parison of different characterization methods. However, several researchers in this monograph use reference materials recently made available through the International Humic Substances Society (IHSS).

The first chapter presents a brief overview of humic and fulvic acids and colloidal organic materials in the environment. The following two chapters examine the nature of humic colloids and use of hollow-fiber ultrafilters for humic and fulvic acid isolation. Hollow-fiber ultrafilters are reported to minimize humic and fulvic acid isolation problems associated with use of XAD-resins or sodium hydroxide processing. Use of hollow-fiber ultrafilters is recommended by the authors for isolation and size fractionation of humic and fulvic acids in surface water and groundwater. However, the authors point out that this method assumes a spherical structure for humic and fulvic acids for the separation cutoffs and is, therefore, an empirical approach.

The following eight chapters summarize chemical characterization and structural determination techniques. Procedures described include nuclear magnetic resonance (NMR), reflectance infrared spectroscopy, fluorescence spectroscopy, and liquid chromatography. These chapters are noteworthy for the wide range of approaches used to characterize the chemical nature of humic substances. Six subsequent chapters examine the importance of humic substances−metal binding reactivity, including transport of radionuclides (Chapter 16). Methods presented include UV-scanning ultracentrifugation to determine humic and fulvic acid molecular weights and to investigate changes in aggregation brought about by metal ion complexation. Metal binding affinity varies among humic substance fractions.

Some interesting presentations include Chapters 13 and 14. Chapter 13 summarizes trivalent ion−humic substance interaction kinetics. Humic acid−metal binding kinetics involve a range of reaction rates, with more rapid reaction rates associated with lower molecular weight fractions. Similar kinetic results were observed for size-fractionated humic acids and poly(acrylic acid). Chapter 14 examines humic material characterization using isotopic techniques to determine the significance of groundwater colloids in the transport of radionuclides. The authors report that differences between humic acid and fulvic acid fractions suggest different sources of the two organic carbon fractions. Two subsequent chapters also address questions of radionuclide migration in the environment.

The final two chapters examine humic acid and fulvic acid interactions with organic pollutants. Chapter 19 describes use of ^{15}N NMR to study aniline covalent binding to humic substances. Aniline incorporation into natural organic matter is reported to resemble noncatalyzed nucleophilic addition reactions. These investigations are important because there is concern that aromatic amines may be released by incomplete industrial waste treatment. Use of ^{15}N NMR may have broad utility for investigations of aromatic amine covalent reactivity with organic matter in the environment.

The monograph is recommended for scientists studying humic and fulvic acid mediated reactions in the environment. It may also serve as an auxiliary text in an upper undergraduate or graduate level course dealing with the structure and reactivity of natural organic matter.

Michael M. Reddy, *U.S. Geological Survey*

JA9756782

S0002-7863(97)05678-3

Prolyl Hydroxylase, Protein Disulfide Isomerase, and Other Structurally Related Proteins. Edited by Norberto Guzman (The R.W. Johnson Pharmaceutical Research Institute). Marcel Dekker, Inc.: New York, Basel, and Hong Kong. 1998. xvii + 530 pp. $185. ISBN 0-8247-9831-7.

Protein disulfide isomerase (PDI) was discovered over 30 years ago; however, it is only recently that this protein has received substantial attention. Over the past several years, this protein has assumed a high profile as a result of its role in assisting in protein folding occurring in the endoplasmic reticulum by catalysis of disulfide rearrangements in these proteins. This role for PDI has been shown to be essential to the viability of yeast cells. This book intends to provide an overview of the current state of knowledge in the field of PDI-related biochemistry. The contributors are acknowledged experts in their fields and provide, for the most part, clear understandable explanations for those not intimately involved in the field.

As the title of the book implies, the coverage spans PDI and the proteins prolyl hydroxylase and microsomal triglyceride transfer protein which have been shown to have PDI as a subunit. The first five chapters focus on prolyl hydroxylase, and Chapter 16 focuses on microsomal triglyceride transfer protein. Although these represent excellent accounts of the properties of these proteins, the connection to the remainder of the volume is unclear. The exact role of PDI in these enzymes is not clear, and the relevance to PDI's role as a protein disulfide isomerase or as a chaperone has not been established. The focus and organization of the book would have been better served by focusing only on PDI and its role as a protein disulfide isomerase and as a chaperone.

The remainder of the volume presents a wide range of articles on the biochemical properties and functions of PDI. Although no grouping of articles has been utilized, the remainder of the articles in this book can be loosely grouped in several categories on the basis of their focus. Chapters 7 and 18 provide a basic introduction to the family of protein disulfide oxidoreductases and PDI, in particular. The relationship between thioredoxin and PDI, in particular the redox chemistry catalyzed by both, is well-covered in Chapters 11 and 21 by A. Holmgren and R. Raines. The role of PDI in protein folding is discussed in Chapter 13 by H. Gilbert, which, along with Chapter 21 by Raines, presents outstanding descriptions of the redox chemistry involved and the role of PDI in protein folding. These should be required reading for anyone working in the field of protein disulfide oxidoreductases. Chapters 12 and 14 provide a provocative discussion of PDI's interaction with peptides and potential role as a chaperone for protein folding. Chapters 15 and 20 provide a discussion of the possible role of PDI as a storage protein for calcium. Chapters 8−10 provide coverage of novel regulation behavior of PDI. Chapters 6, 17, and 19 cover unrelated topics involving plant PDI, the role of PDI in viral entry into cells, and a PDI-related protein involved in cell signaling. The final chapter, 22, provides a useful overview of the applications of PDI for enhancing the production of recombinant proteins.

An index is provided which is helpful in identifying specific areas of interest. All of the articles provide detailed sets of references which make the book a very useful reference guide to lead one into this area. A clearer organization of the articles to group them according to focus and an effort to reduce duplication among the articles would have provided an even better presentation. For both the neophyte and the experienced investigator, this book provides an excellent review of current research regarding PDI and a very useful reference guide.

John Bushweller, *Dartmouth College*

JA975674X

S0002-7863(97)05674-6

Methods in Enzymology Volume 284. Lipases: Part A, Biotechnology. Edited by B. Rubin (Lipomed) and E. A. Dennis (University of California−San Diego). Academic Press: San Diego. 1997. xxxi + 408 pp. $99.00. ISBN 0-12-182185-4.

Lipases constitute a large and broad group of esterases that act on lipidic substrates that do not disperse as monomers in aqueous solutions. In spite of physiological, pharmacological, and industrial importance of interfacial enzymes, basic understanding of these enzymes has lagged compared to those of their cousins that act on monodisperse substrates in aqueous solutions. The knowledge gap has narrowed in recent years, and the subject has been reviewed in numerous edited books.

The scope of this volume is limited to some of the better characterized primary and tertiary structural features of selected triglyceride lipases. The individual articles are written by experts in the field with emphasis on isolation, assay, cloning, and expression. The volume could be useful for beginners who wish to find procedures and references for specific manipulations. The results reported in these articles have limited value because such procedures are notoriously specific for a particular enzyme and substrate used under a specific set of assay conditions. With the appreciation of such a limitation most articles do not even try to identify a general trend.

Mahendra Kumar Jain, *University of Delaware*

JA9756679

S0002-7863(97)05667-9