printing function lets you make hard copy of any lists or compound searches you have made. These lists can be put into a form acceptable to most of the common spreadsheet programs, which is a particularly valuable feature.

When you combine lists, only the data fields of one of them can be passed into the new list. This is a separate action the user must perform. In some cases, this restriction might be an important limitation of LOLI. Permanent lists can be edited to add data manually for any entry. The list editing function also allows you to change names of lists and add footnotes to explain exceptions or deal with other contingencies that do not fit anywhere else. You can add and delete compounds from the list. Sometimes when working with a list, you discover a need to revise the CAS Table containing registry numbers and chemical names. You might have a new compound or a new synonym to add. The list editing function permits you to also edit the CAS Table.

Maintaining the System: There are a set of utility functions that help you maintain the lists. They provide for merging purchased updates into lists and creating reports on what changes those update files will cause. You can off-load a list that can subsequently be reloaded on the same or a different LOLI system. This permits you to exchange your lists with others. You can create new lists from scratch or delete old lists no longer needed. There is a packing function that cleans up the disk files for better efficiency if data have been scattered by extensive editing of the lists.

The User Interface: The LOLI system has a reasonable look and feel. It follows a user interaction protocol quite similar to other software products with which chemists might be familiar. LOLI displays different screens at different points in the program and accepts commands and directions from the keyboard. Prompts for legal functions are shown on the screens. Highlights and color changes give the user good feedback.

The LOLI functions are easy to implement once one becomes familiar with the abbreviations and has basic understanding of the pathways that must be followed. Help screens are available and are reasonably clear. A chemist with some computer experience should be able to sit at the keyboard with the manual and learn how to operate the LOLI system in a few hours. This review was conducted on a ×286 machine running at 12 MHz. Response time was reasonable.

Conclusions: LOLI does not work like a typical relational database and would not be appropriate if searches are anticipated on the basis of some property other than the identity of the compound. It cannot manipulate the data entered for each compound, only display it. It cannot accept non-textual data.

LOLI is appropriate in those situations where keeping track of all the regulatory information is currently a problem. It is a useful tool for the people who must keep up with the regulations and be responsible for ensuring the organization meets its obligations. LOLI would be useful for other applications where the information is strictly list oriented. It is especially useful for dealing with multiple lists. For its intended niche, LOLI is a well-structured product that should serve its users well.

Robert Megargle, *Cleveland State University*

Book Reviews

Structure and Dynamics of Bulk Polymers by NMR-Methods (NMR Basic Principles and Progress. Volume 21). By Vladimir D. Fedotov (USSR Academy of Sciences, Kazan) and Horst Schneider (Technische Hochschule Carl Schorlemmer Leuna-Merseberg, Germany). Edited by P. Diehl, E. Fluck, H. Günther, R. Kosfeld, and J. Seelig. Springer-Verlag: Berlin and New York. 1989. ix + 176 pp. $69.00. ISBN 3-540-50151 and 0-387-50151.

Despite the general nature of the underlying principles of magnetic resonance, its practice has become highly specialized. Some practitioners of NMR spectroscopy are so highly evolved that they are unable to communicate effectively with NMR experts in other fields, through lack of shared culture or, perhaps, temperament. This circumstance is partly a consequence of the inherent flexibility and richness of NMR spectroscopy: there is not a single, unique NMR experiment, but rather the NMR approach can be configured, under favorable circumstances, to address exactly *the* relevant question in many disparate scientific fields. Accordingly, the evolution of NMR spectroscopy in any particular field can be shaped by those with an insight into the fundamental scientific questions in that field. That is the approach taken by this most recent volume of the excellent *NMR Basic Principles and Progress* series. The authors write from positions of authority about the principles and techniques of magnetic resonance and, perhaps more importantly, about issues of polymer morphology and dynamical behavior.

This volume lays out the basic principles of magnetic resonance and moves almost immediately to a compendium of fundamental (pulsed) NMR methods which then see application throughout the book. Homonuclear methods are primarily emphasized, including determination of spin–spin and spin–lattice relaxation times in the laboratory and rotating frame; dipolar relaxation; and relaxation under pulsed spin-locking and under some simple homonuclear line-narrowing sequences. Other more specialized methods are discussed in a review format, with enough information to point the way into the primary literature. As the title of this volume indicates, the perspective is on polymer (physical) structure and dynamics. Little prominence is given to determination of chemical structure through the chemical shift spectrum: cross-polarization and magic angle spinning are discussed primarily for extracting relaxation rates.

Of particular interest is the insight which can be extracted from the free induction decay of the proton signal in polymers. At low temperatures the proton resonance in an organic polymer is quite broad, due to the diffuse magnetic dipolar couplings to other nearby protons; at higher temperature molecular motion modulates these couplings, narrowing the line and lengthening the spin–spin relaxation time T_2. While this phenomenon has been clearly understood in NMR spectroscopy for 40 years, there is no exact, closed-form expression describing how molecular motion reduces the dipolar couplings among many spins. Perhaps for this reason, detailed study of the temperature dependence of the T_2 relaxation time has not been popular recently. However, this book promotes the use and analysis of T_2 data, even by semiempirical relations, and one is impressed at the scope of information obtained.

This book is far more than a review. It presents the fundamentals of NMR spectroscopy, albeit tailored for polymer science, in a consistent fashion and integrates into this framework a detailed description of motions and morphology in organic polymers. A further benefit is that the authors draw heavily from their own work. Such work, especially the polymer studies of Dr. Fedotov, are less accessible to researchers who do not read the Russian scientific literature. Contributions of many other workers are presented clearly and with useful insight.

This book is to be commended, certainly to those with joint interests in NMR spectroscopy and polymers. Though not a primer of NMR spectroscopy, it is written from a sufficiently physical viewpoint that the polymer scientist with only a nodding familiarity with NMR spectroscopy may find some ideas in it. This volume may also prove useful to those interested in biopolymers and large protein structures, which share some features common to lightly cross-linked elastomers.

There are a few minor drawbacks in this volume. The book is most easily read cover to cover: the casual reader may find the search for important tables and equations rather tedious. Sometimes only written descriptions of complex phenomena are presented, with references back to the primary literature: here a key figure would have helped. The style of the figures is, to this reviewer, terse. On graphs, curves tend to be identified only by numbers: one must look into the caption or delve further into the text to determine the parameters associated with these numbers. Some light editing by the publisher would have made the English a bit smoother, though it is certainly readable, and the physical insight gained will more than repay the occasional extra wait for the verb.

A. N. Garroway, *Naval Research Laboratory*

Nucleic Acids and Molecular Biology. Volume 4. Edited by Fritz Eckstein and David M. J. Lilley. Springer-Verlag: Heidelberg and New York. 1990. XII + 291 pp. $138.00. ISBN 0-387-52407-X.

This volume of the series is comprised of 17 chapters covering wide areas of Molecular Biology and written by recognized authorities in the field. The objective of this series is to publish focused review articles by active researchers. The reviews are not intended to be exhaustive, but rather to place the most recent data into context. This volume accurately represents this goal.

The first three chapters deal with unusual DNA structures and DNA binding to antitumor compounds and proteins. In Chapter 1, Frank-Kamentskii discussed the evidence supporting his proposed protonated triplex DNA structures for homopurine-homopyrimidine sequences at

acid pH. In Chapter 2, Lepre and Lippard reviewed their recent work on DNA interactions with *cis*- and *trans*-DDP (diamminedichloroplatinum(II)) to explain the selective toxicity of the cis isomer to the tumor cells. This explanation still remains elusive. In the next chapter, Bauer and White reviewed the topological aspects of closed circular DNA wrapped around proteins.

The next three chapters deal with different aspects of genetic recombination. Lilley reviewed the structure of the helical four-way junction in DNA and its role in genetic recombination. This four-way junction is an important intermediate in site-specific recombination as in the cre-lox system of phage P1 reviewed by Hoess and Abremski. RecBCD enzyme, a large three-subunit protein, also called exonuclease V, plays important roles in many aspects of DNA metabolism, including recombination, repair, and replication, and was reviewed by Smith.

E. coli promoters were reviewed in the next two chapters, Knaus and Bujard reviewed the principles governing the activities of more than 20 promoters utilized by the σ^{70} *E. coli* RNA polymerase. Leirmo and Record discussed in detail their structural, thermodynamic, and kinetic studies of the interaction of $E\sigma^{70}$ RNA polymerase with promoter DNA.

Chromosomal structures from both bacteria and eukaryotes were reviewed. During recent years it has become increasingly clear that DNA is coiled or looped at many sites in the chromosomes where genes are transcriptionally regulated. Pettijohn reviewed the loop organization in bacterial chromosome. Garrad reviewed evidence that these loop organizations may facilitate the interaction of cis-acting sequences with trans-acting factors within a loop domain.

In the next chapter Cullen amd Malim reviewed the genetic complexity of HIV-1 with emphasis on the various cellular and viral trans activators that together serve to modulate both the quantity and quality of HIV-1 gene expression. Pankratz et al. reviewed the recent progress toward understanding the molecular mechanism of *Drosophila* development and the roles of the DNA binding proteins in these development processes.

The last five chapters deal with recent significant developments in RNA structures, functions, and RNA–protein interactions. Tinoco reviewed the structural elements that make up folded RNA and their thermodynamic stabilities relative to the unfolded single strands. Sheldon et al. reviewed the requirements in the Hammerhead structure for self-cleavage. The pre-mRNA splicing apparatus is a multicomponent, ribonucleoprotein structure containing RNP subunits together with an additional protein factor and was reviewed by Lamond, Barabino, and Blencove. Scott reviewed different forms of editing and modifications of mRNA transcripts that alter the protein coding sequences in mRNAs. Finally, Schimmel reviewed the recent work on the structural elements in different tRNAs necessary for synthetase recognition.

Like others in this series, this is an excellent volume, well-written and well-organized. It should be of great interest to a wide audience in molecular biology.

Naba K. Gupta, *The University of Nebraska*

Clinical Magnetic Resonance Spectroscopy. By Ernest B. Cady (University College Hospital, London). Plenum Press: New York and London. 1990. xii + 278 pp. $55.00. ISBN 0-306-43449-0.

The dramatic success of nuclear magnetic resonance imaging (NMRI or MRI) in clinical diagnostic medicine has led to the widespread expectation that NMR spectroscopy will also have a major impact in this area. This expectation is based on the promise of obtaining detailed metabolic or biochemical information, hopefully in vivo but also in vitro, that will assist in the diagnosis of disease. As a result, major efforts are underway to develop applications for NMR spectroscopy in clinical medicine.

Unfortunately, many in the medical community have held unrealistic expectations for clinical NMR spectroscopy with regard to its information content and rapidity of implementation. Difficulties relating to accurate spatial localization, low signal-to-noise ratio, and technique development in competition with busy clinical MRI schedules were appreciated by few at the beginning. Nevertheless, as clinical MRI systems capable of performing spectroscopic observations become more widespread, and as instrumentation and software are developed to ensure accurate localization and ease of use, the potential clinical applications of NMR spectroscopy become more numerous.

It is in this context that the book by Ernest Cady will make a contribution. This book is an introduction to the application of NMR spectroscopy, both in vivo and in vitro, to problems of a clinical nature. The first of the six chapters in the book is an overall introduction to the technique. It reviews the major NMR isotopes available and outlines historically the initial applications of NMR spectroscopy to various organ systems. More in-depth treatments are left to Chapter 3, which provides a survey of studies in brain, muscle, heart, liver, and other organs. In vitro studies of human body fluids and erythrocytes are also reviewed. The remaining four chapters cover fundamental NMR principles, instrumentation, data acquisition and related issues, and spectral analysis and processing. Although this organization is out of the ordinary, it seems to work well. The neophyte can get a good sense of what NMR spectroscopy can accomplish in medicine by reading Chapters 1 and 3 without becoming unduly enmeshed in the details of the technique.

The work covers the literature through 1989. Unfortunately and unavoidably, important developments since the writing of the text are only hinted at. This includes the rapidly increasing use of localized ^{1}H STEAM spectroscopy and ^{31}P and ^{1}H spectroscopic imaging. Little mention is made of the monitoring of drugs or other exogeneous compounds by nuclei such as ^{19}F. The more technical chapters in the book should be useful to the practitioner of clinical NMR spectroscopy in that they treat important issues such as quantitation, the use of surface coils, and spectral processing. These and other issues covered are tremendously important for the proper application of NMR spectroscopy in physiology and clinical medicine, and they present potential pitfalls for the newcomer. The book has a useful index.

In summary, the book is timely and should be useful to practitioners in this area.

Richard A. Komoroski, *University of Arkansas for Medical Sciences*

Cytochromes c: Evolutionary, Structural and Physicochemical Aspects. By Geoffrey R. Moore (University of East Anglia) and Graham W. Pettigrew (Royal (Dick) School of Veterinary Studies Summerhall). Springer-Verlag: Berlin. 1990. xvi + 478 pp. $98.00. ISBN 3-540-50852-X and 0-387-50852-X.

This volume is an excellent companion to the authors' first volume, *Cytochrome c: Biological Aspects* (Springer-Verlag: Berlin, 1987). Indeed, the two volumes should be considered as a single review of the cyochrome *c* literature, since there is a great deal of chemical and biophysical information in the first volume without which the present volume would be incomplete. Although the 3-year delay between the publication of the two volumes is somewhat unusual, this does not detract from the overall usefulness of the set. Cytochrome *c* has served as a model protein for the investigation of many diverse topics, including heme electronic structure, electron transfer reactions, protein–protein interactions, molecular evolution, and structure–function relationships. Indeed, studies of cytochrome *c* have played a key role in the development of many different fields. Taken together, these two volumes provide a comprehensive and balanced review of this enormous literature which emphasizes the exceptionally broad scope of cytochrome *c* investigations. The two volumes are directed toward graduate students and workers in the field.

Chapter 1 of the present volume contains an introduction to the stereochemical and physicochemical properties of hemes. Basic information is provided on the electronic structure of iron, factors affecting the spin state of the heme, and axial ligation. Chapter 2 provides a detailed account of different spectroscopic studies that have been carried out on cytochromes. These include UV/vis, IR, resonance Raman, CD and magnetic CD, Mössbauer, X-ray absorption, EPR, and NMR. This chapter includes a very lucid comparison of what information can and cannot be obtained from each technique. Particularly informative are accounts of how a number of different spectroscopies were used to solve a particular problem, e.g. axial ligation. Chapter 3 contains useful tables of amino acid sequence alignments, as well as similarity matrices.

A detailed discussion of the structures of Class I cytochromes *c* is presented in Chapter 4. This chapter includes comprehensive accounts of such matters as how the internal residues modulate the properties of the heme group, how the ionization states of the heme propionic acids are controlled by neighboring residues, and what factors control the alkaline isomerization of cytochrome *c*. There is a particularly interesting account of the nature and possible significance of conformational differences between ferri- and ferrocytochrome *c*. An up-to-date account of the effects of chemical modification and site-directed mutagenesis on the structure of cytochrome *c* is also included in this chapter. Chapter 5 provides structural information on the Class II, III, and IV cytochromes *c*.

An interesting discussion of the evolution of cytochromes *c* is given in Chapter 6. The authors point out that the detailed 2D and 3D structural information on cytochromes *c* provides a rich source of evolutionary information. In fact, cytochrome *c* has played an important role in the development of the field of molecular evolution. Chapter 7 provides a detailed account of the effect of structure, ionic strength, and pH on the redox potential of cytochromes *c*. The possible physiological significance of these effects are discussed in connection with proton translocating cytochromes, such as cytochrome oxidase.

The final chapter is concerned with the electron-transfer reactions of cytochromes *c*. A very readable introduction to the various theories of electron transfer is included. The chapter contains a comprehensive account of recent experimental work on both intramolecular electron-

transfer reactions involving such constructs as cytochrome *c* covalently labeled with ruthenium complexes and intermolecular reactions between cytochrome *c* and its redox partners. The authors do a good job of pointing out the many ambiguities that remain in the field, such as the importance of aromatic residues in electron transfer and directional control of electron transfer. This is an area of intense current research activity, and it is expected that recent experimental developments will provide new insights into these questions, particularly for intracomplex electron-transfer reactions.

Francis Millett, *University of Arkansas*

Metals and Micro-organisms. By M. N. Hughes and R. K. Poole (King's College London, University of London). Chapman and Hall: London. 1989. xii + 412 pp. $75.00. ISBN 0-412-244004.

The underlying rationale for this book, according to the authors, is the need for an interdisciplinary synthesis of chemical and biological studies of the roles of metal ions in microorganisms. It is intended for a variety of specialists who work in this field, who come from backgrounds in either inorganic chemistry or microbiology. As an effort to write an integrative volume in this broad area, the authors indicate that they have attempted to be comprehensive in the scope of the topics included but that their use of literature references was intended to be illustrative not encyclopedic.

The book begins with an introduction to the function of metals in micro-organisms, which centers on an inorganic understanding of metal complex structure and binding equilibria. Chapters follow on metal nutrition with emphasis on methods of trace metal analysis, metal transport, functions of the different essential metals, toxic metals, and facets of technology relating to metals and microbes.

A number of the topics in the text stirred my interest because typically they have not been covered in books on bioinorganic chemistry. These were mostly in areas of microbiology and cellular biochemistry—nutritional requirements, mechanisms of metal transport, metal ion toxicity, and applied aspects of microbiology involving metals, such as extraction of metals from ores or solutions by microbes. Nevertheless, in most sections I did not sense an interdisciplinary, integrative approach. For one thing, essential and toxic metals are involved in any number of specific processes in cells. Thus, the text naturally turned to individual metal centers and their unrelated properties not to biological function, which is a natural means of organization in monographs on living systems. So, for example, the authors simply enumerated some of the roles of metals in two chapters comprising about 30% of the book. Many other sources do this with much more detail and currency. An attractive section was the one on calcium, particularly the parts that stressed the role of Ca^{2+} in regulation of biochemical processes, which drew the analogy to the key roles of this metal ion in metabolic control in higher organisms.

The chapter on metal transport also lacked coherence. It might have served as the basis for a discussion of metal metabolism—how metals are transferred among metal–ligand complexes from the extracellular medium to their functional binding sites within cells in regulated fashion. But, again, the search for concepts which integrate this area was lacking. Instead, for example, 12 largely unconnected sections described specific metal ion transport into microorganisms. In this chapter, the description of siderophore-mediated uptake of iron was the most elaborate. For workers not familiar with this field it comprises a nice introduction. Particularly interesting were the sections on the strict requirement of iron by microbes in relation to bacterial infection of mammalian hosts and to the role of iron availability in environmental limitation of microbial population growth. Nevertheless, useful reference to the wealth of molecular biological information about induction of siderophore synthesis was lacking.

With its emphasis on general concepts, the chapter on metal toxicity made illuminating reading. Sections on factors that modulate toxicity in cell culture, aspects of metal toxicity in natural environments, mechanisms of immobilization of metals including cell surface binding, and metal deposition by sulfide generation all are unusual contributions to a volume of this sort. The section on mercury resistance was dated and suffered from lack of inclusion of more recent studies by Walsh and O'Halloran. Similarly, the lack of mention of phytochelatins in relationship to cadmium toxicity in yeasts and the omission of the interesting work and literature on induction of metallothionein in yeast indicate that coverage of subjects was not comprehensive.

In general, I found relatively little on molecular genetics in the book, despite the fact that this has become a driving force in several areas of metallobiochemistry. Unfortunately, few literature references after the early 1980's were included. In addition, having been initially surprised that the authors tried to summarize the underlying physical-inorganic chemistry of metal complexation in Chapter 1, I was disappointed that this body of knowledge was hardly utilized throughout the rest of the book. There were few chemical equations, structures, or other consistent indications of the importance of inorganic chemistry in understanding the cellular processes under discussion.

David H. Petering, *University of Wisconsin—Milwaukee*

Advances in Permanent Magnetism. By Rollin J. Parker (Parker Associates). John Wiley and Sons: New York. 1990. xi + 337 pp. $64.95. ISBN 0471-82293-0.

Rollin Parker has written a practical guide to the application of permanent magnet materials. This book is basically an updated version of a 1962 book which he co-authored with R. J. Studders [*Permanent Magnets and their Application*, by Rollin J. Parker and Robert J. Studders; John Wiley and Sons: New York, 1962]. Intended primarily as a resource book for engineers, its approach to the subject is one not often found in texts on magnetism: It combines under one cover both the properties of available permanent magnets and their applications in real devices. It nicely summarizes a broad scope of topics, including the magnetic properties of particular materials, the relevance of their temperature dependence in devices, and the variety of applications for their use. The updated text benefits from a modern perspective not available even in many of the classic texts on magnetism, which includes the development over the last two decades of high performance rare earth–cobalt and rare earth–iron magnets.

After a brief historical introduction in Chapter 1, Chapters 2 and 3 comprise a serviceable review of magnetism and permanent magnet concepts. This material is useful as a review for those who already have some familiarity with the basic concepts of magnetic materials. It is probably not sufficiently tutorial for those who are truly new in the field, for which a more expository textbook might be better recommended. Indeed, a number of sections here and elsewhere in the book are difficult to follow because the exposition is too terse and lacking in logical development. In this regard at least the book appears to fall short of the earlier version.

The heart of the book begins in Chapter 4, which draws together the magnetic properties of all of the relevant permanent magnet materials in use today, including the well-established Alnico and ferrite magnets, high performance rare earth–cobalt, and the new Nd–Fe–B magnets which have revitalized interest in permanent magnets and created ample new opportunities for permanent magnet devices. The information in this chapter, and in the Appendices, provides a valuable summary of the magnetic and materials properties of the most relevant magnet materials available today. The following chapter details the various short-term (reversible and irreversible loss) and long-term (aging or structural loss) effects of temperature exposure on the magnets. These vital issues of temperature stability must be taken into account in any elevated temperature application. The remaining four chapters turn from materials to the arena of applications and provide a compendium of the classes of permanent magnet devices, with examples. Other topics include magnetic measurement techniques, the suitability of particular magnet materials for particular applications, and even considerations of relative cost.

As is characteristic of a book which presents a broad overview of its subject matter, this text does not get into the fine details. It is not a how-to book on permanent magnet motor design. For the audience whose interests range across a broader landscape, however, such as what kind of devices can be made and what magnets are best suited for them, this book can be a useful guide.

Frederick E. Pinkerton, *General Motors Research Laboratories*

Progress in Inorganic Chemistry. Volume 38. Bioinorganic Chemistry. Edited by S. J. Lippard. Wiley-Interscience: New York. 1990. xx + 535 pp. $95.00 (cloth); $34.95 (paper). ISBN 0471-50397-5.

This latest volume of *Progress in Inorganic Chemistry* continues the emphasis on critical and in-depth reviews of specific areas of inorganic chemistry. It is difficult to believe that it has been 17 years since publication of the previous volume (Volume 18) in the series focussed on the emerging subdiscipline of bioinorganic chemistry. This long hiatus does, however, make it possible to assess the tremendous progress that has been made in this area. In order to provide an historical perspective, the preface and introduction to Volume 18 are reprinted in the present volume. It is perhaps surprising that the series editor's earlier classification of research in the field remains valid, albeit with certain extensions. Bioinorganic chemistry continues to focus on the following: (i) direct studies of metallobiomolecules to elucidate their structure and function, (ii) the synthesis and characterization of well-defined model compounds, and (iii) the interaction of biomolecules with exogenous metal ions. In the intervening period, the last of these has been greatly extended beyond the earlier emphasis on added metal ions as probes of biological structure and function to include a wide variety of therapeutic applications of metal ions and the regulation of gene expression by metal ions.

Two of the chapters focus exclusively on the structure and reactivity

of synthetic model systems as broadly defined. Holm et al. summarize their elegant work on the development of subsite-specific reactivity in tetranuclear iron–sulfur clusters as models for enzymes that use such clusters to carry out catalytic reactions. (For comparison, 1973 saw the publication of the *first* paper describing a biologically relevant iron–sulfur cluster, demonstrating the enormous progress made in this area in the last 17 years.) Hendry and Sargeson summarize studies on the role of metal ions in promoting phosphate ester hydrolysis, many of which have been conducted in the latter's laboratory. They provide a clear picture of the basic principles involved and conclude with an insightful discussion of enzymes catalyzing such reactions.

In contrast, the rest of the chapters deal largely with studies on biomolecules that either contain metal ions essential for their function or interact with metal ions. Gray et al. summarize the factors that are important in long-range electron transfer in proteins, focussing on studies on semisynthetic systems that have given precise information on electron-transfer rates as a function of distance and orientation. It is now clear that long-range electron transfer is the norm in biological systems, rather than a rarity. Que and True provide a detailed summary of the properties of proteins containing binuclear iron–oxo centers and the closely related manganese analogues that nicely demonstrates the breadth of expertise and techniques that has been necessary to achieve the current level of understanding, as well as the amazing increase in knowledge since 1973. Hayaishi, the pioneering figure in dioxygenases, and co-workers provide a detailed picture of the properties and reactivity of one such system, indoleamine-2,3-dioxygenase.

The final three chapters deal in a broad sense with metal ion–nucleic acid interactions, either directly or via a modulating regulatory protein. O'Halloran et al. provide a thorough review of the coordination chemistry of the mercuric ion, which has been developed largely to understand the operation of the metalloregulatory Mer R protein, an ultrasensitive receptor for Hg(II) that interacts with DNA to turn on the mercury detoxification system in bacteria. Pyle and Barton describe the use of transition-metal complexes to probe nucleic acid structure, which has already produced significant insights into DNA structure and may lead to sequence- and structure-specific synthetic nucleases for gene sequencing and therapeutic purposes. Finally, Lippard and co-workers focus on the biological processing of DNA that has been modified by therapeutic platinum derivatives and related compounds. This is clearly now at a second-generation level of inquiry, where the basic phenomena of platinum–nucleic acid base interactions are reasonably well understood, and the focus is on how relatively minor structural changes can have major and selective effects on biologically important processes such as DNA replication and repair.

While not attempting to be comprehensive, which is not possible in a single volume given the maturity of the field, this volume nonetheless manages to provide an excellent picture of the breadth and intellectual vitality of contemporary bioinorganic chemistry. A comparison of the contents of Volumes 18 and 38 also provides a dramatic picture of the increased sophistication in both the techniques utilized and the systems examined now vs those in 1973. This volume will provide the reader with an excellent idea of what constitutes 1990 vintage bioinorganic chemistry. We can only hope that the publisher and editor will not wait until 2007 for the next snapshot of the field. The publisher is to be commended both for the expeditious publication of the volume, which ensures the timeliness of the reviews, and for the availability of a paperback version that will make this work available to a much wider audience. The book is indispensable for those currently active in the area or for students wishing to enter the field.

Bruce A. Averill, *University of Virginia*

Advances in Chemical Physics. Volume 76. Molecule Surface Interactions. Edited by K. P. Lawley (Edinburgh University). John Wiley and Sons: Chichester and New York. 1989. ix + 386 pp. $110.00. ISBN 0-471-91782-6.

This volume of *Advances in Chemical Physics* brings together seven articles on molecule surface interactions, an area which has drawn increasing interest from the chemical physics community in the last decade. Both theoretical and experimental aspects of the study of the gas–surface interface are overviewed in the volume.

Two of the articles, Monte Carlo Calculations on Phase Transitions in Adsorbed Layers, by K. Binder and D. P. Landau, and the Theory of Resonant Charge Transfer, by A. T. Amos, K. W. Sulston, and S. G. Davison, provide a fundamental treatment of theoretical aspects of molecule surface interactions, including an extended discussion of the models and mathematical techniques involved. Binder and Landau also give numerous examples of the results of Monte Carlo calculations of thermodynamic and structural properties of model systems and discuss their relation to real adsorbate layers. Calculated phase diagrams are presented, and the phenomena of wetting and layering are considered.

The other article on theory, Gas–Surface Reactions: Molecular Dynamics Simulations of Real Systems, by D. W. Brenner and B. J. Garrison, emphasizes comparison of theoretical and experimental results rather than presentation of formal theory. Examples are given which demonstrate how molecular dynamics studies of sputtering can be combined with results from secondary ion mass spectrometry (SIMS) and energy and angle resolved neutral (EARN) experiments to provide insight in bonding geometries of adsorbates. Applications of molecular dynamics calculations to surface diffusion, crystal growth, and surface reconstructions are also discussed.

The four articles that deal with experimental aspects of molecule–surface interactions span the gamut of traditional surface-science techniques applied to the study of adsorbed species to laser state-selected detection of desorbed molecules. The utility of vibrational spectroscopy as a probe of the gas–surface interface is amply demonstrated in the article titled Infrared Spectroscopy of Molecules Adsorbed on Surfaces, by Roger Ryberg. A large part of the article examines how spectroscopically determined frequency shifts and analysis of the absorption line shapes can provide insight into adsorbate–adsorbate and adsorbate–substrate interactions. Infrared absorption is also shown to be useful for determining the identity and geometry of surface-reaction intermediates in surface-catalyzed decompositions. The relationship of a surface's structure and composition to its catalytic activity is explored in the chapter Model Studies of Surface Catalyzed Reactions, by A. G. Sault and D. W. Goodman. Catalytic properties of structure-insensitive and structure-sensitive reactions, for reactions on chemically modified surfaces, and for reactions on mixed metal catalysts are treated.

The power of state-selected detection for studying the dynamics of molecule–surface interactions is shown by D. S. King and R. R. Cavanagh in their article, Molecular Desorption from Solid Surfaces: Laser Diagnostics and Chemical Dynamics. Studies of the chemical dynamics of both thermal desorption and laser-induced desorption are discussed with emphasis on how molecules accommodate energy with the thermal bath of the solid. A rather comprehensive treatment of Helium-Scattering Studies of the Dynamics and Phase Transitions of Surfaces is given in a nicely written article by Klaus Kern and George Comsa. Both theory and applications of experiments in helium scattering are treated. Topics included are the following: measurement of surface phonon frequencies and dispersion, two-dimensional ordering, including surface reconstructions, and surface roughening.

In summary, the book does a credible job at representing the variety of theoretical and experimental approaches to the study of molecule–surface interactions. Researchers in the field should find the compound index for molecule–surface systems a convenient entry for information on specific systems.

Charles S. Felgerle, *University of Tennessee*

The Healing Forest: Medicinal and Toxic Plants of the Northwest Amazonia. By Richard Evans Schultes and Robert F. Raffauf. Dioscorides Press: Portland, Oregon. 1990. 484 pp. $59.95. ISBN 0-931146-14-3.

For nearly 50 years Richard Evans Schultes has explored the Northwest Amazon, discovering new plant species and recording medicinal uses of plants by indigenous peoples. Some 30 years ago his efforts were joined by those of Robert Raffauf, who led the natural products exploration program maintained at the time by Smith Kline and French. These authors have here brought together the results of their investigations in a fascinating book.

It begins with a long preface which outlines the geography and geology of the region and is illustrated by the authors' photographs and maps. The main part of the book is a listing of plant families with species of interest located within the family lists. The ethnobotany of each species is summarized succinctly, often with line drawings or photographs to supplement the text. Also provided are a general bibliography, a symptoms, disease, and treatment index, and an index to plant genera. References to chemical investigations in the period 1967–1984 are included.

The two inescapable facts emerging from this book are that the region is a treasure-house of biological diversity and that exploration of the bioactive natural products of its plants has scarcely begun. Now, as every television viewer knows, the destruction of these forests proceeds apace. The resulting contact between indigenous peoples and modern society threatens the survival of ethnobotanical knowledge acquired over many centuries. There is therefore every reason for natural products chemists to accelerate work on the multitudes of research projects which this book suggests. If research is done in a coordinated fashion using good bioassay systems we may gain valuable knowledge and save vital species in time. Moreover added strength will be given to the argument, already made by harvesters of natural rubber, that the land is more valuable covered with native forests than burned off, used for agriculture, and irreversibly

impoverished. This unique book has come in the nick of time to help scientists identify research problems and policymakers save the threatened, irreplaceable resources of the Amazon.

Phillip W. Le Quesne, *Northeastern University*

General and Synthetic Methods. Volume 12. Specialist Periodical Report. Edited by G. Pattenden (University of Nottingham). The Royal Society of Chemistry: London. 1990. xiii + 553 pp. £135.00. ISBN 0-85186-934-3.

The format of this latest volume in the specialist periodical series, *General and Synthetic Methods*, remains the same as in previous issues. The chapters are given the following headings: Chapter 1, Saturated and Unsaturated Hydrocarbons by N. Simpkins; Chapter 2, Aldehydes and Ketones by K. E. B. Parkes; Chapter 3, Carboxylic Acids and Derivatives by D. W. Knight; Chapter 4, Alcohols, Halogeno Compounds, and Ethers by C. J. Urch; Chapter 5, Amines, Nitriles, and other Nitrogen-containing Functional Groups by G. M. Robertson; Chapter 6, Organometallics in Synthesis by T. N. Danks, S. E. Thomas, and T. Gallagher (this chapter is further broken down into two parts: (1) The Transition Elements by Danks and Thomas and (2) Main Group Elements by Gallagher); Chapter 7, Saturated Carbocyclic Ring Synthesis by T. V. Lee; Chapter 8, Saturated Heterocyclic Ring Synthesis by K. Cooper and P. J. Whittle; and finally Chapter 9, Highlights in Total Synthesis of Natural Products by C. W. Ellwood, D. C. Harrowven, and G. Pattenden.

Overall, this volume maintains the thorough standard of the previous volumes and provides a reasonable overview of the main synthetic organic literature covering the year 1987. Considering the large number of authors and the inevitable overlap of material, there is very little duplication. Unfortunately, the structure schemes are very frequently several pages from their discussion. Naturally, this makes the text more difficult and tedious to follow. More attention to this aspect would greatly improve the readability. One further complaint, and a more significant one, is that the author index only leads the reader to the chapter containing the reference. One then has to find the reference from the number. This seems to be unnecessarily complicated and tedious. Surely the traditional page number reference would suffice to locate a reference quickly without the labor of plodding through a chapter.

These small editorial criticisms aside, the Royal Society of Chemistry's Specialist Periodical Reports are a valuable addition to the departmental library and to the individual's collection if unlimited/sizable funds are available.

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Alkaloids: Chemical and Biological Perspectives. Volume 7. Edited by S. William Pelletier (University of Georgia). Springer-Verlag: New York. 1991. xv + 591 pp. $98.10. ISBN 0-387-97290-0.

The seventh volume of *Alkaloids: Chemical and Biological Perspectives* maintains the high standard of its predecessors in providing detailed chemical, spectroscopic and, most importantly, taxonomic data for both major and minor classes of alkaloids. One of the main requirements for natural product chemists is an accurate and comprehensive data base for more than 10000 alkaloidal entries. The volume under review contains three chapters, the first of which on homoerythrina alkaloids (by Bick and Panichanun) is a very readable account of this small subset of molecules biosynthesized from phenylalanine and tyrosine. Plant sources, as well as sufficient spectroscopic data to find one's way through and become familiar with the structures, together with methods of synthesis are described (up to 1989). The second chapter, by Agrawal, Srivastava, and Gaffield, is a catalog of spectroscopic data consisting mainly, but not exclusively, of ^{13}C NMR chemical shift assignments (^{1}H NMR and MS data and optical rotations are also included) for some 300 steroidal alkaloids. In the third and final chapter (by Pelletier and Joshi) we find a similar comprehensive spectral catalog of more that 200 norditerpenoid alkaloids, including MS data, physical constants, and $^{13}C/^{1}H$ NMR assignments. The authors are to be congratulated on completing the enormous task of compiling data which brings up to date a previous chapter in volume 2 of this series.

Any reviewer of this volume cannot help making the comparison with the distinguished (and by now classic) series *The Alkaloids*, begun by R. H. Manske and recently continued under the editorship of A. Brossi, together with the valuable chapters on alkaloids in *Natural Product Reports* published by the Royal Society of Chemistry, both of which are comprehensive, well-referenced and, best of all, pleasant to read. The volume under review like its six precursors is a critical and accurate reference catalog providing a valuable supplement to the mainstream and, although hardly a bedside companion, it can be highly recommended to the natural product community. Looking to the future, the mass of data in compendia such as these convey to this reviewer an ever increasing need for a computerized data base for the 50000 or more natural product structures which have an annual increment of ca. 2000. Until this is available, we will have to rely on series such as the *Alkaloids: Chemical and Biological Perspectives* which, at a cost of $98.00 (ca. 15¢/structure), is well worth the price for those deeply involved in the field.

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High Temperature Superconductivity. Edited by Jeffrey W. Lynn (University of Maryland). Springer-Verlag: New York. 1990. vii + 403 pp. $39.95. ISBN 0-387-96770-2.

This book provides an introduction to oxide superconductivity. The book is written in the style of a text and is a result of a graduate physics course given at the University of Maryland. It is definitely a physics perspective on the subject of superconductivity, with a survey of superconductivity, by J. W. Lynn, the theory of Type-II superconductivity, by D. Belitz, and the Josephson effect, by R. A. Ferrell, as the first three chapters. A chemist would have put a chapter on synthesis and synthetic methods near the front. The only synthetic method presented is the ceramic high-temperature method for preparing these oxides. It is expected that the reader already has a background introduction to the theory of superconductivity at the level of solid-state texts such as Ashcroft and Mermin.

The book covers the three chapters mentioned above as well as chapters on crystallography, by A. Santoro, electronic structure, lattice dynamics, and magnetic interactions, by C. S. Wang, synthesis and diamagnetic properties, by R. N. Shelton, thermal and transport properties, by J. E. Crow and N.-P. Ong, magnetic properties, by J. W. Lynn, electron pairing: how and why, by P. B. Allen, and superconducting devices, by F. D. Bedard. Although some of the material in the chapters is already dated, the chapters on the Josephson effect and superconducting devices are especially useful to researchers and students in the field. These chapters provide some of the theory behind the Josephson junction and the interest on the applications of superconductivity research.

I recommend this book to researchers and graduate students working in this field as a reference text. This is also a good reference text for any scientists just starting in this field, providing the necessary physics introduction to the field.

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