

Electric current flow in excitable cells

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Electric Current Flow in Excitable Cells James Julian Bennett Jack, Denis Noble, Richard W. Tsien, 1975 *Electric Current Flow in Excitable Cells* Julian J. B. Jack, Dennis Noble, Richard W. Tsien, 1975 **Electric Current Flow in Excitable Cells** J.J.B. Jack, Richard W. Tsien, D. Noble, 1983 *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** The 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. **Mathematics of Cell Electrophysiology** J. Cronin, 1981-01-01 *The Self-Organizing Brain: From Growth Cones to Functional Networks* M.A. Corner, F.H. Lopes da Silva, H.B.M. Uylings, J. van Pelt, 1994-10-11 This book concentrates on the organizational level of neurons and neuronal networks under the unifying theme *The Self-Organizing Brain: From Growth Cones to Functional Networks*. Such a theme is attractive because it incorporates all phases in the emergence of complexity and adaptive organization as well as involving processes that remain operative in the mature state. The order of the sections follows successive levels of organization from neuronal growth cones, neurite formation, neuronal morphology, and signal processing to network development, network dynamics, and finally to the formation of functional circuits. **Single Neuron Computation** Thomas M. McKenna, Joel L. Davis, Steven F. Zornetzer, 2014-05-19 This book contains twenty-two original contributions that provide a comprehensive overview of computational approaches to

understanding a single neuron structure The focus on cellular level processes is twofold From a computational neuroscience perspective a thorough understanding of the information processing performed by single neurons leads to an understanding of circuit and systems level activity From the standpoint of artificial neural networks ANNs a single real neuron is as complex an operational unit as an entire ANN and formalizing the complex computations performed by real neurons is essential to the design of enhanced processor elements for use in the next generation of ANNs The book covers computation in dendrites and spines computational aspects of ion channels synapses patterned discharge and multistate neurons and stochastic models of neuron dynamics It is the most up to date presentation of biophysical and computational methods

An Introduction to Cardiac Electrophysiology Antonio Zaza, Michael Rosen, 2000-08-08 Knowledge of the basic mechanisms of cardiac excitation is a prerequisite to the understanding of cardiac arrhythmias and their response to therapy The goal of this book is to provide readers unacquainted with the matter with the information necessary to develop pathophysiologically oriented clinical reasoning in this area Besides covering normal

Molecular and Cellular Biophysics Meyer B. Jackson, 2006-01-12 Molecular and Cellular Biophysics provides advanced undergraduate and graduate students with a foundation in the basic concepts of biophysics Students who have taken physical chemistry and calculus courses will find this book an accessible and valuable aid in learning how these concepts can be used in biological research The text provides a rigorous treatment of the fundamental theories in biophysics and illustrates their application with examples Conformational transitions of proteins are studied first using thermodynamics and subsequently with kinetics Allosteric theory is developed as the synthesis of conformational transitions and association reactions Basic ideas of thermodynamics and kinetics are applied to topics such as protein folding enzyme catalysis and ion channel permeation These concepts are then used as the building blocks in a treatment of membrane excitability Through these examples students will gain an understanding of the general importance and broad applicability of biophysical principles to biological problems

Neuroscience Alwyn Scott, 2007-12-14 Arguably the most intricate dynamic object in the universe the human brain is an unsounded source of wonder for the scientific community The primary aim of this book is to provide both students and established investigators in the growing area of neuroscience with an appreciation of the roles that mathematics may play in helping to understand this enigmatic organ Along with discussion of results obtained by the neuroscience community emphasis is placed on suggesting fruitful research problems for those planning to embark on mathematical studies in neuroscience To make the overall perspectives understandable to philosophers and psychologists essential features of the discussions are presented in ordinary English with more detailed mathematical comments in appendices and footnotes Although it attempts to maintain both clarity and biological relevance this is not a text on the anatomy of nerve systems thus readers should bring some knowledge of neurophysiology through other courses associated studies or laboratory research It is a guiding theme throughout the book that the brain is organized into several quite different levels of dynamic activity As will be seen these levels are hierarchically

structured beginning with the molecular dynamics of intrinsic membrane proteins and proceeding upward through the switching properties of active membrane patches and synapses the emergence of impulses on active fibers overall properties of individual neurons and the growth of functional assemblies of interacting neurons to the global dynamics of a brain At each level of description reality turns different facets of her mystery to us and diverse phenomena make their contributions to the brain's collective behavior

Neurotransmitter Actions in the Vertebrate Nervous System Michael

Rogawski, 2012-12-06 Intercellular communication via bioactive substances occurs in virtually all multicellular systems Chemical neurotransmission in the vertebrate nervous system represents a form of signaling of this type The biology of chemical neurotransmission is complex involving transmitter synthesis transport and release by the presynaptic neuron signal generation in the target tissue and mechanisms for termination of the response The focus of this book is on one aspect of this scheme the diverse electrophysiological effects induced by different neurotransmitters on target cells In recent years astonishing progress has been made in elucidating the specific physiological signals mediated by neurotransmitters in the vertebrate nervous system yet in our view this has not been adequately recognized perhaps because the new concepts have yet to filter into neuroscience textbooks Nevertheless the principles of neurotransmitter action are critical to advances in many areas of neuroscience including molecular neurobiology neurochemistry neuropharmacology physiological psychology and clinical neuroscience It was the need for a sourcebook that prompted us to engage a group of neurophysiologists to prepare the chapters in this volume However there was an additional reason for this book more and more it seemed that the field if not yet having reached maturity at least was approaching adolescence with strengths in some areas and healthy conflicts in others At this stage of development a textbook can help to define a field clarify problems to be resolved and identify areas for future investigation

Cellular Physiology and Neurophysiology E-Book Mordecai P. Blaustein, Joseph P. Y. Kao, Donald R. Matteson, 2011-12-14 Gain a quick and easy understanding of this complex subject with the 2nd edition of *Cellular Physiology and Neurophysiology* by doctors Mordecai P Blaustein Joseph P Y Kao and Donald R Matteson The expanded and thoroughly updated content in this Mosby Physiology Monograph Series title bridges the gap between basic biochemistry molecular and cell biology neuroscience and organ and systems physiology providing the rich clinically oriented coverage you need to master the latest concepts in neuroscience See how cells function in health and disease with extensive discussion of cell membranes action potentials membrane proteins transporters osmosis and more Intuitive and user friendly this title is a highly effective way to learn cellular physiology and neurophysiology Focus on the clinical implications of the material with frequent examples from systems physiology pharmacology and pathophysiology Gain a solid grasp of transport processes which are integral to all physiological processes yet are neglected in many other cell biology texts Understand therapeutic interventions and get an updated grasp of the field with information on recently discovered molecular mechanisms Conveniently explore mathematical derivations with special boxes throughout the text Test your knowledge of

the material with an appendix of multiple choice review questions complete with correct answers Understand the latest concepts in neurophysiology with a completely new section on Synaptic Physiology Learn all of the newest cellular physiology knowledge with sweeping updates throughout Reference key abbreviations symbols and numerical constants at a glance with new appendices

Biophysics of Gap Junction Channels M.D. Peracchia, 2018-01-18 This book provides a state of the art account of present knowledge of the biophysics of cell to cell channels It is divided into two sections one dealing with two cell systems and the other with reconstitution systems

Cellular Mechanisms of Sensory Processing Laszlo Urban, 2013-06-29 The research field of somatosensory processing in mammals has experienced revolutionary changes in recent years Accumulation of basic and clinical data has greatly accelerated and new phenomena have emerged With the aid of new refined methods molecular and cellular changes have been described underlying the signal transduction transmission between the internal external environment and the central nervous system have been described The discovery of the interaction between the nervous and the immune system has for example changed our view on the development of inflammatory diseases while the cloning of genes encoding different trophic factors has boosted studies revealing profound changes in the regeneration of neurons and induction of changes in phenotype The study of the pre and postsynaptic modulation of transmitter release and the examination of the combined effects of amino acid and peptide transmitters has become recently possible by using cultured cell lines and in vitro techniques Although it is in embryonic state computational properties of single DRG cells under normal and pathological conditions are being investigated Results soon or later will have a great impact on pain research and consequently ultimately in clinical pain management This brief introduction indicates how our knowledge of the somatosensory system has increased dramatically recently However many investigators cultivate only a very specific field in the growing area of somatosensory research and find it difficult to integrate a more universal knowledge of their work

Fatigue Patricia A. Pierce, 2013-06-29 This volume describes the current state of our knowledge on the neurobiology of muscle fatigue with consideration also given to selected integrative cardiorespiratory mechanisms Our charge to the authors of the various chapters was twofold to provide a systematic review of the topic that could serve as a balanced reference text for practicing health care professionals teaching faculty and pre and postdoctoral trainees in the biomedical sciences and to stimulate further experimental and theoretical work on neurobiology Key issues are addressed in nine interrelated areas fatigue of single muscle fibers fatigue at the neuromuscular junction fatigue of single motor units metabolic fatigue studied with nuclear magnetic resonance fatigue of the segmental motor system fatigue involving suprasegmental mechanisms the task dependency of fatigue mechanisms integrative largely cardiorespiratory systems issues and fatigue of adapted systems due to aging under and overuse and pathophysiology The product is a volume that provides comprehensive of processes that operate from the forebrain to the contractile proteins

[Implantable Neuroprostheses for Restoring Function](#) Kevin Kilgore, 2015-02-24 Research and developments in neuroprostheses are providing scientists with

the potential to greatly improve the lives of individuals who have lost some function Neuroprostheses can help restore or substitute motor and sensory functions which may have been damaged as a result of injury or disease However these minute implantable sensors also provide scientists with challenges This important new book provides readers with a comprehensive review of neuroprostheses Chapters in part one are concerned with the fundamentals of these devices Part two looks at neuroprostheses for restoring sensory function whilst part three addresses neuroprostheses for restoring motor function The final set of chapters discusses significant considerations concerning these sensors Systematic and comprehensive coverage of neuroprostheses Covers the fundamentals of neuroprostheses their application in restoring sensory and motor function and an analysis of the future trends Keen focus on industry needs in the field of biomaterials The Routledge Handbook of Emergence Sophie Gibb, Robin Findlay Hendry, Tom Lancaster, 2019-03-13 Emergence is often described as the idea that the whole is greater than the sum of the parts interactions among the components of a system lead to distinctive novel properties It has been invoked to describe the flocking of birds the phases of matter and human consciousness along with many other phenomena Since the nineteenth century the notion of emergence has been widely applied in philosophy particularly in contemporary philosophy of mind philosophy of science and metaphysics It has more recently become central to scientists understanding of phenomena across physics chemistry complexity and systems theory biology and the social sciences The Routledge Handbook of Emergence is an outstanding reference source and exploration of the concept of emergence and is the first collection of its kind Thirty two chapters by an international team of contributors are organised into four parts Foundations of emergence Emergence and mind Emergence and physics Emergence and the special sciences Within these sections important topics and problems in emergence are explained including the British Emergentists weak vs strong emergence emergence and downward causation dependence complexity and mechanisms mental causation consciousness and dualism quantum mechanics soft matter and chemistry and evolution cognitive science and social sciences Essential reading for students and researchers in philosophy of mind philosophy of science and metaphysics The Routledge Handbook of Emergence will also be of interest to those studying foundational issues in biology chemistry physics and psychology

Biology of the Uterus W. Jollie, R.M. Wynn, 2013-06-29 Almost a quarter of a century has elapsed since Cellular Biology of the Uterus the predecessor of the present volume was planned During that period especially in the decade since the publication of the last edition of Biology of the Uterus new information in the field has been so voluminous as to require major revisions of most of the chapters the addition of several new chapters and the collaboration of a second editor to facilitate the selection of appropriate experts as authors As in prior editions a balance has been struck between classical biology and modern biochemistry and biophysics The inclusion of basic histological and embryological information provides a necessary though often lacking background for the protein chemist and molecular biologist and a bridge between the cell biologist and clinician Thus major practical problems in human reproduction such as the genesis of endometrial carcinoma

and the cause of the initiation of labor may be approached on a firm scientific footing The current edition deals primarily with the biology of the uterus itself comparative and human rather than placentation or pregnancy and thus is a synthesis of data derived from many techniques both conventional and modern As it is clearly beyond the competence of anyone scientist to prepare such a text on the basis of personal knowledge and experience the aid of 22 distinguished scientists was enlisted

New Neuromuscular Blocking Agents Dimitry A. Kharkevich, 2012-12-06 The problems associated with the pharmacologic and physiologic regulation of neuromuscular transmission and of the morphofunctional organization of neuromuscular junctions have attracted a wide range of investigators Numerous handbooks monographs and reviews are devoted to this subject At the same time many fundamental and applied aspects of this trend continue to progress successfully In recent years new experimental and clinical data on the structure and function of neuromuscular junctions have been gained and new more perfect neuromuscular blocking agents have been designed It is these data that the present handbook mainly deals with A considerable number of chapters have been written by authors from eastern Europe This was done intentionally since much of their work has previously been published only in their own languages and is thus inaccessible to most Western readers This is why some of the data included in the volume are not quite the latest but they contain fruitful ideas or important results and are of value for further progress in the pharmacology of neuromuscular transmission Naturally the methodological level of the investigations differs depending on when they were carried out The handbook contains a number of selected chapters on the pharmacology of neuromuscular junctions they comprise data otherwise insufficiently reviewed or not dealt with at all They furthermore reflect the up to date state of the problem and probable directions of further developments in this field D A KHARKEVICH Contents CHAPTER 1 Neuromuscular Blocking Agents General Considerations D A KHARKEVICH Physiology of Membrane Disorders Thomas Andreoli, 2012-12-06

Embracing the Track of Term: An Mental Symphony within **Electric Current Flow In Excitable Cells**

In a world consumed by monitors and the ceaseless chatter of fast transmission, the melodic beauty and psychological symphony created by the prepared term usually fade in to the background, eclipsed by the relentless noise and interruptions that permeate our lives. Nevertheless, nestled within the pages of **Electric Current Flow In Excitable Cells** a stunning fictional value overflowing with natural feelings, lies an immersive symphony waiting to be embraced. Constructed by a wonderful composer of language, this captivating masterpiece conducts viewers on an emotional journey, skillfully unraveling the concealed tunes and profound affect resonating within each carefully crafted phrase. Within the depths of this poignant evaluation, we will examine the book is central harmonies, analyze its enthralling writing type, and surrender ourselves to the profound resonance that echoes in the depths of readers souls.

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