

Metabolic Arrest and the Control of Biological Time

Peter W. Hochachka and Michael Guppy



Harvard University Press

Metabolic Arrest And The Control Of Biological Time

Joseph J. Torres, Thomas G. Bailey



Metabolic Arrest And The Control Of Biological Time:

Metabolic Arrest and the Control of Biological Time Peter W. Hochachka, Michael Guppy, 1987 Freshwater turtles and goldfish can survive for several days without oxygen some diving turtles for several months hibernating animals can exist without food for long periods others can survive extreme conditions such as desiccation freezing and thawing These creatures are in effect self sustaining life support systems with a mysterious ability to regulate their own metabolisms These capabilities raise important questions which Hochachka and Guppy explore in this seminal new book What mechanisms turn down or off cell metabolism and other cell functions How does an animal such as an opossum know when to activate mechanisms for slowing or stopping tissue and organ functions How does it know when to turn them on again How extensive is metabolic arrest as a defense against harsh environmental conditions Can we decipher universal principles of metabolic arrest from available data The lessons to be learned are of potentially great interest to clinicians because the authors provide a theoretical framework in which to organize an attack on the all too practical problem of protecting tissues against hypoxia Areas that may be influenced include research on cardiac arrest strokes acute renal failure liver ischemia lung injury respiratory defense syndrome claudication shock and organ transplant Investigation of other metabolic arrest mechanisms may be similarly useful in both clinical and agricultural fields This is a pioneering book of great use to biomedical clinical researchers and to biologists biochemists and physiologists generally

Diving Seals & Meditating Yogis Robert Elsner, 2015-04-21 The comparative physiology of seemingly disparate organisms often serves as a surprising pathway to biological enlightenment How appropriate then that Robert Elsner sheds new light on the remarkable physiology of diving seals through comparison with members of our own species on quests toward enlightenment meditating yogis As Elsner reveals survival in extreme conditions such as those faced by seals is often not about running for cover or coming up for air but rather about working within the confines of an environment and suppressing normal bodily function Animals in this withdrawn state display reduced resting metabolic rates and are temporarily less dependent upon customary levels of oxygen For diving seals creatures especially well adapted to prolonged submergence in the ocean's cold depths such periods of rest lengthen dive endurance But while human divers share modest brief adjustments of suppressed metabolism with diving seals it is the practiced response achieved during deep meditation that is characterized by metabolic rates well below normal levels sometimes even approaching those of non exercising diving seals And the comparison does not end here hibernating animals infants during birth near drowning victims and clams at low tide all also display similarly reduced metabolisms By investigating these states and the regulatory functions that help maintain them across a range of species Elsner offers suggestive insight into the linked biology of survival and well being

Oxidative Stress in Aquatic Ecosystems Doris Abele, Jose Pablo Vazquez-Medina, Tania Zenteno-Savin, 2011-11-03 Reactive oxygen species ROS are increasingly appreciated as down stream effectors of cellular damage and dysfunction under natural and anthropogenic stress scenarios in aquatic

systems This comprehensive volume describes oxidative stress phenomena in different climatic zones and groups of organisms taking into account specific habitat conditions and how they affect susceptibility to ROS damage A comprehensive and detailed methods section is included which supplies complete protocols for analyzing ROS production oxidative damage and antioxidant systems Methods are also evaluated with respect to applicability and constraints for different types of research The authors are all internationally recognized experts in particular fields of oxidative stress research This comprehensive reference volume is essential for students researchers and technicians in the field of ROS research and also contains information useful for veterinarians environmental health professionals and decision makers Environmental

Stressors and Gene Responses J.M. Storey,K.B. Storey,2000-07-31 Cell and Molecular Responses to Stress is a new multi volume book series from Elsevier Science that focuses on how organisms respond at a molecular level to environmental stresses imposed upon them All organisms deal with variations in multiple environmental factors including temperature oxygen salinity and water availability Many show amazing tolerances to extreme stress with remarkable biochemical adaptations that allow life to persist under very difficult circumstances This series explores the molecular mechanisms by which cells and organisms respond to stress focusing on the variations in metabolic response that allow some cells and organisms to deal with extreme stress others to endure stress within strict limits and others to have a very low tolerance for changes in environmental parameters Articles from within the series highlight the elastic limits of molecular responses in Nature with examples drawn from animal plant and bacteria systems Volume 1 begins by considering some of the roles of environmental stress in determining the geographic distribution of animals and in promoting species divergence and then explores gene expression and metabolic responses to environmental stress with examples of adaptation to high and low temperature osmotic anoxia ischemia desiccation high pressure and heavy metal stresses Life In The Cold Cynthia Carey,Gregory L. Florant,Bruce A. Wunder,Barbara Horwitz,2019-03-13 Contributors present the newest information on ecological physiological neurological cellular and biochemical mechanisms by which vertebrates deal with seasonal cold

Life in the Cold Gerhard Heldmaier,Martin F. Bach,Susanne Klaus,2013-06-29 This book contains the proceedings of the 11 h international symposium dedicated to the understanding of animal Life in the Cold held at Jungholz Austria August 13 18 2000 In 55 chapters contributed by researchers from 16 countries the current state of knowledge is reviewed and the most recent developments and discussions in this field are highlighted The first symposium on hibernation and life in the cold was held in 1959 and from then on they continued to occur every 3 5 years The regular occurrence of these meetings became almost a tradition A tradition which is entirely based on the enthusiasm of participants and was nourished by scientific progress in this area during the past decades The first symposium in 1959 was organised by Charles P Lyman and Albert R Dawe and was almost entirely dedicated to hibernation and torpor This has been a backbone topic of the following symposia although other aspects of animal energetics thermal physiology and biochemistry were included in later meetings Oxygen

Sensing Sukhamay Lahiri, Nanduri R. Prabhakar, Robert E. Forster II, 2006-03-06 Proceedings of the XIVth International Symposium on Arterial Chemoreception held June 24-28 1999 in Philadelphia Pennsylvania This volume containing the proceedings of the fourteenth biannual ISAC meeting presents a new departure from their traditional focus on arterial chemoreceptors and their functions in the expansion to include the study and discussion of oxygen sensing in other tissues and cells and the genes involved Bringing together scientists from cellular and systemic boundaries of physiology working at the interface of cellular and molecular biology this book containing new physiological and biochemical perspectives

Surviving Hypoxia Peter W. Hochachka, Peter L. Lutz, Thomas J. Sick, Myron Rosenthal, 2022-11-30 Surviving Hypoxia Mechanisms of Control and Adaptation is a synthesis of findings and thoughts concerning hypoxia The thermodynamics of hypoxia are discussed in detail including acid base balance and self pollution resulting from the accumulation of anaerobic end products The book focuses on descriptions and discussions of common facets contrasting solutions in a variety of physiological hypoxia defense strategies including those shown by plants invertebrates and vertebrates Special treatment is given to the distinctive problems that hypoxia presents to vulnerable organs such as the kidney liver and brain It also addresses pathological events in addition to protective mechanisms Clinical implications of basic research are examined in the book which provides new insights into underlying pathological processes occurring in hypoxic induced organ failure and indicates new paths for successful clinical intervention Surviving Hypoxia Mechanisms of Control and Adaptation is an excellent reference for all researchers interested in the physiological effects of hypoxia underlying pathological events and protective mechanisms

Environmental Project Management Ebenezer A. Sholarin, Joseph L. Awange, 2016-04-22 This book offers a new framework that facilitates the development of more intelligent systems and methods for data analysis and international information sharing such as the use of satellite imaging and geospatial data to predict changes in weather conditions and shifts in water levels and to assess the extent of the forest cover remaining on Earth that is visible from space It brings together the many aspects of science and technology as well as formula and analytical approaches required for more informed decision making It also highlights the vital importance of understanding the technological economic and social dimensions of environmental projects that have short term results and long term impacts It is unique in that it clearly distinguishes between environmental project management EnvPM and green project management GreenPM and presents an amalgamation of environmental management and project management concepts using geospatial methods to form an EnvPM concept The book sets a benchmark for the professionalism with which environmental projects should be planned executed monitored assessed and delivered While primarily intended for professionals responsible for the management of environmental projects or interested in improving the overall efficiency of such projects it is also a useful handbook for managers in the private public and non for profit sectors It is a valuable resource for students at both undergraduate and master s levels and an indispensable guide for anyone wanting to develop their skills in modern project management

environmental management and geospatial techniques We are the first generation to feel the impact of climate change and the last generation that can do something about it US President Obama's address to the United Nations on Climate Change and Global warming 2015 hison This book provides an in depth well researched and science based approach to applying key project management and spatial tools and practices in environmental projects An important read for leaders considering projects that balance social economic growth against minimising its ill effects on Planet Earth Todd Hutchison Global Chairman of Peopleistic group

The Brain Without Oxygen P.L. Lutz, G.E. Nilsson, H.M. Prentice, 2007-05-08 It is well known and researched that deprivation of oxygen to the brain can quickly result in irreversible damage and death What is less well known is that some vertebrate species are exceptionally tolerant of brain hypoxia The Brain Without Oxygen Causes of failure Physiological and molecular mechanisms for survival Third edition discusses the mechanisms of brain hypoxia tolerance in these exceptional vertebrates which include diving marine mammals high altitude dwellers and the hibernating mammal Special attention is given to the extraordinary adaptations that allow a few turtle and fish species to tolerate months of brain anoxia This third fully updated edition addresses the potential of these animal models as targets for human clinical intervention Perhaps the most interesting of these are those involved in the suppression of metabolic activities to new set points well below their normoxic minima or maintenance levels This volume will be valuable reading for researchers in physiology medicine and general biological sciences and of great importance to pharmaceutical companies researching novel models for stroke and brain ischemia

Diverse Divers Gerald L. Kooyman, 2012-12-06 This book is not a conventional review of diving physiology The coverage of the literature has been selective rather than encompassing the emphasis has been on field studies rather than laboratory investigations and the dive responses described are often discussed from the perspective of some of the flaws or weaknesses in the conclusions Some of these points are of more historical interest to note how our concepts have evolved as we learn more about behavior and responses to natural diving in contrast to forced submersions in the laboratory As a result there is a degree of evaluation of some experiments on my part that may seem obvious or controversial to the specialist I have followed this plan at times in order to aid the reader who I hope is often an undergraduate or graduate student the nonspecialist and the layman in appreciating to some degree the level of dissatisfaction or skepticism about certain areas of research in diving physiology In view of historical boundaries in vertebrate biology the subject is of broad enough importance to catch the interest of a wide audience of readers if I have done my job well For example of the major epochal transitions or events there have been in vertebrate history three come immediately to mind 1 The transition from aquatic to aerial respiration which ultimately led to a broad occupation of terrestrial habitats 2 The development of endothermy

Life in the Open Ocean Joseph J. Torres, Thomas G. Bailey, 2022-01-14 Life in the Open Ocean Life in the Open Ocean The Biology of Pelagic Species provides in depth coverage of the different marine animal groups that form the communities inhabiting the ocean's pelagic realm This comprehensive

resource explores the physical environment foraging strategies energetics locomotion sensory mechanisms global and vertical distributions special adaptations and other characteristics of a wide array of marine taxa Bringing together the most recent information available in a single volume authors Joseph J Torres and Thomas G Bailey cover the Cnidaria stinging jellies the ctenophores comb jellies pelagic nemerteans pelagic annelids crustaceans cephalopods and pelagic gastropods invertebrate chordates as well as micronektonic and larger fishes such as sharks tunas mackerels and mahi mahi Detailed chapters on each pelagic group describe internal and external anatomy classification and history feeding and digestion bioluminescent systems and their function reproduction and development respiration excretion nervous systems and more The first book of its kind to address all of the major animal groups comprising both the swimmers and drifters of the open sea this important resource Explains how different animals have adapted to live in the open ocean environment Covers all sensory mechanisms of animals living in the pelagic habitat including photoreception mechanoreception and chemoreception Treats the diverse micronekton assemblage as a community Includes a thorough introduction to the physical oceanography and properties of water in the pelagic realm Life in the Open Ocean The Biology of Pelagic Species is an excellent senior level undergraduate and graduate textbook for courses in biology and biological oceanography and a valuable reference for all those with interest in open ocean biology *Globalized Poverty and Environment* Nathaniel O. Agola, Joseph L.

Awange, 2014-07-08 This book reviews the key conceptions and economic theories of poverty explains poverty environment nexus and finally offers innovative socio economic and scientific geospatial solutions for the 21st Century The book makes it possible for our readers to understand poverty thorough a concise review of the major theoretical economic frameworks measures of poverty and points out the need to understand rural urban dichotomy of poverty We find the theories and measures to be less than perfect and therefore point out the need to treat these measures and theories as convenient tools lacking perfect accuracy and utmost scientific reliability It follows then that the supposedly knowledgeably crafted poverty reduction and environmental preservation solutions are inherently imperfect The economic solutions proposed in this book transcend extant humdrum macroeconomic and policy measures targeting poverty and environmental issues We point to a new paradigm in which private sector and other stakeholders can create new and inclusive markets where value is co created and shared Above all this book offers timely state of the art geospatial solutions targeting the most pressing global problems of water e g the use of the Gravity Recovery and Climate Experiment GRACE missions to estimate changes in stored water in the water poverty environment nexus pollution agriculture and disaster management where geospatial techniques are applied under strong environmental impact assessment regulatory regimes This book provides a good summary of economic theories of poverty as well as a vivid depiction of the state of environmental degradation in the world People often work separately on different issues that are in fact closely intertwined The principle of holism is that the whole is greater than the sum of its parts and I believe that this joint venture of two experts on poverty and environment has produced something more

than a sum of two separate monographs on the issues Various points raised in this volume are worth heeding when we think of formulation and implementation of a truly effective post MDGs development agenda Yoichi Mine Professor of Human Security and African Area Study Graduate School of Global Studies Doshisha University Japan Marine Mammal Physiology Michael A. Castellini, Jo-Ann Mellish, 2015-11-18 Suppose you were designing a marine mammal What would you need to think about to allow it to live in the ocean How would you keep it warm What would you design to allow it to dive for very long periods to extreme depths Where would it find water to drink How would you minimize the cost of swimming and how would it find its prey in the deep an **Physiological Adaptations in Vertebrates** Alan Hargens, 1991-10-31 This volume originates from a symposium held in Copenhagen in June 1989 to commemorate Kjell Johansen who died March 4 1987 The volume begins with a nonscientific but fascinating glimpse at Kjell followed by an overview of the kinds of physiology that interested him i e adaptational environme Environmental Geoinformatics Joseph L. Awange, John B. Kyalo Kiema, 2013-06-13 There is no doubt that today perhaps more than ever before humanity faces a myriad of complex and demanding challenges These include natural resource depletion and environmental degradation food and water insecurity energy shortages diminishing biodiversity increasing losses from natural disasters and climate change with its associated potentially devastating consequences such as rising sea levels These human induced and natural impacts on the environment need to be well understood in order to develop informed policies decisions and remedial measures to mitigate current and future negative impacts To achieve this continuous monitoring and management of the environment to acquire data that can be soundly and rigorously analyzed to provide information about its current state and changing patterns and thereby allow predictions of possible future impacts are essential Developing pragmatic and sustainable solutions to address these and many other similar challenges requires the use of geodata and the application of geoinformatics This book presents the concepts and applications of geoinformatics a multidisciplinary field that has at its core different technologies that support the acquisition analysis and visualization of geodata for environmental monitoring and management We depart from the 4D to the 5D data paradigm which defines geodata accurately consistently rapidly and completely in order to be useful without any restrictions in space time or scale to represent a truly global dimension of the digital Earth The book also features the state of the art discussion of Web GIS The concepts and applications of geoinformatics presented in this book will be of benefit to decision makers across a wide range of fields including those at environmental agencies in the emergency services public health and epidemiology crime mapping environmental management agencies tourist industry market analysis and e commerce or mineral exploration among many others The title and subtitle of this textbook convey a distinct message Monitoring the passive part in the subtitle refers to observation and data acquisition whereas management the active component stands for operation and performance The topic is our environment which is intimately related to geoinformatics The overall message is all the mentioned elements do interact and must not be separated Hans Peter Bahr Prof Dr Ing Dr h c

Karlsruhe Institute of Technology KIT Germany *Water Pollution and Fish Physiology* Alan G. Heath, 2018-02-06 This book provides a concise synthesis of how toxic chemical pollutants affect physiological processes in teleost fish This Second Edition of the well received *Water Pollution and Fish Physiology* has been completely updated and chapters have been added on immunology and acid toxicity The emphasis as in the first edition is on understanding mechanisms of sublethal effects on fish and their responses to these environmental stressors The first chapter covers the basic principles involved in understanding how fish respond in general to environmental alterations Each subsequent chapter is devoted to a particular organ system or physiological function and begins with a short overview of normal physiology of that system function This is followed by a review of how various toxic chemicals may alter normal conditions in fish Chapters covering environmental hypoxia behavior cellular enzymes and acid toxicity are also included The book closes with a discussion on the practical application of physiological and biochemical measurements of fish in water pollution control in research and regulatory settings Biochemical Adaptation Peter William Hochachka, George N. Somero, 2002 Suitable for graduates and

undergraduates in environmental biology comparative physiology and marine biology this text lays out the principles of mechanistic comparative physiology in an ecological and evolutionary context This text lays out the principles of mechanistic comparative physiology in an ecological and evolutionary context The subject of evolutionary physiology has been advancing considerably and this book will bring readers up to date on a number of new techniques ideas and data Topics include NMR spectroscopy and molecular biology evolution and adaptation phylogenetically based analytical techniques and more

Intensive Care in Neurology and Neurosurgery Daniel Agustin Godoy, Gustavo Rene Piñero, 2013-03 Neuromonitoring is the tool of trade in intensive care and should incorporate cutting edge technology with patience repeated clinical observation careful identification of neuroworsening The aim of the book is to be of practical use and to assist the clinical practice of the busy physician The clinical examination belongs to the introductory section of the book and an abundance of technology with specific emphasis on the importance of intracranial pressure comes in the following parts Since the patient with an injured brain can have chances only if other organs and systems as the lungs and the acid base equilibrium etc are preserved a section of the book covers the interactions between the affected brain and other organs The way the brain reacts to different insults has common aspects as inflammatory responses edema etc but also specific features Sections five to nine summarize the most relevant pathologies from ischemic to hemorrhagic lesions trauma tumors etc and also mentions new comers as the specific problems related to the expanding field of neuroradiological interventions Finally neurointensive care does not exist without knowledgeable nurses The intracranial pressure measurement starts or unfortunately ends with a catheter well maintained and that becomes vital when the drainage of hydrocephalus is concerned Dealing with patients with severe brain damage has plenty of ethical implications up to the problems related to brain death and organ donation This book is published in two volumes **Hypoxia** Robert C. Roach, Peter D. Wagner, Peter H. Hackett, 2012-12-06 The International

Hypoxia Symposium convenes biannually to bring together international experts from many fields to explore the state of the art in normal and pathophysiological responses to hypoxia. Representatives from five continents and 32 countries joined together in February 2003 for four days in the dramatic mountains of Banff, Alberta. As editors of the Proceedings of the International Hypoxia Symposia, we strive to maintain a 26-year tradition of presenting a stimulating blend of clinical and basic science papers focused on hypoxia. Topics covered in 2003 include hibernation and hypoxia, hypoxia and fetal development, and new advances in high altitude pathophysiology, oxidative stress, and membrane damage, hypoxic regulation of blood flow, heat shock proteins in hypoxia, and future directions in hypoxia research. In 2003 we also had the privilege of honoring John W. Severinghaus as a friend, colleague, mentor, and inspiration to many in the field. Tom Hornbein's personal tribute to John Severinghaus is the first chapter in this volume, followed by an entertaining update of the history of the discovery of oxygen, written by John Severinghaus.

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