Bacterial Membranes Structural And Molecular Biology

Physical Microbiology

Protein targeting is a fast-moving field that has encompassed areas from biophysics to molecular biology to try to gain insight into how proteins are directed to their final functional location and how such macromolecules are able to cross semi-permeable membrane barriers during their journey. This text reviews our current state of knowledge regarding the interaction of proteins at the membrane interface and the assembly of proteins into biological membranes, before proceeding to look at targeting pathways in both prokaryotic and eukaryotic systems. The reviews have been written by some of the leading researchers in the field, with contributions from around the world and with more than 1,800 references. The text is aimed at graduate students and at researchers with an interest in protein targeting, but may also be of use to final-year undergraduates. Originally published in 1999. The Princeton Legacy Library uses the latest print-on-demand technology to again make available previously out-of-print books from the distinguished backlist of Princeton University Press. These editions preserve the original texts of these important books while presenting them in durable paperback and hardcover editions. The goal of the Princeton Legacy Library is to vastly increase access to the rich scholarly heritage found in the thousands of books published by Princeton University Press since its founding in 1905.

Protein Secretion Pathways in Bacteria

This book has information about prokaryotes, prokaryotes are single-celled organisms that are the earliest and most primitive forms of life on earth. As organized in the Three Domain System, prokaryotes include bacteria and archaeans. Some prokaryotes, such as cyanobacteria, are photosynthetic organisms and are capable of photosynthesis. There are sections in this book that explain the role of membranes in transport, about bioenergetics of bacteria cells, Mycoplasma, immunology of bacteria membrane and receptors.

Membrane Biogenesis

Structural Biology of Membrane examines various methods to assess membrane structure, so as to understand the bacterial membrane dynamics. The book has been divided into six different sections explaining the entire biological membrane systematically. The first section is focused upon methods to assess membrane structure and content followed by the second section discussing about bacterial membrane dynamics which highlights permeability of CO2 through membranes. Provides the reader with an insight into the factors helping in regulating lysosomal membrane potential. Various effects of tumor membrane bound molecules on immune detection have also been discussed to draw reader's attention towards the clinical and diagnostic applications of membrane dynamics.

Protein Export and Membrane Biogenesis

This textbook provides a strong foundation and a clear overview for students of membrane biology and an invaluable synthesis of cutting-edge research for working scientists. The text retains its clear and engaging style, providing a solid background in membrane biochemistry, while also incorporating the approaches of biophysics, genetics and cell biology to investigations of membrane structure, function and biogenesis to provide a unique overview of this fast-moving field. A wealth of new high resolution structures of membrane proteins are presented, including the Na/K pump and a receptor-G protein complex, offering exciting insights into how they function. All key tools of current membrane research are described, including detergents and model systems, bioinformatics, protein-folding methodology, crystallography and diffraction, and molecular modeling. This comprehensive and up-to-date text, emphasising the correlations between membrane research and human health, provides a solid foundation for all those working in this field.

Physiology of the Bacterial Cell

Cell Membranes offers a solid foundation for understanding the structure and function of biological membranes. The book explores the composition and dynamics of cell membranes discussing the molecular and biological diversity of its lipid and protein components and how the combinatorial richness of both components explains the chemical, mechanical,

Molecular Biology of Membranes

In 1968 when Cell Walls and Membranes was published it was still reasonable to attempt to write a book covering the whole subject. Accordingly this edition of the book had something to say about walls from micro-organisms and plants as well as about membranes from bacteria and animal cells. A decade later this is manifestly impossible. Knowledge about almost all the subjects has grown explosively, par ticularly about membranes and the biosynthesis of macromolecules. Moreover aspects of the subject that were still in a relatively primitive state ten years ago have grown into highly sophisticated subjects worthy of extended treatment. The result is that the present book has had to be confined to structures and functions relating to only one division of the biological kingdom, namely micro-organisms. Even then severe limitations have had to be made to keep the task within the time available to the authors and their expertise. A few of the titles of chapters such as those on the isolation of walls and membranes, the structure of the components of bacterial and micro-fungal walls and their biosynthesis remain from the earlier book. These chapters have been almost completely rewritten and a number of quite new chapters

added on topics such as the action of the antibiotics that inhibit bacterial wall syn thesis, on the function of bacterial membranes, and the bacterial autolysins.

Membrane Protein Crystallization

It is a common statement that because of its simplicity the bacterial cell makes an ideal model for the study of a wide variety of biological systems and phenomena. While no-one would dispute that much of our under standing of biological function derives from the study of the humble bacterium, the concept of a simple life-form would be hotly disputed by any scientist engaged in the determination of the relationship between structure and function within the bacterial cell. Bacteria are particularly amenable to intensive study; their physiology can be probed with powerful biochemical, genetical and immunological techniques. Each piece of information obtained inevitably raises as many questions as answers, and can lead to a highly confused picture being presented to the lay reader. Nowhere is this more evident than in the study of the surface layers of the bacterial cell. Examination of the early electron micrographs suggested that the bacterial cytoplasm was surrounded by some sort of semi-rigid layer, possessing sufficient intrinsic strength to protect the organism from osmotic lysis. The belief that the surface layers were rather passive led to their neglect, while researchers concentrated on the superficially more exciting cytoplasmic components. Over the last twenty years our view of the bacterial envelope has undergone extensive revision, revealing a structure of enormous complexity.

The Biophysics of Cell Membranes

There are currently a growing number of laboratories actively studying the mechanism by which various biological membranes are assembled. This area of research is still relatively new to biochemists and molecular biologists, but in view of the rapid progress being made, a review of the field at this time is justified. The present volume focuses on the biogenesis of three related membranes. Mitochondria and chloroplasts are semiautonomous organelles whose biogenesis is carried out partly in the external cytoplasm and partly by the organelles themselves. Both membranes are principally concerned with the energy metabolism of the cell, and this commonality of function is reflected in a considerable degree of similarity in their ul trastructure and enzymatic composition. Although the bacterial cell membrane is a much more diversified structure, it also fulfills the basic energy requirements of the cell, and depending on the organism, this can take the form of photosynthesis or oxidative phosphorylation. The addi tional consideration that prokaryotic organisms may, in fact, be the evolu tionary ancestors of mitochondria and chloroplasts, makes it all the more compelling that those interested in biogenesis be aware of new develop ments in each of these three areas. In organizing this book, I felt that the contributors should summarize and bring up to date their own research and review the literature only in sofar as would be necessary to provide the proper perspective for their work.

Protein Targeting and Translocation

This volume of Current Topics in Membranes focuses on Membrane Protein Crystallization, beginning with a review of past successes and general trends, then further discussing challenges of mebranes protein crystallization, cell free production of membrane proteins and novel lipids for membrane protein crystallization. This publication also includes tools to enchance membrane protein crystallization, technique advancements, and crystallization strategies used for photosystem I and its complexes, establishing Membrane Protein Crystallization as a needed, practical reference for researchers.

Membrane Structural Biology

In the last few years there have been many exciting and innovative developments in the field of membrane protein structure and this trend is set to continue. Structural Biology of Membrane Proteins is a new monograph covering a wide range of topics with contributions from leading experts in the field. The book is split into three sections: the first discusses topics such as expression, purification and crystallisation; the second covers characterisation techniques and the final section looks at new protein structures. The book will hence have wide appeal to researchers working in and around the field and provide an up-to-date reference source. Introductory sections to each topic are accompanied by more detailed discussions for the more experienced biochemist. Detailed descriptions of experimental methods are included to demonstrate practical approaches to membrane protein structure projects. The book also offers an up-to-date reference source in addition to descriptions of new and emerging developments, including state-of-the-art techniques for solving membrane protein structures. Structural Biology of Membrane Proteins encompasses both basic introductions and detailed descriptions of themes and should appeal to a wide range of biochemical scientists, both experienced and beginner.

Molecular Biology of the Cell

This book provides an up-to-date overview of the architecture and biosynthesis of bacterial and archaeal cell walls, highlighting the evolution-based similarities in, but also the intriguing differences between the cell walls of Gram-negative bacteria, the Firmicutes and Actinobacteria, and the Archaea. The recent major advances in this field, which have brought to light many new structural and functional details, are presented and discussed. Over the past five years, a number of novel systems, e.g. for lipid, porin and lipopolysaccharide biosynthesis have been described. In addition, new structural achievements with periplasmic chaperones have been made, all of which have revealed amazing details on how bacterial cell walls are synthesized. These findings provide an essential basis for future research, e.g. the development of new antibiotics. The book's content is the logical continuation of Volume 84 of SCBI (on Prokaryotic Cytoskeletons), and sets the stage for upcoming volumes on Protein Complexes.

The Structure of Biological Membranes, Third Edition

The Fourth Edition of Microbial Physiology retains the logical, easy-to-follow organization of the previous editions. An introduction to cell structure and synthesis of cell components is provided, followed by detailed discussions of genetics, metabolism, growth, and regulation for anyone wishing to understand the mechanisms underlying cell survival and growth. This comprehensive reference approaches the subject from a modern molecular genetic perspective, incorporating new insights gained from various genome projects.

Bacterial Cell Surfaces

In this present volume, different approaches are detailed to produce membrane proteins, purify them, study their function, determine their structure, and model them in membrane. Since every membrane protein behaves mostly in a unique way /fashion, knowledge of guidelines and tricks may help to increase chances to express, purify and characterize a peculiar membrane protein. Production of correctly folded protein remains a challenge. Moreover, getting a functional and stable protein requires to optimize membrane mimicking environments that can be detergent or artificial membranes. In some cases, the finding of the correct ligand which will stabilize the desired conformation is needed. In other cases, stabilization can be obtained using specific antibodies. This volume also presents different techniques to analyze the functional status of membrane proteins. Written in the highly successful Methods in Molecular Biology series format, chapters in Membrane Protein Structure and Function Characterization: Methods and Protocols provide different techniques to analyze the functional and structural status of membrane proteins. Chapters include introductions to their respective topics, lists of the necessary materials and reagents, step-by-step, readily reproducible laboratory protocols, and tips on troubleshooting and avoiding known pitfalls. Authoritative and practical, Membrane Protein Structure and Function Characterization: Methods and Protocols aims to ensure successful results in the further study of this vital field.

The Cell Membrane

This Methods in Molecular Biology book gathers tools for studying protein structure and function and enzymatic activities, purifying and analyzing of macromolecules and their complexes and investigating regulatory mechanisms and cell biological processes.\"

Cell Boundaries

A selection of 56 papers from a symposium in Breisgan, Germany, in August 1989. Treats the structure and regulation of genes coding for pigment-binding membrane proteins and enzymes for bacteriochlorophyll, carotenoid, and cytochrome synthesis under the control of oxygen and light gradients. Discussions of the composition, structure, organization,

Membrane Protein Structure and Function Characterization

The incentive for putting together Volume 4 of this series was to review the wealth of new information that has become available in prokaryotic organisms in protein export and membrane biogenesis. Just in the last several years, protein translocation has now been efficiently reconstituted using defined components and the mechanism by which proteins are moved across membrane bilayers is now being examined at a higher resolution. In addition, because of a new technical breakthrough using osmolytes, it is now possible to reconstitute a number of channel proteins, ATPase, receptors, and transporters. In many cases, it is possible to successfully predict the membrane topology of these types of proteins using both \"hydrophobicity analysis\" and the \"positive inside\" rule. In this volume, two chapters focus on protein translocation across membranes (Biochemical Analyses of Components Comprising the Protein Translocation Machinery of E. Coli; Protein Translocation Genetics), while several others on how proteins assemble into the ineer membrane of E. Coli (Membrane Protein Assembly; Membrane Insertion of Small Proteins: Evolutionary and Functional Aspects; Pigment-Protein Complex Assembly in Rhodobacter sphaeroides and Rhodobacter Capsulatus). Other sections review recent progress on transporters (Identification and Reconstitution of Anion Exchange Mechanisms in Bacteria; Helic Packing in the C-Terminal Half of Lactose Permease) and signal transduction (Mechanism of Transmembrane Signaling in Osmoregulation) as well as the assembly of prints into the outer membrane (Export and Assembly of Outer Membrane Proteins in E. coli). Although the emphasis of the book is on proteins, the role of phospholipids in controlling various cell surface processes is reviewed (Role of Phospholipids in coli Cell Function). I should point out the reason for the rapid progress in bacteria research is because of the possibility to apply biochemistry and genetics in this organism.

The Bacterial Cell Wall

The bacterial cell wall plays an important role in the interaction between bacteria and their environment. Thus, knowledge of the cell wall structure helps us to understand the biological properties. This volume presents a comprehensive description of all main cell wall components of both gram-negative and -positive bacteria (including mycobacteria) and archaea. Surface components outside of the cell wall, i.e. capsules, S-layers, and appendices (flagellae, fimbriae, pili), are discussed and the genetic background of their chemical structures is elucidated. On the basis of the structural background, the biological properties are explained. Methodological topics are also presented and critically discussed.

Structure and Function of Biological Membranes

This text attempts to introduce the molecular biology of cell membranes to students and professionals of diverse backgrounds. Although several membrane biology books are available, they do not integrate recent knowledge gained using modern molecular tools with more traditional membrane topics. Molecular techniques, such as cDNA cloning and x-ray

diffraction, have provided fresh insights into cell membrane structure and function. The great excitement today, which I attempt to convey in this book, is that molecular details are beginning to merge with physiological responses. In other words, we are beginning to understand precisely how membranes work. This textbook is appropriate for upper-level undergraduate or beginning graduate students. Readers should have previous or concurrent coursework in biochemistry; prior studies in elementary physiology would be helpful. I have found that the presentation of topics in this book is appropriate for students of biology, biochemistry, biophysics and physiology, chemistry, and medicine. This book will be useful in courses focusing on membranes and as a supplementary text in biochemistry courses. Professionals will also find this to be a useful resource book for their personal libraries.

The Bacterial Cell Wall

This volume focuses on the modulation of biological membranes by specific biophysical properties. The readers are introduced to emerging biophysical approaches that mimick specific states (like membrane lipid asymmetry, membrane curvature, lipid flip-flop, lipid phase separation) that are relevant to the functioning of biological membranes. The first chapter describes innovative methods to mimic the prevailing asymmetry in biological membranes by forming asymmetrical membranes made of monolayers with different compositions. One of the chapters illustrates how physical parameters, like curvature and elasticity, can affect and modulate the interactions between lipids and proteins. This volume also describes the sensitivity of certain ion channels to mechanical forces and it presents an analysis of how cell shape is determined by both the cytoskeleton and the lipid domains in the membrane. The last chapter provides evidence that liposomes can be used as a minimal cellular model to reconstitute processes related to the origin of life. Each topic covered in this volume is presented by leading experts in the field who are able to present clear, authoritative and up-to-date reviews. The novelty of the methods proposed and their potential for a deeper molecular description of membrane functioning are particularly relevant experts in the areas of biochemistry, biophysics and cell biology, while also presenting clear and thorough introductions, making the material suitable for students in these fields as well.

Molecular Dynamics in Biological Membranes

Membrane Research: Classic Origins and Current Concepts is a special volume of the International Review of Cytology dedicated to Dr. Danielli on the occasion of his retirement from official duties. The central theme of the volume is membranes. The diversity of topics ranges from the biogenesis of membranes and their components, to the use of optical and lectin probes as a means to study the structure, physiology, and interactions of cell components and organelles in plant and animal systems. The book begins with a study on the cell surface of the mammalian embryo and the events associated with the formation of the differentiated blastocyst. This is followed by separate chapters on the structural associations between the inner and outer bacterial membrane; the interactions of cell wall and membrane in plant cells; the morphological and functional aspects of membranes; and methods for studying the physiology of cell and organelles at the membrane level. Subsequent chapters deal with the synthesis of cellular proteins and glycoproteins; techniques for fixing and preserving the ultrastructure of the membrane; the synthesis of artificial organelles; and the effects of drugs and chemicals on membrane transport utilizing kidney tissue and vesicles. This book provides an outstanding reference source for all scientific researchers and teachers.

Membrane Research: Classic Origins and Current Concepts

Molecular Biology of Membrane-Bound Complexes in Phototrophic Bacteria

Microbial Energy Transduction

The central themes of Cell Boundaries concern the structural and organizational principles underlying cell membranes, and how these principles enable function. By building a biological and biophysical foundation for understanding the organization of lipids in bilayers and the folding, assembly, stability, and function of membrane proteins, the book aims to broaden the knowledge of bioscience students to include the basic physics and physical chemistry that inform us about membranes. In doing so, it is hoped that physics students will find familiar territory that will lead them to an interest in biology. Our progress toward understanding membranes and membrane proteins depends strongly upon the concerted use of both biology and physics. It is important for students to know not only what we know, but how we have come to know it, so Cell Boundaries endeavours to bring out the history behind the central discoveries, especially in the early chapters, where the foundation is laid for later chapters. Science is far more interesting if, as students, we can appreciate and share in the adventures—and misadventures—of discovering new scientific knowledge. Cell Boundaries was written with advanced undergraduates and beginning graduate students in the biological and physical sciences in mind, though this textbook will likely have appeal to researchers and other academics as well. Highlights the history of important central discoveries Early chapters lay the foundation for later chapters to build on, so knowledge is amassed High-quality line diagrams illustrate key concepts and illuminate molecular mechanisms Box features and spreads expand on topics in main text, including histories of discoveries, special techniques, and applications

Techniques for the Analysis of Membrane Proteins

Crystalline surface layers (S-layers) represent an almost universal feature of archaebacterial cell envelopes and can be found in gram-positive and gram-negative eubacterial species from nearly all phylogenetic branches. S-layers consist of a single protein- or glycoprotein species and thus can be considered as one of the most primitive membrane structures developed during evolution. Prokaryotes carrying S-layers are ubiquitously found in every part of the biosphere. This supports the concept of a general supramolecular \"porous crystalline surface layer\" fulfilling a broad spectrum of functions

which are strongly dependent on the particular environmental and ecological conditions. Their structural simplicity makes S-layers a suitable model for analyzing structure-function relationships as well as dynamic aspects of membrane morphogenesis.

Bacterial Membranes and the Respiratory Chain

The most valuable service Dr. Gel'man and her colleagues have performed for the many investigators of bacterial membrane systems in producing their first excellent monograph on \"The Respiratory Apparatus of Bacteria\" in 1966 has been continued and expanded in the preparation of this volume. The au thors have brought together in a single volume much of the detail of investiga tions of bacterial membranes at the ultrastructura11eve1 and the chemical and biochemical organizationa11eve1s. The approach in bringing together this rap idly increasing volume of discovery has been both comprehensive and system atic, with a constant awareness of the importance of the molecular and func tional properties and relationships existing in various bacterial membranes. The monograph naturally reflects the authors' interest and their own inti mate involvement in the elucidation at the molecular level of the respiratory chains organized in the prokaryotic bacterial membrane system. It is entirely appropriate that the chapter devoted to this topic should occupy a substantial proportion of this monograph. Indeed, had this volume been prepared at this very moment, that proportion would have been even greater, as the work in .

Microbial Physiology

A preface should justify the existence of the book it precedes and this is invariably done in scientific texts by reference to the explosive growth of the field since the last such volume appeared. In molecular biology, most fields can be justifiably described as growing explosively, as should be the case for a young and vigorous science, but the study of membrane proteins stands out as one which has taken giant strides in the last few years. Ignorance of the structure and function of membrane proteins at the molecular level was certainly not due to lack of interest but rather was a result of lack of appropriate techniques. It has above all been the development of new experimental methods which has wrenched membrane biochemistry out of what Anthony Martonosi fetchingly called its 'romantic phase' (Le. lots of ideas and few facts), into an era when the determination of membrane protein structure and mechanism is a reasonable goal. Membrane proteins are generally classified as peripheral or integral. Peripheral proteins are relatively easily dissociated from membranes by mild treatments whence their study is essentially no different to that of soluble proteins. This book therefore concentrates on integral proteins which are strongly bound to the membrane by hydrophobic interactions with lipids. A crucial step in their study is of necessity the d~velopment of methods of solubilization and purification under non-denaturing conditions.

The Bacterial Cell Surface

Biological membranes provide the fundamental structure of cells and viruses. Because much of what happens in a cell or in a virus occurs on, in, or across biological membranes, the study of membranes has rapidly permeated the fields of biology, pharmaceutical chemistry, and materials science. The Structure of Biological Membranes, Third Edition provides readers with an understanding of membrane structure and function that is rooted in the history of the field and brought to the forefront of current knowledge. The first part of the book focuses on the fundamentals of lipid bilayers and membrane proteins. Three introductory chapters supply those new to the field with the tools and conceptual framework with which to approach the state-of-the-art chapters that follow. The second part of the book presents in-depth analyses of focused subjects within the study of membranes, covering topics that include: Phase behavior of lipid bilayers Lipid bilayers as an isolated structure Cholesterol’s role in cell biology Lateral organization of membranes The role of membrane lipids in initial membrane protein folding Membrane protein synthesis and assembly of oligomeric membrane proteins Membrane protein stability with relationships to function and protein turnover Membrane protein function using a transport protein Interactions between membrane proteins and membrane lipids A final chapter pulls together many of the topics, examining in detail the complexity inherent in the synthesis and assembly of lipids and proteins in mitochondrial membranes. With contributions from leading researchers, this completely revised and updated third edition reflects recent advances in the field of biological membranes. It offers a valuable resource for students, as well as structural biologists, biophysicists, cell biologists, biochemists, and researchers in the pharmaceutical and biotechnology industries. What’s New in This Edition: Three accessible chapters introduce students to the field of biological membranes Completely revised and updated chapters present current topics in membrane research

Bacterial Outer Membranes as Model Systems

Geared to an understanding of how pathogenic bacteria interact with animal tissues, this text examines the structure and function of bacterial outer membranes and uses them as model systems for studying various aspects of cell biology and molecular biology: mechanisms of cell-to-cell interaction, functions of membrane proteins, molecular mechanisms of protein secretion across membranes, and more. Over 60 tables and figures are featured.

Biomembranes

The contents of this book reflect a symposium held in honor of Professor Herman Kalckar's seventy-fifth birthday. His impact on the history of biochemistry is reflected by the diversity of the contributions of his former students and friends. Speakers came from Asia, Europe, and the United States to discuss both procaryotes and eukaryotes. The unifying theme was the cell membrane, both its organization and its function. Ektobiology, a topic that has held the attention of Professor Kalckar for many years, was clearly defined as a central topic in biology. This subject deals with the key structure whereby the cell interacts with the outside world and which, in a sense, defines the boundary between what is the cell and what is not. Topics discussed include the biogenesis of membrane proteins, sugars and lipids, the role of membrane components in osmoregula

tion, and mechanisms of nutrient transport. Of great interest is the system for surface recognition evolved in vertebrates, exemplified by the HLA system of man. Neoplasia causes changes in the cell membrane that may be of significant future potential in the diagnosis and treatment of malignancies as well as in the understanding of the process of transformation. The changes in glycosphingolipids and carbohydrate antigens in relation to oncogenesis are detailed. I should like to recognize Doctors Kurt J. Isselbacher, Phillips W. Robbins, Victor Ginsburg, and Hiroshi Nikaido for their ,assistance in organizing the symposium. Ms. Jean Brumbaugh deserves special thanks for putting this book together.

Textbook of Membrane Biology

Less than a year before this writing, a Nobel Prize was shared by Albert Claude, Christian de Duve, and George Palade, pioneers in the development of modern cell biology, of which membrane biology is an integral part. For many years, a seemingly unbridgeable gap separated the physiologist working at the organ level from the biochemist studying the molecular composition of cell constituents and the chemical reactions that occur in water-soluble extracts of cells. Physiology has a long history, and the disciplines epitomized by intermediary metabolism and molecular biology progressed rapidly during the 1950s and 1960s. Meanwhile, electron micros copists painstakingly mapped the newly discovered intracellular world of membranes, organelles, microtubules, and microfilaments, and other scien tists developed techniques for the quantitative separation and characteriza tion of these intracellular structures. Thus it finally became possible to localize the many enzymes, and the metabolic activities they catalyze, to recognizable structures whose composition and organization can be studied. We are now well on our way to bridging that gap between biochemistry and physiology-to understanding how the cell functions.

Bacterial Cell Walls and Membranes

This book provides an up-to-date overview of the architecture and biosynthesis of bacterial and archaeal cell walls, highlighting the evolution-based similarities in, but also the intriguing differences between the cell walls of Gram-negative bacteria, the Firmicutes and Actinobacteria, and the Archaea. The recent major advances in this field, which have brought to light many new structural and functional details, are presented and discussed. Over the past five years, a number of novel systems, e.g. for lipid, porin and lipopolysaccharide biosynthesis have been described. In addition, new structural achievements with periplasmic chaperones have been made, all of which have revealed amazing details on how bacterial cell walls are synthesized. These findings provide an essential basis for future research, e.g. the development of new antibiotics. The book’s content is the logical continuation of Volume 84 of SCBI (on Prokaryotic Cytoskeletons), and sets the stage for upcoming volumes on Protein Complexes.

Bacterial Cell Walls and Membranes

Structure and Function of Biological Membranes explains the membrane phenomena at the molecular level through the use of biochemical and biophysical approaches. The book is an in-depth study of the structure and function of membranes. It is divided into three main parts. The first part provides an overview of the study of the biological membrane at the molecular level. Part II focuses on the detailed description of the overall molecular organization of membranes. The third part covers the relationship of the molecular organization of membranes to specific membrane functions; discusses catalytic membrane proteins; presents the role of membranes in important cellular functions; and looks at the membrane systems in eukaryotic cells. Biochemists, cell physiologists, biologists, researchers, and graduate and postdoctoral students in the field of biology will find the text a good reference material.

Cell Membranes

This book emerges from the idea that specific physics-inspired approaches are necessary to understand different stage of bacterial physiology and the infections they cause. Many aspects of bacterial life depend on processes typically described by physical laws: The rheology of biofilms is determined by complex cohesive forces. Physical laws of diffusion are essential to all processes of bacterial metabolism. The formation of the numerous bacterial biomacromolecules require complex self-organization processes and their function are powered by potent molecular motors. Host-pathogen interactions during infection frequently occur in environments determined by fluid mechanics. In this book, different chapters represent research at the interface between microbiology and physics. Topics range from intracellular organization to cell-cell interactions. A good part of the book is devoted to mechanical forces, which are involved in the function of elaborate bacterial nanomachines, chromosome segregation, and cell division. The effect of bacterial toxins provides an example of the alteration of cellular membrane properties by bacteria. Symmetrically, histones from mammalian cells alter bacterial membranes as a defense mechanism during infection. The editors of this book, Guillaume Duménil and Sven van Teeffelen, have selected researchers at the forefront of research in physical microbiology to provide the most recent view in this fast-moving field. The contents of this book are designed to be accessible for scientists with training in biology and for scientists with training in physics. The objective is to provide a fresh perspective on microbiology and infection by highlighting recent multidisciplinary research and favor rapid advances at this fruitful interface.

Bacterial Membranes

Membranes are pivotal components of life, acting as formidable insulators that demarcate a living cell; generate energy in the form of ion gradients; transport ions, proteins, nucleic acids, nutrients, and metabolites; and provide transduction systems to sense the environment and to communicate with other cells. Membranes also provide shape and structure to cells and are important in cell motility. In addition, they fulfill a scaffolding function for proteins and organelles that interact with the extracellular environment. Written by specialists in the field, this book provides a comprehensive overview of the structural

and molecular biology of cellular processes that occur at or near bacterial membranes. The book presents and discusses recent progress on the function and involvement of membranes in bacterial physiology, enabling a greater understanding of the molecular details of the cell envelope, its biogenesis, and its function. The topics covered include: cell wall growth * shape and division * the outer membrane of Gram-negative bacteria * outer membrane protein biosynthesis * bacterial lipoproteins * mycobacteria * lipid composition * ABC transporters * transport across the outer membrane * drug passage across membranes * bacterial membrane proteins * secretion systems * signal transduction * signalling mechanisms * bacterial membranes in adhesion and pathogenesis * membranes as a drug target. This cutting-edge text will provide a valuable resource for all those working in this field and is recommended for all microbiology libraries.

Structural Biology of Membrane Proteins

Textbook for upper-division and graduate students in the biological and biochemical sciences introduces the properties of bacteria that have led to their success as colonizers of this planet. The major theme is the analysis of the molecular devices that have led to the ability of bacteria to grow rapidly in a variety of environments, to adapt quickly to changes in their surroundings, to withstand starvation and exposure to toxic agents, and to compete successfully with other organisms. Annotation copyrighted by Book News, Inc., Portland, OR

Crystalline Bacterial Cell Surface Layers

This detailed volume explores methods currently used to investigate the cell wall of various bacterial species and pathogens. By using a combination of genetic, molecular, biochemical, and cytological techniques, the protocols address many fundamental questions involving the composition, biosynthesis, and regulation of bacterial peptidoglycan. Written for the highly successful Methods in Molecular Biology series, chapters include introductions to their respective topics, lists of the necessary materials and reagents, step-by-step and readily reproducible laboratory protocols, as well as tips for troubleshooting and avoiding known pitfalls. Authoritative and practical, The Bacterial Cell Wall: Methods and Protocols provides current and future researchers with a compilation of many of the most important and useful procedures in a single resource.

Structural Biology of Membranes

There is something fascinating about science. One gets such wholesale returns of conjecture out of such a trifling investment of fact. Mark Twain The recent explosion in ou. r knowledge of basis physiologic processes, molecular biology, and genetic regulatory mech\u00ad anisms has resulted, in large measure, from a single concep\u00ad tual advance: the realization that, at the molecular level, evolutionarily divergent organisms are more similar than different. Thus, in Escherichia coli and Homo sapiens, the enzymatic pathways for the utilization of galactose and glu\u00ad cose are the same, although more than a single sequence of enzymatic reactions can lead to the utilization of either sugar. Also, extensive studies have revealed the essential of the genetic code, the mechanism of decxy\u00ad universality ribonucleic acid (DNA) repli~ation, and the processes by which genetic information is transcribed to ribonucleic acid (RNA) and RNA is translated into protein. A detailed com\u00ad parative examination of anyone area of biologic interest, of course, reveals differences among phylogenetically distinct organisms. In prokaryotic organisms protein synthesis is initiated with N-formyl methionyl-transfer RNA (tRNA), whereas methionyl tRNA serves this function in the cyto\u00ad plasm of the eukaryote. Mechanistic differences may have evolved to accommodate the differing degrees of com\u00ad plexity of cellular construction or to coordinate functions of differentiated cells in a multicellular organism. Yet, we must realize that the basic, life-endowing molecular pro\u00ad cesses had to exist prior to extensive evolutionary diverg\u00ad ence-before the appearance of two distinct cell types.

Organization of Prokaryotic Cell Membranes

1: The Bacterial Membrane.- I. Introduction.- II. Membranes and Surface Organization of the Bacterial Cell.- A. Surface Structures of Gram-Negative Bacteria.- B. Surface Structures of Gram-Positive Bacteria.- III. Intracellular Membrane Systems in Bacteria.- A. Mesosome Vesicles and Membranes.- B. Photosynthetic Membranes.- C. Membrane Vesicles, \"Stacked\" Membranes, Dissociation, and Gas Vacuoles.- D. Reticulum.- IV. Anatomy of Bacterial Membranes.- V. Chemical Composition of Isolated Membranes.- A. Gross Chemical Composition.- B. Lipids and Lipid-Soluble Components.- C. Proteins.- VI. Molecul.

Microbial Cell Walls and Membranes

This book provides a comprehensive overview of the basic principles, concepts, techniques and latest advances in the field of biomembranes and membrane-associated processes. With new emerging technologies and bioinformatics tools, this is a promising area for future study and research. The book discusses the composition, fluidity and dynamic nature of phospholipid bilayers, which vary with cell/organelle type and function. It describes the various types of transport proteins that facilitate the transport of polar and nonpolar molecules across the membrane actively or passively via ion-channels or through porins. It also explores the many cellular functions membranes participate in: (1) energy transduction, which includes the electron transport chain in inner membrane of mitochondria and bacterial cytoplasmic membrane and photosynthetic electron transport in thylakoid membranes in chloroplast and photosynthetic bacterial membranes; (2) cell–cell communication involving various signal transduction pathways triggered by activated membrane receptors; (3) cell–cell interactions involving various types of adhesion and receptor proteins; (4) nerve transmission involving opening and closing of voltage gated ionic channels; and (5) intracellular transport involving the processes of endocytosis, exocytosis, vesicular transport of solutes between intracellular compartments, membrane fusion and membrane biogenesis.

Methods in Membrane Biology

For bacteria ...\"the times are achanging\"... The genomes of over 60 different bacteria have now been sequenced, and we know a lot about the important research organism Escherichia coli, the important industrial organism Bacillus subtilis, and about important plant and human pathogens. It will not take long before we know all the gene products and their functions of a few of these bacteria. Some of us already begin to think about a digital model E. coli or Bacillus cell. For that end we need to know all the physiological activities and metabolic routes of the cell. But in addition we like to know how things work at the molecular level and how protein and membranes as well as other (macromolecular) structures work together to carry out specific cell functions. Protein Secretion Pathways in Bacteria describes all the known folding and targeting routes of inner and outer membrane proteins as well as of proteins that are secreted by several specific export routes. The book gives detailed molecular information about the structures that are important for the different mechanisms involved. This is a valuable contribution to the understanding of how rather simple and yet complex bacterial cells work.