After cooling, the gummy product was triturated with anhydrous Et_2O to yield a crude crystalline product. Recrystallization from *i*-PrOH afforded 0.23 g (43%) of **5c** as tiny golden needles: mp 197–198 °C; IR ($CHCl_3$) 1605 cm^{-1}; NMR ($CDCl_3$) δ 0.6 (t, 4 H, CH_2CH_2), 1.5 (m, 1 H, CH), 4.1 (d, 2 H, N-CH_2), 5.2 (s, 1 H, C_3 H), 7.7 (m, 3 H), 9.2 (m, 1 H, aromatic protons); UV (95% EtOH) λ_{max} 225 (ϵ 15 370), 268 (6900), 298 (1380); mass spectrum, *m/e* (relative intensity) 272 (23), 55 (100). See Table II for microanalytical data.

All of the mesoionic compounds (**3c**–**14c**, Table II) were prepared in the same manner as **5c**, employing the appropriately substituted amine, **3b**–**14b**, and malonate ester, **19a**–**e**.

***N*-(1-Piperidinylethyl)-2-benzothiazolamine (15).** Compound **15** was prepared in 60% yield by the reduction of **15b**[6] using the same procedure employed for the reduction of **5a**. The product was characterized as the hydrochloride salt, mp 227–230 °C after recrystallization from 95% EtOH. Anal. ($C_{14}H_{19}N_3S \cdot 2HCl \cdot 0.5H_2O$) C, H, N.

3,4-Dicarbomethoxy-1-oxopyrido[2,1-*b*]benzothiazole (18). Compound **3c** (0.62 g, 2.5 mmol) and dimethylacetylene dicarboxylate (0.71 g, 5 mmol), in $CHCl_3$ (50 mL), were heated at reflux for 24 h. The solvent was removed under reduced pressure, and trituration of the resultant gummy mass with anhydrous Et_2O afforded an orange solid. Recrystallization from *i*-PrOH gave 0.13 g (16%) of **18** as yellow needles: mp 197–200 °C; IR ($CHCl_3$) 1745, 1700, 1670 cm^{-1}; NMR ($CDCl_3$) δ 4.0 (s, 6 H, CH_3), 6.5 (s, 1 H, C_2H), 7.7 (m, 3 H), 9.3 (m, 1 H); mass spectrum, *m/e* (relative intensity) 317 (18), 316 (100), 258 (73). Anal. ($C_{15}H_{11}NO_5S$) C, H, N.

3-Ethyl-2,3,4,5-tetrahydropyrido[2,1-*b*]benzothiazole-2,4-dione (17). A mixture of 2-aminobenzothiazole (0.53 g, 3.5 mmol) and **19c**[5] (1.72 g, 3.5 mmol) was heated neat at 160 °C for 1 min. Upon cooling, the mixture was triturated with anhydrous Et_2O (25 mL) and filtered. The Et_2O-insoluble material was collected and recrystallized from absolute EtOH (250 mL) to give 0.4 g (46%) of **17** as flocculant white needles, mp 284–286 °C. Anal. ($C_{12}H_{10}N_2O_2S$) C, H, N.

PDE Assay. The assay of Klee[7] was used, employing bovine heart phosphodiesterase (Sigma Chemical Co.) and 1 μM [8-^{3}H]adenosine cyclic monophosphate as we have previously described in more detail.[2] I_{50} values were determined by plotting uninhibited velocity/inhibited velocity (V_0/V) vs. the inhibitor concentration. The I_{50} is the inhibitor concentration where $V_0/V = 2$. At least five different inhibitor concentrations, giving 25–75% inhibition, were used for each inhibitor.

Acknowledgment. This work was supported, in part, by U.S. Public Health Service Grant HL-22566. In addition, we express our appreciation to Anthony Burke for his technical assistance.

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Book Reviews

Compendium of Organic Synthetic Methods. Volume 4. By Leroy G. Wade, Jr. Wiley, New York. 1980. xvi + 497 pp. 16 × 23.5 cm. $22.50.

The fourth volume in this series presents the new synthetic methods for preparation of monofunctional compounds for 1977, 1978, and 1979. As in the previous volumes, sections appear corresponding to most of the possible interconversions between the major functional groups. This volume also contains examples of new methods of preparation of difunctional compounds formed from pairs of the major functional groups.

This collection of reactions facilitates the rapid location of reactions when the functional groups present in the starting material and product are known. These volumes serve as an invaluable tool for synthetic organic chemists, medicinal chemists, and biochemists.

Staff

Somatostatin. Volume 2. By M. T. McQuillan. Eden Press, St. Alans, VT. 1980. iii + 234 pp. 13 × 21 cm. $30.00.

This book is an admirable compilation of the literature on somatostatin from mid-1977 to 1979. It consists of 16 chapters which are well written and well referenced, thus valuable to current research investigators.

The voluminous amount of literature dealing with the effects on secretion of hormones of the pancreatic islets, distribution, and biosynthesis of somatostatin has been elegantly covered in Chapters 3, 9, and 10, respectively. The chapter on "Properties of the Somatostatin Molecule" deals adequately with the isolation techniques for somatostatin or "somatostatin-like" molecules. Medicinal chemists will appreciate an interesting chapter on structure–activity relationship and a section on conformation in a book primarily devoted to biological aspects of the peptide.

In conclusion, this book is timely and well worth its price. It will be most useful to research scientists working in the area of somatostatin. Furthermore, it will also be a valuable addition to the libraries of academic and research institutions. Considering the number of papers published in this area since the publication of this book, it is imperative to update this volume in the next few years.

Smith Kline & French Laboratories **Tikam C. Jain**
Philadelphia, Pennsylvania 19101

Synthesis and Release of Adenohypophyseal Hormones. Edited by Marian Jutisz and Kenneth W. McKerns. Plenum Press, New York. 1980. 797 pp. 15.5 × 23.5 cm. $69.50.

This is an interesting and informative book mainly concerned with cellular and molecular mechanisms that regulate pituitary hormone secretion. The volume contains 37 chapters with the main emphasis placed on hormone synthesis and release by the anterior pituitary gland, although one chapter deals with control of the anterior lobe by the neutral lobe, and another chapter deals with secretion by the intermediate lobe. Comparative aspects are also presented, since there are chapters on hormone release in fish and amphibians. There are several chapters dealing with morphology, and these present information obtained mainly from immunocytochemical techniques.

The adenohypophyseal hormones that received the most attention were gonadotropins and ACTH and related peptides. Less emphasis was placed on growth hormone, prolactin, and TSH. All of the questions and answers from the discussion periods are contained at the end of each chapter, along with an excellent bibliography.

One of the interesting aspects of this volume, unlike many publications of symposia, is that many of the authors presented

new data that had not previously been published. This tends to offset the late publication date. The book is the publication of a symposium held in September 1978 at Chateau de Sellac, France. Its greatest appeal should be to graduate students and researchers in endocrinology, biochemistry, and cell biology.

The Lilly Research Laboratories **James A. Clemens**
Indianapolis, Indiana 46206

Organic Chemistry of Drug Synthesis. Volume 2. By Daniel Lednicer and Lester A. Mitscher. Wiley, New York. 1980. xvii + 526 pp. 15.5 × 23.0 cm. $28.00.

In volume 2, the authors have continued their superb review of the organic chemistry of drug design and synthesis. The material that is covered in this book fills some of the gaps left by the previous work as well as updates developments in the field since 1976. Like the first volume, the organization of chapters is based upon the chemical structure of the drugs rather than upon their biological activity. The most conspicuous change is the increased emphasis upon heterocyclic compounds, although aliphatic and carbocyclic drugs are not neglected by any means. The first seven chapters, comprising about 40% of the book, are devoted to the cyclic aliphatic and aromatic derivatives such as prostanoids, benzyl and phenylethylamines, arylalkanoic acids, steroids, and polycyclic aromatic compounds. The remainder of this volume reviews various classes of heterocyclic drugs, including special chapters devoted to the morphinoids, benzodiazepines and β-lactam antibiotics. At the end there are a cross index of drugs, a general index, and section containing errata for the first volume which are very helpful for the reader.

Several significant improvements are apparent in this book compared to the first volume. The drug syntheses are described in greater detail which provide better insight into the rationales and approaches that were used. Because the major emphasis is on the synthetic chemistry, the biological activity has been reduced to concise but accurate descriptions for each class of drugs. It was satisfying to observe that many of the typographical and textual errors that were so annoying in the first volume have been eliminated. The only consistent errors that were present were incorrect arrows in a number of reaction schemes.

By providing updated material and more heterocyclic chemistry the authors have provided a valuable sequel to their first volume. Together, these books can be useful to medicinal chemists either as reference works or as texts at the graduate level, and at its modest price it is well worth its purchase.

Department of Medicinal Chemistry and Pharmacology **Robert N. Hanson**
Northeastern University
Boston, Massachusetts 02115

Substance P. Volume 2. Annual Research Reviews. By Petr Skrabanek and David Powell. Series Editor, D. F. Horrobin. Eden Press, Quebec, Canada. (Distributed in the U.S.A. by Pergamon Press, Elmsford, NY). 1980. 175 pp. 15 × 21.5 cm. $26.00.

This is the second volume dealing with the intriguing and rapidly expanding field of substance P research and, according to the authors, it "is not a revised edition of the first volume but supplementary to it. There is virtually no overlap, since the present volume takes up the thread where it left off in late 1977 and reviews all the literature on substance P (SP) published from the autumn of 1977 till autumn 1979".

To this reviewer it seems that the difficult task of doing a follow-up in the multitude of SP papers appearing in the literature has been successfully solved by the authors. The huge amount of information contained in the papers reporting effects obtained with SP and its fragments in different investigations is thoroughly covered and digested into coherent essays that shed light upon different aspects of SP involvement in the particular functions, as well as their possible physiological significance. The topics covered include the central behavioral effects of SP and its interactions with other neuropeptides and neurotransmitters, as well as the role of SP in nociception, regulation of endo- and exocrine glandular secretion, and in gastrointestinal functions. Also, the clinical findings with SP are reviewed and its possible involvement in the pathophysiology of, for example, the carcinoid syndrome is discussed.

"Substance P", Vol 2, is a comprehensive overview of recent SP research and may, therefore, be anticipated to attract the interest of investigators in many different areas.

Department of Pharmacology **Stephan Hjorth**
University of Göteborg
Göteborg, Sweden

Aminocyclitol Antibiotics. ACS Symposium Series. Number 125. Edited by K. H. Rinehart, Jr., and T. Suami. American Chemical Society, Washington, DC. 1980. x + 437 pp. 16 × 24 cm. $39.50.

This book is part of the American Chemical Society Symposium Series which was founded in 1974 and is a compilation of the papers presented at a symposium chaired by Drs. Rinehart and Suami at the combined American Chemical Society and Chemical Society of Japan Chemical Congress held in Honolulu, HI, April 2 and 3, 1979. The aminocyclitol antibiotics include many therapeutically important agents, including the aminoglycosides such as streptomycin, neomycin, kanamycin, gentamicin, tobramycin, and amikacin, as well as spectinomycin. The book has been divided into three sections covering current synthetic, structural, and biochemical studies. These sections have been further divided into 22 chapters authored by individuals or research groups. Each of the chapters provide a state of the art discussion of the particular topic. This book should be available to all researchers interested in the aminocyclitol antibiotics and for those teaching courses covering the chemistry and biochemistry of antiinfective agents.

Staff

Reviews in Biochemical Toxicology. Volume 2. Edited by E. Hodgson, J. R. Bend, and R. M. Philpot. Elsevier/North-Holland, New York. 1980. ix + 300 pp. 17 × 24.5 cm. $35.00.

This book contains nine current reviews in which most deal principally with selected toxicants and their metabolic pathways. A chapter by R. E. Faith and others covering the effects on immunocompetence by chemicals of environmental concern brings together concepts and data from this emerging area of toxicology. H. A. Tilson and C. L. Mitchell describe relevant behavioral models for neurotoxicity testing, and A. Stier discusses membrane probes as a new method in biochemical toxicology. The remainder of the book focuses individual chapters on metabolism and toxicity of furan derviatives, acetaminophen, thionosulfur compounds, and organophosphorus insecticides. Xenobiotic pathways involving ligandin, glutathione *S*-transferases, and glutathione are also discussed. The chapters range from 20 to 40 pages in length.

Staff

Perspectives in Steroid Receptor Research. Edited by Francesco Bresciani. Raven Press, New York. 1980. xvii + 316 pp. 16 × 24 cm. $30.00.

The Sorrento symposium, on which this volume is based, marked the 20th anniversary of the birth of modern steroid receptor research. Two decades of research have led to a generally accepted model for steroid action: steroid binds to a cytoplasmic receptor protein, the steroid–receptor complex is "activated" (manifested by an increased affinity for the nuclear compartment), the complex interacts with genomic material, and specific genes are expressed. Within this framework there has been much research on and discussion about the biologically native forms of the receptors and the details of the biochemical mechanisms intermediate to gene expression.

Even though no collection of papers could claim to represent all viewpoints on steroid–receptor regulation of cellular processes, this volume succeeds in presenting many different perspectives

in its 19 chapters. The chapters can be divided into two groups: (1) basic biochemical papers and (2) clinical papers. The initial two-thirds of the book covers biochemical topics, including physical chemistry of steroid–receptor binding, purification and characterization of receptors, activation and inactivation of steroid–receptor complexes, interactions of steroid–receptor complexes and genomic structures, and new methods of receptor detection. The remaining one-third covers clinical topics, including analyses of estrogen and progesterone receptor levels in normal and cancerous breast tissue, the application of receptor assays to the evaluation of hormone replacement therapy for menopausal symptoms, and technical improvements in receptor assays.

Some aspects of this volume detract from its usefulness for researchers and clinicians not previously initiated into the field of steroid receptor research. For instance, terms such as "activated", "unactivated", and "inactivated" are applied to receptors without clear definition. Several operational definitions can be inferred from the experimental contexts, but the biological significance of these terms is not clear.

Nevertheless, this volume presents a good overview of the recent progress in the receptor field. Of particular interest is the chapter on immunochemical probes for receptors. This breakthrough in receptor detection by use of radiolabeled monoclonal antibodies permits the study of receptors in the absence of steroids. Previously, receptor detection depended upon the binding of radiolabeled steroids.

Results important to clinical evaluation of breast cancer treatment are reported in two chapters. One chapter indicates that successful endocrine therapy can be predicted by high levels of estrogen receptors. The other indicates that successful therapy can be predicted by the presence of both estrogen and progesterone receptors. Both of these methods are better predictors than the prevalent practice of evaluating therapeutic options on the basis of only qualitative estrogen receptor assays.

Augmenting the statistical analyses of clinical receptor measurements, one chapter outlines an improved method of receptor detection using NaSCN to increase steroid exchange rates. Although the basic information in this chapter is valuable, there are irritating errors in the kinetic model associated with the data analysis. The model neglects a dissociation rate constant k_{-1}, which is typically the same order of magnitude as the model's "inactivation" rate constant k_2'. The assumption that k_{-1} is not important is clearly in error when the receptors become saturated with steroid.

Also annoying, especially in the clinical chapters, is the number of typographical errors. Most are obvious and inconsequential. On page 253, however, figure 4 has been replaced by figure 5 which is reproduced again on the following page.

For biochemists and clinicians who have a background in receptor research this volume would be useful as a summary of recent progress in the field. In addition, some chapters anticipate progress in the next decade toward resolution of uncertainties in the details of steroid–receptor gene regulation.

Harvard University **Daniel H. Seeley**
Boston, Massachusetts 02115

Annual Reports in Medicinal Chemistry. Volume 15. Editor in Chief, Hans-Jürgen Hess. Academic Press, New York. 1980. xiii + 346 pp. 17 × 25 cm. $22.50.

According to the editor in chief, this volume strives to provide up-to-date critical accounts of progress in medicinal chemistry and related fields. Contributing authors are charged with providing highlights of a given area in ten pages or less. Within this limitation, the contributors have provided current and comprehensive reviews of topics (chapters) covered.

The book includes sections and chapters with the following titles. Section I, CNS Agents: Chapter 1, "Antidepressants"; 2, "Antipsychotic Agents and Dopamine Agonists"; 3, "Antianxiety Agents, Anticonvulsants, and Sedative-Hypnotics"; 4, "Analgesics, Endorphins, and the Opiate Receptor"; 5, "GABA Agonists and Antagonists"; 6, "Interoceptive Discriminative Stimuli in the Development of CNS Drugs and a Case of an Animal Model of Anxiety". Section II, Pharmacodynamic Agents: Chapter 7, "Pulmonary and Antiallergy Drugs"; 8, "Slow-Reacting Substances"; 9, "Antihypertensive Agents"; 10, "Agents for the Treatment of Ischemic Heart Disease"; 11, "Diuretics". Section III, Chemotherapeutic Agents: Chapter 12, "Antibacterial Agents"; 13, "Antiparasitic Agents"; 14, "Antineoplastic Agents"; 15, "Antifungal Chemotherapy"; 16, "Antiviral Agents". Section IV, Metabolic Diseases and Endocrine Function: Chapter 17, "Recent Developments in Lipoprotein Research and Antihyperlipidemic Agents"; 18, "Recent Advances in the Design and Development of Antiobesity Agents"; 19, "Modulation of Cyclic Nucleotide Metabolism and Function by Xenobiotics"; 20, "Complement Inhibitors"; 21, "Agents That Affect Prolactin Secretion". Section V, Topics in Biology: Chapter 22, "Scope and Mechanism of Enzymatic Monooxygenation Reactions"; 23, "Recent Developments in Adrenergic Receptor Research"; 24, "Chemotaxis"; 25, "Antibodies as Drug Carriers and Toxicity Reversal Agents". Section VI, Topics in Chemistry and Drug Design: Chapter 26, "Reactions of Interest in Medicinal Chemistry"; 27, "New Developments in Natural Products of Medicinal Interest"; 28, "Pharmacophore Identification and Receptor Mapping"; 29, "Altered Drug Disposition in Disease States"; 30, "Vitamin D Metabolites and Their Analogs"; 31, "Drug Delivery Systems".

In addition to the five sections, the book contains a compound name and code number index which simplifies the search for information about a specific drug. Also included in this volume is a cumulative chapter titles index of previous *Annual Reports in Medicinal Chemistry*.

Faithful readers of this series will recognize topic coverage from prior volumes. More novel entries include Chapter 6 on a new animal model for anxiety. The classical pharmacologic procedures involve measurement of the effect of a new drug on behavior of animals. Such approaches utilize behavioral measures to monitor animals' perceptual realizations that the drug is acting in the body. The drug actions which cause this realization are interoceptive stimuli and are defined as stimulus events that are initiated primarily from within the body (e.g., drug-induced neuronal events). Animals can be trained to recognize discrete interoceptive stimuli and to retain this ability for 6–12 months. This fact makes the proposed methodology competitive economically with most traditional behavioral assays used in pharmacology.

The chapter on the scope and mechanisms of monooxygenation reactions is particularly timely and useful. This chapter, however, has apparently replaced previous yearly offerings in drug metabolism which is somewhat unfortunate. Chapters on adrenergic receptor research, antibodies as drug carriers and toxicity reversal agents, and natural products of medicinal interest provide particularly fruitful leads for extended medicinal chemical research. Concluding chapters on altered drug disposition in disease states and drug delivery systems provide important advances in pharmaceutics that should be of interest to medicinal chemists.

The chapters of this volume are consistently well written. Most chapters are well illustrated with structures of pertinent compounds. A couple of chapters in the biology section and chapter 16 are exceptions. The extensive inclusion of structures has been a highly useful feature of the *Annual Reports* series. The printing is of high quality despite the use of a direct photoduplicative process. One exception is the structures in Chapter 3.

The volume is practically devoid of typographical or substantive errors. It is priced fairly and is a bargain particularly for members of the Division of Medicinal Chemistry of the American Chemical Society who receive it free! It should be on the bookshelf of every medicinal chemist and scientist interested in medicinal chemical and related research.

The University of Texas **Abram Brubaker**
Austin, Texas 78712 **Robert V. Smith**

Biochemistry and Pharmacology of Ethanol. Volumes 1 and 2. Edited by E. Majchrowicz and E. P. Noble. Plenum Press, New York. 1979. Vol. 1: xiii + 704 pp. 17 × 26 cm. $47.50. Vol. 2: xxviii + 572 pp. 17 × 26 cm. $42.50.

This two-volume work edited by two highly respected scientists in the field, one a former Director of NIAAA, has an ambitious title that promises much. Indeed, they have done a remarkable job in assembling a wide spectrum of experts representing "Who's

Who" in alcoholism research. With a few exceptions, the individual chapters represent well-written, in-depth reviews of the assigned topics, with some personal editorializing supported by the editors. While the chapter authors were encouraged to draw their own conclusions and expand on their own theories and hypotheses, they were restricted to citations of only published data. Occasionally, personal biases are recognizable, but for the most part they reflect judgmental views of experts in their respective fields and make for pleasant reading in the manner of the "Perspective" section of the *Journal of Medicinal Chemistry*.

To the credit of the editors, the behavioral aspects of alcoholism—not well understood and controversial subjects at best—are absent or have been minimized, and the focus on clinical aspects of alcoholism is restricted to the well-known chronic effects of alcohol on the liver. To aid the casual reader in digesting the subject material covered, each chapter has a "Summary and Conclusions" section which reinforces those points deemed to be important by the chapter authors.

In works of this magnitude with 28 and 27 chapters for the respective two volumes, it is impossible to cite all the subjects covered or give adequate credit to individual authors—except by reproducing the table of contents. However, one is challenged by the breadth of information gathered on the biochemical, pharmacological, and neurobiological aspects of alcoholism, and this review is written from the vantage point of a medicinal chemist with the charge (a) how can medicinal chemistry play a role in unraveling the mysteries of alcoholism, and (b) what are the prospects for therapeutic intervention.

Volume 1. The subject of ethanol biochemistry and pharmacology must necessarily include the pharmacokinetics of ethanol distribution and elimination (covered in three chapters, including the elaborate treatise by Higgins) as well as its metabolism and the enzyme systems responsible for the latter (seven chapters). Somewhat disenchanting is the paucity of information available on the human liver alcohol dehydrogenases (LAD) compared to the wealth of data for the horse liver enzyme, although some progress is in the making here. This is especially true since collateral pathways of ethanol metabolism not catalyzed by LAD do not play major roles in humans. More enlightening are the two chapters on acetaldehyde oxidation mediated by the aldehyde dehydrogenases written by Weiner, who has taken some confusing literature data and put them into order. While seemingly out of place for a book on ethanol, Tephly and his colleagues, nevertheless, present a succinct and definitive account of the mechanisms of methanol toxicity in monkeys, the only animal model that mimics the human situation. The exciting prospects for enzyme inhibitor (4-methylpyrazole) intervention to protect against methanol toxicity are introduced.

The remaining chapters look at the effect of ethanol on intermediary metabolism and the metabolic aberrations seen in various organs, especially in liver and brain, with one chapter devoted to possible mutagenic/carcinogenic effects of ethanol (not yet conclusive for man).

Volume 2. This volume focuses initially on the effects of ethanol on the physiology of electrolyte balance and on membrane and endocrine functions (ten chapters) and then leads into the intriguing neuropharmacologic effects of ethanol (four chapters). The chapters by Hunt and Majchrowicz on ethanol effects on neurotransmitter function and by Wajda comparing ethanol effects with the opiate drugs on the metabolism of biogenic amines recite much data without providing a coherent picture, perhaps reflecting the present state of flux in this area. The later chapters by Deitrich and Peterson ("Interaction of Ethanol with Other Drugs"), Deis and Lester ("Biochemical Pharmacology of Pyrazole"), and Faiman ("Disulfiram") are "must" readings for medicinal chemists with therapeutic inclinations. "Amethystic Agents" (drugs that can reverse ethanol intoxication) by Alkana and Noble was a disappointing chapter, primarily because there do not presently appear to be any good leads to follow up on and, secondly, because the prospects for opiate antagonists, such as nalaxone, or of prostaglandins were not touched upon.

Perhaps the most comprehensive chapter in this volume is one entitled "Drug Therapy of Alcohol Withdrawal Syndrome" by Gessner, while the important subject of "Fetal Alcohol Syndrome" (Rosett) is restricted to clinical pharmacology with no insights given as to possible etiologic mechanisms. In the final chapter, Cicero laments the fact that there are presently no true animal analogues (models) of (human) alcoholism; in particular, models that address the problems of tolerance and physical dependence.

These two volumes are strongly recommended for every biomedical laboratory conducting any type of research on alcoholism. They also serve as excellent texts for a graduate course on the biochemistry and pharmacology of alcoholism.

Department of Medicinal Chemistry
University of Minnesota
Minneapolis, Minnesota 55417

Herbert T. Nagasawa

Advances in Chemistry Series. Volume 188. Bioelectrochemistry: Ions, Surfaces, Membranes. Edited by Martin Blank. American Chemical Society, Washington, DC. 1980. xii + 527 pp. 16 × 23.5 cm. $58.00.

This book is based on the symposium, "Surface Chemistry in Biology and Medicine: Bioelectrochemistry", at the 176th meeting of the American Chemical Society, which took place on September 13–14, 1978, in Miami Beach, FL. It contains 28 articles covering a wide range of topics from theoretical derivations to medical applications. Most of them are updated reports on the authors' current research, with only two exceptions—Chapter 1, "Aggregation of Red Blood Cells", and Chapter 14, "Displacement Photocurrents in Pigment-Containing Biomembranes"—both of which are intended as minireviews on the said subjects with electrochemical interpretations. The main emphasis is placed on nonfaradaic processes and their relations with surface chemistry and colloid chemistry. As stated in the preface, the editor's (Martin Blank) idea of ideal interdisciplinary research is scientists with different views attacking the same problem, rather than applying the technique of one to the system of the other. This is in contrast to a previous ACS Symposium Series on Bioelectrochemistry ("Electrochemical Studies of Biological Systems", Edited by D. T. Sawyer), which dealt with applying electroanalytical techniques to biological systems.

The first chapter is a keynote address on "Aggregation of Red Blood Cells". The remaining 27 chapters were divided into four sections under the headings of (1) "Surface Interactions", (2) "Macromolecules", (3) "Membrane Processes", and (4) "Cells and Tissues". A goodly portion is devoted to discussions of the interactions of Ca^{2+}, Mg^{2+}, and other cations with simple bilayer membranes or enzyme systems. Conceptually, one can think of cell-membrane interactions as resulting from the contact of electrically charged plates, of dissolved macrmolecules as surface-stabilized suspension droplets, of electrochemical interactions in arrays of charged molecules, etc. Though written by various authors on considerably different subjects, there is uniform quality in each chapter which consistently seems to satisfy the objective of this book—electrochemical thinking to solving biological problems. The editor has done an excellent job in bringing fresh approaches to problems in biology and medicine.

University of Maryland
College Park, Maryland 20742

Hung Yuan Cheng