Book Reviews

Enzyme Assays. A Practical Approach. Edited by Robert Eisenthal and Michael J. Danson (University of Bath). Oxford University Press: New York. 1992. xxiv + 351 pp. $68.00. ISBN 0-19-963142-5.

The Practical Approach Series often provides a valuable resource for researchers who need to perform a variety of basic assays. The *Enzyme Assays* book edited by Eisenthal and Danson compiles much information about common methods to analyze enzyme activities. Much of the information described in each chapter has been available for many years (only 15% of the over 600 references provided are within the last decade), and the book adds little to the rapidly growing field of enzymology. The book was intended to help inexperienced enzymologists when performing assays, and as such it contains a wealth of useful tips. Any experienced enzymologist, however, is unlikely to find new information, and the lack of recent references weakens the utility of the book to this group of readers. The book would also have benefited from a general overview on each chapter, or at the end, by the editors (their only written contribution is the preface).

The book opens with a chapter on basic enzyme kinetics. The chapter is well written and covers the major pitfalls related to the interpretation of kinetic data. Of particular interest is the well-organized discussion of reasons why progress curves can have anomalous characteristics. Tipton's introductory chapter contains the most valuable information presented, and it significantly improves the quality of the book.

Chapters 2–7 present summaries of methods ranging from HPLC to pH-stats. The level of detail in each chapter also varies (9 pages to 30 pages). The method descriptions are useful, and most of these chapters contain protocols for typical enzyme assays utilizing the chosen method. The protocols are simple to follow and will be useful to those people working on the enzymes chosen.

Chapter 8 presents methods for enzyme assays in gels. This is an important area for many investigators, and it will be of value to experts and novices alike. Chapter 9 discusses protein purification, and although an interesting chapter, it seems rather out of place. It would be almost impossible to summarize this area adequately in only 18 pages. Indeed, the Practical Approach Series has another entire book titled *Protein Purification Methods*. Chapter 10 discusses statistics and emphasizes that statistics cannot make bad data good. The final chapter presents methods for protein determinations, and though it is an excellent summary, the information can be found from many other sources.

A useful inclusion in the book would have been a discussion of assays of immobilized enzymes, or assays for enzymes which are not easily available in the literature. In conclusion, this book summarizes different approaches for enzyme assays, providing a number of examples along the way. The book is a useful introduction to those not in the field but would not enhance most experienced enzymologists' understanding of the subject.

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Pulsed-Field Gel Electrophoresis: Protocols, Methods, and Theories. Methods in Molecular Biology. Volume 12. Edited by M. Burmeister and L. Ulansovsky. The Humana Press Inc.: Clifton, NJ. 1992. xiii + 481 pp. $69.50. ISBN 0-89603-229-0.

Pulsed-field gel electrophoresis (PFGE) is now routinely employed for the separation of a variety of macromolecules and complex structures in molecular biology. It has become a major separation technique for numerous applications. This laboratory-oriented text has 27 chapters with each chapter written by different individuals who are apparently expert in that particular field. The chapters are divided into four major parts: (i) electrophoretic techniques, (ii) auxiliary methods, (iii) biological applications, and (iv) theories and applications. Many of the methods described in this text have been tested and used routinely in the molecular biology laboratories. This comprehensive book of techniques is very timely, not only for technicians to carry out routine separations with little instructions from the laboratory director but also for the graduate students to learn about the underlying theories of these separations. This is the first text to present this subject material in a protocol format, a hallmark of this series. Each chapter is carefully divided into appropriate sections, such as Introduction, Materials, Methods, and References. The Method section typically contains consideration of practical details, equipment and apparatus calibration, running of the samples, and special notes. The Reference section contains exhaustive citations covering the period up to 1991. Each reference is cited with article title and includes the last page of the publication, which are very helpful for the reader. Several chapters include discussions on strategies helpful in planning experiments. The final part of the book contains theories and observations elucidating the complex behavior of DNA during PFGE.

The investigator can easily proceed by assembling a protocol from more than one chapter (e.g., CHEF, preparation of agarose blocks, and mapping strategies) for a given application of this technique. To help in this process, the editors have furnished an index and cross-references that allow easy access to all the methods. Certain methods, such as the preparation of yeast size markers, are done somewhat differently in different laboratories; therefore the investigator will find several protocols from which to choose.

This is a multidisciplinary tool. For example, biologist use the PFGE method for the analysis and separation of large DNA fragments or chromosomes. Physicist employ it to study the behavior of DNA during PFGE, resulting in great application potential. The present book gives some say to both groups. Biologists, one hopes, will be encouraged to read some of the theoretical approaches. On the other hand, physicists may gain more insight into the mechanism of PFGE and appreciate where improvements are needed by reading through the experimental procedures and problems that biologists face.

The monograph is an excellent reference and experimental manual for a researcher doing any analytical work in the nucleic acid field. The text is a must for every biochemistry and molecular biology library.

Ram P. Singhal, *The Wichita State University*

Molecular Dynamics Simulation: Elementary Methods. By J. M. Haile (Clemsen University). John Wiley and Sons: New York, Chichester, Brisbane, Toronto, Singapore. 1992. xvii + 489 pp. $59.95. ISBN 0-471-81966-2.

This book provides an interesting and readable introduction to the title topic. The book is organized into seven chapters covering such subjects as Fundamentals, Hard Spheres, and Dynamic Properties, followed by thirteen appendices on a miscellany of topics. Each chapter is followed by 20 to 30 problems and a list of references. There is also a separate bibliography at the end of the book.

The first chapter, Introduction, presents a rather philosophical view of the role of simulations and, for example, deals with the question of whether a simulation is theory or experiment. This chapter has an extensive series of references: the classical references; N. A. Metropolis et al. for Monte Carlo and B. J. Alder and T. E. Wainwright for molecular dynamics; and current applications in chemistry, chemical engineering, astronomy, and even current intellectual fashion (R. Penrose, *The Emperor's New Mind*). The first chapter and the rest of the book are liberally footnoted with phrases from W. Thomson (Lord Kelvin), a practice I appreciate, since it provides a hundred years of history in a few words.

The problem sets contain many of the standard type: "Prove Eq. (...)" and "Program the situation...". Some of the problems in the book are the sort that would be in a mechanics or statistical mechanics course. The first problem asks the reader to determine the probability of landing on any given square in the game of *Monopoly* and then proceeds to give the rules. This is a nice illustration—a useful problem, the point of which can be grasped by high school students.

The next chapter on Fundamentals contains all manner of subjects from a standard derivation of Hamilton's equations to the classification of dynamical systems. The book is best when illustrating general points with specific molecular dynamics examples such as pictures of the trajectories of a particle bouncing off smooth walls vs those off walls with a more complex structure.

Succeeding chapters discuss hard spheres, soft spheres, finite difference methods, and the calculation of both static and dynamic properties. The emphasis is on properties of liquids, and the various topics are illustrated with the results of simulations. Occasionally, the text is enlivened with miscellaneous references, as in a discussion of the stress autocorrelation function, which invokes both Lake Woebegon and Lord Kelvin. On occasion, the dimensionless quantities such as t^* are called "unitless", a misnomer deplored at least as far back as the book by E. B. Wilson (*An Introduction to Scientific Research*).

Over a hundred pages of appendices follow, covering topics such as the integrating over the $\delta(x)$ function, the derivation of thermodynamic functions in a microconical ensemble, and error propagation. The various appendices are—like the problem sets—at very different levels ofsophistication. Sample well-annotated simulation programs are given. It

is difficult to review programs without running them, but it should be noted that the random-number generator *Roulet* taken from W. A. Press et al., *Numerical Recipes*, has known problems and has been superseded in the second edition of *Numerical Recipes* (1992).

Molecular Dynamics Simulations is a useful introduction and can be used as a supplemental text in a graduate level course or as a self-study guide by an interested undergraduate. The author's observations make the book more interesting to read than the often very dry, equation-based text. The author warns us repeatedly not to take a simulation result at face value without thought, and so too with any text.

Herbert L. Strauss, *University of California, Berkeley*

Macromolecular Crystallography with Synchrotron Radiation. By John R. Helliwell (University of Manchester). Cambridge University Press: New York. 1992. xix + 595 pp. $165.00. ISBN 0-521-33467-5.

Synchrotron sources generate X-ray beams nearly a thousand-fold more intense than typically available with conventional laboratory sources. These intense beams offer the macromolecular crystallographer a multitude of new experimental opportunities for structural analyses. Despite the growing numbers of investigators who travel regularly to collect data at synchrotrons, researchers in this field have thus far lacked a comprehensive treatment on the use of synchrotron radiation in structural studies of biological macromolecules. Helliwell's book fills this void and covers the essentials of protein structure and macromolecular crystallography, together with the many recent theoretical and technological advances that specifically capitalize upon the unique properties of synchrotron radiation. Following a fairly extensive introductory treatment of protein structure and crystallography, a substantial portion of the book is properly devoted to a detailed treatment of the unique multiwavelength, polarization, and spectral properties of synchrotron radiation. Lucid descriptions are given of the magnetic devices (wigglers and undulators) used to alter the spectral power distribution that is obtained in the emitted synchrotron X-ray beam, as well as a great variety of mirrors, crystal monochromators, and related instrumentation for tuning, regulating the spectral bandpass, and focusing the synchrotron X-ray beam. Properties of the various data collection devices, which include film, multiwire area detectors, and newer image plate detectors, are treated in detail and will interest all macromolecular crystallographers wishing to understand the relative merits and shortcomings of these data collection devices. Novel experimental approaches that exploit the multiwavelength or time-structured characteristics of synchrotron radiation are discussed through case studies of important recent work in the literature of structural biology.

Helliwell's pioneering role in the use of synchrotron radiation for macromolecular crystallography is evident throughout the book. This gives an interesting perspective to his presentation of crystallographic theory and is effective in emphasizing the unique utility of synchrotron radiation. Helliwell's presentation of case studies combined with a readable style make the book accessible to noncrystallographers trying to understand, for example, how chemical reactions can be monitored in the crystalline state using time-resolved synchrotron radiation studies. In summary, this timely book provides the structural community with a valuable reference text dealing specifically with the application of synchrotron radiation to macromolecular crystallography and more generally with modern methods of structure determination.

Patricia C. Weber, *The DuPont Merck Pharmaceutical Company*

Advances in Carbanion Chemistry. Edited by Victor Snieckus (University of Waterloo). JAI Press: Greenwich, Connecticut, and London. 1992. xiii + 291 pp. $78.50. ISBN 0-89232-859-2.

This first volume in a projected series on carbanion chemistry consists of five chapters by experts in recently developed areas of much current interest: superbases and their use in organic synthesis (Mordini), structures of lithium enolates and phenolates in solution (Jackman and Bortiatynski), NMR spectroscopy of organolithium compounds (Bauer and Schleyer), stereoselective aldol reactions (Braun), and chiral sulfinylallyl and α-sulfinyl ketimine anions (Hua). Though the major interest in carbanions is as synthetic intermediates, the editor wisely covers structural and physical organic as well as synthetic aspects. This and future volumes should be of interest to organic and inorganic chemists who wish to better understand and use carbanion reagents and reactions.

Robert B. Bates, *University of Arizona*

Advances in Strain in Organic Chemistry. Volume 1. Edited by Brian Halton (Victoria University of Wellington). JAI Press Ltd.: London and Greenwich, Connecticut. 1991. xi + 283 pp. $78.50. ISBN 1-55938-180-9.

This is the first volume in a series of strained ring systems. The preface states that it is the intention of this volume to begin a serial coverage of strain in organic chemistry. Since this area of research has provided a playground at one time or another for a large number of organic chemists, it is anticipated that this and future volumes will appeal to a fairly large audience.

Volume 1 contains six chapters written by leading investigators in the field. The titles and authors of the chapters are as follows: Strain in Organic Chemistry: A Perspective (Brian Halton); *gem*-Dihalocyclopropanes in Chemical Synthesis (M. G. Banwell and M. E. Reum); 1-Halo- and 1,2-Dihalocyclopropenes: Useful Synthetic Intermediates (M. S. Baird); Cyclization and Cycloaddition Reactions of Cyclopropenes (A. Padwa and G. E. Fryxell); New Synthetic Pathways from Cyclobutanones (E. Lee-Ruff); Cyclic Alkynes, Enynes and Dienynes: A Synthetic Challenge (H. Meier).

The first chapter by Halton, who is also the editor of the series, presents a lucid discussion on strain in organic chemistry. This section is followed by contributions from researchers who have written up-to-date accounts in their own areas of specialization.

The first by Banwell and Reum covers *gem*-dihalocyclopropenes in chemical synthesis. Although it would be impossible to cover this topic comprehensively in a single chapter, the authors have nevertheless been able to present representative examples of the reactions experienced by these compounds. The contribution by Baird which follows is a well-written account describing the syntheses of 1-halo- and 1,2-dihalocyclopropenes and their uses in organic syntheses. This chapter provides a good review for investigators who might use these versatile synthons. A very nice chapter by Padwa and Fryxell on the cyclization and cycloaddition reactions of cyclopropenes follows the Baird chapter.

The well-written penultimate chapter by Lee-Ruff is devoted to the chemistry of cyclobutanones and should serve as a good up-to-date source for reference material. The volume concludes with the chapter by Meier dealing with cyclic alkynes, enynes, and dienynes. This chapter contains a great deal of interesting information and is written for the generalist beginning with a discussion of ring strain. Synthetic strategies are then presented, followed by a discussion on molecular geometry and dynamics and reactivity. The chapter ends with an attempt to identify interesting research topics in this area.

The editor is to be commended for producing a book nearly free of errors. The use of computer programs is almost essential for the production of structures during this type of publication. It would have been desirable to see some uniformity from section to section. Nevertheless, the structures are very clear and easy to read.

In summary, this book will be a valuable addition to the departmental library as well as to the collections of some individuals who work in this area.

W. E. Billups, *Rice University*