacological or biochemical interest. Volume 3 presents over 650 drugs currently under study that were selected from biomedical journals and congress and symposium proceedings. About 50 products from Volume 2 have also been given updated entries.

In order to facilitate the location of drugs, three cumulative indexes of products from Volumes 2 and 3 are provided: "The Cross Index of Names", consisting of about 5000 entries, enabling the reader to locate drugs by proprietary and generic names and research code numbers; the "Pharmacological Index", in which drugs are grouped according to pharmacological action; and, for the first time, the "Manufacturers Index", which is an alphabetical listing of the manufacturers and some licensees (industrial sources only). Also included in this year's volume is a listing of new nonproprietary names for drugs appearing in Volume 2.

Readers of this Journal will find these *Annual Drug Data Reports* an extremely useful source of new and updated drug information.

Staff

Topics in Molecular Pharmacology. Volume 1. Edited by Arnold S. V. Burgen and Gordon C. K. Roberts. Elsevier Biomedical Press, Amsterdam and New York. 1981. v + 249 pp. 17 × 24.5 cm. ISBN 0-444-80354-8. \$74.50.

In recent years, there have been considerable advances in our knowledge of small molecule-macromolecule interactions, as well as the characterization of receptor molecules, giving an understanding of drug, hormone, and neurotransmitter action at a molecular level. This new series deals with the fundamental general principles governing drug-receptor interactions and their biological consequences and with analysis of specific receptor systems. This first volume is concerned primarily with analysis of specific systems, e.g., the structural and functional organization of the receptor system and the atomic details of the drug-receptor interaction.

This volume will add to an understanding of drug action in terms of the three-dimensional structure and dynamics of the drug-receptor system.

Staff

Annual Review of Neuroscience. Volume 5. Edited by W. Maxwell Cowan, Zach W. Hall, and Eric R. Kandel. Annual Reviews Inc., Palo Alto, CA. 1982. ix + 392 pp. 16 × 23 cm. ISBN 0-8243-2405-6. \$22.

There is no central theme running through this year's volume of the *Annual Review of Neuroscience*. Of course the individual reviews, in themselves, are complete and detailed. Such reviews always provide excellent source references for further study. I will list their subjects, followed by the contributors in parentheses, so that the reader can determine if any areas of particular interest are covered: "Morphology of Cutaneous Receptors" (Iggo and Andres); "Inherited Metabolic Storage Disorders" (Brady); "The Molecular Forms of Cholinesterase and Acetylcholinesterase in Vertebrates" (Massoulie and Bon); "Intracellular Perfusion" (Kostyuk); "Electroreception" (Bullock); "Signaling of Kinesthetic Information by Peripheral Sensory Receptors" (Burgess et al.); "Where Does Sherrington's "Muscular Sense" Originate?" (Matthews); "Multiple Sclerosis" (McKhann); "The Neuropsychology of Human Memory" (Squire); "Cerebellar Control of the Vestibulo-ocular Reflex—Around the Flocculus Hypothesis" (Ito);

The final one-fifth of the volume records the Presidential Symposium from The Society for Neuroscience 11th Annual Meeting, Los Angeles, in 1981. Four leading neuroscientists (Cole, Eccles, Levi-Montalcini, and Hubel) tell of the major influences and historical developments in their specific research areas of excitable membranes, synaptic transmission, developmental neurobiology, and higher functions of the cerebral cortex, respectively. As the introduction to this section by the President of The Society for Neuroscience, Dr. Kandel, states: "We can profit from their perspective and the direct recounting of their experience." Each "review" is short and, obviously, highly personal. As such, they are not scientific reviews of the usual and expected type. However, they are interesting to read and provide the background information to the research process that is not generally known or appreciated. At the present time of such rapid development in the various areas of neuroscience research, it is refreshing to read of others' trials and tribulations and the excitement of discovery.

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Advances in Biochemical Psychopharmacology. Volume 34. Serotonin in Biological Psychiatry. Edited by Beng T. Ho, Joseph C. Schoolar, and Earl Usdin. Raven Press, New York. 1982. xiv + 338 pp. 18 × 26 cm. ISBN 0-89004-803-7. \$33.00.

This volume is based on the proceedings of a symposium at the Texas Research Institute of Mental Sciences, Houston, TX, in November 1981. It is comprised of 19 presentations, an epilogue, and abstracts of 12 original research papers that formed the poster session. The first three sections (12 chapters) of the book—"Serotonin Regulation", "Serotonin Precursors", and "Serotonin Receptors"—were intended to provide a basic overview of the regulation of serotonergic function and offer the reader a foundation in the most advanced serotonin-related research. Although each of these chapters, written by experts in the field, treat their subjects comprehensively, collectively they present a somewhat fragmented foundation, rather than a coordinated foundation that the organizers were seeking. These sections might have been better integrated and of greater value to most medicinal chemists if a more systematic introduction and review of the topics had been presented. It is commendable, however, that each of the chapters provides some new information. Particularly informative chapters are: "Some Strategies to Study the Biochemical Pharmacology of Serotonergic Function", in which E. Costa suggests that it is probably more the rule than the exception that there is more than one neurotransmitter present in individual neurons, and mental diseases cannot be attributed to an imbalance of a single substance; "Effect of Serotonin Precursors and Serotonin Agonists on Plasma Hormone Levels", where Herbert Y. Meltzer and his collaborators present a superb review of this field as well as some original research.

The final two sections (seven chapters)—"Serotonin Uptake Inhibition" and "Serotonin in Affective Disorders and Other

Diseases"—are uniformly informative and comprehensive. In the chapter "Molecular Aspects of 5-HT Uptake Inhibitors", Beng T. Ho and Vincente S. Estevez present an excellent introduction to the subject and a comprehensive review of structure-activity relationship data for this class of compounds, and they attempt to rationalize clinical antidepressant actions with these data. In the chapter, "Functional Consequences of Inhibiting Serotonin Uptake with Fluoxetine", Ray W. Fuller carefully reviews this subject to provide insights into the potential utility of this class of compounds. Laurent Maitre and his coauthors present an informative comparison of various monoamine uptake inhibitors in identical test systems to assess the relevance of serotonin modulation in their chapter "5-HT Uptake Inhibitors: Psychopharmacological and Neurobiochemical Criteria of Selectivity".

After a brief consideration of various clinical "Research Strategies in the Investigation of the Indoleamine Hypothesis of Affective Illness" by William E. Bunney, Jr., A Coppen and K. Wood in their chapter "5-Hydroxytryptamine in Pathogenesis of Affective Disorders" scrutinize various antidepressive modalities in terms of serotonergic effects. This is followed by an exhaustive review of clinical studies involving "Serotonin Precursors in the Treatment of Depression" by Herman M. van Praag. The concluding chapter by Gerald L. Brown and his coauthors presents a thorough survey on "Human Aggression and Suicide: The Relationship to Neuropsychiatric Diagnoses and Serotonin Metabolism" in which correlations of body levels of serotonin and its metabolites with aggression and suicide are examined.

The 12 abstracts of the poster presentations cover a wide range of topics, varying from disclosure of new compounds affecting central serotonergic systems to new pharmacological paradigms to isolation of proteins associated with postsynaptic serotonin receptors.

The book has been compiled from "camera-ready" manuscripts, which results in inconsistencies in type and editorial style but provides the advantage of timeliness. Medicinal chemists directly involved in serotonin or antidepressant research should find this book of interest. They will want access to this book because of its original data; however, even these specialists will probably not need a desk copy.

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Serotonin Neurotransmission and Behavior. Edited by Barry L. Jacobs and Alan Gelperin. The MIT Press, Cambridge, MA. 1981. xv + 448 pp. 16 × 24 cm. ISBN 0-262-10023-1. \$45.00.

This book is the outgrowth of a 2-day symposium at Princeton University. Its objective is to summarize the present status of basic research—anatomical, physiological, and chemical—on serotonin, to examine serotonin neurotransmission by cross-phyletic comparisons, and to utilize serotonin to address various issues regarding chemical neurotransmission. To achieve this objective, the book has been divided into six major sections: "Anatomy" (I), "Chemistry" (II), "Synaptic Mechanisms" (III), "Synaptic Modulation and Behavior" (IV), "Complex Behavioral Processes" (V), and an "Overview" (VI).

Serotonin neurotransmission in both the peripheral and autonomic nervous system and the question of whether such serotonergic neurotransmission represents a morphologically new type of synaptic relation that lacks classical pre- and postsynaptic elements are considered. The possibility that serotonin neurotransmission may be based on a mechanism of *modulation*, rather than *mediation*, is another focal point of this book. The major categories of serotonin neurotransmission and its effect on behavior are treated in 14 chapters written by the editors and other recognized experts in the field, namely, André Parent and Robert Y. Moore (Anatomy), John D. Fernstrom (Chemistry), H. M. Gerschenfeld, Forrest F. Weight, and George K. Aghajanian (Synaptic Mechanisms), Edward A. Kravitz, Eric R. Kandel, and Irving Kupfermann (Synaptic Modulation and Behavior), Edmund G. Anderson (Complex Behavioral Processes), and Floyd E. Bloom (Overview). The chapters generally present comprehensive reviews of the subject matter with a major emphasis on the role of serotonin at the cellular level; however, some of the material is clearly

highly specialized and of major import only to specialists in the field. The chemistry section considers mainly serotonin biosynthesis, the effects of tryptophan ingestion, and resultant alteration of central serotonin levels on blood pressure, pain, appetite, sleep, and the production of growth hormone. It does not treat structure-activity relationships among various modulators, e.g., agonists, antagonists, uptake inhibitors, etc. of serotonin; this may be disappointing to medicinal chemists involved in serotonin research. Also, as a consequence of increasingly intense research in the field, it is not surprising that some recent significant research, such as various studies identifying multiple serotonin receptors, has not been included.

The book is well organized, practically error free, its references are timely (considering the 1981 publication date), and it has very adequate name and subject indexes. After reading this book one can only be impressed by the magnitude of research of serotonin neurotransmission and behavior while remaining uncertain, or perhaps somewhat discouraged, by the overall conclusions to be derived from this effort. Clearly, and as implied by the large number of outstanding issues cited by Professor Jacobs in his chapter on "Serotonin in the Action of Hallucinogenic Drugs", perhaps more questions have been raised than answered by serotonin neurotransmission and behavioral research to date. I believe this book is one to which most medicinal chemists would want access; however, a personal copy of this specialized treatment of a very complex subject will be needed only by those medicinal chemists, biochemists, and pharmacologists intimately involved in serotonin research.

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Progress in Clinical and Biological Research. Volume 68.

The Role of Peptides and Amino Acids as Neurotransmitters. Edited by J. B. Lombardini and A. D. Kenny. Alan R. Liss, Inc. New York. 1981. xv + 232 pp. 15.5 × 23.5 cm. ISBN 0-8451-0068-8. \$36.00.

This book represents the proceedings of the Third Tarbox Parkinson's Disease Symposium held October 16-18, 1980; hence, the rather comprehensive title of the book is somewhat misleading. Although amino acids are covered adequately, the area of brain peptides is sadly lacking—no mention of angiotensin, vasopressin, substance P, or a host of other peptides. Several amino acid related chapters, including those on GABA receptors (by Graham Johnston), excitatory amino acids (by Hugh McLennan), and taurine (by Ryan Huxtable), serve as state of the art reviews of the particular area. In addition, the chapter by Huxtable ranks as a minor literary "gem"—including quotes from Humpty Dumpty and a philosophical discourse on the meaning of "function". In summary, this book is a stimulating, informative discourse on amino acids but a rather limited review of the peptide area.

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Biological Electrochemistry. Volume 1. By Glenn Dryhurst, Karl M. Kadish, Frieder Scheller, and Reinhard Renneberg. Academic Press, New York. 1982. xi + 548 pp. 16 × 23.5 cm. ISBN 0-12-222401-9. \$74.00.

The development of more sophisticated electroanalytical techniques and the increasing research emphasis on bioelectrochemistry in recent years have led to systematic studies of redox chemistry of several classes of biologically important compounds. However, most of the results are so scattered in literatures that the progress and available information have not been fully appreciated. In this regard, this book made a significant contribution by providing a reasonably complete review of the material published through 1980 (through 1981 for some chapters) on a wide

range of topics in biological electrochemistry. This is the first of the two volumes that will be published. Volume 1 is concerned with the redox chemistry of small and large organic molecules, including proteins. Volume 2 will focus on inorganic and organometallic compounds of biological interest.

This volume contains seven independent chapters. Each of them includes an introduction of the biological roles of the selected class of compounds, a review generally in the order of increasing molecular complexity, a summary of the current understanding of the topic, and a list of major references. Chapter 1 covers the electrochemistry of simple quinones and biologically important quinones and hydroquinones in aqueous and nonaqueous solutions. Discussions on the redox mechanisms of naturally occurring quinones are limited to ubiquinone or coenzyme Q, vitamin K, plastoquinone, and tocopherylquinone groups. Organic electrochemistry of catecholamine derivatives is the main subject of Chapter 2. A heavy emphasis is placed on the neurochemical significance of the redox behaviors of these molecules. A short review on electrochemical techniques for in situ brain measurement is also included with references through 1979. Chapter 3 reviews electrochemical studies of phenothiazine derivatives with a major portion devoted to work on chlorpromazine, a widely used tranquilizer, and its ring-hydroxylated derivatives. Chapter 4 deals with electrochemical oxidation of ascorbic acid and the associated chemical reactions in aqueous solutions. Chapter 5 is concerned largely with recent work on the mechanism of electrochemical and enzymatic oxidation of uric acid and various uric acid derivatives. Valuable information was obtained by observing spectrophotometrically the kinetic behavior of the electrochemically generated intermediates via the optically transparent thin-layer electrode. Chapter 6 reviews results from polarographic, voltammetric, and spectroelectrochemical studies of vitamin B₁₂ and related compounds (cobalamins). Finally, chapter 7 provides a fairly complete discussion on the electrochemistry of proteins. Topics include charge transfer at interfaces, thermodynamic considerations, adsorption at electrode surfaces, redox mechanisms, electroactive labeling, and biological electron-transfer chain.

The material presented in this volume is well organized. The extensive usage of figures and tables from the original literature makes this book very readable to those who are interested, but not familiar, with the selected topics. This book should be a valuable addition to the collections of scientific libraries and individual researchers.

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Advances in Steroid Analysis. Volume 10. Analytical Chemistry Symposia Series. Edited by S. Gorog. Elsevier Scientific Publishing Co., Amsterdam, Oxford, and New York. 1982. xi + 552 pp. 16.5 × 25 cm. ISBN 0-444-99711-3. \$104.75.

The 71 papers that comprise this volume have been contributed by scientists from 15 countries and represent the proceedings of the Symposium on the Analysis of Steroids that took place in Eger, Hungary, from May 20 to 22, 1981. This book forms a comprehensive survey of the state of the art in the field of the determination of steroids in biological samples and pharmaceutical preparations. The methodological problems involved in the analysis of such important groups of steroids as hormones, sterols, D vitamins, bile acids, cardiac glycosides, etc. are covered in depth.

The two main fields of steroid analysis, biological-clinical and industrial-pharmaceutical, are both well represented. The majority of papers in the biological-clinical field deal with the application of protein-binding (mainly immunological) methods, with various chromatographic separation techniques and gas chromatographic-mass spectroscopic methods also included. In the industrial-pharmaceutical field, the methods most commonly used are thin-layer chromatography and high-performance liquid chromatography, and this is reflected in the papers presented here. Modernized versions of the classical methods of spectrophotometry and polarography are also reported on.

Staff

Practical NMR Spectroscopy. By M. L. Martin, J.-J. Delpuech, and G. J. Martin. Heyden and Son, Inc., Philadelphia. 1980. xxi + 460 pp. 16 × 24 cm. ISBN 0-85501-462-8. \$65.00.

Experimental Pulse NMR: A Nuts and Bolts Approach. Edited by E. Fukushima and S. B. W. Roeder. Addison-Wesley, Reading, MA. 1981. xiii + 539 pp. 16.5 × 24 cm. \$34.50.

Both of the above books deal with the experimental aspect of NMR spectroscopy and bring together information not available to the reader in a comprehensive form elsewhere. These monographs are therefore welcome additions to the current long list of NMR treatises and should be particularly useful to the newcomer in the field of NMR spectroscopy.

"Practical NMR Spectroscopy" is a well-prepared and rather comprehensive handbook aimed at covering the experimental methods and techniques of high-resolution NMR. In their opening chapter, the authors give a brief review of the "NMR phenomenon", the relaxation processes, the NMR parameters and the continuous-wave (CW) and Fourier-transform (FT) experiments. They follow with a chapter on NMR instrumentation and two chapters on operating techniques, one for CW and one for FT instruments. A chapter dedicated to sampling techniques follows. Included here are such items as degassing of a sample, sealing of an NMR tube, internal and external referencing, and calibration of spectra. There are three chapters that cover a wide diversity of NMR experiments. One chapter deals with multiple irradiation and includes decoupling, off-resonance decoupling, double irradiation, INDOR, and the measurement of nuclear Overhauser effects (NOE). Another chapter deals with the various methods used in the measurement of relaxation times (T_1 , T_2 , $T_{1\rho}$). Dynamic NMR experiments make up a separate chapter in which the authors discuss line-shape analysis, saturation transfer experiments, stopped-flow and continuous-flow techniques. Recognizing the importance of NMR in quantitative analysis, the authors devote a chapter for the discussion of techniques used for such measurements and the pitfalls that can be encountered. The last chapter deals with the use of chemicals as NMR auxiliary reagents, such as shift, chiral, and relaxation reagents. The final inclusion of the monograph are seven appendixes with a good deal of diverse information useful to the experimentalist: Tables with ^1H , ^{13}C , ^{15}N , ^{19}F , ^{29}Si , and ^{31}P NMR T_1 values for a variety of molecules; examples of graphical and computer-assisted lifetime determinations; charts for temperature calibration etc.

This monograph is written carefully. It includes numerous tables, drawings, and well-produced representative spectra to illustrate the various techniques. The reader who seeks more detailed information will find most of the important references. This book is not without shortcomings. Its principal one is its failure to provide adequate coverage for some of the important new techniques that are being used increasingly in structural analysis. Only two short pages are thus reserved for 2-D NMR, while high-resolution NMR in solids is covered in one page. No discussion on difference spectroscopy is included.

"Experimental Pulse NMR" is not a comprehensive reference book on experimental NMR. It is rather a guidebook with enough information to lead the reader to an actual experiment or to the specialized literature. As stated by the authors, the book emphasizes the "physical ideas underlying NMR experiments and the actual techniques including the hardware used." The first chapter introduces the reader to the basics of pulse and FT NMR, while the second chapter discusses many experimental details. Included here are items like pulse length, tip angle, dynamic range and digitizer resolution, FT spectroscopy of wide lines, selective excitation, and many others. Relaxation and the methods used for the measurement of relaxation times are covered in a separate chapter, followed by a chapter on NMR of solids. NMR hardware is a subject rarely covered in NMR textbooks. When included, it is covered only sketchily. To fill this gap, the authors have written an excellent chapter with a comprehensive description of how the hardware works, how they may be modified, and what to look for in commercial instruments. The last chapter in the book is on practical techniques and discusses turning the instrument on, tuning, troubleshooting, removal of noise, field cycling, and many others. There are also appendixes with a wide variety of practical information for the NMR spectroscopist, such as lists of NMR monographs, journals, reviews, and hardware sources.

In their attempt to communicate difficult information in a practical and accessible manner, the authors have adopted an informal style all through the book. The language is casual. No pictures or spectra are included. Instead, the book contains numerous hand-drawn schematic illustrations of instrumental components, electronic diagrams, spins, magnetizations, pulses, etc. This approach is by and large successful. On the deficit side, the book suffers from the usual shortcomings of photo-offset reproduction, typographical errors, and uneconomical use of space. On the whole, this is a very informative book directed at the newcomer who wants to understand what happens in the spectrometer "box" during the NMR experiment.

Both books reviewed here are recommended. Although they contain a substantial amount of overlapping material, each has a different focus. They are therefore complementary. The first book can be viewed as a reference text and should be valuable in an NMR laboratory or a library. The second is recommended for a chemist who is interested in gaining insight into the principles behind the evergrowing number of pulse and FT NMR techniques and the instrumentation involved.

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ACS Symposium Series. Number 186. Biological Activities of Polymers. Edited by Charles E. Carraher, Jr., and Charles G. Gebelein. American Chemical Society, Washington, DC. 1982. x + 293 pp. 16 × 24 cm. ISBN 0-8412-0719-4. \$31.95.

This volume, based on an ACS Symposium sponsored by the Division of Organic Coatings and Plastics Chemistry, contains 21 chapters covering such diverse subjects as metal-containing bioactive polymers; metal-chelating polymers; polymers for drug delivery; polymer-bound proteins, fungicides, and herbicides; naturally occurring bioactive polymers, such as polypeptides hormones, carbohydrates, and nucleic acids; and bioactive polyanions.

Individual chapters within this book are excellent; however, the detail in which each chapter is presented varies from short preliminary studies to detailed review articles. Such variation is not totally unexpected in this type of symposium series; however, greater consistency throughout the entire book would have been desirable. Particularly strong are those chapters discussing bioactive polyanions.

The editors have chosen to break the book into three sections entitled: "Nonmedical Applications", "Drug Related Activity: Medical Applications", and "Anticancer Applications". This was probably done because of the broad subject areas covered. Such sectioning appears to be artificial and creates unnecessary distinctions between chapters dealing with different applications of similar polymers and by doing so disrupts the reader's flow.

This volume lacks sufficient depth in any one major area but would be a useful addition to library shelves as an overview of the area of bioactive polymers.

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From Genetic Experimentation to Biotechnology—The Critical Transition. Edited by W. J. Whelan and S. Black. Wiley, Chichester, New York, Brisbane, Toronto, and Singapore. 1982. xx + 266 pp. 16 × 23.5 cm. ISBN 0471-101-8-6. \$39.95.

This volume provides a review of how the genetic engineering industry can make the critical transition from laboratory ex-

periments to industrial production. The first section describes advances stemming from research using various forms of genetic experimentation with special emphasis on practical applications. The second section reviews the burgeoning genetic engineering industry with discussion as to how academic institutions can participate in its exploitation, the roles of government, foundations and industry in funding research, and the question of patents and the role of regulatory agencies in releasing products for sale.

Molecular biologists, biochemists, biotechnologists, the pharmaceutical industry, major chemical industries with a stake in the new biology, and the genetic engineering industry will find this volume to be of interest.

Staff

Neuroendocrinology of Reproduction: Physiology and Behavior. Edited by Norman T. Adler. Plenum Press, New York. 1981. xxi + 555 pp. 17.5 × 26 cm. ISBN 0-306-40600-4. \$42.50.

Neuroendocrinology as a discipline has progressed farthest and produced its greatest successes in the study of reproduction. This book represents an admirable effort at summarizing the physiological and behavioral studies that have propelled reproductive neuroendocrinology to its current heights. The editor and contributors set out to produce a book that could serve several purposes simultaneously. Their hopes were to offer a text that would appeal at once to both novice and professional, a book that, according to the cover, "begins with the fundamentals and works its way up to contemporary research of the most sophisticated nature". In many ways this seemingly paradoxical goal has been achieved. The book is divided into four main sections ("Chemical Foundations", "Development", "Organismic/Physiological Control Mechanisms", and "Cellular/Chemical Control Mechanisms") containing 17 chapters and an appendix, which together provide a reasonable balance or cross section of the discipline. The editor has succeeded beautifully in molding the writing of the 17 coauthors into a book with a consistent style and tone throughout, a book that emphasizes simplicity and clarity of presentation. In this respect, the text is well suited to its primary audience of advanced undergraduate and graduate students. Some chapters, such as those by Adkins-Regan on comparative organizational effects of hormones and by Crowley and Zemlan on neurochemical control of sexual behavior, even provide unique reviews heretofore unavailable elsewhere and of considerable value to workers at all levels.

A text that is intended as a "primer" should provide a historical perspective outlining the solution of significant scientific puzzles along with notes on changing methodologies. Several chapters provide fine examples of this approach, such as Feder's discussion in Chapter 3 of the unraveling of the mechanisms of cholesterol synthesis and McCann's extremely readable account of the discovery of the hypothalamic neurohormones in Chapter 13. Other chapters, perhaps often because of the contemporary nature of the research techniques, provide only a summary of present research.

This book is unusual; it is not simply another set of reviews; rather, it is a worthy effort to extend a helping hand to students and to those not intimately conversant with the field—an invitation of sorts to explore a truly exciting frontier. Still, like all endeavors, it has its shortcomings, and some of these clearly could have been avoided. The most serious detraction is the absence of any meaningful integration of the chapters in Part I (Chemical Background of Endocrine Function) with the remaining parts of the book. For example, Chapter 2 (Histology of the Pituitary) is only four pages long and has only three references. There is no discussion of the problems encountered in histological studies of the brain, and no allusion to the extremely important immunohistochemical techniques now in use in neuroendocrinology. On the opposite extreme, Chapter 3 on steroid biochemistry stretches for 44 pages and appears to be much more detailed than would be necessary for an understanding of the subsequent chapters. Even at this length, the author fails to point out how his information relates to present research findings. For example, there is little or no mention of the mechanism of action of antiestrogens, such as CI-628, of the effects of genetically determined enzyme deficiencies, etc. Part I of the text presents an elementary

discussion of four separate subjects but not an "introduction" to reproductive neuroendocrinology. Similarly, it is unclear how the appendix on innervation of the pelvis of the female rat contributes to the unity of the text.

Other detractions include an unduly short subject index and the long lag time (up to 4 years) between manuscript completions and publication. Presumably as a result of this latter fact, several interesting developments are not mentioned, such as the awarding of the Nobel Prize to Schally and Guillemin for their work in neuroendocrinology, the critical importance of the suprachiasmatic nucleus in generating circadian rhythms, etc. In spite of these objections, the merits of this book substantially outweigh the shortcomings. For the first time we have a highly readable, interesting account of reproductive neuroendocrinology—a book that succeeds at bringing an array of complex information into a sharp focus for students and for all others who want a glimpse into one of the most fascinating areas of scientific inquiry. The book is truly an important contribution to science and to science education.

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The Natural Coumarins: Occurrence, Chemistry & Biochemistry. By Robert D. H. Murray, Jesus Mendez, and Stewart A. Brown. Wiley, Chichester. 1982. xi + 702 pp. 18.5 × 26 cm. ISBN 0471-28057-7. \$162.00.

As the authors claim, "this book brings together the current knowledge of natural coumarins to form a comprehensive volume which is interdisciplinary in its approach". The result is everything you ever needed to know about natural coumarins located in one complete, albeit expensive, reference. This volume is indeed comprehensive, as all subject areas are covered completely and in great detail where appropriate. The book is also multidisciplinary in its scope, with approximately equal space allotted to the (1) chemistry and (2) biological activity/mechanism of action of the natural coumarins.

The first half of the book is text. The early chapters deal with the areas of isolation, identification and structural elucidation, natural occurrence, chemistry, stereochemistry, biosynthesis, chemical synthesis, and metabolism. For the discussion of biological activity the natural coumarins are divided into four classes: 4-hydroxycoumarins, furanocoumarins, aflatoxins, and others. Where appropriate, the other chapters are broken down into the above four categories, which in most cases facilitates the retrieval of information. There is indeed much information to be had in these chapters, and in support of this, the book is thoroughly referenced with 3383 references.

The second half of the book is occupied by a variety of appendixes, the most useful being the classification of natural coumarins, which lists the name(s), structure, molecular formula, melting point, and specific rotation for all natural coumarins. Another appendix lists the family, genus, and species of the coumarin-producing organism and, where appropriate, the part of the plant producing any given coumarin.

In addition to being recent and complete in its coverage, there are sections of this book that provide simple interesting reading due to the wide variety of coumarins that occur in nature and the broad range of biological activity exhibited by this diverse group of natural products. This volume would certainly be a valuable reference for natural product chemists, biochemists, and pharmacologists working in the area.

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Methods in Cancer Research. Volume 19. Tumor Markers. Edited by Harris Busch and Lynn C. Yeoman. Academic Press, New York. 1982. xxii + 423 pp. 15.5 × 23 cm. ISBN 0-12-147679-0. \$56.00.

The 19th volume of *Methods in Cancer Research* presents a timely discussion and bibliography of chemical, physical, and immunological methods used in isolation, purification, and

characterization of several types of molecules that may be sufficiently specific to malignant cells to be considered as diagnostic and prognostic markers. The volume is divided into three sections: "Cell Surface Markers for Neoplasia" (2 chapters), "Antigen Markers of Tumor Cells and Nuclei" (4 chapters), and "Models and Methods for Diagnosis and Therapy" (2 chapters).

In most cases, methods are generally described with specific reference to the primary methodology papers for the reader interested in adapting methods to his/her own research problems. However, detailed, "how-to" methods are presented for many standard techniques, including isolation of subcellular fractions; column chromatography; isolation and purification of several substances; isoelectric focusing; immunoelectrophoresis; gel filtration; solid-phase enzyme immunoassay; immunofluorescent and immunoperoxidase staining; heteroantibody production, purification, and absorption; monoclonal antibody production and characterization; 5'-nucleotide phosphodiesterase assays; and *in vitro* immunization.

The discussion of the isolation and characterization of tumor markers is particularly important, since much emphasis is currently being placed on early diagnosis and on eliciting appropriate immune responses in patients to supplement traditional therapeutic modalities for eradication of minor populations of residual tumor cells. Early noninvasive diagnosis has been hampered by lack of defined markers specific for neoplasia in general or specific malignant cell types in particular. Standard physical and chemical isolation and purification methods that have been used successfully in other fields have often not been sufficiently rigorously applied to isolation of substances that either are present in minute quantities and/or are difficult to separate from normal constituents. Rigorous specific assay procedures to determine kinetics of production of these putative markers have also been either lacking or haphazardly applied. The problems addressed in this volume amply illustrate model protocols for isolation, characterization, and assay of several types of markers; the reader may choose those methods particularly suited to specific problems. Unfortunately, most of the authors do not adequately identify and discuss potential problems and pitfalls that may be encountered with particular methods; notable exceptions are the chapters on 5'-nucleotide phosphodiesterase and on *in vitro* immunization.

Another advantage of this multidisciplinary, multiinstitutional volume is that the reader may readily discern additional techniques that may enhance the refinement of results. For example, the excellent discussion in Chapter I of surface markers for the numerous lymphoid subpopulations leads the reader to think of proposing more elegant separation or recombination of subpopulations to achieve more predictable *in vitro* immunization procedures, augmenting those proposed in Chapter IX.

The chapters on tumor antigens provide excellent backgrounds for purification of these antigens for diagnostic purposes. The therapist should also be particularly interested to seek specific host immune responses that may be useful for immune modulation as adjuvant therapy, as alluded to in Chapter IX.

The chapters on surface markers cover lymphoid cell markers (Chapter I) and glycoprotein markers (Chapter II). Methods for definition of lymphoid cell-surface markers are presented, and the usefulness of the markers for defining subpopulations is discussed. Those markers that may be used to define specific cell types encountered in acute lymphoblastic leukemia (ALL) are stressed. The methods presented include rosette formation; detection of immunoglobulin (surface and cytoplasmic); detection of FC and complement receptors; immunological detection of differentiation and leukemia-specific antigens; detection of glucocorticoid, peanut agglutinin, histamine, Epstein-Barr virus (EBV), and hormone receptors; response to T-cell growth factor; and electrophoretic mobility determinations. Future directions are indicated for use of monoclonal antibodies for detection of particular determinants and for use of recombinant DNA techniques in detection of gene rearrangements that may clarify origins of many null cell leukemias.

Chapter II discusses problems associated with chemical/physical purification and characterization of surface glycoproteins.

The importance of using cells in the same compartment of the growth cycle is properly stressed, particularly for quantification purposes. Immunological methods for isolation and purification are presented in addition to the standard physical/chemical techniques of chromatography and electrophoresis.

The section on isolation and characterization of antigenic markers presents chapters on nucleolar antigens of rat hepatomas and human tumor cell lines (Chapter III); human prostate antigen (Chapter IV); human prostatic acid phosphatase (Chapter V); human colon tumor antigens (Chapter VI); and 5'-nucleotide phosphodiesterase (Chapter VII). The antigens/enzymes discussed are not tumor specific, unfortunately, and their localization and diagnostic importance must be further substantiated. Standard physical and chemical separation techniques are either referenced or described in detail. Immunodiffusion, immunoelectrophoresis, and immunochemical staining techniques are emphasized for assay and localization.

Perhaps the most useful and provocative section is composed of two chapters on therapeutic modeling. Chapter VIII presents a detailed and precise model for design and monitoring of therapeutic efficacy of traditional radiation and chemotherapy modalities. Consideration is given to the effect of amount and timing of doses of each type separately and in combination. Addition of adjuvant immunotherapy is discussed generally. Interested readers should consult Chapters I and IX for more specific parameters to be considered in monitoring immunotherapy regimens.

Chapter IX presents a most interesting approach to therapy—*in vitro* immunization or lymphocyte response augmentation. Critical factors in the initial response in a murine system are presented. Unfortunately, precise definition of populations is not emphasized. As noted, the therapist should consider this chapter in association with Chapter I for maximum benefit. However, the problems of suppression by the host's response to the tumor and by the tumor itself are not discussed. The murine systems described are deliberately designed to be applicable to human problems; transfer to the human system could and should now be given priority.

In summary, this volume represents an excellent reference for initiating studies on identification of tumor markers and in utilization of these markers for diagnosis and therapy of human malignancies.

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Books of Interest

Problems of Drug Dependence 1981. Proceedings of the 43rd Annual Scientific Meeting. The Committee on Problems of Drug Dependence. NIDA Research Monograph. Number 41. Edited by Louis S. Harris. U.S. Department of Health and Human Services, Rockville, MD. 1982. xvii + 561 pp. 14.5 × 23 cm.

Organic Reactions. Volume 27. Edited by William G. Dauben. Wiley, New York. 1982. vii + 405 pp. 15.5 × 23.5 cm. ISBN 0-471-0965701. \$45.00.

Biological Carcinogenesis. Edited by Marvin A. Rich and Philip Furmanski. Marcel Dekker, New York and London. 1982. x + 310 pp. 15.5 × 23.5 cm. ISBN 0-8247-1635-3. \$49.50.

Immune Regulation: Evolutionary & Biological Significance. Immunology Series. Volume 17. Edited by Laurens N. Ruben and M. Eric Gershwin. Marcel Dekker, New York and London. 1982. xv + 331 pp. 15.5 × 23.5 cm. ISBN 0-8247-18-3-4. \$45.00.

Handbook of Carcinogens and Hazardous Substances: Chemical & Trace Analysis. Edited by Malcolm C. Bowman. Marcel Dekker, New York and London. 1982. ix + 750 pp. 16 × 23.5 cm. ISBN 0-8247-1683-3. \$99.50.