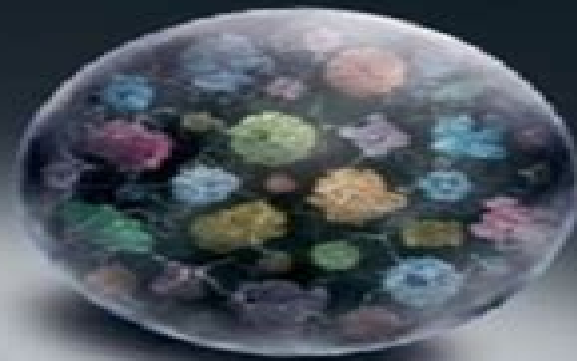


MOLECULAR MACHINES *in* BIOLOGY

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Molecular Machines in Biology Joachim Frank, 2011-12-19 The concept of molecular machines in biology has transformed the medical field in a profound way Many essential processes that occur in the cell including transcription translation protein folding and protein degradation are all carried out by molecular machines This volume focuses on important molecular machines whose architecture is known and whose functional principles have been established by tools of biophysical imaging X ray crystallography and cryo electron microscopy and fluorescence probing single molecule FRET This edited volume includes contributions from prominent scientists and researchers who understand and have explored the structure and functions of these machines This book is essential for students and professionals in the medical field who want to learn more about molecular machines

Nanoscale Biophysics of the Cell Mohammad Ashrafuzzaman, 2018-04-12 Macroscopic cellular structures and functions are generally investigated using biological and biochemical approaches But these methods are no longer adequate when one needs to penetrate deep into the small scale structures and understand their functions The cell is found to hold various physical structures molecular machines and processes that require physical and mathematical approaches to understand and indeed manipulate them Disorders in general cellular compartments perturbations in single molecular structures drug distribution therein and target specific drug binding etc are mostly physical phenomena This book will show how biophysics has revolutionized our way of addressing the science and technology of nanoscale structures of cells and also describes the potential for manipulating the events that occur in them

Using the Biological Literature Diane Schmidt, 2014-04-14 The biological sciences cover a broad array of literature types from younger fields like molecular biology with its reliance on recent journal articles genomic databases and protocol manuals to classic fields such as taxonomy with its scattered literature found in monographs and journals from the past three centuries Using the Biological Literature A Practical Guide Fourth Edition is an annotated guide to selected resources in the biological sciences presenting a wide ranging list of important sources This completely revised edition contains numerous new resources and descriptions of all entries including textbooks The guide emphasizes current materials in the English language and includes retrospective references for historical perspective and to provide access to the taxonomic literature It covers both print and electronic resources including monographs journals databases indexes and abstracting tools websites and associations providing users with listings of authoritative informational resources of both classical and recently published works With chapters devoted to each of the main fields in the basic biological sciences this book offers a guide to the best and most up to date resources in biology It is appropriate for anyone interested in searching the biological literature from undergraduate students to faculty researchers and librarians The guide includes a supplementary website dedicated to keeping URLs of electronic and web based resources up to date a popular feature continued from the third edition

Novel Developments in Cryo-EM of Biological Molecules Joachim Frank, 2023-10-06 Cryo EM as it is currently practiced in

many laboratories is limited to the visualization of molecules that are in thermal equilibrium at the time before freezing. A further limitation is that the existing software does not fully exploit the information that is contained in the images of large ensembles of molecules in thermal equilibrium. This book is a collection of recent articles by the author reprinted with introductions and they mainly describe two novel methods in cryo EM: one computational and the other experimental that requires the use of a microfluidic device. Both methods have the capacity to shed light on the dynamic behavior of biomolecules. Combined, they greatly expand the range of applications of cryo EM. The book describes a successful approach in which, based on cryo EM data, all states visited by the molecule in thermal equilibrium are mapped by manifold embedding, a method of geometric machine learning, and the energy landscape of the molecule is derived. It also discusses methods and biological results of time-resolved cryo EM following a reaction in a non-equilibrium system over a short period of time and resulting in the capture of short-lived states that have been inaccessible by standard methods of cryo EM. **Protein**

Actions: Principles and Modeling Ivet Bahar, Robert L. Jernigan, Ken A. Dill, 2017-02-14. *Protein Actions: Principles and Modeling* is aimed at graduates, advanced undergraduates, and any professional who seeks an introduction to the biological, chemical, and physical properties of proteins. Broadly accessible to biophysicists and biochemists, it will be particularly useful to student and professional structural biologists and molecular biophysicists, bioinformaticians, and computational biologists, biological chemists, particularly drug designers, and molecular bioengineers. The book begins by introducing the basic principles of protein structure and function. Some readers will be familiar with aspects of this, but the authors build up a more quantitative approach than their competitors. Emphasizing concepts and theory rather than experimental techniques, the book shows how proteins can be analyzed using the disciplines of elementary statistical mechanics, energetics, and kinetics. These chapters illuminate how proteins attain biologically active states and the properties of those states. The book ends with a synopsis of the roles of computational biology and bioinformatics in protein science. **Molecular Storms** Liam

Graham, 2023-11-02. Following in the footsteps of Stephen Hawking's *A Brief History of Time* and Simon Singh's *Fermat's Last Theorem*, this exceptionally accessible book will leave you marveling at the wonders of the world and, if you didn't listen to your science teachers, wishing you had. Graham writes with the mind of a physicist and the soul of a poet. Nicki Hayes, CCO, The Communications Practice. author of *First Aid for Feelings*. Only a few writers have managed to turn the highly technical jargon of science into language accessible for interested lay readers. Isaac Asimov showed us how it could be done, and Carl Zimmer and Brian Greene are continuing today. In *Molecular Storms*, his first book, Liam Graham has shown that he has the essential quality required to join this group: a love of first learning, then explaining, how the universe works. David Deamer, Professor of Biomolecular Engineering, University of California, Santa Cruz, author of *Assembling Life*. Why is the universe the way it is? Wherever we look, we find ordered structures, from stars to planets to living cells. This book shows that the same driving force is behind structure everywhere: the incessant random motion of the components of matter. Physicists call it

thermal noise Let's call it the molecular storm This storm drives the fusion reactions that make stars shine It drives whirlpools and currents in atmospheres and oceans It spins and distorts molecules until they are in the right orientation to react and form new substances In living cells it drives proteins to fold and molecules to self assemble It is behind every detail of the astonishing molecular machines that control cellular processes Using cutting edge research Molecular Storms takes us on a dazzling journey from the early universe to the interior of the smallest living things There in a nanoscale world of biological devices it explains the physics behind the chemical system which we call Life Whether you're someone with a general interest in science or a student looking to add context to your studies this book is for you Molecular Storms is an accessible and captivating read that will deepen your appreciation of the power of science to explain the world **The**

Nobel Prizes 2017 Karl Grandin,Eva Windrup,2020-03-20 The Nobel Prizes is the official yearbook of the Nobel Foundation This edition provides extensive information about the 2017 laureates their Nobel Prize lectures and their autobiographies as well as presentation speeches and background about the Nobel festivities Published on behalf of the Nobel Foundation

X-Ray Free Electron Lasers Uwe Bergmann,Vittal Yachandra,Junko Yano,2017-08-11 The ultra bright femtosecond X ray pulses provided by X ray free electron lasers XFELs open up opportunities to study the structure and dynamics of a wide variety of systems beyond what is possible with synchrotron sources This book introduces the principles and properties of currently operating and future XFELs before outlining applications in materials science chemistry and biology Edited by pioneers in this exciting field and featuring contributions from leading researchers this book is ideal for researchers working with XFELs synchrotron radiation ultrafast and femtosecond crystallography and femtosecond spectroscopy Proceedings

John von Neumann-Institut für Computing,2012 Encyclopedia of Bioinformatics and Computational Biology ,2018-08-21 Encyclopedia of Bioinformatics and Computational Biology ABC of Bioinformatics Three Volume Set combines elements of computer science information technology mathematics statistics and biotechnology providing the methodology and in silico solutions to mine biological data and processes The book covers Theory Topics and Applications with a special focus on Integrative omics and Systems Biology The theoretical methodological underpinnings of BCB including phylogeny are covered as are more current areas of focus such as translational bioinformatics cheminformatics and environmental informatics Finally Applications provide guidance for commonly asked questions This major reference work spans basic and cutting edge methodologies authored by leaders in the field providing an invaluable resource for students scientists professionals in research institutes and a broad swath of researchers in biotechnology and the biomedical and pharmaceutical industries Brings together information from computer science information technology mathematics statistics and biotechnology Written and reviewed by leading experts in the field providing a unique and authoritative resource Focuses on the main theoretical and methodological concepts before expanding on specific topics and applications Includes interactive images multimedia tools and crosslinking to further resources and databases Cell Biology Maika G.

Mitchell,2016-01-16 Cell Biology Translational Impact in Cancer Biology and Bioinformatics provides insight into the implications for cell cycle regulation and cell proliferation in cancer growth and dissemination Offering guidance for techniques and tools to help with diagnosis this publication provides users with a broad view of this research area and is also useful for both early and experienced researchers across cell biology cancer research molecular biology and in clinical and translational science Offers insight into how cell cycle and cell division relates to cancer biology Emphasizes flow cytometry and other cell biology techniques for diagnosis Includes recommendations for integration and analyzation of molecular and clinical data **Philosophical Perspectives on the Engineering Approach in Biology** Sune Holm,Maria

Serban,2020-06-07 Philosophical Perspectives on the Engineering Approach in Biology provides a philosophical examination of what has been called the most powerful metaphor in biology The machine metaphor The chapters collected in this volume discuss the idea that living systems can be understood through the lens of engineering methods and machine metaphors from both historical theoretical and practical perspectives In their contributions the authors examine questions about scientific explanation and methodology the interrelationship between science and engineering and the impact that the use of engineering metaphors in science may have for bioethics and science communication such as the worry that its wide application reinforces public misconceptions of the nature of new biotechnology and biological life The book also contains an introduction that describes the rise of the machine analogy and the many ways in which it plays a central role in fundamental debates about e g design adaptation and reductionism in the philosophy of biology The book will be useful as a core reading for professionals as well as graduate and undergraduate students in courses of philosophy of science and for life scientists taking courses in philosophy of science and bioethics *Molecular Theory of the Living Cell* Sungchul Ji,2012-04-05 The

book presents the first comprehensive molecular theory of the living cell ever published since the cell doctrine was formulated in 1838 1839 It introduces into cell biology over thirty key concepts principles and laws imported from physics chemistry computer science linguistics semiotics and philosophy The author formulates physically chemically and enzymologically realistic molecular mechanisms to account for basic living processes such as ligand receptor interactions enzymic catalysis force generating mechanisms in molecular motors chromatin remodelling and signal transduction Possible solutions to basic and practical problems facing contemporary biology and biomedical sciences have been suggested including pharmacotherapeutics and personalized medicine *Artificial Life V* Christopher G. Langton,Katsunori

Shimohara,1997 In addition to presenting the latest work in the field Artificial Life V includes a retrospective and prospective look at both artificial and natural life with the aim of refining the methods and approaches discovered so far into viable practical tools for the pursuit of science and engineering goals May 16 18 1996 Nara Japan Despite all the successes in computer engineering adaptive computation bottom up AI and robotics Artificial Life must not become simply a one way bridge borrowing biological principles to enhance our engineering efforts in the construction of life as it could be We must

ensure that we give back to biology in kind by developing tools and methods that will be of real value in the effort to understand life as it is Artificial Life V marks a decade since Christopher Langton organized the first workshop on artificial life a decade characterized by the exploration of new possibilities and techniques as researchers have sought to understand through synthetic experiments the organizing principles underlying the dynamics usually the nonlinear dynamics of living systems In addition to presenting the latest work in the field Artificial Life V includes a retrospective and prospective look at both artificial and natural life with the aim of refining the methods and approaches discovered so far into viable practical tools for the pursuit of science and engineering goals

Complex Adaptive Systems series Elements of Computational Systems Biology

Huma M. Lodhi, Stephen H. Muggleton, 2010-03-25 Groundbreaking long ranging research in this emergent field that enables solutions to complex biological problems Computational systems biology is an emerging discipline that is evolving quickly due to recent advances in biology such as genome sequencing high throughput technologies and the recent development of sophisticated computational methodologies Elements of Computational Systems Biology is a comprehensive reference covering the computational frameworks and techniques needed to help research scientists and professionals in computer science biology chemistry pharmaceutical science and physics solve complex biological problems Written by leading experts in the field this practical resource gives detailed descriptions of core subjects including biological network modeling analysis and inference presents a measured introduction to foundational topics like genomics and describes state of the art software tools for systems biology Offers a coordinated integrated systems view of defining and applying computational and mathematical tools and methods to solving problems in systems biology Chapters provide a multidisciplinary approach and range from analysis modeling prediction reasoning inference and exploration of biological systems to the implications of computational systems biology on drug design and medicine Helps reduce the gap between mathematics and biology by presenting chapters on mathematical models of biological systems Establishes solutions in computer science biology chemistry and physics by presenting an in depth description of computational methodologies for systems biology Elements of Computational Systems Biology is intended for academic industry researchers and scientists in computer science biology mathematics chemistry physics biotechnology and pharmaceutical science It is also accessible to undergraduate and graduate students in machine learning data mining bioinformatics computational biology and systems biology courses

Transactions on Computational Systems Biology III

Corrado Priami, Emanuela Merelli, Pedro Pablo Gonzalez, Andrea Omicini, 2005-12-06 The LNCS journal Transactions on Computational Systems Biology is devoted to inter and multidisciplinary research in the fields of computer science and life sciences and supports a paradigmatic shift in the techniques from computer and information science to cope with the new challenges arising from the systems oriented point of view of biological phenomena This the third Transactions on Computational Systems Biology volume edited by Emanuela Merelli Pedro Pablo Gonzalez and Andrea Omicini is devoted to considerably extended versions of selected papers presented

at the International Workshop on Network Tools and Applications in Biology NETTAB 2004 held at the University of Camerino in Camerino Italy in September 2004 Dedicated especially to models and metaphors from biology to bioinformatics tools the 10 papers selected for the special issue cover a wide range of bioinformatics research such as data visualisation protein RNA structure prediction motif finding modelling and simulation of protein interaction genetic linkage analysis and notations and models for systems biology **Index of Conference Proceedings** British Library. Document Supply Centre,2003 **Advances in Physarum Machines** Andrew Adamatzky,2016-01-09 This book is devoted to Slime mould *Physarum polycephalum* which is a large single cell capable for distributed sensing concurrent information processing parallel computation and decentralized actuation The ease of culturing and experimenting with *Physarum* makes this slime mould an ideal substrate for real world implementations of unconventional sensing and computing devices The book is a treatise of theoretical and experimental laboratory studies on sensing and computing properties of slime mould and on the development of mathematical and logical theories of *Physarum* behavior It is shown how to make logical gates and circuits electronic devices memristors diodes transistors wires chemical and tactile sensors with the slime mould The book demonstrates how to modify properties of *Physarum* computing circuits with functional nano particles and polymers to interface the slime mould with field programmable arrays and to use *Physarum* as a controller of microbial fuel cells A unique multi agent model of slime is shown to serve well as a software slime mould capable for solving problems of computational geometry and graph optimization The multiagent model is complemented by cellular automata models with parallel accelerations Presented mathematical models inspired by *Physarum* include non quantum implementation of Shor's factorization structural learning computation of shortest path tree on dynamic graphs supply chain network design p-adic computing and syllogistic reasoning The book is a unique composition of vibrant and lavishly illustrated essays which will inspire scientists engineers and artists to exploit natural phenomena in designs of future and emergent computing and sensing devices It is a bible of experimental computing with spatially extended living substrates it spans topics from biology of slime mould to bio sensing to unconventional computing devices and robotics non classical logics and music and arts

Membranes to Molecular Machines Mathias Grote,2019-07-09 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

Protein-Protein Interactions Krishna Mohan Poluri,Khushboo Gulati,Sharanya Sarkar,2021-05-19 This book provides a comprehensive overview of the fundamental aspects of protein protein interactions PPI including a detailed account of the energetics and thermodynamics involved in these interactions It also discusses a number of computational and experimental approaches for the prediction of PPI interactions and reviews their principles advantages drawbacks and the recent developments Further it offers structural and mechanistic insights into the formation of protein protein complexes and maps different PPIs into networks to delineate various pathways that operate at the cellular level Lastly it describes computational protein protein docking techniques and discusses their implications for further experimental research Given its scope this book is a valuable resource for students researchers scientists entrepreneurs and medical healthcare professionals

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