Book Reviews

Stereochemistry of Carbohydrates. By J. F. STODDART (University of Sheffield, England). Wiley-Interscience, New York, N. Y. 1971. xi + 249 pp. $14.95.

This book is intended to present to the reader who has no specialized background knowledge of carbohydrates a systematic application of stereochemical and conformational principles to this class of compounds. It is directed to the general reader in that it demonstrates the particular utility of carbohydrates and their derivatives for illustrating and also developing new knowledge of conformational and stereochemical principles in polyfunctional molecules that have acyclic chain structures, five- and six-membered ring systems, fused ring systems, and also macromolecular systems. For the carbohydrate specialist it organizes and brings into focus from a coordinated viewpoint much general stereochemical and conformational knowledge.

The constitution and configuration of the simple sugars is not developed along traditional lines but is introduced by consideration of symmetry elements and point-group theory. The conformational behavior of simple sugars is described briefly and interpreted extensively in the light of various current theories, and the macromolecular conformational properties of oligo- and polysaccharides are treated briefly. A chapter on physical methods emphasizes the particular importance of nmr spectroscopy and polarimetry in the study of carbohydrate stereochemistry. The final chapter, on the general subject of isomerism, discusses the tautomeric equilibria of the free sugars in solution, the equilibria involved in their conversion into glycosides and internal anhydrides, and in the formation of cyclic acetals between carbonyl reagents and the diol systems present in cyclic sugars, and their open-chain derivatives.

The author, a young lecturer in chemistry at the University of Sheffield, wrote this book while a postdoctoral fellow at Queen's University, Kingston, Ontario. By having initial drafts scrutinized by several authorities in the fields of stereochemistry and carbohydrates, he was able to avoid many potential pitfalls. Some criticisms remain. The book does not present a fully balanced and integrated account of all pertinent literature, so that it is not useful as an authoritative source of reference. The author has a strong inclination to furnish detailed quantitative interpretations and extrapolations, in a field where theoretical sophistication and frequently the experimental data scarcely merit such hard-and-fast conclusions; a more cautious qualitative or semiquantitative approach would have given the book a better long-term credibility. The book will be useful as collateral reading for the advanced undergraduate or graduate student interested in stereochemistry or in carbohydrates. The approach of presenting the basic stereochemistry of sugars through point-group theory is a brave attempt to introduce rigorous symmetry arguments at an early stage. However, to be realistic, there will be few students, especially those interested in biological aspects, who will appreciate or understand such a ponderous approach. The necessity of handling a great deal of specialized terminology will engender more confusion than enlightenment for the novice, who could have assimilated without difficulty the more traditional treatment and be equally well prepared to understand the remainder of the book.

Nevertheless, the book does present an interesting and readable account of the field. It should serve to stimulate interest and further work in the area and should help chemists working in other fields to appreciate the contributions made to stereochemical knowledge through studies on the carbohydrates.

Derek Horton, *The Ohio State University*

Electron Spin Resonance of Metal Complexes. By TEH FU YEN (California State College at Los Angeles). Plenum Press, New York, N. Y. 1969. ix + 204 pp. $15.00.

This monograph consists of 12 original contributions, and it is "designed to bridge the gap between chemical theory and application and to acquaint the chemist with the potentially immense amount of information that can be obtained from ESR."

With only 12 papers averaging some 18 pages each, this is a major undertaking but one which has been achieved to a considerable degree. The two papers on computer analysis and the contribution on second-derivative line-sharpening divide draw attention to the degree of sophistication in electron instrumentation which is becoming commonplace in chemical laboratories. The interesting contribution by Peisach and Blumberg on metalloproteins provides a good example of a biochemical application. The papers on structure and bonding, coordination number, and low symmetry are generally first rate and presented by people who are recognized in the field.

The conference which formed the basis for this book was held in March 1968, and there has been recent interest in a few other areas of epr of metal complexes not considered in this volume. The area of epr studies of strong metal–metal bonds, which has had only few contributions but is of growing importance, and the area of weak exchange interactions between metals are also not considered in this monograph. This deficiency is not very serious, since the interested reader may consult the recent review literature.

This monograph should be especially useful to workers whose primary interest is not epr studies directly but rather to those who use epr as a tool, and to graduate students who seek a reasonably broad view of recent work.

Gerald F. Kokoszka, *SUNY-Plattsburgh*

Organic Chemistry. By N. L. ALLINGER (University of Georgia), M. P. CAVA (University of Pennsylvania), D. C. DEJONGH, C. R. JOHNSON, N. A. LEBEL, and C. L. STEVENS (Wayne State University). Worth Publishers, Inc., New York, N. Y. 1971. xxi + 1007 pp. $15.95.

Thoughtful and competent chemists have put together a very comprehensive, elementary textbook which should find an important niche in the present book-market. The "Wayne State text" is different from its competitors in some respects. Reading more like a series of lectures, the book more or less can be divided into three parts. The first part, covering 250 pages, deals with structure alone, most of the time brilliantly, but at other times a little feebly for giving understanding because of purposeful avoidance of describing chemical reactions. Bridging the gap between parts one and two are three chapters, an excellent one on chemical reaction intermediates and two good chapters on thermodynamics and kinetics (if the teacher has time to cover these topics). The second part, covering pages 300–650, deals with chemical reactions very comprehensively, perhaps too much in depth for an elementary text. Although part two is treated in a quite conventional manner, it is enhanced by a superlative summary of reactions at the end of each chapter and by the inclusion of two separate, novel, and increasingly sophisticated chapters on the philosophy and practice of organic synthesis. The synthesis chapters are most unusual and quite attractive. Part three is devoted to a series of varied and highly topical subjects among which the teacher probably would have to choose to include in a year's course. This part comprises chapters on synthetic polymers, sulfur compounds, carbohydrates, heterocycles, proteins, terpenes, uv and photochemistry, nmr and mass spectrometry, silicon and phosphorus chemistry, industrial chemistry, and, at the end, a delightful little chapter on history.

The following points are not criticisms but perhaps views of the other side of the contingent involved in teaching elementary organic chemistry. As much could be found to argue about with any other text. The book has too much information for an elementary text, and the reviewer does not agree that the "level has been found suitable both for chemistry majors and nonmajors." This book should be for the major only and would be a disservice to use for the nonmajor. Chapter 6 on stereochemistry, an excellent, thorough treatment, ends in an apology, "No way is known to make this topic easy." In way of argument against this statement, concerning the tortuous explanation for nonoptical activity of *cis*-dibromocyclopropane, can it not be said that the two asymmetric carbon atoms have identical groups attached and therefore the *magnitude* of rotation for each carbon as plane polarized light passes through is identical, say 10°, and as it passes through the second asymmetric carbon from the first, the sign will be opposite? Therefore a combination of +10 and −10 makes zero, or a meso form. On page 437 the relatively greater acidity of methanol compared to *tert*-butyl alcohol is stated to be caused only by greater solvation of the smaller anion and not by induction. On page 547, however, it appears that induction is used to explain the greater basicity of a monoalkyl-substituted malonic ester anion as compared to the unsubstituted anion. Does the methyl group, compared to the hydrogen, have induction or not? Only six typographical errors were found throughout the book.

Exercises occur frequently with some answers in the back; a considerable number of problems occur at the end of each chapter with no answers. Illustrations are frequent in the first part of the book and in many cases are the best ever observed. Nmr is introduced early and worked into many problems throughout. Names of outstanding organic chemists are mentioned, but absolutely no references are given.

The book concludes with a paragraph that probably 90% of all organic chemists who ever lived are alive and, in perspective, the reader sees "that organic chemistry may have really just begun." The reviewer concurs and believes that this book has contributed to viewing the three-dimensional nature of organic chemistry—its lengthiness, its wide variety, and its great scientific depth.

D. E. Pearson, *Vanderbilt University*

Modern Practice of Liquid Chromatography. Edited by J. J. KIRKLAND (E. I. duPont de Nemours and Co.). Wiley-Interscience, John Wiley and Sons, New York, N. Y. 1971. xix + 454 pp. $14.95.

This worthwhile text is the first to summarize the recent developments in one of the most promising areas of separation science—high-speed, high-resolution liquid chromatography. The expanded lecture notes of speakers at a symposium on the subject held in the spring of 1970, it is a well-organized, eminently readable survey of the state of art today. Chromatographic theory and its implication are well integrated with many practical examples and considerations. Liquid–liquid, liquid–solid, ion-exchange, and gel chromatography are covered in some detail with emphasis on general and specific construction practice, choice of mobile and stationary phase, and selection of detectors. Much of the material in the book will be familiar to an expert in the area. On the other hand, for the vast majority of potential users in chemistry, biology, and medicine who are unfamiliar with the literature of separation science, it will provide an excellent introduction to a rapidly developing field. This reviewer feels that it is a book that should be read by all those who use chromatographic techniques in their research.

Charles H. Lochmüller, *Duke University*

Introductory Organic Chemistry. By ROBERT J. OUELLETTE (The Ohio State University). Harper and Row, New York, N. Y. 1971. xiii + 429 pp. $7.00.

An introductory textbook in any field is probably one of the hardest books to write. Dr. Ouellette has made a valiant attempt to accomplish the impossible. It is impossible because of the varied backgrounds of the students who will be using the book. Questions which always arise before any book is written are:

1. How much background can be assumed?
2. How detailed should the material be?
3. Can the subject be covered completely without detailed explanations?

If the book is designed for first-year college students with very little background, then the explanations given are not complete. Dr. Ouellette used terms which are never defined to explain theory; I thus found the book somewhat confusing. For example, he uses terms such as groups, subshells (s and p), electronic configuration ($1S^2$, etc.), highest energy levels, electron dot notations, and electron transfer to describe bonding. There was really no explanation as to what an atom is, no explanation of electrons, especially in terms of energy levels (shells, subshells, or orbitals); therefore, a student would have to rely on other sources for this information. By not taking time to go into a detailed investigation of any one area, Dr. Ouellette was able to introduce a tremendous amount of varied information.

Except for the lack of clear explanations, Dr. Ouellette has accomplished what I assume was his main objective. It is difficult sometimes to get into a subject clearly. This appears to be Dr. Ouellette's problem. The material presented in chapter one is important and very significant to the overall subject matter. However, much more information is needed for the chapter to be understood by students who are not interested in chemistry.

If the book is designed for students with at least one year of general chemistry, then I would say Dr. Ouellette has written a fairly good book. His pictorial descriptions of orbitals are very good. The suggested readings, which are usually absent in books, are most valuable to a student who wants a more complete understanding of the material.

I am not completely convinced that students at this level are really interested in the more complicated organic compounds presented in this book.

It is interesting to note that even though Dr. Ouellette does not care to emphasize reaction mechanisms, he uses them in almost every reaction. If a reaction is truly logical, stepwise, and straightforward, then that reaction is easily understood. It seems significant to mention that mechanisms should not make organic chemical reactions harder but easier to understand. Since this book is for nonchemistry majors, a more easily understandable approach should be the direction the author would take; therefore I can't agree with Dr. Ouellette's position on mechanisms.

After careful consideration of the strong and weak points, I would rate the book as a fair book for nonchemistry majors.

Danny L. Stephenson, *Howard Payne College*

Peptides 1969. Proceedings of the Tenth European Peptide Symposium, Abano Terme, Italy, September 1969. Edited by E. SCOFFONE (University of Padova). North-Holland Publishing Co., Amsterdam. 1971. xxiii + 379 pp. $25.75.

This well-edited volume contains 56 contributions (all but two in English) to the synthesis and conformation of peptides presented by chemists from 16 European countries, Israel, and the United States at the Tenth European Peptide Symposium. Presented in full are the plenary lectures by J. Engel on the equilibrium and kinetics of cooperative interactions in peptides and proteins and by E. Zuckerkandl on mutational trends and random processes in protein evolution. Other topics discussed include new methods for the activation and protection of functional groups; new solid-phase resins for the synthesis of protected peptides; chemical syntheses of human and salmon calcitonin, [8-arginine]-vasopressin, and analogs of caerulein, secretin, a staphylococcal nuclease fragment, and a bacterial peptidoglycan tetrapeptide; the conformations of oligopeptides and cyclodepsipeptides; and studies of enzyme active-sites using peptide substrates and inhibitors.

Two years have elapsed between the symposium and publication of this volume, during which the more important results have been published elsewhere. Yet "Peptides 1969" serves a convenient archival role as a collection of papers and written discussions that characterize the state of peptide chemistry in 1969. This book and earlier volumes in the series are quite useful to research groups interested in peptide chemistry.

Bruce W. Erickson, *The Rockefeller University*

Methoden der Organischen Chemie (Houben-Weyl). Band IV/4. Isocyclische Vierring-Verbindungen. Edited by EUGEN MÜLLER (University of Tübingen). Georg Thieme Verlag, Stuttgart, Germany. 1971. xxviii + 567 pp. DM 258.

The lastest volume in the new Houben-Weyl series consists of a major section by Dieter Seebach on the preparation and transformations of carbocyclic four-membered ring compounds, and an appendix by Siegfried Beckmann and Hans Geiger on natural products containing cyclopropane and cyclobutane rings.

Most of this volume (up to p 444) is essentially a monograph by Dr. Seebach on the chemistry of cyclobutanes and condensed cyclobutanes. In line with the Houben-Weyl tradition, the emphasis is placed on methods of synthesis, which are subdivided in a logical and systematic manner; laboratory procedures and references are interspersed generously. In addition, Dr. Seebach has added shorter but significant chapters on the physical properties, and on transformations (mostly ring cleavages) of four-membered carbocycles. A most useful feature of this review is the subject index, in which various condensed-ring compounds are easily found with the aid of structural formulas included in the index. The literature is covered in good part through 1970, with a few more recent references in footnote form. Dr. Seebach is to be congratulated on turning out a first-rate and thorough treatment of cyclobutane chemistry, and on filling a gaping void in modern chemical literature.

The short appendix by Drs. Beckmann and Geiger is simply an up-to-date (up to 1971) listing of all natural products containing a three- or four-membered ring. Names, structures, and botanical sources are given for each compound; the chemistry of the compounds is not discussed. This compendium should be of use to chemists engaged in isolating new natural products, particularly those in the terpene field.

It is satisfying to see that the new Houben-Weyl series is continuing in the traditions of relevance and scholarly excellence which made the old series such an essential reference work for our chemical predecessors.

Michael P. Cava, *University of Pennsylvania*