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Book Reviews

Crop Protection Agents—Their Biological Evaluation. Edited by N. R. MCFARLANE (Shell Research Ltd). Academic Press. London. 1977. xvii + 638 pp. £19.50/\$38.00.

This volume records the papers given at an International Conference on "The Evaluation of Biological Activity" held in Holland in 1975. The title is somewhat meaningless until coupled with the name of the organizers, The Pesticide Group of the British Society of Chemical Industry. It is also misleading in that two of the eight sessions dealt with plant growth regulators and chemicals controlling cattle ticks, which can hardly be termed "Crop Protection Agents".

However, most papers deal more or less with the main subject, techniques for evaluating biocides and bioregulators, and specifically with screening methods utilized in the discovery and development of insecticides, acaricides, fungicides, herbicides, insect and plant growth regulators, and chemicals affecting insect behavior. These contributions are obviously not intended as a catalogue of methods. Their purpose is rather to illustrate the diversity and relevance of the information required in this vast and fascinating field in which the ultimate objective is to increase food production by the discovery and introduction of new products, and techniques for their safe, effective use. Of course, all this leads to complication in handling and interpreting much data, necessitating the use of computer-based information systems and modelling techniques. Contributions on the latter and more general interface topics, such as pesticide legislation, effectively illustrate the technical, managerial, economic, social, and philosophical relevance of the methodology described.

The book will appeal to all who seek authoritative insight into a somewhat maligned technology, and particularly to those who are interested in its skills and disciplines. In the words of a plenary speaker who directs R&D in one of the largest and most successful commercial organizations developing pesticides, "the screening lab is absolutely not the place for second raters".

G. E. Barnsley, *Ciba-Geigy Canada Ltd.*

Analysis with Ion-Selective Electrodes. By P. L. BAILEY (Electronic Instruments Limited). Heyden & Son Ltd., London. 1976. xii + 228 pp. \$13.50.

The rapid development and increasing acceptance of potentiometric membrane electrodes has spawned a substantial number of books and monographs during the last few years. Such books generally fall into one of two categories, e.g., research monographs with multiple contributors drawn from active laboratories around the world and general volumes intended to survey the field for the nonspecialist. Bailey's book falls into the latter category with brief sections on theory, construction, selected properties, and analytical applications of typical ion-selective and gas-sensing membrane electrodes.

These topics are covered at a level acceptable for a novice to the field. The book will serve as a practical guide for the potential user of such membrane electrodes who desires to carry out routine analytical measurements or to "troubleshoot" commercial electrodes and associated products. The book also contains potentially useful com-

pilations of selectivity data and of selected properties of the principal commercially available electrode types.

Unfortunately, Bailey's book does not cover any new ground and is similar to several other available volumes. The November 1976 publication date also means that the treatment lags behind present knowledge of the field, to some inevitable extent, although this is not a serious criticism as far as the practical side of the field is concerned.

There is some question in this reviewer's mind on whether it is still appropriate to deal with membrane electrodes, as has been done for some 12 years now, according to the nature of the membrane phase material. The classical distinction of membrane materials into the glass, liquid, and solid categories has become blurred in recent years. Such a division obscures the essential unity of phase boundary and selectivity considerations at the electrochemical and mechanistic levels apparent from much contemporary research. As a result, the book can be recommended only as a practical laboratory guide or as an introductory monograph.

G. A. Rechnitz, *University of Delaware*

Physical Methods in Chemistry. By RUSSELL S. DRAGO (University of Illinois). Saunders, Philadelphia, Pa. 1977. xvi + 660 pp. \$25.95.

This substantially enlarged revision of Drago's "Physical Methods in Inorganic Chemistry" is intended as a text for seniors and graduate students. The material covered includes symmetry and group theory (46 pp), MO theory (34 pp), electronic spectra (36 pp), vibrational and rotational spectra (55 pp), NMR (128 pp), EPR (43 pp), electronic, NMR, and EPR spectra of transition-metal complex ions (126 pp), magnetism (25 pp), NQR spectroscopy (20 pp), Mössbauer spectroscopy (22 pp), mass spectroscopy (14 pp), photoelectron spectroscopy (19 pp), and X-ray crystallography (38 pp). The development of NMR and EPR is much more thorough than that of vibrational and rotational spectroscopy; microwave spectroscopy receives only 2 pages, with no discussion of the rotational energy levels of polyatomic molecules. Discussions of instrumentation are brief. The emphasis is mainly, but not exclusively, on inorganic compounds.

The amount of theoretical material is much greater than in Drago's earlier book. Unfortunately, the theoretical discussions are generally poor. Many of the fundamental concepts are introduced without adequate definitions or explanations. Symbols are often used without definition. The theory is presented in a very fragmented form, with many equations and results poorly explained. There are a number of careless errors. (For example, the L_2 eigenvalues are given as 0, 1, 2, . . . , $n - 1$ and the electronic Hamiltonian of H_2 is written with a kinetic-energy operator for only one electron.)

The book gives very good specific examples of the applications of spectroscopy to lots of molecules, and this is its major strength. However, students will find the theoretical discussions more confusing than enlightening.

Ira N. Levine, *Brooklyn College, CUNY*

Molecular Symmetry and Group Theory. By A. VINCENT (Kingston Polytechnic). John Wiley & Sons, London, 1977. x + 156 pp. \$13.50 (cloth), \$5.95 (paper).

This is a "self-study" textbook written for chemistry undergraduates. Presumably it is also meant as a textbook used in either undergraduate or graduate courses on this subject. It is based on the method of "programmes", which has recently become very popular in conjunction with tutoring by computer, and comes complete with problems, tests, test scores, and a very formalized step-by-step approach. It is difficult for this reviewer to judge the efficacy of such an approach without having had the experience of using it with students. As to the group theoretical content and method, one finds here a very simplified and pictorial approach, based on chemical examples, which is very attractive. However, there is too much oversimplification, resulting in deliberately calling the characters "representations" (e.g., p 56), in an attempt to deal with representations before dealing with matrices. Thus, also, the degenerate irreducible representations (their characters) are introduced in Chapter 3, before degeneracy is introduced. This must be confusing to the student (e.g., the C_{3v} group example on p 55). There are also too many references to future material (e.g., pp 52 and 60). Personally, I object to calling a trace of a matrix a "character" (how will the student then understand that a character is a set of traces?) as well as to terminology such as "is not a representation but a reducible representation". I would also suggest the use of the term "rep" for "irreducible representation". In fairness, I should point out that the above specific criticisms practically cover all the objectionable points I have found. The bulk of this book is mathematically very clean and commendable. The real question about its utilization relates to its very special format. The latter may or may not suit the instructor's taste. An important consideration, though, should be the student clientele. This book may be most appropriate for a class of students who have so far not been exposed to "real" group theory. Whether they should be exposed to it at all remains an interesting question.

Raoul Kopelman, *University of Michigan*

Chemistry and Properties of Crosslinked Polymers. Edited by S. S. LABANA (Ford Motor Co.). Academic Press, New York, 1977. xiii + 581 pp. \$29.50.

If one introduces chemical bonds between polymer chains to the extent that approximately one repeat unit out of a hundred is crosslinked, the resulting material frequently exhibits rubberlike elasticity (i.e., large, reversible deformability). At higher degrees of crosslinking—approximately ten units out of a hundred—the polymer becomes a "thermosetting resin", of considerable rigidity. These materials are not highly elastomeric and are used primarily as molded objects, coatings, adhesives, ion-exchange resins, etc. Both types of polymers are covered in this book and this creates somewhat of a dichotomy since the two classes of substances are so different in their properties and methods of characterization.

The 33 papers collected in this volume were all presented at an ACS Symposium held in September 1976. They are about equally divided between elastomers and thermosetting resins. The topics most emphasized are crosslinking techniques, elasticity theory, elastomers consisting of interpenetrating networks, epoxy resins, and polyimide and polyquinoxaline resins of unusual thermal stability.

The articles are generally of very high quality. Researchers working on either elastomers or thermosetting resins will find a great deal of useful information in the book.

J. E. Mark, *University of Cincinnati*

Biochemistry of Steroids and Other Isopentenoids. By WILLIAM R. NES and MARGARET LEE MCKEAN (Drexel University). University Park Press, Baltimore, Md. 1977. vii + 690 pp. \$39.50.

This book is concerned with the chemistry and biochemistry of isopentenoids, including the steroids. Its emphasis is on their biosynthesis and distribution. Unusual attention is given to ecology and phylogenetics. Relatively less emphasis is given to functions of steroids (and isopentenoids) than one might assume from the title.

The book is logically organized and readable. Each major section is developed from its logical and historical origins, features that will be appreciated by students and investigators seeking to understand the subject area in depth. The contents are organized into 11 chapters. Chapter 1 (Historical Introduction) presents early history and the origins of the isoprene rule and other structural concepts. A special section relates the development of the subject to 14 Nobel awards

which were made for notable achievements in the subject area. Chapter 2 (Structure and Nomenclature) explains current concepts of isopentenoid nomenclature and traces their logical and historical origins. Chapter 3 (Analytical Procedures) is a brief but informative account of the applications of widely applicable chemical and physical methods to steroid analyses. Special sections on chromatography and on methods using protein-steroid interactions are presented. Chapter 4 (Formation of the Isopentenoid Unit), Chapter 5 (Polymerization of the C_5 Unit), Chapter 6 (Head-to-Head Coupling of Isopentenoid Polymers), Chapter 7 (Cyclization of Squalene), Chapter 8 (Cyclization of Other Isopentenoids), and Chapter 9 (Metabolism of Lanosterol and Cycloartenol to Δ^5 Sterols) present a comprehensive treatment of the biosynthesis of steroid and related isopentenoids. Chapter 10 (Occurrence, Physiology, and Ecology of Sterols) describes the distribution of various sterols in various organisms and in some cases relates occurrence to physiological and ecological relationships. Chapter 11 (Functions of Steroids) briefly describes the functions of steroids as membrane components, hormones, vitamin precursor (vitamin D), and bile salts and acids.

This book should be valuable as an orienting and reference text for graduate students and investigators in natural product chemistry and in the biological sciences, especially in areas concerned with lipid chemistry and biochemistry.

Merle Mason, *University of Michigan*

Microemulsions: Theory and Practice. Edited by L. M. PRINCE. Academic Press, New York, 1977. xii + 179 pp. \$12.00.

The book under review contains seven chapters as follows: Chapter 1, Schulman's Microemulsions; Chapter 2, Commercial History; Chapter 3, Formulation; Chapter 4, How to Formulate Microemulsions with Less Surfactants; Chapter 5, The Mixed Film Theory; Chapter 6, Microemulsions and Micellar Solutions; and Chapter 7, Microemulsions and Tertiary Oil Recovery. Four of these chapters are contributed by the editor himself, who has had a wealth of experience in the area of microemulsions. Authors of the remaining chapters are active researchers of international repute.

This book is the first to appear which deals solely with the important topic of microemulsions. The title of the book is fully justified by the good blend of theoretical and practical aspects of microemulsions. I personally savored the whole book, particularly the historical perspective in Chapter 2. The book is amply referenced and should be of great value to both experienced workers (as a reference) and neophytes (as a primer) in the field of microemulsions. It is a very welcome addition to the literature and is highly recommended for both library and personal use. The editor should be commended for "pulling together" the knowledgeable microemulsions acquired over the years in one readily accessible source. The subject index provided at the end should be helpful.

K. L. Mittal, *IBM Corporation*

Catalysis. Volume 1 (Specialist Periodical Reports). Senior Reporter, C. KEMBALL (University of Edinburgh). The Chemical Society, London, 1977. xiv + 425 pp. \$54.00.

The book is the first volume of the new series on Catalysis. It includes the review of certain aspects of homogeneous and heterogeneous catalysis up to mid-1976, surveyed both in breadth and depth.

Ten subjects were reviewed with the following titles and authors: (1) Catalysis on Well-Defined Metal Surfaces and Non-metallic Substrates (S. J. Thomson); (2) Reactions of Hydrocarbons on Alloy and Bimetallic Catalysis (R. L. Moss); (3) Catalysis on Faujasitic Zeolites (R. Rudham and S. Stockwell); (4) Catalytic Properties of Aluminas for Reactions of Hydrocarbons and Alcohols (C. S. John and M. S. Scurrill); (5) Selective Oxidation of Hydrocarbons over Mixed Oxide Catalysts (R. Higgins and P. Hayden); (6) Reactions on Sulphide Catalysts (P. C. H. Mitchell); (7) Ziegler Polymerization (A. D. Caunt); (8) Olefin Metathesis (J. J. Rooney and A. Stewart); (9) The Homogeneous Catalytic Activation of C-H Bonds (G. W. Parshall); (10) Homogeneous Catalysis Involving Carbon Monoxide (P. J. Davidson, R. R. Hignett, and D. T. Thompson).

The first chapter deals mainly with application to surfaces of ESCA, PES, XPS, AES, LEED, AEAP, and other spectroscopic methods. The second chapter reviews the patterns of activity or selectivity variation in hydrocarbon reactions as a function of alloy composition.

The structure and catalytic properties of Faujasites and of aluminas are each reviewed in a chapter. The oxidation of hydrocarbons over

mixed oxides covers the literature starting with the beginning of 1973.

The chapter on Ziegler Polymerization was limited to Ziegler catalysts with a common mechanism of operation, namely "co-ordination polymerization".

Although olefin metathesis and ring-opening polymerization have been extensively reviewed, the last few years have seen significant advances in understanding the mechanism of this important reaction. This excellent review covers in depth the most recent progress in this field.

The last two chapters review progress in homogeneous activation of C-H bonds of arenes, alkenes, and alkanes, and to hydroformylation and carbonylation reaction of alkenes, alkynes, halides, and alcohols.

The Specialist Periodical Reports on Catalysis contains excellent reviews of timely subjects, and no practicing catalytic chemist can afford to be without it.

Herman Pines, *Northwestern University*

Electrochemistry, Volume 5. Edited by H. R. THIRSK (University of Newcastle upon Tyne). The Chemical Society, London. 1975. 311 pp. \$46.75.

This volume consists of four chapters which review the electrochemical literature up to March 1974. Two of the chapters, synthetic aspects of organic electrochemistry (O. R. Brown) and membrane phenomena (N. Lakshminarayanaiah), are continuations of material presented in Volume 4. A short chapter on electrolyte solutions (T. H. Lilley) is included along with a comprehensive review on the nature of electron transfer reactions (P. P. Schmidt). The latter chapter is the first of a two-part series and is more theoretical in nature than the other chapters.

Thermodynamic measurements in single solvent (solute) and mixed solvent (solute) systems are reviewed in the chapter on electrolyte solutions. Activity and osmotic pressure coefficients, enthalpies, and heat capacities and the volumetric behavior of ionic systems are reported for aqueous and nonaqueous solvents. Ion-solvent and ion-pairing interactions also are covered.

Chapter 2 deals with the theory of simple electron-transfer reactions in polar media. The subject matter of this chapter comes primarily from the electrochemical literature of 1965-1974 and covers the following topics: the electron transfer model, the Born-Oppenheimer separation, and the origin of potential energy surfaces, reactions and potential energy surfaces, the quantum mechanical basis of chemical reaction rates, simple adiabatic transition state theory (Marcus theory), and nonadiabatic theory of simple outer-sphere electron-transfer reactions in a simple dielectric fluid.

The chapter on membrane phenomena begins with a section on theory. The remaining sections are concerned with phenomena observed in chemical and electrochemical gradients, applied electric fields, and pressure and temperature gradients. A discussion of biomolecular lipid membranes also is included. The state of the art for cation and anion selective membrane electrodes is assessed for the following species: ammonium ion, Cd(II), Ca(II), Cu(II), hydrogen ion (pH), Fe(III), Pb(II), K(I), Ag(I), Zn(II), cyanide, halide, nitrate, perchlorate, sulfate, and sulfide.

Chapter 4 is a comprehensive report of the literature published in 1973 on the synthetic aspects of organic electrochemistry. The chapter is divided into three parts covering reductions and oxidations of organic compounds and organometallic electrosynthesis, although this last topic accounts for less than 5% of the subject matter reviewed. The oxidation and reduction reactions are classified according to the reactants involved and, when dealing with polyfunctional groups, according to the functional group chiefly responsible for the electrochemical activity of the molecule.

R. A. Rizzo, *Globe-Union, Inc.*

Plant Biochemistry 11: International Review of Biochemistry, Volume 13. Edited by D. H. NORTHCOPE (University of Cambridge). University Park Press, Baltimore, Md. 1977. ix + 262 pp. \$29.50.

The chapters in this book cover biochemical aspects of the following topics: plastocyanin, electron and proton transport in chloroplasts, sucrose, osmotic regulation, plant pathogens, glycoproteins, and functions of ion transport in plants. Nearly all chapters appear complete in their coverage of subject matter, yet concise and well rounded.

The review of the chemistry and function of plastocyanin constitutes

the first on this topic in the literature. It should be particularly useful not only to those who have to describe plastocyanin in their lectures, but also to all research workers in the plastocyanin field and others interested in protein isolation. The impact of the material presented in Chapter 2 on the nature of the pigment systems and electron transport chain of plants would have been improved by the inclusion of a few diagrams summarizing the possible situations and interrelationships of these systems within the chloroplast membrane. That is, however, a minor defect in view of the scope and volume of material covered in the review. Chapter 3 provides an interesting review of sucrose chemistry and physiological aspects of sucrose synthesis. The lack of any definite conclusion is at first disconcerting, but does serve to accentuate the authors' point that further work is needed to clarify the role and importance of sucrose in plant tissues. The author of Chapter 4 makes a valiant effort to provide a better biochemical understanding of osmotic regulation within plant cells. This presentation appeared deficient in at least one area, notably the discussion of proline and other amino acids as possible osmotic agents. The fact that "potassium accumulation affects several metabolic systems", is dismissed in this one sentence on page 135. In fact, growth in high concentrations of K⁺ and Na⁺ causes plants to produce a number of compounds not usually in evidence, for example, the production of cadaverine by peas. One can seriously wonder if such phenomena, including the production of high levels of proline, are not merely due to the derangement of normal metabolic control systems, and have no specific bearing on osmotic control mechanisms. The biochemistry of plant pathogens is dealt with very fully from the point of view of fungal pathogens, but there does not appear to be much specific information on bacterial pathogens. In spite of this, the chapter constitutes a very worthwhile review of the biochemistry of disease processes, and plants' reaction to them. Chapter 6 constitutes a very worthwhile review of glycoprotein structure, function, and biosynthesis in plants. The final chapter of the book is on the functions of ion transport in plants and cells. After dealing with mechanisms of ion accumulation, the author deals with the role of such processes in guard cell closure, leaf movements, and insectivorous plants. Finally, he considers the role of ions in developmental processes.

In summary, I felt that this book represents an effort to present material not to be found elsewhere, but which would nevertheless be of interest to a large number of readers. The material appears to be adequate and well presented.

Peter D. Shargool, *University of Saskatchewan*

Recent Advances in Phytochemistry, Volume 11. The Structure, Biosynthesis, and Degradation of Wood. Edited by FRANK A. LOEWUS (Washington State University) and V. C. RONECKLES (The University of British Columbia). Plenum Press, New York. 1977. xii + 527. \$49.50.

The book is based on a symposium held at the University of British Columbia in 1976, and is a collection of 11 well-documented chapters written by recognized authorities in their fields.

Chapter 1, by W. A. Côté, is introductory and displays the ultrastructure of wood in 39 electron micrographs. In Chapter 2, D. P. Delmer has accomplished a remarkable feat of summarizing the existing knowledge about the biosynthesis of cellulose. In addition, a few other β -glucans are treated briefly. Cell wall glycoproteins, an oft-neglected subject, is reviewed by D. T. A. Lamport in Chapter 3. In a similar way, P. E. Kolattukudy reviews the lipid polymers, suberin, and cutin in Chapter 6. Of special interest to workers in the control of plant diseases is the possible role of these remarkable polymers in pathogenesis. Even though only nonwoody organisms have thus far been studied, the biochemistry is doubtless applicable to that in the higher plants.

Of all wood components, lignin remains aloof and mysterious in its origin, structure, and chemistry. A. Sakakibara in Chapter 4 summarizes the major structural features of lignin as revealed by chemical degradation, and closes his chapter on a prophetic note: "... the chemical structure of lignin will never be distinctly established like the structure of some other natural macromolecules, but will only be defined as a statistical model from information about linkage types between the phenylpropane [units] present". G. G. Gross in Chapter 5 condenses the existing knowledge about the biosynthesis of lignin. This subject matter, together with that in Chapter 9, by T. K. Kirk, W. J. Connors, and J. G. Zeikus, on the microbiological degradation of lignin, constitutes an especially useful source of information about lignin.

The secondary changes in wood are described in Chapter 7, by W. E. Hillis, with authority and expertise. In place of extensive lists of extraneous substances, Hillis draws together knowledge of the origin of these materials and their role in the life and properties of woody plants.

In Chapter 8 by E. T. Reese, the degradation of polysaccharides by microbial enzymes is reviewed. This chapter, in combination with Chapter 9, constitutes a minimonograph on the biodegradation of wood.

The ways in which bark protects and defends the tree against mechanical, insect, and pathogenic attacks are discussed in Chapter 10, by D. B. Mullick. A model of host-pathogen interactions is used to interpret past studies and to aid in the planning of future research.

The volume concludes with a brief historical survey of the utilization of chemicals from wood along with some suggestions for possible practical uses. Thus, Chapter 11, by F. W. Herrick and H. L. Hergert, is a thumbnail sketch of the chemical composition and reactions of wood components with respect to commercial utilization. The authors urge the pursuit (presumably by the wood-using industries) of "end-use research to develop information that will demonstrate the utility of a given product". In contrast to the position of Sakakibara (Chapter 4), Herrick and Hergert suggest that "lignin as mysterious or unknown in structure has become a myth. The time has come to admit that we know a great deal about the chemistry of every major component of the commonly available woods".

Indeed, this book is a contribution to our knowledge of wood and other plants and should find its way into the libraries of all scientists who deal in any way with the chemistry and biology of wood.

Edgar E. Dickey, *Institute of Paper Chemistry*

The Organization and Expression of the Eukaryotic Genome. Edited by E. M. BRADBURY (Portsmouth Polytechnic) and K. JAVAHERIAN (University of Tehran). Academic Press, London, 1977. xii + 510 pp. \$26.50.

This book contains the proceedings of an International Symposium held in Tehran in 1976. Articles are grouped under the general headings: (I) Chromatin Proteins, (II) Chromatin Structure, (III) Control Mechanisms in Prokaryotes, (IV) Transcription from Chromatin, (V) Eukaryote Gene Organization. In most cases, the articles are summaries of research areas in individual laboratories. For specific experimental details, however, readers must go to the original literature.

Studies of the organization and expression of the eukaryotic genome are progressing rapidly, and considerable additional information has been obtained since this book was published. Thus, it is an interesting collection of articles that describes the field as of 1977, but it is rapidly becoming outdated.

William R. Folk, *University of Michigan*

Fast Processes in Radiation Chemistry and Biology. Edited by G. E. ADAMS, E. M. FIELDEN, and B. D. MICHAEL. The Institute of Physics and John Wiley & Sons, London, 1975. vi + 379 pp. \$33.00.

This book contains the Proceedings of the 5th L. H. Gray Conference held in the University of Sussex, September 1973. Many of his colleagues and friends set up a memorial trust to support these conferences, which excel in coverage of the interaction between ionizing and ultraviolet radiation with emphasis on radiation biological and chemical aspects. For the most part, the presentations are concentrated on the early radiation processes important in damage to living cells. In a logical way, the book describes the basic techniques for detecting short-lived reactive species produced by radiation, followed by chapters which emphasize fast radiation response of biologically important molecules and living cells.

The first chapter describes several unusual physical techniques to detect the fast radiation response. A special linear accelerator can now generate a single 30-picosecond electron pulse. Also, a pulse conductivity system can detect the ions produced by the beam, and a pulsed electron spin resonance system can detect free radicals with high resolution and accuracy.

Other chapters describe short-lived ions, free radicals, and excited states as they relax, react, and interact with neighboring molecules in times as short as 20 psec. Some papers describe basic problems in radiation chemistry, while others mention specific problems in pho-

tosynthesis, artificial membranes, proteins, and the sensitive radiation target, DNA. The final papers show how a radiation chemical approach can be used to understand and alter the radiation response of cells.

This book shows many facets of the approach in trying to understand early radiation processes in living cells. However, like most proceedings, this book is a collection of papers that give little background and explanation for those not expert in this field. Therefore, this collection is mainly designed as a reference book only and is not for general use.

J. W. Hunt, *Ontario Cancer Institute*

Thermodynamics of the Polymerization of Protein. By F. OOSAWA and S. ASAKURA. Academic Press, London, 1976. viii + 204 pp. \$16.75.

Ever since Fraenkel-Conrat and Williams' first successful experiment in 1955 reassembling the tubular polymer of tobacco mosaic virus spontaneously from protein and nucleic acid constituents *in vitro*, there has been a growing realization that an understanding of the association of protein monomers into polymeric structures in living cells can be enhanced by an analysis of such phenomena under laboratory conditions. With the publication of this work the field has been given a comprehensive picture of the characteristics common to the polymerization of different proteins. The authors have drawn extensively upon their own studies of muscle protein actin, plasmodium actin, and bacterial flagellum to provide illustrations of how the principles of thermodynamics and the kinetic analysis of polymerization and crystallization can be applied successfully to interactions between complex protein molecules *in vitro*.

The work begins with two brief chapters on self-assembly, polymer structure, and physical characteristics of polymerization. Next are three chapters on the basic models for polymerization equilibria and application of classical thermodynamic and kinetic analysis to the model processes. After a chapter on the geometry of polymer construction, the regulation of polymerization is discussed. The final four chapters discuss copolymerization, polymorphism, higher order structures, and fluctuation and motility of protein polymers.

The authors have written an excellent introduction to the thermodynamics of protein polymerizations. The text is well written, and the numerous illustrations enhance the clarity of the discussion. The book will provide a very helpful resource for researchers and students in biochemistry, biophysics, and physiology, as well as for crystallographers and molecular biologists.

Frederick Allen Johnson, *The University of Michigan*

High-Speed Liquid Chromatography. By P. M. RAJCSANYI (Central Research Institute for Chemistry, Budapest) and E. RAJCSANYI (Semmelweis Medical University). Marcel Dekker, New York, 1975. xii + 203 pp. \$15.50.

This monograph is Volume 6 in the Chromatographic Science series initiated by J. Calvin Giddings' classic work on the "Dynamics of Chromatography." The present volume continues the downward spiral in the quality of this series. In only 123 pages of text the authors review the theory (too brief), the instrumentation (no details), and the applications (out of date) of modern liquid chromatography. There are several introductions far superior to the present volume which serves primarily as a literature source of rather limited scope.

Peter T. Kissinger, *Purdue University*

Hochdruck-Flüssigkeits-Chromatographie. Anleitungen für die Chemische Laboratoriumspraxis. Volume 14. By H. ENGELHARDT (Universität des Saarlandes). Springer-Verlag, New York, 1975. x + 213 pp. \$23.00.

While somewhat dated in 1978, this brief text (in German) provides a well-balanced introductory treatment of almost all aspects of modern liquid chromatography. This book is among the best sources this reviewer has encountered for the beginner to this rapidly developing experimental science. There is considerable overlap in content with the book "Introduction to Modern Liquid Chromatography" by L. R. Snyder and J. J. Kirkland. It therefore seems likely that a translation of an updated version of the present volume would be necessary before it can make an impact among American chemists.

Peter T. Kissinger, *Purdue University*