

Glycopeptides And Glycoproteins Synthesis Structure And Application Topics In Current Chemistry

Concepts and techniques in genomics and proteomics covers the important concepts of high-throughput modern techniques used in the genomics and proteomics field. Each technique is explained with its underlying concepts, and simple line diagrams and flow charts are included to aid understanding and memory. A summary of key points precedes each chapter within the book, followed by detailed description in the subsections. Each subsection concludes with suggested relevant original references. Provides definitions for key concepts Case studies are included to illustrate ideas Important points to remember are noted Carbohydrate Chemistry provides review coverage of all publications relevant to the chemistry of monosaccharides and oligosaccharides in a given year. The amount of research in this field appearing in the organic chemical literature is increasing because of the enhanced importance of the subject, especially in areas of medicinal chemistry and biology. In no part of the field is this more apparent than in the synthesis of oligosaccharides required by scientists working in glycobiology. Glycomedical chemistry and its reliance on carbohydrate synthesis is now very well established, for example, by the preparation of specific carbohydrate-based antigens, especially cancer-specific oligosaccharides and glycoconjugates. Coverage of topics such as nucleosides, amino-sugars, alditols and cyclitols also covers much research of relevance to biological and medicinal chemistry. Each volume of the series brings together references to all published work in given areas of the subject and serves as a comprehensive database for the active research chemist Specialist Periodical Reports provide systematic and detailed review coverage in major areas of chemical research. Compiled by teams of leading authorities in the relevant subject areas, the series creates a unique service for the active research chemist, with regular, in-depth accounts of progress in particular fields of chemistry. Subject coverage within different volumes of a given title is similar and publication is on an annual or biennial basis. This book is a comprehensive and concise review on principles, strategies, and crucial advances in glycobiology. It focuses on synthesis and practical applications and emphasizes state-of-the-art approaches to the assembly and design of sugars. • Provides detailed discussion on specific topics like oligosaccharide assembly and design of sugars, techniques in glycoconjugate preparation, multivalency, and carbohydrate-based drug design • Uses notable examples, like solution-based one-pot methods and automated methods for sugar assembly, to illustrate important concepts and advances in a rapidly emerging field • Discusses practical applications of carbohydrates, like medicine, therapeutics, drug and vaccine development

This book is in many ways a sequel to The Biochemistry of Glycoproteins and Proteoglycans. The enormous recent progress in understanding the biological roles of glycoproteins has prompted the present volume. The reasons for studying glycoproteins have multiplied, and in the present volume the roles played by glycoproteins are explored in a variety of biological situations. The first two chapters describe molecules involved in cell-substratum and cell-cell interactions in a broad sense, and also focus on recent progress in identifying specific attachment molecules. Our understanding of how normal processes, such as cellular differentiation and tissue organization, are regulated is dependent on understanding how cells interact with the extracellular matrix. When these processes go awry the consequences can be tragic, for example, when manifest as birth defects and cancer. Our ability to devise appropriate therapies is in many cases limited by our understanding of such cell-matrix interactions. The third chapter explores the roles by glycoproteins during early mammalian development. The carbohydrate portions clearly play very important roles in presenting information during early embryogenesis, and an unusual tumor stem cell, the embryonal carcinoma, looks very promising in providing an experimental system for understanding how the expression of these complex carbohydrate determinants is regulated. The next three chapters explore the biology of glycoproteins in distinct situations: in the immune system, in the nervous system, and during erythropoiesis.

Glycoconjugate Research

A Review of Structure and Function

Development and Use of Chemical and Enzymatic Methods in Both Solution and Solid Phase for the Synthesis of Glycopeptides, Glycoproteins and Oligosaccharides

The Glycoconjugates V2

Synthesis, Analysis, and Applications

It is only relatively recently that neurochemists and neurobiologists have shown appreciable interest in the class of macromolecules now generally referred to as complex carbohydrates, although gangliosides were, of course, first identified and studied in brain. The glycosaminoglycans fell chiefly within the province of connective-tissue biochemists, and earlier information concerning the structure and metabolism of glycoproteins was largely limited to the more accessible glycoproteins and oligosaccharides (such as those found in plasma, milk, and urine), or ones which are relatively simple to prepare in a soluble and manageable form. Techniques were later devised for the isolation and purification of tightly bound membrane glycoproteins, where initial studies concentrated mainly on the erythrocyte, for which large amounts of a single cell population are available. Because of the structural complexity of nervous tissue and the large numbers, low concentrations, and membrane-bound form of many of its complex carbohydrates, progress has occurred more slowly in this area.

Biology and Chemistry of Eucaryotic Cell Surfaces contains the proceedings of the Miami Winter Symposia, held on January 14- 15, 1974 and organized by the Department of Biochemistry, University of Miami School of Medicine, in Miami, Florida. Organized into 27 chapters, separating the manuscripts presented at the symposium, this book presents the stochastic studies on cell surface stickiness and the adhesion and aggregation of blood platelets. This text also explains the cell-contact and transformation-induced changes in the dynamic organization of normal and neoplastic cell plasma membranes and their role in lectin-mediated toxicity toward tumor cells. It also looks into the chemical components of surface membranes related to biological properties, carbohydrate antigens of cell surfaces, and molecular orientation of erythrocyte membrane glycoproteins. Some other chapters discuss the cell envelope glycoprotein biosynthesis in fungi, cellular lectin receptors, and topographical alterations of the fat cell surface membrane elicited by concanavalin A. Immunochemical evidence for putrescine sites on the membrane of mammalian cells, as well as the fractionation and biosynthesis of membrane components in erythroid cells, are also described.

This third edition is a comprehensive and extended study about the best known approaches for preparing the main types of glycosides, covering the classic and more recent glycosylation reactions used for preparing simple and challenging glycosides currently used as potent antiviral and antineoplastic drugs, or fluorogenic substrates used for enzymatic detection in cell biology. Besides, this new edition provides more examples of the glycosidic methodologies followed for preparing complex glycoconjugates such as glycoproteins and glycosphingolipids and gangliosides used as adjuvants or as synthetic vaccines candidates. Also, additional mechanistic evidence is presented for better understanding of the glycosylation reaction, trying to identify the variables mainly depending on protecting and leaving groups, as well as catalyst and reaction condition which altogether directs the anomeric stereo control. A chapter on the glycoside hydrolysis is included in view of the increasing interest in the use of biomass as a natural and renewable source for obtaining important intermediates or products used in food or valuable materials. The author includes information in the characterization of glycosides section with the aim of giving additional tools for the structural assignment through NMR, X-Ray and mass spectra techniques.

The Jenner International Glycoimmunology Meetings have charted the rapid development of glycobiology within the field of inflammation. In less than a decade, the science has grown from basically being involved in carbohydrate analysis to the understanding of how sugars are associated with inflammation and how they have potential as anti-inflammatory therapeutics. The 4th Jenner International Glycoimmunology Meeting was recently held in Loutraki, Greece, and set the scene for what promises to be an exciting future for the specialty. Discussion reflected the rapid advances glycobiology is making and ranged from the basic biochemistry of carbohydrate physiology to therapeutic trials utilizing synthetic sugars designed to block inflammatory responses. The meeting is summarized in considerable detail in this book which will provide the interested scientist and clinician with the essential up-to-date facts within the field of glyco immunology. Acknowledgments Many people have been involved in ensuring the success of the Jenner Glycoimmunology Meetings but none more so than my secretary Susan Henderson who has borne the brunt of all four meetings and is currently preparing for the 5th.

Proceedings of the Interior Symposium on Glycoconjugates

Preface [zu: Glycopeptides and Glycoproteins

Essentials of Glycobiology

Glycobiophysics

Synthesis of Glycoproteins and Glycopeptide Mimetics

The student of biological science in his final years as an undergraduate and his first years as a graduate is expected to gain some familiarity with current research at the frontiers of his discipline. New research work is published in a perplexing diversity of publications and is inevitably concerned with the minutiae of the subject. The sheer number of research journals and papers also causes confusion and difficulties of assimilation. Review articles usually presuppose a background knowledge of the field and are inevitably rather restricted in scope. There is thus a need for short but authoritative introductions to those areas of modern biological research which are either not dealt with in standard introductory textbooks or are not dealt with in sufficient detail to enable the student to go on from them to read scholarly reviews with profit. This series of books is designed to satisfy this need. The authors have been asked to produce a brief outline of their subject assuming that their readers will have read and remembered much of a standard introductory textbook of biology. This outline then sets out to provide by building on this basis, the conceptual framework within which modern research work is progressing and aims to give the reader an indication of the problems, both conceptual and practical, which must be overcome if progress is to be maintained.

Protein Glycosylation provides clear, up-to-date, and integrated coverage of key topics in this field. Particular emphasis is placed on the biosynthetic pathways that result in a wide variety of identified protein-bound oligosaccharides. Protein Glycosylation begins with an overview of the chemical structures of mono- and oligosaccharides, to provide a scientific basis for the later chapters. The book includes discussions on the purification, function, and enzyme kinetics of selected glycosidases and glycotransferases, as well as a review of the roles of oligosaccharides in glycoprotein function and the *in vivo* role of glycoproteins themselves. Finally, the *in vitro* synthesis of glycoproteins is presented, together with future directions in glycobiology. Protein Glycosylation serves as an excellent text for upper-level undergraduate and graduate students as well as a reference for those scientists whose training is not in glycobiology but who are moving into this field.

The structural complexity and the synthetic challenges facing glycans have historically hampered efforts to study their multifaceted roles and the application of carbohydrates in drug development. However, in very recent years, new synthetic techniques flanked by the growing knowledge about carbohydrate involvement in physiological and pathological states has spurred renewed interest in the chemistry, biology and therapeutic potentialities of carbohydrates. This book offers an overview of key aspects of carbohydrate biology and chemistry that are fundamental for the design of novel therapeutics. The four-part structure of this book introduces these essential components to life, starting from their structure and biological roles and covering analytical methods and synthesis which pave the way for the development of a wide range of therapeutic applications.Leadng experts from around the world are brought together to offer their recent research with the ultimate aim of enlightening the reader on the complex yet exciting field of carbohydrate chemistry. Academic and industrial researchers in structural biology, drug discovery and carbohydrate chemistry will find this book an essential guide to the latest research and future potential of medicinal chemistry.

Although the process of understanding the biological functions of carbohydrates has developed slowly due to the lack of efficient approaches in obtaining and studying these structures, in the past two decades, remarkable advances have been made in chemical and chemoenzymatic synthesis of carbohydrates and glycoconjugates. The material presented in this volume shows how a better understanding of the structure and the function of carbohydrate-containing bacterial cell wall has revealed that carbohydrate-containing molecules and carbohydrate-like structures are useful as carbohydrate-based anti-microbial vaccines, anti-viral drugs, anti-coagulants, anti-cancer drugs, and potential anti-cancer vaccines. In addition, the text explores the important roles that novel glycolipids have been found to play in the immune system. Metabolic engineering has demonstrated itself as an efficient approach to probe and manipulate biological functions of carbohydrates both *in vitro* and *in vivo*. Automated glycan analysis, carbohydrate microarrays, and novel high-throughput screening methods have hastened the analysis and the understanding of carbohydrate-containing structures. Polypeptide-based glycopolymers have been developed for the study of multivalent binding events of carbohydrates and proteins. This text presents examples of these recent developments in using chemical techniques and tools to study glycobiology. This is an excellent reference book for upper-division undergraduate students, graduate students, and researchers who are interested in carbohydrate-related medicinal chemistry, organic chemistry, biology, and chemical biology.

Complex Carbohydrates of Nervous Tissue

The Biology of Glycoproteins

Carbohydrate Chemistry: State Of The Art And Challenges For Drug Development - An Overview On Structure, Biological Roles, Synthetic Methods And Application As Therapeutics

Concepts and Techniques in Genomics and Proteomics

Glycoprotein I

Chemical Glycology, Volume 597, the latest release in the Methods in Enzymology series, continues the legacy of this premier serial with quality chapters authored by leaders in the field. This volume, the first on chemical glycobiology, contains comprehensive chapters on the Discovery of New Glycosidases from Metagenomic Libraries, Structure-guided directed evolution of glycosidases: A case study in engineering a blood group antigen-cleaving enzyme, A Pipeline for Studying and Engineering Single-Subunit Oligosaccharyltransferases, Directed evolution of glycopeptides using mRNA display, Chemoenzymatic Synthesis and Applications of Prokaryote-Specific UDP-Sugars, and Biosynthesis of Leguminamic Acid and its Incorporation into Glycoconjugates. Readers will find the latest information on this developing area of research, as reported by leaders in the field. Presents an updated volume in this regular series Covers research on chemical glycobiology

The aim of the book is to provide a succinct overview of the current state of glycoscience from both basic biological and medical points of view and to propose future directions, in order to facilitate further integrations of glycoscience with other fields in biological and medical studies. Glycans (carbohydrate oligomers) are the so-called "building blocks" of carbohydrates, nucleic acids, proteins and lipids and play major roles in many biological phenomena as well as in various pathophysiological processes. However, this area of glycoscience has been neglected from the research community because glycan structures are very complex and functionally diverse and as compared to proteins and nucleic acids simple tools for the amplification, sequencing and auto-synthesis of glycans are not available. Many scientists in other fields of research have now realized that glycosylation, i.e. the addition of glycans to a protein backbone, is the most abundant post translational modification reactions and is an important field of research and sometimes they require a glycobiology and/or glycochemistry approach to be used. It is still difficult, however, for non-expert researchers to use these techniques. This book will provide numerous but simple overviews of current topics and protocols for the experiments. The book is aimed at university students and above, including non-experts in the field of glycoscience.

Membrane Glycoproteins: A Review of Structure and Function deals with membrane glycoproteins found in biological systems. The book describes the structure and biosynthesis of the glycoproteins in relation to known or postulated functions in membranes. The text opens with an introduction and a topic on detection and distribution of membrane glycoproteins. The book then notes that the isolation of membrane glycoproteins brought by the progress in research and technology of membrane solubilization and purification of the soluble components is now possible. Discussion is also directed to glycoproteins as being integral components of intracellular membranes, and not just located on cell surfaces. Through the structural analysis of glycoproteins produced by the secretory glands, analysis of human blood group antigens is available. Likewise, discoveries are made, explaining that lectins are useful reagents in detecting the type and numbers of glycoproteins found on cellular members. Lectins are likewise being widely used in tests for carbohydrate-containing substances in membrane-mediated processes. The metabolism, growth control, and cell surface reactions of membrane glycoproteins are also explained. The book can serve as a guide for biologists, chemists, biochemists, and academicians interested in the study of membranes or glycoproteins.

The past two decades have seen an expansion of interest in glycoproteins. From being a borderline area between carbohydrate and protein chemistry, it has become relevant to a wide range of biological phenomena. The aim of the book is to describe techniques which can be used to answer some of the basic questions about glycosylated proteins. Methods are discussed for isolation; compositional analysis; structure carbohydrate units; protein-carbohydrate linkages, keeping in mind the diverse nature of problems which readers may have to tackle.

Monolithic Materials

Synthesis of Glycosylated Amino Acids

The Protein Composition, Structure, and Function

Strategies and Applications

Glycoprotein and Proteoglycan Techniques

Glycans play a vital role in modulating protein structure and function from involvement in protein folding, solubility and stability to regulation of tissue distribution, recognition specificity, and biological activity. They can act as both positive and negative regulators of protein function, providing an additional level of control with respect to genetic and environmental conditions. Due to the complexity of glycosylated protein forms, elucidating structural and functional information has been challenging task for researchers but recent development of chemical biology-based tools and techniques is bridging these knowledge gaps. This book provides a thorough review of the current state of glycoprotein chemical biology, describing the development and application of glycoprotein and glycan synthesis technologies for understanding and manipulating protein glycosylation.

To exploit the full potential of this diverse compound class for the development of novel active substances, this handbook presents the latest knowledge on carbohydrate chemistry and biochemistry. While it is unique in covering the entire field, particular emphasis is placed on carbohydrates with pharmaceutical potential. Topics include the following: > Chemical Synthesis of Carbohydrates > Carbohydrate Biosynthesis and Metabolism > Carbohydrate Analysis > Cellular Functions of Carbohydrates > Development of Carbohydrate-based Drugs A premier resource for carbohydrate chemists and drug developers, this comprehensive two-volume work contains contributions by more than 50 of the world's leading carbohydrate chemists.

Although glycoproteins and proteoglycans have been a subject of research for many years, it is only during the last five or so years that they have aroused the interest of a very broad cross section of investigators in the biological sciences. The reason for this expanded interest in these molecules is simple: not only are glycoproteins and proteoglycans ubiquitous, but many are molecules with well-defined and important biological functions. The list of molecules that fall into this category grows daily: interferon, immunoglobulins, certain hormones, many cell surface receptors, and viral coat proteins are but a few examples. Thus, investigators with interests as diverse as viral replication, cell-cell interactions, poly isoprenoid synthesis, secretory processes, hormone responses, embryonic development, and immunology have become concerned with glycoproteins and proteoglycans. The objective of this book is to summarize the current state of knowledge on the biochemistry of these molecules. Coverage is by no means encyclopedic; rather the thrust is to emphasize the recent advances. The first chapter deals primarily with structural work on the oligosaccharide chains of glycoproteins, but it will be apparent in it and in the succeeding two chapters on biosynthesis that not only do structural studies aid biosynthetic investigations, but that studies on biosynthesis often play a major role in elucidation of structure.

The Glycoconjugates: Mammalian Glycoproteins, Glycolipids, and Proteoglycans Volume II is a collaboration of different experts in the field of molecular biology on the subject of glycoconjugates. The text of the second volume covers topics such as the structure and biosynthesis of connective tissue proteoglycans, glycoproteins, and glycolipids; and glycoprotein and glycolipid catabolism and degradation. It also discusses the structure, composition, and isolation of surface membranes; and lectins – its immunological aspects and its use in the study of mammalian glycoprotein. The book is recommended for molecular biologists, organic chemists, and biochemists who would like to know more about glycolipids and glycoproteins and their applications.

Biology and Chemistry of Eukaryotic Cell Surfaces

Glycochemical Synthesis

I

Glycoproteins II

Preparation, Properties and Applications

This book reviews the applications of glycolibotechnology, it offers an authoritative discussion about future directions of glycoengineering, and it provides a comprehensive overview about the current and emerging approaches to identify, quantify and characterize glycosylated proteins. Divided into 14 chapters, the book outlines recombinant glycoprotein expression in mammalian cells, insect cells, yeast, and bacterial systems. It covers the chemical and enzymatic syntheses of glycans and glycoconjugates, and addresses the impact of glycosylation on protein function for the development of biologicals including vaccines. In the final chapters of the book, readers will discover more about the state-of-the-art in glycomics, glycoproteomics and glycan array technologies.

Glycoconjugate Research, Volume II contains the proceedings of the Fourth International Symposium on Glycoconjugates held in Woods Hole, Massachusetts in 1977. The papers explore the biosynthesis and regulation of glycoconjugates, particularly those of cell membranes, and glycolipid storage diseases. This volume is comprised of 95 chapters divided into three sections. After reviewing the regulatory mechanisms underlying glycoprotein synthesis, it turns to enzymic modifications of sialic acids in the course of glycoconjugate biosynthesis. The following chapters focus on the biosynthesis and characterization of lipid-linked sugars in the outer membrane of liver mitochondria; effect of bacitracin on the biosynthesis of dolichol derivatives in calf pancreas microsomes; secretion of proteoglycans by chondrocytes; and heterogeneity of arterial proteoglycans. The biosynthesis of elastin by chondroblasts in monolayer cultures is also considered, along with the phosphorylation of proteoglycans in human articular cartilage. The final chapter describes a double-antibody radioimmunoassay for soluble and cell-surface blood group II antigens. This book will be a useful resource for biochemists.

Part II of this excellent work covers proteoglycans and mucins and deals with many more examples of glycoprotein function. It also covers glycoproteins from four more species (slime mold, snails, fish, batracians). The content of the volume is very comprehensive in that most contributors are focussed on discussing, in depth, the wealth of most recent advances in their field, referring to previous reviews of older work for background information. This method effectively produces a very wide subject coverage in a smaller number of chapters/volumes.

The volume is an important information source for all glycolibologist researchers (senior investigators, post-doctoral fellows and graduate students), and as a good, comprehensive, reference text for scientists working in the life sciences.

This book presents state of the art biophysical approaches to issues in glycobiology that have cutting-edge applications. Despite the importance of glycosylation, the complexity, heterogeneity, and flexibility of the glycans have inhibited their study. Each chapter in this book explains very recent significant advances in biophysical approaches through the use of techniques such as NMR spectroscopy, mass spectrometry, single-molecule imaging, X-ray crystallography, high-speed atomic force microscopy, and computational simulation and their integrative application. Concrete examples are provided of the value of these techniques in addressing key problems in the field. In addition, significant functional glycobiological issues are considered. For example, glycolipids can form dynamic clusters on cell membranes and provide platforms for molecules involved in cell recognition and subsequent signal transduction. The detailed delineation of these molecular systems is discussed, revealing their structural complexity and ability to assemble transiently. This timely book will be of value for graduate students and postdocs interested in frontier topics in glycoscience and also for senior bio-researchers in academic and industrial fields.

Carbohydrate-based Drug Discovery

Guide to Techniques in Glycobiology

Chemoenzymatic Synthesis of Homogeneous Glycopeptides and Glycoproteins for Functional Studies

Chemical Biology of Glycoproteins

Towards Synthesis of Glycopeptides/Glycoproteins Via Serine/Threonine Ligation

Part I covers modern advances in the determination of glycoprotein structure and in the biosynthesis of mammalian, bacterial, yeast, plant and insect glycoproteins. There are also two chapters on functional aspects (glycoprotein hormones andcollagens). The content of the volume is very comprehensive in that, mostcontributors have focussed on discussing, in depth, the wealthof most recent advances in their field, and referring to previousreviews of older work for background information. This method caneffectively produce a very wide subject coverage in a smaller number of chapters/volumes. The volume is an importantinformation source for all glycolibologist researchers (seniorinvestigators, post-doctoral fellows and graduate students), andas a good, comprehensive, reference text for scientists working inthe life sciences.

Presents state-of-the-art methods for the synthesis, analysis, and conformational investigation of glycoproteins and glycopeptides. Discusses the history of glycoprotein synthesis, therapeutic applications, and the future of research.

Findings and structural studies on glycoproteins are hampered by lack of homogeneous structures due to the inherent structural heterogeneity in the pendant glycans which makes separation by routine chromatographic techniques extremely difficult. To address this problem, we used a chemoenzymatic method to make homogeneous glycopeptides and glycoproteins, which relies on the glycosynthase-based transglycosylation of a GlcNAc-peptide/protein using synthetic glycan oxazoline as the enzyme substrate. The thesis research presented here consists of three projects.

The Proteins: Composition, Structure, and Function, Second Edition, Volume IV covers the significant developments in understanding the relationships between the composition, structure, and function of proteins. This three-chapter volume deals first with the genetic determination of protein structure and with the effects of mutational alteration on the structure and function of proteins. A highly relevant aspect of this topic is the change in protein structure during evolution and cell development. The second chapter describes the basic structure of several glycoproteins, such as orosomucoid, egg albumin, and submaxillary gland glycoprotein. The third chapter highlights the features of composition and arrangement of the group protein, which impart the capacity to perform their physical function. This book is of value to organic chemists, biochemists, and researchers in the protein-related fields.

Synthesis, Structure, and Application

Protein Glycosylation

Glycoproteins

Glycopeptides and Glycoproteins

Glycoimmunology 2

Presented in this thesis is work on developing an *in vitro* chemo-enzymatic methodology for the specific construction of glycopeptides and glycoproteins of known sequence, thus providing a route to investigate the importance of displayed oligosaccharides in cellular and molecular communication. Studies of the dependence of subtilisin stability in organic solvents on the buffer counterion are presented. The synthesis and subsequent use of the known slow-binding inhibitor Boc-Ala-Val-Phe-trifluoroketone to determine the effect organic solvents have on the hydrogen bonding in the active site of subtilisin are also discussed. The use of subtilisin in the ligation of glycopeptides is explored. A systematic study is presented in which the permissiveness of subtilisin toward the glycosyl moiety in the enzyme subsites is investigated. In addition a cleavable linker is synthesized and used which provides a direct route via solid-phase to produce a peptide ester suitable for subtilisin ligation. The heterogeneous glycoprotein RNase B as a model compound, several novel glycoforms were synthesized enzymatically. This was done by first removing the glycan except for the inner-most GlcNAc to give a homogeneous starting material. Then glycosyltransferases were used to build the unique N-linked glycan moiety. In addition the RNase derivative containing only a single GlcNAc could be proteolyzed at the known site to give peptide S and GlcNAc-protein S. These could be religated under thermodynamic conditions to form the full GlcNAc-RNase. The new methodology was used to incorporate a heavy metal labeled sialic acid into a new RNase glycoform. Heavy atom doping is often used to help elucidate difficult structures and there is very little information of the structure of glycan portions of many important glycoproteins.

Sugar chains (glycans) are often attached to proteins and lipids and have multiple roles in the organization and function of all organisms. "Essentials of Glycobiology" describes their biogenesis and function and offers a useful gateway to the understanding of glycans.

Part I covers modern advances in the determination of glycoprotein structure and in the biosynthesis of mammalian, bacterial, yeast, plant and insect glycoproteins. There are also two chapters on functional aspects (glycoprotein hormones and collagens). The content of the volume is very comprehensive in that, most contributors have focussed on discussing, in depth, the wealth of most recent advances in their field, and referring to previous reviews of older work for background information. This method can effectively produce a very wide subject coverage in a smaller number of chapters/volumes. The volume is an important information source for all glycolibologist researchers (senior investigators, post-doctoral fellows and graduate students), and as a good, comprehensive, reference text for scientists working in the life sciences.

For many years studies of the structure and biosynthesis of saccharides formed a specialised and somewhat abstruse part of biochemistry, with little or no place in molecular biology. In recent years this has changed profoundly, as has the character of much of carbohydrate biochemistry. Saccharides are now seen as generally possessing specific structures, which are potentially informational-though there is little firm evidence, as yet, as to the nature and expression of this information. Biosynthetic studies, especially upon glyco proteins, have provided major new insights into the ways by which specific sugar sequences can be assembled and the relationship of this to membranes and membrane flow. While the study of polysaccharide biosynthesis has developed more slowly, its future progress will be profoundly affected by the new knowledge of glycoproteins and this, in turn, will have major implications in the understanding of biological matrices and microenvironments. With this rapid growth and change, ever more scientists - of increasingly diverse backgrounds - are needing to understand something of carbohydrate biochemistry. This book is directed towards them, not with the intention that it should compete with existing text books, or simply be an elementary introduction, but with the intent that it should provide a bridge between the rather disparate and diverging lines of development in the subject and to bring out the important principles of saccharide assembly that are emerging.

The Biosynthesis of Polysaccharides

Solid-phase Assembly of T-cell Immunogenic Glycopeptides and Fragments from HIV Gp120

Synthesis and Characterization of Glycosides

Mammalian Glycoproteins and Glycolipids and Proteoglycans

Their Composition, Structure and Function

During the past decade, monolithic materials in the shape of discs, stacked layers, rolled sheets, sponges, irregular chunks, tubes, and cylinders have all been successfully demonstrated. These formats were prepared from a wide variety of materials including natural polymers such as cellulose, synthetic polymers that involved porous styrene-, methacrylate-, and acrylamide-based polymers, and inorganic materials, mainly silica. Each approach is interesting from the point of view of both preparation and application. Although the current papers and patents concerned with monolithic separation media are quite numerous, the information is scattered throughout a vast number of journals. This book therefore fills the gap in the market for a comprehensive reference book on this subject. Monolithic materials concerns all of the current formats of monolithic materials and provides an integrated view of this novel format of separation media. Since the flow pattern in monolithic devices is different from that in packed beds, the hydrodynamics of the system and mass transport differ considerably from those derived for packed columns. Therefore, this book presents contributions concerned with both flow and mass transfer in the monolithic materials. A significant proportion of the book is devoted to the applications of monolithic materials. It also provides the reader with valuable information about the sources of the specific materials, their properties, and potential applications. - Monolithic materials are currently very popular within several scientific areas such as chromatography, optics, catalysis, diagnostics, genomics, proteomics, and microfluidics. - Provides valuable information about the sources of the specific materials, their properties, and potential applications. - Chapters written by leading experts in the area.

The critically acclaimed laboratory standard, Methods in Enzymology, is one of the most highly respected publications in the field of biochemistry. Since 1955, each volume has been eagerly awaited, frequently consulted, and praised by researchers and reviewers alike. The series contains much material still relevant today--truly an essential publication for researchers in all fields of life sciences. Key Features * Detailed procedures newly written for this volume * Extensive practical information * Rationale and strategies for carbohydrate chain analysis Among the topics covered: * Release of Oligosaccharides from Glycoproteins by Hydranzolysis * Mass Spectrometry of Carbohydrate-Containing Biopolymers * High-resolution Polyacrylamide Gel Electrophoresis of Fluorophore-Labeled Reducing Saccharides * Capillary Electrophoresis of Oligosaccharides * Synthesis and Uses of Azido-Substituted Nucleoside Diphosphate Sugar Photoaffinity Analogs * Structural Analysis of Glycosylphosphatidylinositol Anchors * Identification of Polysialic Acids in Glycoconjugates

This dissertation, "Towards synthesis of glycopeptides/glycoproteins via serine/threonine ligation" by Ci, Xu, 许群, was obtained from The University of Hong Kong (Pokfulam, Hong Kong) and is being sold pursuant to Creative Commons: Attribution 3.0 Hong Kong License. The content of this dissertation has not been altered in any way. We have altered the formatting in order to facilitate the ease of printing and reading of the dissertation. All rights not granted by the above license are retained by the author. Abstract: Glycoproteins are proteins that are post-translationally modified with oligosaccharides. Due to the non-template-mediated biosynthesis of glycoproteins in the nature, glycoproteins always exist as heterogeneous mixtures with different glycan structures. In order to obtain the homogeneous glycoproteins with the well-defined glycan structures for an extensive investigation of the relationship between the structure and function of glycoproteins, synthetic strategies including chemical and chemoenzymatic synthesis have been employed and achieved great success over the past years. Among these approaches, our research group has developed a novel serine/threonine ligation (STL), which involves a chemoselective ligation between a peptide with a salicylaldehyde (SAL) ester at the C-terminus and an N-terminal serine or threonine of another peptide to generate the natural Xxx-Ser/Thr linkage (Xxx represents any amino acid) at the conjugation site. STL provides more possibilities for the synthesis of protein/glycoprotein synthesis. My research has been focused on the synthesis of MUC1 glycopeptides. MUC1 is a transmembrane glycoprotein expressed on the apical surface of most normal epithelial cells at low levels but highly overexpressed on the entire membrane of human epithelial tumor cells. In the extracellular part, MUC1 contains a variable number of tandem repeat (VNTR) units which consist of twenty amino acids with five potential O-glycosylation sites. As MUC1 has been shown as promising target for the production of immunostimulating antigens, a variety of chemical assembly strategies have been applied for the development of MUC1 glycopeptide-based anticancer vaccines with high immunogenicity and tumor selectivity, including the construction of multivalent dendrimers presenting tumor-associated MUC1 glycopeptide antigens and the incorporation of various immunoadjuvants. In my studies, I have successfully synthesized the large MUC1 VNTR glycopeptides (40-mer and 80-mer sections) possessing tumor-associated Tn antigens via one and three consecutive STL reactions. On the other hand, the cyclic MUC1 glycopeptide-BSA conjugates has been successfully constructed. We are yet to test the immunological properties of synthetic MUC1 glycopeptide oligomers and MUC1-based glycoconjugates as anticancer vaccine candidates. In addition, inspired by STL, I have developed an aspartic acid ligation, in which a C-terminal peptide-SAL ester chemoselectively reacts with an N-terminal diol group of another peptide under the same conditions as STL to form a six-membered N, O-benzylidene acetal linked intermediate. Followed by treatment with acidsand selectiveoxidation, the natural Xxx-Asp linkage(Xxx represents any amino acid) is chemoselectively generated at the conjugation site. This STL-based aspartic acid ligation has been applied in the synthesis of a series of cyclic and linear peptides. Subjects: Glycopeptides - Synthesis Glycoproteins - Synthesis

Their structure, biosynthesis, and mode of action are summarized in the 7th chapter. The last chapter covers current methods for the determination of high-resolution structures of glycopeptides and glycoproteins mainly based onNMRspectroscopy, X-raycrystallography,and molecular modeling. The Biochemistry of Glycoproteins and Proteoglycans Advances in Glycobiotechnology Synthesis, Structure, and Application] Chemical Glycobiology Glycoscience: Biology and Medicine