crushed until nearly all had dissolved. The benzene layer was separated, washed in turn with 1-L portions of 14% NH_3, water, and twice with 1 N HCl, and dried over K_2CO_3. The solvent was removed by distillation and the resulting solid distilled rapidly, to prevent clogging of the condenser, at 144–156 °C (0.03 mm). The distillate was recrystallized from 1.2 L of hexane. White crystals, 230.1 g (93%), of mp 61–62.5 °C were obtained (lit. mp 62 °C).

4-Hexyloxybenzonitrile (Method C). A solution of 75 g (0.63 mol) of 4-hydroxybenzonitrile in 1 L of absolute ethanol was treated under N_2 with 76.4 g (0.68 mol) of potassium *tert*-butoxide. Much heat was evolved. After a few minutes, 132 g (0.8 mol) of 1-bromohexane was added and the mixture was stirred and heated on a steam bath overnight (bumping!) The mixture was filtered from inorganic solids and the solvent was distilled from the filtrate at the water pump on a steam bath. The residue and the initial inorganic solids were partitioned between ether and water. Titration of the aqueous portion (Ag^+) showed 0.65 mol of Br^-. The ethereal solution was extracted with 400 mL of 1 N NaOH solution, dried over K_2CO_3, and treated with an equal volume of pentane. Storage at −14 °C gave 163 g (97% if pure) of crystals, mp 27 °C (lit. mp 32 °C).

Biological Tests. The tetrabenazine arousal test in mice was performed according to the method of Vernier et al.[10] Test animals received 10 mg/kg ip of the imidazoline 30 min prior to 35 mg/kg ip of tetrabenazine, and antitetrabenazine activity was determined 30 min after the tetrabenazine administration. Control animals received Tween 80 plus tetrabenazine. Ten animals were used for each group. Pargyline, 10 mg/kg, served as the reference standard. Results were expressed as the percent antagonism compared to control animals and are given in Table I.

Monoamine oxidase inhibition was determined in vitro using the method of Bogdanski et al.[12] Again pargyline served as the standard compound. Reversibility of MAO inhibition was checked as follows. The inhibitor (Table II, compounds **5** and **14**) and rat brain monoamine oxidase were preincubated together at 37 °C for 15 min. The mixture was then dialyzed (dialysis factor $>10^5$). Percent inhibition before and after dialysis was calculated.

compd	before dialysis	after dialysis
6	96%	77%
14	91%	93%

The activity of the MAO preparation in the absence of inhibitor was unchanged under these conditions. Activities after dialysis were measured using serotonin as substrate and should have become vanishingly small, since a freely dialyzing inhibitor would have been present at a final concentration of ca. 10^{-11} M (I_{50}, from Table I, 10^{-8} and 10^{-7} for **5** and **14**).

Acknowledgment. The authors wish to thank Dr. Helen White of these Laboratories both for redetermining many data in improved systems and for helpful discussions of these results.

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Book Reviews

Aldehydes in Biological Systems. By E. Schauenstein, H. Esterbauer, and H. Zollner. Translator, P. H. Gore. Pion Limited, London, and Academic Press, London and New York. 1977. 205 pp. 15.5 × 24 cm. £9.00.

There has been some interest in recent years in the metabolic inhibitory activities and possible biological roles of certain naturally occurring aliphatic aldehydes, i.e., a class of compounds with generally high chemical reactivity that are widely distributed in living matter. This monograph intends to provide a reasonably complete survey of the relevant literature and of the current status of research in this field.

Following a brief outline of the chemical reactions of aldehydes with thiol or amino groups present in the biological target molecules (primarily amino acids and proteins), the authors discuss the occurrence and biological effects of specific types of aldehydes (saturated, α,β-unsaturated, α-hydroxy, α-keto, and dialdehydes) as inhibitors of metabolism, biosynthesis, and cell division. Some of the best documented studies described in this monograph are those relating to the 4-hydroxy-2-alkenals which have been the specific subject of the authors' own research efforts. These compounds react selectively with some of the free sulfhydryl groups of the various cell constituents, and they appear to be useful reagents for comparisons of the diverse concentrations and reactivities of the protein and nonprotein thiols present in various organs and tumor tissues, as well as for studies of the functional sulfhydryl groups of purified enzyme preparations. Moreover, these and some of the other aldehydes are potent and more or less selective inhibitors of certain important enzymes involved in energy metabolism and DNA biosynthesis. The observed biological effects of aldehydes include inhibition of the multiplication of bacteria, viruses, and tumor cells. Due to their chemical reactivity and lack of stability in biological systems, the in vivo antitumor effects of such compounds could be demonstrated only by using local administration; therefore, they do not seem to hold promise as potential chemotherapeutic agents per se (except, perhaps, in the form of their derivatives). However, the possible biological functions of those aldehydes which are

potent inhibitors but occur as normal metabolic intermediates (e.g., glyceraldehyde, methylglyoxal) remain an intriguing problem.

The much shorter second part of the monograph includes a survey of the aldehydes involved in intermediary metabolism and a section dealing with a variety of other naturally occurring aldehydes having specific structures, properties, and functions.

The authors present the large amount and sometimes contradictory information with competence, balance, and good judgment but not in an easily readable style. The book is generally informative to biochemists and biologists; it is, of course, most useful to those interested in the general area outlined above.

State University of New York at Buffalo **Thomas J. Bardos**

Purine and Pyrimidine Metabolism. Ciba Foundation Symposium 48 (new series). Elsevier–Excerpta Medica–North-Holland, Amsterdam. 1977. xi + 369 pp. 17 × 24 cm. $30.95.

For several decades, the Ciba Foundation, a scientific and educational charity established by CIBA Ltd. (now CIBA-GEIGY Ltd.) of Basle, Switzerland, but operates independently in London under English trust law, has invited selected scientists to participate in special symposia for the promotion of international cooperation in chemical and medical research. The present book is a record of a symposium on purine and pyrimidine metabolism held at London on June 9–11, 1976.

As indicated by Chairman R. W. E. Watts in his opening remarks, emphasis of this conference was on three aspects: (1) regulation of purine and pyrimidine biosynthesis, (2) relationship between immunology and the biochemistry of purine metabolism, and (3) interference between neurology and biochemistry of purine metabolism. Since it is generally believed that purines not only regulate their own biosynthesis but also regulate pyrimidine synthesis as well and the converse does not hold, more attention has been directed on purine metabolism study than that of the pyrimidines during this symposium.

Most of the invited participants in this symposium are biochemists, biologists, and clinicians; hence, many of the reports were concerned with inherited disorders—diseases caused by inborn errors of purine and pyrimidine metabolism. Discussion of these ailments, including Lesch–Nyhan syndrome, oroticaciduria, and xanthinuria, is both timely and significant. After years of biochemical studies of the enzymic influence of de novo and salvage pathways relative to purine and pyrimidine metabolism, and medical studies of over 100 inherited metabolic diseases, information gathered by combining both disciplines should furnish a truer understanding of the regulation of normal and irregular metabolic pathways of these nucleic acid components. In this regard, J. F. Henderson urged all investigators to recognize the differences between in vitro and in vivo metabolism studies and be cautious in extrapolating results of enzyme studies to intact cells and tissues in experimental animals and humans.

Various aspects in regulating and controlling purine and pyrimidine biosynthesis were presented (title abbreviated) by J. S. Gots et al. (microbial models and regulatory elements), J. B. Wyngaarden et al. (molecular nature of enzyme regulation), W. L. Nyhan (genetic heterogeneity in HGPRT), R. O. McKeran (tissue damage factors), B. T. Emmerson (HGPRT activity in erythrocytes), G. H. Reem (purine biosynthesis in mutant mammalian cells), G. Nuki et al. (nucleotides in mutant human lymphoblasts), O. Sperling et al. (purine overproduction and gout), N. Zöllner et al. (dietary feedback regulation), A. de Vries et al. (nephropathy and urolithiasis in purine disorders), A. C. Allison et al. (de novo purine synthesis in lymphocyte transformation), and T. Hovi et al. (control of cell proliferation). In addition, the effect of adenosine on lymphoid cell proliferation and antibody formation was presented by J. E. Seegmiller et al., and W. N. Kelley et al. reported that adenosine deaminase deficiency is associated with severe immunodeficiency.

A purinergic nerve hypothesis was forwarded by G. Burnstock wherein the active principal released by a nonadrenergic and noncholinergic component in the autonomic nervous system is a purine nucleotide somewhat resembling ATP. Some properties of purinergic receptors were also described. Although this presentation is still regarded as a hypothesis, it is important that presentation of working hypotheses by experimental scientists be encouraged, provided efforts be made for their verification.

By comparison of the present symposium with a similar one held in 1956 (cf. CIBA Foundation Symposium No. 33, "Chemistry and Biology of Purines", Little, Brown & Co., Boston, Mass., 1957), one can appreciate the progress made during the past 20 years as well as the changing attitude and emphasis on the fundamental and applied research objectives in this field. Nevertheless, throughout the entire symposium, it can readily be seen that, although some fundamental aspects have now been clarified, others, such as the mechanism controling cell differentiation, including biochemical differentiation, are poorly understood, and many problems remain either unanswered or unsettled. The already interwoven metabolic pathways are actually much more complicated and interrelated than originally visualized. It is encouraging to note that, through modern biochemical, bioengineering, and computer technology, international cooperation and information exchange and management of research results from medicinal chemists, biochemists, biologists, and clinicians may soon be realized to assist in studying this complicated problem of life. This book will thus be of interest to all conscientious scientists working in the field of life sciences.

Midwest Research Institute **C. C. Cheng**

The Synthesis of Prostaglandins. By Abhijt Mitra. Wiley-Interscience, New York, N.Y. 1977. xiii + 44 pp. 15.5 × 23 cm. $22.50.

This book attempts to provide a comprehensive review of prostaglandin synthesis, which will be a useful reference book for practicing organic chemists. It therefore invites comparison with a recent book on this same subject, i.e., "Prostaglandin Synthesis", by J. S. Bindra and R. Bindra, Academic Press, 1977. Both books adequately cover the area and it will be a matter of personal preference as to whether one prefers the condensed structural formula presentations of Mr. Mitra or the interspersed descriptive material of the Bindras. An important difference in presentation of the structural formulas by Mr. Mitra is the use of the retrosynthetic approach to synthesis design, i.e., the presentation of an antithetic flow diagram, as well as a synthetic flow diagram. In many cases I am sure that this is artificial and does not represent the thinking of the workers at the time their synthesis was being carried out. In one case I can be certain it was not so. Nevertheless, the antithetic approach is certainly important to teach to new students of organic synthesis (hopefully not the only approach!). A more classical review of prostaglandin synthesis by an experienced worker in the field, Professor Pierre Crabbé, has also recently appeared: "Prostaglandin Research", edited by P. Crabbé, Academic Press, 1977. The reader can then surely be able to find a presentation of this subject matter to his liking.

The present book by Mr. Mitra can be regarded as a truly remarkable achievement for a graduate student, even one from Professor Stork's group. The literature coverage extends well beyond the preface data of Jan 1977. This underscores the merit of having the literature citations as footnotes in the text, rather than compiled at the end of long chapters where additions in proof are difficult, if not impossible. This literature coverage, as far as the synthesis of naturally occurring prostaglandins is concerned, appears to me to be complete and readily retrievable, either via the subject or author index. The structure of the book lends itself well to retrievability if one has an outline of the synthetic scheme in mind. The retrieval can be made from the chapter headings and then a quick thumbing through to pick up a subheading, e.g., the "Syntex Synthesis" can be located in an instant in the chapter on "1,4-Additions" if one remembers they used organo cuprate additions to a cyclopentenone. A minor criticism of the book is the lack of consistency in the choice of such subheadings. One might have always used the senior author's name, e.g., as in the "Sih Synthesis", because this is a common mnemonic of chemists. This subheading is used mainly for academic investigators, and industrial groups are identified by company name. Unfortunately, it is not done consistently, e.g., the "Reckitt and Coleman Synthesis" is described as the "Turner Synthesis", so one should be familiar with both name and affiliation for prompt retrieval.

The "Acetoxyfulvene Approach" is graced by neither name (Dr. E. D. Brown) nor affiliation (I.C.I.). Nevertheless, this book is a very useful key to the literature of the synthesis of natural prostaglandins.

This book is not a particularly critical review of prostaglandin synthesis. On page 12 mention is made of the sensitivity of β-ketols to acid and base; yet, on pages 29 and 88 schemes involving acid-catalyzed removal of the ketal are presented without comment. Two Baeyer–Villiger processes on the same compound are described which give different products without any comment being provided (pages 193 and 195). Many schemes are presented without yields, and many procedures, while of interest from a lab bench point of view, have serious limitations of cost or logistics if scaled up. In some cases the point being made by the original authors has been misunderstood. For example, on page 76 the difference in the outcome mentioned in ref 70 is not due to the nature of the oxime but due to the presence or absence of the tetrahydropyranyl-protecting group. The role of the tetrahydropyranyl group in assisting certain reactions has been noted by others (page 294, ref 20). Mr. Mitra also perpetuates the confusion about the biological role of prostaglandins on page 12. They are *not* hormones. Generally speaking the coverage of the subject from the biological standpoint is poor; yet, the language of the biochemist is introduced untranslated from time to time; e.g., BSVM on page 47 means "bovine seminal vesicle microsomes" to only a small percentage of the intended readership.

The other general criticism is the inclusion of a chapter on prostaglandin analogues. The literature here is just too voluminous to handle in a book of this size. It is also much harder to identify those compounds which will be of interest and those of passing fancy. A good example is the omission from the chapter of the first prostaglandin analogue of commerical importance, Fluprostenol, Equimate of I.C.I., which is already described in the 9th Edition of the Merck Index (No. 4076). Instead, a lot of coverage is provided for the 11-deoxyprostaglandins which are no longer of real interest.

This book has an unusual number of typographical errors. The structures of PGH_2 and PGG_2 are incorrectly assigned (page 8). Dr. Vorbrüggen's name is spelled incorrectly in the text (page 18) and in the author index (page 432). On page 45 the subscript 3 is missing from $[Me_3SiCN]$ in the center of the page and $(CH_3)_3$ from the Si atom in the product. On page 218 the bottom structure is $PGF_2\beta$. On page 222 the word "used" is missing from the second line. On page 269, line 4 from the bottom, *one* – not only. On page 371, the third structure down is the same as the one above. It should be the $CH_3C(=O)OCH_2O-$ group on the oxime. On page 372, the structure in the bottom right hand corner lacks a methylene group. On page 404 in the top left hand structure, there is a methylene group too many. On page 416 it should be endoperoxides on the first line.

The final judgment for this reviewer is, should it be recommended for one's own or the institutional library. On balance, the answer is affirmative. Mr. Mitra has done a good job of organizing the literature of prostaglandin synthesis in an attractive and readily retrievable way. As a final point, none of the three books in this area mention the work of Dr. Masayasu Kurono of the Ono Pharmaceutical Co. in Osaka, as it is described only in the patent literature. Nevertheless, it is the work of Dr. Kurono's group that really made the natural prostaglandins freely available for study. While many academic, and even industrial, groups were struggling to prepare them in milligram quantities, the Ono Pharmaceutical Company would provide, for a price, gram quantities of excellent quality materials. It is somehow a pity that such efforts are not deserving of a citation.

CIBA-GEIGY Corporation **Neville Finch**

Psychopharmacological Agents. Medicinal Chemistry. A Series of Monographs. Volume IV. Use, Misuse and Abuse. Edited by Maxwell Gordon. Academic Press, New York, N.Y. 1976. xv + 215 pp. 16 × 23.5 cm. $22.00.

This volume, which is the fourth in the series on the chemistry and pharmacology of psychopharmacological agents, presents various topics related to the use, misuse and abuse of these drugs. The primary subjects of this book are the narcotic analgetics, with four of the six chapters being devoted to aspects of those drugs. Chapter 1, "Introduction to Drug Abuse and Drug Dependence", utilizes the history of opiate addiction as an example of the development of drug abuse and the progression to dependency. How the problems of drug abuse and dependency are managed, both on the national (economic, governmental, and geographic factors) and individual (narcotic antagonist and methadone maintenance) scale, is described in Chapter 2, "Perspectives in Drug Abuse". Chapter 3, "Research Toward Nonabusive Analgetics", covers the literature through 1972 and reviews the efforts of synthetic organic chemists to develop nonaddictive analgetics. Chapter 5, "Treatment of Opiate Abuse by Methadone Maintenance", examines the clinical and social experience of the New York City methadone program for the treatment of opiate addiction. Chapter 4, "Psychotomimetic Agents", which comprises half of the book, provides a well-organized overview of the chemistry and biological activity of a number of classes of psychotomimetic drugs, including the lysergic acid amides, tryptamines and carbolines, peyote alkaloids, methoxyamphetamines, cannabanoids, and muscarinic agents. The last chapter, "Regulatory Aspects of Drug Abuse", describes some of the attempts by the U.S. Government to control the traffic and use of drugs, primarily the narcotics, over the last 75 years.

Although some historical and social insight into drug abuse may be gained from chapters 1, 2, 5, and 6, only chapters 3 and 4 will provide any substantial information for the serious medicinal chemist or pharmacologist. However, the two chapters do make the acquisition of the book worthwhile.

Northeastern University **Robert N. Hanson**

Chemistry and Biochemistry of Amino Acids, Peptides and Proteins. Volume 4. Edited by Boris Weinstein. Marcel Dekker, New York and Basel. 1977. xi + 339 pp. 15 × 23.5 cm. $39.50.

This series consists of reviews which emphasize the chemistry of amino acids and their polymeric derivatives. Volume 4 contains five reviews. The first and shortest, "The Occurrence and Biosynthesis of D-Amino Acids" by J. S. Davies, is atypical in that chemical synthesis is not stressed. Its most stimulating section describes possible reaction mechanisms by which D-amino acids might be biosynthesized. Surprisingly, D-amino acids in insects [J. J. Corrigan, *Science*, **164**, 142 (1969)] are not mentioned. The second review, "Sequential Polypeptide Synthesis" by J. H. Jones, discusses the chemical synthesis of peptides with simple repeating amino acid sequences. Two important limitations in this field are stressed: (a) the inability to detect racemization at levels below 2% and (b) the difficulty of obtaining accurate molecular weights. Some leading references on the uses of sequential polypeptides are provided. The third review, "Haloketone Inhibitors of Proteolytic Enzymes" by J. C. Powers, covers in great detail the chemical synthesis and interaction of these important compounds with enzymes. A relatively brief but stimulating section on the effect of haloketones in fertilization, cell growth, protein synthesis, tumors, and viruses is included. There are more than the usual number of minor errors. Among others "sulfhydryl" (p 130) is misspelled twice, and "moose blastocysts" (p 137) and "moose fibroblasts" (p 142) are discussed where the corresponding mouse cells are meant. The fourth review, "The Chemistry of Cyclic Alpha Imino Acids" by A. B. Mauger, thoroughly covers the natural occurrence and chemical synthesis of cyclic imino acids containing four→seven-membered rings. Biochemical aspects of these compounds are not discussed. The fifth review, "The Chemistry and Biochemistry of Beta-Amino Acids" by C. N. C. Drey, emphasizes the chemical synthesis of β-alanine, β-aminoisobutyric acid, other β-amino acids, and peptides. Some biological studies are mentioned. For example, with (1β-alanine) ACTH enhanced and prolonged activity is obtained, whereas with (6β-alanine) bradykinin inhibition is observed.

Author and subject indexes are included. Volume 4 should prove of value to workers in the field, but it is probably too detailed and thorough for the general reader.

Tufts University School of Medicine **Roy L. Kisliuk**

Methodicum Chimicum. Volume 11. Part 2. Natural Compounds. Antibiotics, Vitamins and Hormones. Edited by F. Korte and M. Goto. Academic Press, New York, N.Y. 1977. ix + 304 pp. 18.4 × 26.4 cm. $49.50.

This book is the second of three parts comprising Volume 11 of this extensive work. It is intended to provide graduate students and research workers with extensive summaries of various aspects of natural products chemistry at a level between the textbooks and advanced treatises on the subject. The preface indicates a desire to provide nonspecialists with concise and unambiguous descriptions of proven, reliable methods without providing an exhaustive listing of everything available.

On balance, this is a very attractively put together individual volume. The chapters are uneven in quality and utility, as is common with multiauthored tomes. The liberal use of formulas and extensive referencing in most sections live up to the intent of the preface and are the principal value of the work. The timeliness of volumes of this type, unfortunately, decreases too rapidly for comfort, but these monographs will provide an entry into the fields covered for those beginning a new research effort or "shopping" for ideas to appropriate into their own area of current specialization. The high cost of the series and this individual volume will restrict the sale of this volume and series to libraries. Those medicinal chemists with access to such libraries will find much of interest here.

Chapter 1 by R. Reiner deals with the antibiotics. Much interesting background material is presented in these 68 pages. The chapter is, however, the least satisfying in the book to this reviewer because relatively few references to the source of the material are given, and the depth of coverage is quite uneven. A fairly thorough discussion of elementary microbiological and clinical considerations is given, along with 7 whole pages (10% of the total) devoted to a chronological listing of the discovery date of various compounds and concepts. On the other hand, partial and total syntheses are covered essentially only in flow chart fashion, with reaction specificities and molecular rearrangements uncommented upon, and the syntheses are not referenced. One is left to search the literature using the author's name, the name of the compounds, and the year in which the work appeared. In the total synthesis of oxytetracycline by Muxfeldt, for example, some sequences are explicated only as "three steps", "five steps", etc. This is the main defect of this chapter. Specialists will argue that inclusion of examples of structure proof as the penicillin work completed essentially in 1945 and the oxytetracycline work completed essentially in 1952 without the discussion of any use of physical measurements does not reflect contemporary practice. The section on partial synthesis of penicillins and cephalosporins leaves out the recent elegant methods of chemical transamidation without necessitating side-chain cleavage, and the discussion of the synthesis of amikacin from kanamycin A makes no mention of the role ambutyrosin played in introducing the HABA group to this class of antibiotics and does not mention the fact that there are amikacin-resisting microorganisms operating by *R*-factor mechanisms. In the biosynthesis section no mention is made of the enormous impact of stable isotope–Fourier transform magnetic resonance methods on such work. Chemical degradations of the classic type may now be things of the past for this kind of work. Eight pages (another 10%) are given over to a tabular listing of the formulas and some other properties of the new penicillins and cephalosporins. If only the interested reader had some leading references! The reference section, in fact, consists entirely of 23 reviews and the names and addresses of two antibiotic journals. Surely these imperfections and other specific points I would quarrel with are largely a consequence of trying to cram so much material into such a short space, but they, nonetheless, diminish the value of this chapter to medicinal chemists.

The second chapter is written by a consortium of 23 Japanese authors and divides the vitamins into brief, up-to-date, and fully referenced (both journal articles and reviews) subsections written by active participants in each subfield. Some of these suffered from the use of too few structural formulas for clarity, but this 75-page section comes off well. Relatively recent advances, for example, in the vitamin D area, are at least mentioned.

Chapter 3 is a 9-page exegesis of the enzymes by F. Friedberg. There is only room for a very brief section on enzyme kinetics, nomenclature, purification methods including affinity chromatography, immobilized enzyme technology, diagnostic applications, and cofactors. This short chapter is somewhat superficial but has 119 references and cites six books for further reading.

The fourth chapter, on the hormones, is written by seven German and Japanese authors and covers peptide, steroid, insect, and phytohormones in 67 pages. This chapter is one of the best in the book, being heavily referenced and replete with structural formulas and helpful diagrams in most subsections.

Chapter 5 has three authors and discusses algal and fungal toxins, toxic substances from animal and plant origin (including marine toxins), methods for bioassay, and mutagenicity tests (including the famous Ames' system) in 16 pages. The selection of subject matter is necesarily arbitrary and the first section would have been greatly improved by the inclusion of structural formulas.

In the sixth chapter, three Japanese authors from Kyowa Hakko Co. describe industrial fermentations in 15 pages. This discussion ranges from amino acid production to nucleic acid analogues, to citric and other organic acids, to enzymes, Sih's Dopa process, single-cell protein from hydrocarbons, and so on. This is an area foreign to many medicinal chemists and the lucid style and many references recommend this chapter.

In the seventh, and last, chapter, six Canadian and Japanese authors put together a highly interesting series of monographs on the physical chemistry of smell, substances with particular tastes, luciferins and luciferases, and the chemical aspects of memory. Many medicinal chemists will find this entertaining reading out of the mainstream of their professional interests, but the taste and smell substances, for example, clearly are involved with small molecule–receptor interactions which lead to integrated neural responses and will begin to look familiar in this light.

The University of Kansas **Lester A. Mitscher**

Membrane Proteins and Their Interactions with Lipids. Volume 1. Edited by R. A. Capaldi. Marcel Dekker, New York and Basel. 1977. ix + 260 pp. 15.5 × 23.5 cm. $34.75.

This slim volume is the first of a projected multivolume series on the structure and function of membrane proteins. There are six chapters written by nine authors, most of them are relative newcomers to the rapidly growing field of membrane research. Chapter titles are as follows: 1, The Structure Properties of Membrane Proteins (R. A. Capaldi); 2, Molecular Properties of Membrane Proteins (J. P. Segrest and R. L. Jackson); 3, Lipid–Properties and Lipid–Protein Interactions (G. Lenaz); 4, The Ca–Mg ATPase Protein of Sarcoplasmic Reticulum (SR) (R. J. Baskin); 5, The Na–K ATPase (R. E. Barnett); and 6, The Glycoproteins of the Semliki Forest Virus Membrane (K. Simons, H. Garoff, and A. Helenius). Of 260 pages, more then a quarter are devoted to references, author, and subject indices. In the introduction to the series, the editor points out that the volume "shall be an important reference source for advanced students". This reviewer has no doubt that this may be so, for there are 1023 references listed. The most readable and useful chapter is the one on lipid–protein interactions. It also happens to be the most lengthy one (83 pages with 502 references). This chapter provides a balanced, in-depth account of the work published prior to 1975, with a few exceptions. Most of the other chapters are too brief to make the book worth the cost, since more up-to-date review articles on similar topics can be found in journals devoted to membranes. For an example, A. Shamoo has published an article on the ATPase of SR in the Biomembrane Review of *Biochim. Biophys. Acta* in 1977. The future volumes of this series should aim at more in-depth coverage and a speedier publication so that the stated aim of providing a forum for discussion of current advances could better be realized.

Michigan State University **H. Ti Tien**