

BIOPHYSICAL CHEMISTRY: MOLECULES TO MEMBRANES

Bergethon, Peter R.

Biophysical Chemistry Molecules To Membranes

D. Das

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Biophysical Chemistry Molecules To Membranes:

Biophysical Chemistry Peter R. Bergethon, Elizabeth R. Simons, 2012-12-06 Biophysical Chemistry Molecules to Membranes is a one semester textbook for graduate and senior undergraduate students Developed over several years of teaching the approach differs from that of other texts by emphasizing thermodynamics of aqueous solutions by rigorously treating electrostatics and irreversible phenomena and by applying these principles to topics of biochemistry and biophysics The main sections are 1 Basic principles of equilibrium thermodynamics 2 Structure and behavior of solutions of ions and molecules The discussions range from properties of bulk water to the solvent structure of solutions of small molecules and macromolecules 3 Physical principles are extended for the non homogenous and non equilibrium nature of biological processes Areas included are lipid water systems transport phenomena membranes and bio electrochemistry This new textbook will provide an essential foundation for research in cellular physiology biochemistry membranebiology as well as the derived areas bioengineering pharmacology nephrology and many others

The Physical Basis of Biochemistry Peter R. Bergethon, 2013-03-14 The objective of this book is to provide a unifying approach to the study of biophysical chemistry for the advanced undergraduate who has had a year of physics organic chemistry calculus and biology This book began as a revised edition of Biophysical Chemistry Molecules to Membranes which Elizabeth Simons and I coauthored That short volume was written in an attempt to provide a concise text for a one semester course in biophysical chemistry at the graduate level The experience of teaching biophysical chemistry to biologically oriented students over the last decade has made it clear that the subject requires a more fundamental text that unifies the many threads of modern science physics chemistry biology mathematics and statistics This book represents that effort This volume is not a treatment of modern biophysical chemistry with its rich history and many controversies although a book on that topic is also needed The Physical Basis of Biochemistry is an introduction to the philosophy and practice of an interdisciplinary field in which biological systems are explored using the quantitative perspective of the physical scientist I have three primary objectives in this volume one to provide a unifying picture of the interdisciplinary threads from which the tapestry of biophysical studies is woven two to provide an insight into the power of the modeling approach to scientific investigation and three to communicate a sense of excitement for the activity and wholesome argument that characterize this field of study

Biophysical Chemistry Robin Leatherbarrow, R H Templer, 2007-10-31 In the post genomic world advances in the comprehension of cell behaviour will depend upon scientists deciphering the molecular basis of interactions between proteins and membranes Bringing together contributions from chemists biologists and physicists Biophysical Chemistry Membranes and Proteins demonstrates how multidisciplinary teams can gain insights into understanding complex biological systems This book reflects both the scope and the interdisciplinary nature of the field with topics including modelling of biological systems membrane structure and interactions probing biomolecules and channels and receptors Full of stimulating articles and opinions readers from

academia and industry will welcome the wide range of coverage and the state of the art science

Molecular Organization of Membranes: Where Biology Meets Biophysics Marek Cebecauer, David Holowka, 2018-02-07 Biological membranes protect cells and organelles from the surrounding environment but serve also as organising platforms for physiological processes such as cell signalling The hydrophobic core of membranes is composed of lipids and proteins influencing each other Local membrane composition and properties define its molecular organisation and in this way regulate the function of all associated molecules Therefore studying interactions of components biophysical properties and overall membrane dynamics provides essential information on its function in the context of cell activities Such knowledge can contribute to biomedical fields such as pharmacology immunology neurobiology and many others The goal of the Research Topic entitled Molecular organisation of membranes where biology meets biophysics was to provide a comprehensive platform for publishing articles reviews and opinions focused on membrane organisation and the forces behind its heterogeneous and dynamic structure We collected 11 works which cover topics as diverse as general membrane organisation models membrane trafficking and signalling regulation biogenesis of caveolae protein lipid interactions and the importance of membrane associated tetraspanins networks The prevalent theme was the existence of membrane nanodomains To this point new emerging technologies are presented which own the power to bring a novel insight on how membrane nanodomains are formed and maintained and what is their function We believe that the collection of works in this Research Topic brings forward some important questions which will stimulate further research in this difficult but exciting field

Fundamentals of Polymer Physics and Molecular Biophysics Himadri B. Bohidar, 2015-01-05 Macromolecules in solutions can be distinctly characterised by their transport behaviour in solution phase The study of the transport processes includes diffusion coefficient sedimentation coefficient intrinsic viscosity and friction constant The question arises as to how to explicitly characterise the macromolecules from the data of coefficients This book answers this question in a systematic manner It provides physical interpretation of the data obtained in macromolecular transport phenomena in a given system and also addresses some important issues and concepts related to biopolymers such as proteins and nucleic acids The application of concepts like conformational properties and salient physicochemical features of protein and nucleic acids is also elucidated in the book Based on the molecular structure it provides the essential concepts which can be used to model and analyse the static and transport behaviour of polymers and biopolymers

Biophysical Chemistry, 1958

Membranes to Molecular Machines Mathias Grote, 2019-07-19 Today's science tells us that our bodies are filled with molecular machinery that orchestrates all sorts of life processes When we think microscopic channels open and close in our brain cell membranes when we run tiny motors spin in our muscle cell membranes and when we see light operates molecular switches in our eyes and nerves A molecular mechanical vision of life has become commonplace in both the halls of philosophy and the offices of drug companies where researchers are developing proton pump inhibitors or medicines similar

to Prozac Membranes to Molecular Machines explores just how late twentieth century science came to think of our cells and bodies this way This story is told through the lens of membrane research an unwritten history at the crossroads of molecular biology biochemistry physiology and the neurosciences that directly feeds into today s synthetic biology as well as nano and biotechnology Mathias Grote shows how these sciences not only have made us think differently about life they have by reworking what membranes and proteins represent in laboratories allowed us to manipulate life as active matter in new ways Covering the science of biological membranes in the United States and Europe from the mid 1960s to the 1990s this book connects that history to contemporary work with optogenetics a method for stimulating individual neurons using light and will enlighten and provoke anyone interested in the intersection of chemical research and the life sciences from practitioner to historian to philosopher The research described in the book and its central actor Dieter Oesterhelt were honored with the 2021 Albert Lasker Basic Medical Research Award for his contribution to the development of optogenetics **Cell**

Physiology Source Book Nicholas Sperelakis,Nick Sperelakis,2001-08-02 This completely revised and updated source book provides comprehensive and authoritative coverage of cell physiology and membrane biophysics Intended primarily as a text for advanced undergraduate and graduate students and as a reference for researchers this multidisciplinary book includes several new chapters and is an invaluable aid to scientists interested in cell physiology biophysics cell biology electrophysiology and cell signaling KEY FEATURES Completely revised and updated includes 8 new chapters on such topics as membrane structure intracellular chloride regulation transport sensory receptors pressure effects and infrared detectors Includes broad coverage of both animal and plant cells Appendixes review basics of the propagation of action potentials electricity and cable properties Authored by leading experts in the field Clear concise comprehensive coverage of all aspects of cellular physiology from fundamental concepts to more advanced topics PRAISE FOR THE SECOND EDITION T he authoritative volume in the field of cell physiology and certainly one of the most current sources of comprehensive information available CHOICE a core textbook in cell physiology The need for such a book is well justified and it fulfills its objectives admirably It is especially strong on the subjects of signal transduction membrane biology ion channels and neuronal and muscle cell physiology It is a solid textbook in its field DOODY S PUBLISHING REVIEWS Cell Physiology Source Book 2e will be useful for advanced undergraduate and graduate students studying cell physiology cell biophysics electrophysiology and biological scientists in many fields The book is particularly suitable for introducing cell physiology to students with training in the physical sciences and for introducing cell biophysics to students with backgrounds in biology BIOPHYSICAL JOURNAL The Cell Physiology Source Book was on CHOICE s list of Outstanding Academic Books for 1996 and the second edition was on CHOICE s list of Outstanding Academic Books in 1998 Cell Physiology Source Book Nick Sperelakis,2012-01-11 Cell Physiology Source Book gathers together a broad range of ideas and topics that define the field It provides clear concise and comprehensive coverage of all aspects of cellular physiology from fundamental concepts to more

advanced topics The 4e contains substantial new material Most chapters have been thoroughly reworked The book includes chapters on important topics such as sensory transduction the physiology of protozoa and bacteria and synaptic transmission Authored by leading researchers in the field Clear concise and comprehensive coverage of all aspects of cellular physiology from fundamental concepts to more advanced topics Full color illustrations *Biophysics & Biophysical Chemistry* D. Das, 1982

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