Book Reviews

Advances in Enzymology and Related Areas of Molecular Biology. Volume 64. Edited by Alton Meister. John Wiley & Sons, Inc., New York. 1991. v + 494 pp. 16 × 23.5 cm. ISBN: 0-471-50949-3. $69.95.

The 64th volume of this prestigious series is divided into seven sections which are devoted to a diverse range of topics of classical biochemistry: (1) Evolution of Glutathione Metabolism, (2) Covalent Inhibitors of the Gelation of Sickle Cell Hemoglobin and Their Effects on Function, (3) Structural Basis for Catalysis by Tryptophan Synthase, (4) Structure and Mechanism of F_0F_1-Type ATP Synthases and ATPases, (5) Novel Aspects of the Biochemistry of the Molybdenum Cofactor, (6) Ovothiols: Biological and Chemical Perspectives, and (7) N^5-(1-Carboxyethyl)ornithine and Related (*N*-Carboxyalkyl)-Amino Acids: Structure, Biosynthesis, and Function. The volume also includes author and subject indices, as well as cumulative indices for volumes 1–64.

The section of glutathione metabolism traces the natural history of this ostensibly ubiquitous metabolite in terms of the evolution of the enzymes which conduct its synthesis and metabolism and emphasizes the importance of this substance in protecting aerobic organisms from oxygen toxicity. The second section describes covalent modifiers of sickle-cell hemoglobin, such as sodium cyanate, glyceraldehyde, aspirin, and pyridoxal derivatives, which modify the crippled hemoglobin such that it is made more functional in terms of oxygen binding. The third section is a comprehensive review of tryptophan synthase, with significant emphasis on its three-dimensional structure, its subunit interactions, and substrate channeling. Recent mutagenesis data and protein folding studies are discussed, as well as a detailed review of the proposed catalytic mechanism of the enzyme.

The fourth section of this volume covers in succinct detail, from the standpoint of enzyme structure and chemical mechanism, two of the best studied enzymes of oxidative phosphorylation, the ATP synthases and ATPases. The review of mechanistic studies of these enzymes is fairly extensive. The fifth section covers the biochemical role of molybdenum in enzymes and is primarily a review of the structural evidence for the existence of molybdenum-containing pterin cofactors. The final two sections are of similar format and review the known biochemistry and structural elucidations of two classes of metabolites, the ovothiols, and the N-carboxyalkyl amino acids. The former of these, the ovothiols, are naturally occurring antioxidants which are mercaptohistidine derivatives conjugated to various aromatic functionalities. The latter are the reductive amination adducts of the α-keto acids such as pyruvate and α-ketoglutarate and amino acids such as ornithine, lysine, and others. The chemical and biochemical syntheses of these compounds, and the enzymes involved, are discussed. Overall, the reviews in this volume are well-written, informative, and current. As is typical for this series, the volume contains many useful illustrations and figures and is indexed particularly well.

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Protective Groups in Organic Synthesis. Second Edition. By Theodora W. Greene and Peter G. M. Wuts. Wiley-Interscience, New York. 1991. xvi + 473 pp. 15.5 × 24 cm. ISBN 0-471-62301-6. $59.95.

Since the first edition of this book was published in 1981 many new protective groups, as well as new methods of introduction or removal of known protective groups, have been developed. Thus over 200 new groups and about 1500 new references have been added in the second edition of this extensively used text. Following an introductory chapter on the role of protective groups in organic synthesis, the next six chapters address protective groups for alcoholic and phenolic hydroxyl, carbonyl, carboxylic acid, thiol, and amino groups. The chemistry of each protective group is described structurally and is illustrated with equations. The best methods of formation and cleavage plus as an indication of the scope and limitations of the protective group are also systematically outlined. The final chapter contains 10 reactivity charts that will aid synthetic chemists in selecting the appropriate protective group. These charts, one for each major class of protective group, enable the assessment of the effect of a wide variety of standard types of reagents and reaction conditions on the different possible protected functionalities. In addition, four levels of reactivity, i.e. high, marginal, low, or reacts (the protected compound reacts readily, but the original functional group is not restored), are indicated for each protective group.

A major addition in this second edition is the inclusion of two new sections on the protection for indoles, imidazoles, and pyrroles, and protection for the amide NH group in the chapter dealing with protection of amines. This addition was made because of the strikingly different chemical properties, and consequent difference in the chemistry of protection and deprotection, of these NH-containing compounds.

Protective groups are of major importance to all who practice organic chemistry. Thus the inclusive guide to protecting and reforming the major organic functional groups afforded by this *Second Edition of Protective Groups in Organic Synthesis* will be an extremely valuable source of information for all medicinal, as well as organic and pharmaceutical, chemists.

Staff

Methods of Biochemical Analysis. Volume 35. Protein Structure Determination. Edited by C. H. Suelter. John Wiley & Sons, Inc., New York. 1991. ix + 310 pp. ISBN 0-471-51326-1. $75.00.

This is the latest is a series dating back to 1954 for which each volume now focuses on a specific method or the application of a variety of methods to solve a specific biological or biomedical problem. This volume concentrates on protein structure, and the first chapter (87 pages) concerns theoretical and empirical approaches to protein-structure prediction and analysis. After an introductory review of molecular dynamics and Monte Carlo simulations, the authors launch into a thorough discussion of a variety of methods for prediction of secondary and supersecondary structure; the text is nicely complemented by stereoscopic diagrams both in color and in black-and-white. Prediction of tertiary structure is equally well-treated, with emphasis on homology-based and heuristic approaches. Chapter 2 (38 pages) treats protein-ligand interactions as probes of the surface properties of proteins. The major emphasis here is on ligand and hydrophobic interaction chromatography. The usefulness of these procedures for protein separations is clear, but the case for using these techniques as useful probes of the protein surface remains obscure. Chapter 3 (78 pages) concerns fluorescence techniques for studying protein structure. After a nice review of basic principles, the authors discuss time-resolved protein fluorescence in depth, with a focus on intrinsic tryptophan fluorescence, and resonance-energy transfer. The last chapter (44 pages) discusses two approaches for elucidating domain structure and structure–function relationships: limited proteolysis and the use of monoclonal antibodies. This provides a useful primer for newcomers to this field as well as providing specific examples to illustrate subtle aspects of these techniques for more advanced readers.

Overall, this volume continues in the fine tradition of the series and provides workers in the field with a useful reference work to advance their understanding of these specialized approaches to the study of protein structure.

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