Book Reviews*

Chemistry in the Environment: Readings from *Scientific American*. Introduction by CAROLE L. HAMILTON (California Institute of Technology). W. H. Freeman and Co., San Francisco, Calif. 1973. 361 pp. $12.00 (cloth); $5.95 (paper).

This handsomely produced book, amply provided with black and white and colored illustrations, is a collection of articles that have appeared in the magazine *Scientific American* over the last twenty years. The subjects are arranged into five groups, which deal respectively with the element cycles, the chemical aspects of intensified agriculture, the sources of technological energy, the consequences of energy production, and the chemical consequences of the activities of a material-rich society. Each of these groups is preceded by a unifying introduction. The articles are written for nonspecialists, of course, and the chemistry is consequently kept quite simple. There are necessarily some gaps in the coverage of the title subject, and the fact that it was not feasible to have the many authors update the older articles results in some incomplete or otherwise dated treatments. Nevertheless, the selection is good and, taken as a whole, provides useful perspective even for the professional chemist, and could be valuable supplementary reading for undergraduate students.

Encyclopedia of Industrial Chemical Analysis. Volume 17: Phenols to Sensory Testing Methods. Edited by F. D. SNELL and L. S. ETTRE. Wiley-Interscience, New York, N. Y. 1973. xii + 644 pp. $45.00 ($35.00 by subscription).

There is much inorganic chemistry of the elements in this volume, which includes phosphorus, the platinum group metals, rare earths, etc. Organic chemistry is represented by substantial sections on phthalic acid derivatives, polyamides, polycarbonates, and pyridine and derivatives. The final entry is largely concerned with flavors and odors; it devotes a surprisingly large fraction of its length to the human problem of panel selection and indoctrination. Some of the qualities to be examined, such as "chewiness, gumminess,. . ., and overall mouthfeel" must be a real challenge to express in SI units!!

Preparative Organic Chemistry. Edited by G. HILGETAG and A. MARTINI (Institut für Organische Chemie der Deutschen Akademie der Wissenschaften zu Berlin). John Wiley & Sons, New York, N. Y. 1973. xxv + 1181 pp. $42.50.

This work is an English version of the fourth edition of the late Professor Conrad Weygand's "Organisch-Chemische Experimentierkunst," originally published in 1938. It has been totally rewritten by a team of German chemists from Berlin, and the scope has been restricted to reactions, the original sections on materials and operations, and on characterization, having been dropped, except for an appendix on "Preparative organic work with small quantities" by O. Kovacs of Szeged.

The organization is very systematic and follows Professor Weygand's original arrangement according to forming and breaking of bonds, which is generally familiar from its use in the Theilheimer series. A mammoth table of contents (17 pp), larger than the index of many books, makes it easy to find the part one is interested in. There one finds an extremely succinct description of the reaction concerned, accompanied by one or more representative experimental directions, and a short selection of leading references. This book thus has a strong resemblance to Buehler and Pearson's "Survey of Organic Syntheses," from which it differs principally in organization (the latter is organized to functional group). There are advantages to each arrangement, and they are thus to a large extent mutually complementary. Unfortunately, delays, presumably of translation, have made Weygand/Hilgetag two years *behind* Buehler and Pearson, even though it is published two years later. However, since neither book attempts encyclopedic coverage, this shortcoming is less important. The new book will be found very useful.

Radioisotope Laboratory Techniques. By R. A. FAIRES and B. H. PARKS (A.E.R.E., Harwell). Wiley/Halsted, New York, N. Y. 1973 xiv + 312 pp. $11.50

The authors attempt to collect into a single volume the expansive basic knowledge and practices of nuclear science. Intended for the technologist in a radioisotope laboratory, much practical information is given without exposing or belaboring principles. In general, a nuclear scientist may find the book overly ambitious in providing a complete manual for the laboratory technologist.

The information is very readable and oriented to British examples of equipment, etc. This will not, for the most part, be a handicap to the American user.

The book is roughly divided into the areas of introductory principles, radiation health and safety topics, and counting systems and methods. A new chapter has been added (by R. D. Stubbs) on liquid scintillation techniques. The topic is covered quite adequately. Solid-state detectors are poorly covered, being given very little emphasis.

Throughout the book there is much good advice about practical radioisotope laboratory techniques. A chemist working with radioisotopes will find this book useful.

Moses Attrep, Jr., *East Texas State University*

Progress in Surface and Membrane Science. Volume 6. Edited by J. F. DANIELLI (SUNY, Amherst), M. D. ROSENBERG (University of Minnesota), and S. A. CADENHEAD (SUNY, Buffalo). Academic Press, New York, N. Y. 1973. xiii + 380 pp. $22.50.

Volume 6 contains six articles, three of which (Solid State Chemistry of the Silver Halide Surface by R. Matejec, H. D. Meissner, and E. Moisar; Double Layer at the Mercury-Solution Interface by Richard Payne; and Contact-Angle Hysteresis by T. D. Blake and J. M. Haynes) are primarily addressed to physical chemists. While no reviewer is likely to find a volume of this sort to be completely free of significant omission or technical error, these are on the whole informed reviews, very narrow in scope, by active workers in the fields. The subject matter of the longest article, Ion Binding and Ion Transport Produced by Neutral Lipid-Soluble Molecules by G. Eisenman, G. Szabo, S. Ciani, S. McLaughlin, and S. Krasne, is somewhat more restricted than the title might imply, being almost exclusively concerned with the role of a few macrocyclic antibiotics in modifying the transport of alkali metal and ammonium ions through lipid bilayers. The emphasis is on the quantitative adequacy of a particular model rather than on a comprehensive review.

The almost exclusively descriptive article on the Structure and Function of the Nuclear Membrane is representative of a class of reviews which is likely to be of significant utility to a number of readers of this journal. Dr. Kessel surveys an extensive literature in cytology, electron microscopy, and cell biology and so provides a chemist with a convenient comprehensive source of biological background. The concluding contribution, Biophysical Interactions of Blood Proteins with Polymeric and Artificial Surfaces by D. A. Olsen and H. D. Kletschka, is likely to be of bibliographic interest rather than a source of interesting scientific interpretation.

This volume will be usefully acquired by libraries. In the opinion of the reviewer, few individuals will wish to purchase it.

Leon J. Slutsky, *University of Washington*

Topics in Lipid Chemistry. Volumes 2 and 3. Edited by F. D. GUNSTONE (University of St. Andrews). John Wiley & Sons, New York, N. Y. Volume 2: 1971. ix + 313 pp. $19.50. Volume 3: ix + 282 pp. $17.50.

These additional volumes of the newly initiated series continue the high quality of reviews on matters of lipid chemistry by practicing experts. Emphasis is on chemistry of lipids with relatively little consideration given to lipid technology or to biochemistry. The individual topics do not have a close relationship with one another but have been selected by the editor as being significant and not reviewed elsewhere.

Topics of Volume 2 are: Ozonolysis, Allylic Halogenation and Oxidation of Unsaturated Esters, Nitrogen and Sulphur Analogues of Epoxy and Hydroxy Acids, Natural Alkyl-Branched Long-Chain Acids, and Olefin Reactions Catalysed by Transition Metal Compounds. Volume 2 also contains appendices: Books and Reviews on Lipids, which list items published between 1965–1970, and NMR Spectra of Fatty Acids and Related Compounds, which tabulates important contributions for the period 1959–1970.

Topics of Volume 3 are: Synthetic Glycerides, Fatty Acids

* Unsigned book reviews are by the Book Review Editor.

with Conjugated Unsaturation, Glyceride Chirality, The Production of Fatty Acids from Hydrocarbons by Micro-organisms, The Preparation of Alkyl Esters from Fatty Acids and Lipids, and Plant Waxes. An appendix lists books and reviews on lipids for the period 1963–1971.

Each topic is well written, contains timely and adequate references to pertinent literature, and leaves the reader with the feeling that he has been rewarded by reading the reviews. Whereas most of the reviews dwell on descriptive organic chemistry, two chapters of Volume 3 which deal with unsaturated fatty acids and with plant waxes have a natural-products orientation. The chapter on microbially produced fatty acids necessarily also emphasizes the microbial agents involved, and the review is organized along taxonomic lines.

Comparison of the volumes with two other series "Progress in the Chemistry of Fats and Other Lipids" and "Advances in Lipid Research" is inevitable and reveals the clearly distinctive emphasis on chemistry of the presently reviewed series. Accordingly, the two volumes and their predecessor, Volume 1, provide unique review treatment of important topics of lipid chemistry and supplement but do not overlap the other more biochemically oriented series mentioned. The reviewed volumes are suitable for inclusion in the personal libraries of lipid chemists and also for addition to general chemistry libraries.

Leland L. Smith, *University of Texas Medical Branch*

Amino-Acids, Peptides and Proteins. Volume 4 (Specialist Periodical Reports). Edited by G. T. YOUNG (The University of Oxford) with 16 other contributors. The Chemical Society, London, 1973. xvi + 498 pp. £9.00.

Contributions to the peptide literature have continued at a rapid pace and investigators find it increasingly difficult to remain current in their own specialized areas, let alone broadly related areas. Preceding volumes of the series have done an excellent job of lightening the burden and Volume 4, which covers the literature of 1971, continues the standards of excellence set in previous years.

Approximately 3000 papers have been summarized by Professor Young and his sixteen collaborators. In the introduction to Chapter 2, Young states; "Another year, another report, another attempt to compress the proverbial quart into the pint pot." The "pint pot" must be quite expandable for volumes of information have been concentrated to a residue of precise statements. Sufficient detail is provided, however, so that referral to the original literature is only necessary when exact procedures are required.

The five chapters of the review encompass amino acids, structural investigation of peptide and proteins, peptide synthesis, peptides with structural features not typical of proteins and abstracts of IUPAC and IUB Commission on Biochemical Nomenclature. The appendix to Chapter 3, peptide synthesis, lists the peptides synthesized during 1971. This list, coupled with the author index and a very complete table of contents, helps to overcome the inconvenience of the lack of a subject index. The new synthetic methods listed in a second appendix to Chapter 3 is particularly useful to the synthetic peptide chemist even though, as Professor Young states, "this list is selective and subjective."

Finally, the addition in Chapter 5 of the most recent IUPAC–IUB nomenclature recommendations relevant to amino acids, peptides, and proteins is most welcome.

The active investigator as well as the casually interested scientist will find this book indispensable to fulfilling his needs.

Eugene L. Woroch, *Abbott Laboratories*

Case Studies in Atomic Collision Physics. Volume 2. Edited by E. W. MCDANIEL (Georgia Institute of Technology) and M. R. C. MCDOWELL (Royal Holloway College, Surrey). North-Holland Publishing Co., Amsterdam. 1972. xiv + 650 pp. $49.50.

The field of atomic collision physics is a mature yet still advancing research area which is becoming of increased interest to many physical chemists. This volume follows the format of the first volume in the series, published in 1969, by presenting eight lengthy and thorough reviews of research on various aspects of atomic collisions. The reviews and their authors are: "Three-body Recombination of Positive and Negative Ions" (M. R. Flannery); "Precision Measurements of Electron Transport Coefficients" (M. T. Elford); "Differential Cross Sections in Electron Impact Ionization" (H. Ehrhardt, K. H. Hesselbacher, K. Jung, and K. Willmann); "Interpretation of Spectral Intensities from Laboratory and Astrophysical Plasmas" (A. H. Gabriel and C. Jordan); "Atomic Processes in Astrophysical Plasmas" (V. P. Myerscough and G. Peach); "Polarized Orbital Approximations" (R. J. Drachman and A. Temkin); "Photodetachment: Cross Sections and Electron Affinities" (B. Steiner); and "The Role of Metastable Particles in Collision Processes" (R. D. Rundel and R. F. Stebbings). An outstanding feature of all of the articles is the interweaving of experimental and theoretical results, as well as the frequent stating of important but as yet unsolved problems. The articles of perhaps greatest interest to chemists are Steiner's article on photodetachment and Rundel and Stebbing's article on metastable particles in collisions. The former contains a very extensive list of atomic and molecular electron affinities, together with descriptions of methods used for their determination, while the latter discusses at length the process of chemiionization.

Despite its high cost, this volume is highly recommended to those researchers interested in atomic and molecular beam research, in the physics of plasmas, in stellar atmospheres and their spectra, or in photoionization and electron impact processes. The various articles complement each other to an extent rare in review volumes today, thus presenting a balanced yet detailed overview of the status of atomic collision physics.

Lawrence L. Lohr, Jr., *University of Michigan*

Amorphous Materials. Edited by R. W. DOUGLAS and BRYAN ELLIS (University of Sheffield). John Wiley & Sons, New York, N. Y. 1972. xviii + 550 pp. $24.95.

This book is a collection of papers presented to the Third International Conference on the Physics of Non-crystalline Solids held at Sheffield University in September of 1970. The fifty-two papers which comprise the volume consider mechanical properties, thermodynamic and transport properties, structure, and absorption spectra of glasses and amorphous organic polymers.

The book contains review articles, theoretical investigations, and experimental reports, all organized according to the particular process or property discussed. Several viewpoints on the same subject are often presented, especially in the discussions concerning the nature of the glass transition.

Any student of the solid or liquid state will find this book an authoritative introduction to the present thrusts of inquiry into the nature of amorphous materials. A brief abstract at the beginning of each paper would have further aided the reader in quickly locating those papers most appropriate to his needs.

Dale A. Huckaby, *Texas Christian University*

High Pressure Liquid Chromatography. Biomedical and Biochemical Applications. By PHYLLIS R. BROWN (Brown University). Academic Press, New York, N. Y. 1973. xi + 202 pp. $11.50.

There have been a large number of books and articles published on high-pressure liquid chromatography in the last few years. These publications have generally concentrated on the detailed theory of liquid chromatography and on instrumentation. This book is specifically designed for the student and researcher who will use liquid chromatography techniques as a tool, more interested in results than in theory or design.

The book is not concerned with any real detail but concentrates on providing introductions to the terms and concepts used in modern liquid chromatography. Material is accurately presented and is very concise. The examples are uniformly selected from biological and biochemical sources and serve to demonstrate the author's discussion in terms which will be familiar to readers in the biological sciences.

The book will provide the student or researcher with the background needed to understand the detailed literature on high-pressure liquid chromatography. The book is quite readable and is well suited for self-study.

V. Alan Mode, *Lawrence Livermore Laboratory*

The Bimolecular Lipid Membrane. By MAHENDRA K. JAIN (Indiana University). Van Nostrand Reinhold Co., New York, N. Y. 1972. ix + 470 pp. $22.50.

In view of the interdisciplinary approaches adopted by various researchers to understand the structure and function of biological membranes, it is not surprising that a book entirely devoted to the bimolecular lipid membrane has appeared. However, it is to the author's credit that the book is not limited solely to the bimolecular lipid membrane, but that it also contains relevant chapters on surface chemistry of lipids, energy transduction, excitability, permeability, and molecular structure and organization of biological membranes. Hence, the book presents a lucid transition from model to biological membranes without oversimplifying the complexities of biological membranes. Various biochemical aspects such as composition, structure, and enzyme activity of membranes are well presented. The book also offers more than 1,322 references up to 1971 related to biological and model membranes.

This book would be a very good textbook for many graduate level courses on membrane phenomena. It would also be very useful to the researcher who is entering this area of research, because a wealth of information is presented on experimentation and the techniques used to study biological and model membranes.

Besides being the first published book on bimolecular lipid membrane, its organization and contents are truly interdisciplinary. The book is highly recommended for all investigators, experts and novices alike, who are working in the area of biological and model membranes.

D. O. Shah, *University of Florida*

Advances in Heterocyclic Chemistry. Volume 15. Edited by A. R. KATRITZKY and A. J. BOULTON (University of East Anglia). Academic Press, New York, N. Y. 1973. xxi + 350 pp. $28.50.

The fore-pages of this volume contain a tribute to Professor Adrien Albert, to whom the volume is dedicated, on the occasion of his retirement as Head of the Department of Medical Chemistry of the Australian National University. Professor Albert's bibliography of 126 papers, thirteen reviews, and four books is included. The seven chapters, of which Professor Albert is coauthor of one, are by ten contributors. One chapter is a systematic review of heterocyclic oligomers, one deals with hydrogen exchange reactions on surfaces, and five cover specific heterocyclic systems: 4-oxy- and 4-ketotetrahydroisoquinolines; oxidation products of pyrroles; pyrindines; nmr spectra of indoles; and saccharin and derivatives. There is an enormous author index, and a cumulative index of titles, but, strangely, no subject index. The closing date for literature coverage, which is regrettably not stated for all chapters, seems to vary from 1969 to late 1971.

Biochemical and Pharmacological Mechanisms Underlying Behavior. Edited by P. B. BRADLEY and R. W. BRIMBLECOMBE. American Elsevier, New York, N. Y. 1972. x + 203 pp. $24.50.

This volume is No. 36 of the series Progress in Brain Research, and contains papers presented at a meeting of government scientists and academic research workers from Britain, Norway, Sweden, and the Netherlands, held in March 1971. The eighteen papers, which include diagrams, references, and the test of the ensuing discussions, should have a considerable amount of interest for medicinal chemists and enzyme chemists. There is a good subject index. One wonders if the original research reported here, in a form that *Chemical Abstracts* customarily ignores, will at some time be offered for redundant publication in journals.

Chemiluminescence and Bioluminescence. Edited by M. J. CORMIER, D. M. HERCULES, and J. LEE (University of Georgia). Plenum Press, New York, N. Y. 1973. xvi + 515 pp.

The collected papers given at an International Conference held in October, 1972, are presented in this volume. They are photoreproduced from the authors' typescripts; the discussions in edited form follow each paper, The papers are grouped under the topics: Theory and Gas-Phase Reactions; Oxygen Reactions; Radical Ions; Organic Reaction Mechanisms; and Applications of Chemiluminescence. A 20-page section of abstracts of short contributions, an author index, and a subject index complete this very expeditiously produced work.

Encyclopedia of Chemistry. Third Edition. Edited by C. A. HAMPEL and G. G. HAWLEY. Van Nostrand Reinhold Co., New York, N. Y. 1973. xviii + 1198 pp. $39.50.

This third edition is stated to have been completely revised and enlarged with respect to the previous edition (1966). The brave aim of covering "virtually every aspect of the science of chemistry" has been pursued with the help of almost 600 contributors, who have written over 800 articles. The task of fitting such a broad subject between one set of covers is staggering, and it is not surprising that, in the effort, certain subjects have been by-passed or included in unexpected places. Oximes are treated, for example, but neither hydroxylamine(s) nor hydrazine(s) can be found as a heading. Interestingly, there is an article on legal chemistry, but not one on illegal chemistry, certainly a subject of current concern!

The contributors have obviously had to strain to fit some of the larger topics in the allotted space, and the result is occasionally rather bland. Unfortunately, only a few of the articles include any references for further reading, a situation that may leave the reader with an empty feeling of nowhere to go. The overall treatment is for the reader with college-level familiarity with chemistry. Structural and mathematical formulas are used somewhat sparingly, but appear throughout; there are very few tables, and no space is wasted on photographic illustrations.

The articles are generally well done and provide a useful explanation of an introduction to a subject, and the book is consequently a valuable work of reference for a library and for technical offices.

ESR Applications to Polymer Research (Nobel Symposium 22). Edited by PER-OLOF KINELL, BENGT RÖNBY, and VERA RUNNSTRÖM-REIO. Wiley/Halsted, New York, N. Y. 1973. 312 pp. $15.00.

This volume constitutes the proceedings of a symposium held in 1972; the promptness of its appearance is welcome. The papers report original research, but it is not clear whether independent journal publication is also intended. Edited versions of the ensuing discussions are included. There is no index.

Molecular Motions in Amorphous Solids and Liquids. Edited by F. C. TOMPKINS. Faraday Division, The Chemical Society, London. 1973. 196 pp. £4.00.

This softbound volume is No. 6 of the Faraday Symposia, and contains all the papers and accompanying discussions presented at a Symposium held in Manchester in April 1972. The papers are accounts of original research, in journal form. There is a table of contents and index of contributors, but no subject index. This volume is evidently considered to be a serial publication (*Faraday Symp. Chem. Soc.*, **6** (1972)), and presumably the authors do not intend to seek duplicative publication elsewhere.

Outlook for Natural Gas—A Quality Fuel. Edited by PETER HEPPLE. Wiley/Halsted, New York, N. Y. 1972. viii + 268 pp. $21.50.

This is the proceedings of the British Institute of Petroleum's Summer Meeting, held in 1972. The orientation is commercial, but there are sections on environmental effects.

Pesticide Formulations. Edited by WADE VAN VALKENBURG (3M Company). Marcel Dekker Inc., New York, N. Y. 1973. x + 481 pp. $29.50.

This book differs from that by Martin (following review) in that it is an assemblage of contributed chapters, its scope is limited to chemical means of crop protection, and its concern with the relation of biological activity with structure is confined to one chapter in which correlating principles are given strong emphasis over descriptive matter. Much of the book is devoted to applied surface chemistry: emulsions, wetting and spreading, adsorption, etc. As the editor states in the preface, this book is meant "to foster a greater understanding of fundamental principles involved in research on pesticidal formulations"; it is not a recipe book. Its approach is sophisticated, and it is well supplied with references, an author and a subject index, and extensive tables.

The Scientific Principles of Crop Protection. Sixth Edition. By H. MARTIN. Crane, Russak and Co., Inc., New York, N. Y. 1973. viii + 423 pp. $37.50.

Of the fifteen chapters in this book, five are essentially chemical, and there is additional chemistry scattered throughout the others. Correlation of structure with activity, toxicity, use, and historical development are presented succinctly and with good documentation. The many structures shown appear to be correct. A highly detailed subject index and an author index, along with the numerous references, make this a useful work of reference.

Phospholipide. Edited by G. SCHETTLER. Georg Thieme Verlag, Stuttgart. 1972. viii + 114 pp.

The papers given at a symposium on biochemistry, experimentation, and clinical application of phospholipids, held at Bad Schlangenbad, are collected in this softbound volume. Some are in English, some in German; they are reports of original research. In addition to the usual illustrations, there are 18 in color.

Youth and Drugs: Report of a WHO Study Group. World Health Organization, Geneva. 1973. 45 pp. $1.00.

This report, No. 516 in the Technical Report Series, is sociological rather than chemical in orientation, but provides interesting background information.

Information Theory and the Living System. By LILA L. GATLIN (The University of California at Berkley). Columbia University Press, New York, N. Y. 1972. 210 pp. $10.00.

Somewhat over 100 years ago the founders of thermodynamics realized that a key to interrelating forms of energy was entropy, a measure of the general extent of randomness as a ubiquitous component in natural processes. The inclusion of entropy permits the

bookkeeping of energy transformations to be precisely balanced, but, especially in complex systems, the contribution of the individual components to overall entropy is usually difficult or impossible to determine. About 30 years ago, communications engineers began developing relationships between deviations from randomness and the capacity to transmit information which have focused attention on the balance between entropy and intelligibility. In effect, these considerations have begun to dissect entropy into various classes, each with different characteristics and potentials for exploitation. Structure and specification constitute the essence of living systems and the major purposes for which metabolic energy is expended; thus, it would be expected that conceptual developments along an entropic/informational component of the energy abstraction might eventually form a bridge whereby, to whatever extent this may prove to be possible, biology will be related to physical theory.

Although such a biological thermodynamics goes well beyond the intention of the author, I feel that the book represents a significant stimulus toward developing the types of parameters which will be necessary to proceed in that direction. The purpose of her book, paraphrased from the first chapter, is "to constitute a step towards defining life operationally in terms of information." The first few chapters introduce the essentials of biochemical central dogma and present the author's interpretation of information theory. These basics are well chosen and a good balance is preserved between sufficient detail and clarity of exposition for the purposes of the book.

The next section comprises a restatement and extension of the author's published work comparing informational measures for a number of living systems. Two basic indices of information are developed; one (D_1) measures divergence from equiprobability in the nucleotide composition of DNA and the other (D_2) divergence from randomness for nucleotide pairs given the DNA base composition. The latter index, of "dependence," is based on nearest neighbor frequency data. Several other indices are derived from D_1 and D_2 to emphasize the extent each of these contributes to the overall information. These parameters are calculated for polynucleotides from over 80 organisms and various plots are presented to compare these parameters for different classes of organisms. A number of interesting clusterings of similar organisms are depicted, and trends compatible with evolutionary expectations are derived and discussed.

Speculations on the relationship of game theory and evolution occupy a transitional chapter which leads, then, to chapters dealing with the genetic code, redundant DNA, and information density in proteins. In developing the relationship between nucleotide and amino acid sequences from an informational point of view, emphasis is placed on the observation that a DNA base composition of 42% G + C (which characterizes most vertebrate DNAs) is just the composition one would calculate from amino acid codons as that necessary to assure an equal probability for all amino acids. The implication is that, by maximizing D_1 at this composition, vertebrates may have achieved optimal flexibility in protein design at the cellular level. However, in the synthesis and/or concentration of each amino acid, widely different amounts of metabolic energy are required and one wonders whether the theoretical advantages of amino acid equiprobability would be modulated by practical considerations of altered energy demands. If an evolutionary game strategy that took such factors (as well as charge, polarity, hydrophobicity, aromaticity, etc.) into account also predicted such an optimum composition, the probability would be enhanced that the observed compositional similarity was more than coincidence. The final chapter focuses on evolution, and here the author makes a strong case for the utility of analyzing entropy into components, *i.e.*, of using "laws of information theory" to interpret laws of thermodynamics. Throughout the book the exposition is developed in a historical perspective, and a sufficient selection of research citations is included.

One criticism of the approach the author has taken is that the genetic messages whose coding properties are presumed to be optimized by evolution are from the set of all nucleotide sequences compatible with a given organism, but the quantitative informational measures are derived only from those obeying compositional and nearest neighbor constraints—actually only a subset of all possible sequences. Certainly for information specifying some types of macromolecules, *e.g.*, t-RNAs, secondary and tertiary configurational constraints may have great importance. In general, such constraints cannot be conveniently treated as second-, third-, or higher-order Markov dependences. However, it may very well turn out that complex constraints only play a minor role in the overall informational economy of organisms and can be neglected in analyzing evolutionary strategy. Certainly the clusterings of related organisms on mappings derived from simple informational parameters, such as those presented, are intriguing indications that Gatlin's approach may indeed be a significant step toward her stated goal.

N. Burr Furlong, *The University of Texas M. D. Anderson Hospital & Tumor Institute at Houston*

Research Progress in Organic, Biological and Medicinal Chemistry. Volume 3 (2 Books). Edited by ULISSE GALLO and LEONIDA SANTAMARIA (Societa Editoriale Farmaceutica, Milan). American Elsevier Publishing Co., Inc., New York, N. Y. 1972. SLIV + 432 (Part I); 433–776 (Part II) pp. $64.00.

The title of this volume in this series (issued in two parts) tends to be misleading since it is devoted exclusively to every conceivable phase involving the chemistry and biology of photodynamic substances. After an impressive table entitled "List of (over 400) the Photodynamic Substances," the editors present 41 chapters written by physicists, chemists, biologists, and clinicians. Their goal to bring this "new field of research.... highly interdisciplinary....., as a working tool to young scientists eager to participate in such a stimulating area of investigation" is not reached. Instead of placing these 41 chapters in the hands of an editor with expertise in this area to coordinate the whole effort, they in effect reprinted chapters summarizing each author(s) own endeavor, interwoven only with the contributions of closely related research. The greatest impact this book could have had is to coordinate the effect of radiation on related systems.

The result is that each chapter features a suitable introduction, contemporary theories, but omits integration of *related* phenomena. One finds, for example, that mechanism of dye-sensitized photooxidations is discussed a number of times and other classic pieces of research are quoted over and over. This book really could serve as an admirable tome from which one could write a concise text in this burgeoning area.

The major *sections* are: Fundamentals of Photochemistry; Mechanisms of Photodynamic Action; Genetic Damage by Photodynamic Action; Cell Repair Mechanisms of Light Damage; Membrane Damage by Photodynamic Action; Natural Photodynamic Sensitivity; Pathological Aspects of Photodynamic Action; X-, UV-, and Visible-Ray Effects of Interest to Photodynamic Action.

Each author did make a reasonable attempt to summarize the area in his designated chapter, but the length of the book precludes easy reading. For example, "Dark repair of DNA damage" is discussed in three different places, and that of deoxyribonucleic acid in four different chapters in the book!

The book includes everything ever published on photoinduced phenomena. It discusses techniques, theories, and areas of future investigations and delves into every area associated with photochemistry from the cells in the skin to DNA. It discusses the role of photodynamic substances when present in skin to topics such as photoallergy, sun-protective substances, and carcinogenity.

There could have been produced a treatise which could orient scientists of many disciplines. However, these short essays report on very narrow areas and frequently one has the feeling these are really only "progress reports." Although most of the (few) formulas in the text are satisfactory, several leave much to be desired. One does not print the O's outside the ring system (*e.g.*, furocoumarins) as, for example, on p 164. The aromatic bonds for some dyes are also omitted (*e.g.*, p 301). The other illustrations are usually of excellent quality.

The price of the book precludes a large student market. Topics in this area of biology should be included in courses in photochemistry or photobiology, but rapid advances in this area tend to date these reviews rather rapidly.

Ludwig Bauer, *University of Illinois at the Medical Center*