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Book Reviews

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BOOK REVIEWS

Techniques in Glycobiology. Edited by R. Reid Townsend (University of California-San Francisco) and Arland T. Hotchkiss, Jr. (Agricultural Research Service, U.S.D.A), Marcel Dekker, Inc.: New York, 1997, xx + 637 pp. \$65.00, ISBN 0-8247-9822-8.

Recent progress in glycobiology is both the result of and is resulting in remarkable advances in carbohydrate analysis. State of the art analytical approaches to carbohydrate research have been gathered together in the book *Techniques in Glycobiology*. More than just a convenient compilation, this exceptionally well written and well edited book is highly instructive, at times reading like a good novel, as it covers the spectrum of improved methods in glycobiology. Each topic includes very well organized background material, a full explanation of the theoretical basis of the technique, and a clear description of the method and its application. The technical detail provided is sufficient to allow its use directly on the bench. Each chapter contains an example of how the method is applied toward a specific biologically meaningful question and demonstrates how the data is analyzed and interpreted. These features make this an excellent single source for cutting-edge methods, but, more importantly, for modern approaches to glycobiology research. This book is of enduring worth for people newly entering the field as well as for those who have spent a lifetime working on complex carbohydrates. The book is divided into six parts, each containing several chapters:

Part I is composed of information about mass spectrometry and NMR. It contains such topics as NMR of microgram quantities of complex carbohydrates (Manzi and Keifer), analysis of anionic glycoconjugates by MALDI-TOF/MS (Gibson et al.), MALDI-TOF/MS of oligosaccharides separated by high pH anion exchange chromatography (Papac et al.), fragmentation of glycopeptides in post source decay MALDI/MS (Rapp et al.), electrospray MS of phosphorylated oligosaccharides (Haynes et al.), carbohydrate-protein interactions by MS (Ohashi et al.), and structural studies on mycobacterial lipoarabinomannans (Delmas et al.).

Part 2 describes new physical methods for the study of glycolipids. Included is TLC blotting (Taki), HPLC of gangliosides (Sonnino et al.), ELISA determination of cell surface ganglioside and carbohydrate antigens (Ravindranath et al.), ganglioside aggregation by scattering techniques (Cantù et al.), polysaccharide imaging by atomic force microscopy (McIntire and Brant), measurement of carbohydrate ligand interaction with surface plasmon resonance (Shinohara et al.), and glycoprotein detection by potentiometric sensor (Dill).

Part 3 addresses several aspects of the *O*-glycosylation of proteins. It is comprised of the role and characterization of heavily *O*-glycosylated mucin domains (Gerken et al.), predicting mucin *O*-glycosylation sites (Elhammer et al.), *O*-glycosylation in vivo (Nehrke et al.), identifying sites of glycosylation in proteins (Pisano et al.), high energy dissociation

of *O*-linked glycopeptides (Medzihradzsky), and GC and GC-MS of permethylated oligosaccharides (Thomsson et al.).

Part 4 gives examples of oligosaccharide labeling. It covers precolumn derivatization and HPLC of monosaccharides and amino sugar alcohols (Anumula), glycan labeling with fluorophors (Hardy), capillary gel electrophoresis of derivatized oligosaccharides (Guttman), and glycosylpyrazole derivatives (Kett et al.).

Part 5 discusses strategies for oligosaccharide separations and sequencing. The topics of the chapters consist of novel glycosidases (Wong-Madden et al.), capillary electrophoresis of oligosaccharides (Stefansson and Novotny), oligosaccharide profiling methods (Higgins and Bernasconi), high pH anion exchange HPLC mapping of oligosaccharides (Lipniunas et al.), monosaccharide analysis by high pH anion exchange HPLC with a refractive index detector (Rao et al.), MALDI/MS of 2-aminobenzamide-labeled glycoproteins (Kopp et al.), characterization of subnanomolar amounts of *N*-glycans by MALDI/MS (Nuck and Gohlke), and *N*-linked oligosaccharides from yeast glycoproteins (Trimble).

Part 6 is about Plant Glycobiology. It is composed of chapters on the electrophoretic analysis of carbohydrates using a DNA sequencer (O'Shea and Morrell), starch structure by HPLC/PAD (Wong and Jane), structural determinations of seaweed galactans (Stortz et al.), plant polyuronic acids (Carpita and McCann), and analysis of cellulose and carrageenan (Gretz et al.).

Each chapter is of outstanding quality, reflecting a job well done by the editors. Typographical errors are scarce, and the quality of the typesetting, figures, non-acid paper, and binding make this well-crafted book a tribute to the publisher. I would recommend that any laboratory conducting research in this area buy a copy of this book, or coerce a well funded nearby colleague into doing so. This is an excellent book to recommend to your library, because, even in this rapidly evolving field, *Techniques in Glycobiology* promises to be a highly useful book for some time.

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Analytical Chemistry of Carbohydrates. By Heimo Scherz and Gunther Bonn. Thieme Stuttgart, New York, 1998, 344 pp + index. \$ 114.00. Cloth ISBN 3-13-102351-1.

Books in the demanding field of carbohydrate analysis are few and far between. Only rarely does a volume comprehensively summarize new developments. Professors Scherz and Bonn have done just that in a new volume in the series entitled, *Thieme Organic Chemistry Monograph Series*.

The authors' foreword highlights the specificity of chemical structures and physical properties of mono-, oligo- and polysaccharides as well as chemical reactions of glycoproteins and glycolipids. The volume encompasses four well-divided chapters.

The first chapter deals with "Analytical Methods without Separation" and is broken into eight sections. "Reaction Methods" comprise the first section. The authors describe various analytical techniques in the form of detailed protocols. The second section presents "Reactions with Phenylhydrazine and Related Compounds." The third section deals with "Reagents which Split α -Glycosidic Linkages" and the fourth section with "Reactions with Acids." Section five is one of the most useful and describes "Enzymatic Methods in Aqueous Solutions." The section covers important monosaccharides such as glucose, fructose, galactose, L-arabinose, D-gluconate, D-glucono- δ -lactone and sorbitol. Section six describes all "Enzymatic Methods with Immobilized Enzyme Systems" to determine glucose, galactose, lactose and sucrose. Section seven deals exclusively with "Polarimetry," whereas section eight covers "Electrochemical Methods" such as polarography and amperometric oxidation. Each section concludes with valuable references.

The second chapter specifically focuses on the "Analytical Methods using Separation Procedures" and is divided into two subchapters. The first subchapter describes "Chromatographic Methods," in four sections, Paper Chromatography, Thin-Layer Chromatography, Column (High Pressure) Liquid Chromatography and Gas Chromatography.

The second subchapter concentrates on "Electrophoretic Methods" and is divided into four sections. The first section discusses paper electrophoresis. The second section deals with cellulose acetate. The third section is devoted to "Electrophoresis on Glass Fibre Paper" and the fourth to "Silanized Silica Gel." The fifth section of this chapter deals exclusively with "Capillary Zone Electrophoresis"

Perhaps one of the most important contributions to the book is the third chapter "Polysaccharides," which is divided into three subchapters. The first one describes "Isolation of Polysaccharides." The second subchapter covers "Separation Methods for Soluble Polysaccharides." The last subchapter entitled "Identification of Polysaccharides" presents various examples of degradation of polysaccharides to their monomeric units and the determination of the position of the external glycosidic bonds. Also, the section on "Cleavage of the Polysaccharide with Periodate" discusses the Smith degradation of vicinal polyhydroxy compounds with periodate ions. This important chapter concludes with supplementary literature and 120 important references.

The last chapter, "Glycoproteins," presents various aspects of *O*- and *N*-glycosyl glycoproteins and begins with a comprehensive introduction followed by "Isolation of the Carbohydrate Parts of Glycoproteins." Various optional techniques such as cleavage of the *O*-glycosyl linkages by treatment with dilute alkali, cleavage of *N*-glycosidic linkage by hydrazinolysis and enzymatic deglycosylation are described.

The book concludes with an extensive subject index of ten pages. Overall, the volume is well-organized and meticulously edited and translated, making it free of any obvious errors. It is a pleasure to read.

This textbook provides the foundation for an analytical course in carbohydrate chemistry. Thus, the volume is an indispensable reference for researchers, especially in the emerging new field of modern analytical aspects of molecular biology of carbohydrates. Organic and medicinal chemists, biotechnologists and all scientists engaged in research on biochemistry and carbohydrate chemistry, especially in the emerging field of glycobiology of biologically active oligosaccharides as potential new therapeutics, should pay special attention to this volume. This volume should be an essential addition to every institutional library.

In addition, the attractive price of the book should convince all scientists and graduate students engaged in research on carbohydrate chemistry to purchase it for their personal library. It will serve as a handy reference.

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