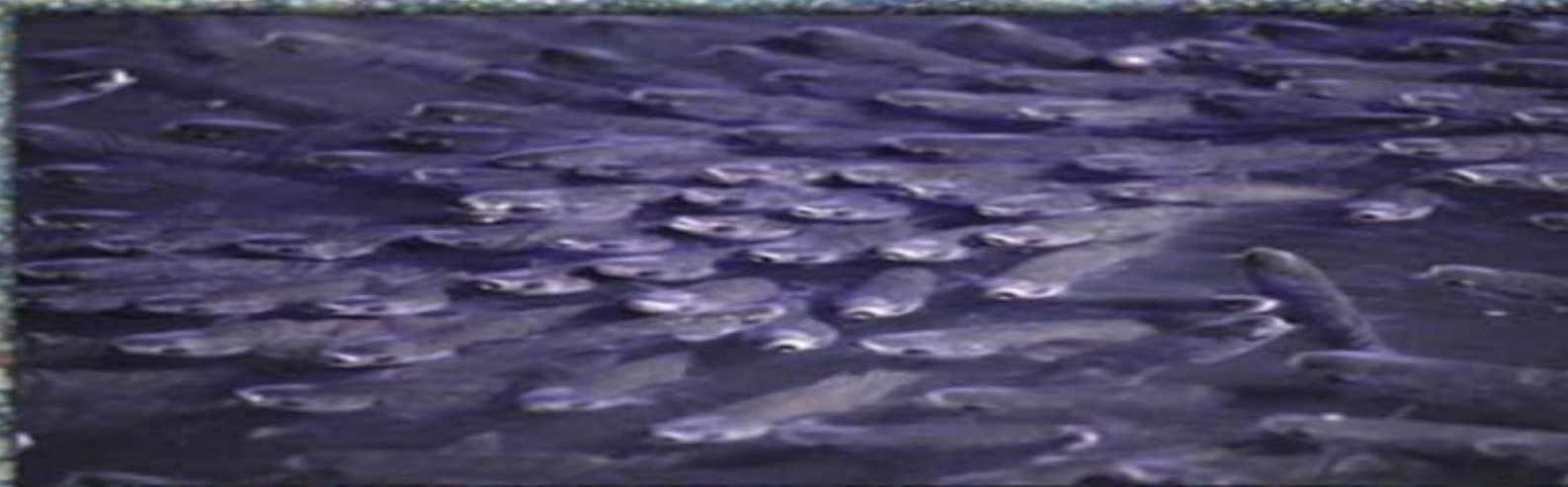


Fish Physiology
Volume 27

Hypoxia



Jeffrey G. Richards
Anthony P. Farrell
Colin J. Brauner

SERIES EDITORS: Anthony P. Farrell and Colin J. Brauner



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Fish Physiology: Hypoxia Jeffrey G. Richards, Anthony Farrell, Colin Brauner, 2009-03-10 Periods of environmental hypoxia Low Oxygen Availability are extremely common in aquatic systems due to both natural causes such as diurnal oscillations in algal respiration seasonal flooding stratification under ice cover in lakes and isolation of densely vegetated water bodies as well as more recent anthropogenic causes e g eutrophication In view of this it is perhaps not surprising that among all vertebrates fish boast the largest number of hypoxia tolerant species hypoxia has clearly played an important role in shaping the evolution of many unique adaptive strategies These unique adaptive strategies either allow fish to maintain function at low oxygen levels thus extending hypoxia tolerance limits or permit them to defend against the metabolic consequences of oxygen levels that fall below a threshold where metabolic functions cannot be maintained The aim of this volume is two fold First this book will review and synthesize the adaptive behavioural morphological physiological biochemical and molecular strategies used by fish to survive hypoxia exposure and place them within an environmental and ecological context Second through the development of a synthesis chapter this book will serve as the cornerstone for directing future research into the effects of hypoxia exposures on fish physiology and biochemistry The only single volume available to provide an in depth discussion of the adaptations and responses of fish to environmental hypoxia Reviews and synthesizes the adaptive behavioural morphological physiological biochemical and molecular strategies used by fish to survive hypoxia exposure Includes discussion of the evolutionary and ecological consequences of hypoxia exposure in fish

Fish Physiology: Hypoxia William Stewart Hoar, 1969 Hypoxia Richards J. G., Farrell A. P., Brauner C. J., 2009

Hypoxia Jeffrey G. Richards, Anthony Peter Farrell, Colin J. Brauner, 2009 Annotation Periods of environmental hypoxia Low Oxygen Availability are extremely common in aquatic systems due to both natural causes such as diurnal oscillations in algal respiration seasonal flooding stratification under ice cover in lakes and isolation of densely vegetated water bodies as well as more recent anthropogenic causes e g eutrophication In view of this it is perhaps not surprising that among all vertebrates fish boast the largest number of hypoxia tolerant species hypoxia has clearly played an important role in shaping the evolution of many unique adaptive strategies These unique adaptive strategies either allow fish to maintain function at low oxygen levels thus extending hypoxia tolerance limits or permit them to defend against the metabolic consequences of oxygen levels that fall below a threshold where metabolic functions cannot be maintained The aim of this volume is two fold First this book will review and synthesize the adaptive behavioural morphological physiological biochemical and molecular strategies used by fish to survive hypoxia exposure and place them within an environmental and ecological context Second through the development of a synthesis chapter this book will serve as the cornerstone for directing future research into the effects of hypoxia exposures on fish physiology and biochemistry *Fish Physiology: Hypoxia* Jeffrey G. Richards, Anthony Farrell, Colin Brauner, 2009 Periods of environmental hypoxia Low Oxygen Availability are extremely common in aquatic

systems due to both natural causes such as diurnal oscillations in algal respiration seasonal flooding stratification under ice cover in lakes and isolation of densely vegetated water bodies as well as more recent anthropogenic causes e.g. eutrophication. In view of this it is perhaps not surprising that among all vertebrates fish boast the largest number of hypoxia tolerant species. Hypoxia has clearly played an important role in shaping the evolution of many unique adaptive strategies. These unique adaptive strategies either allow fish to maintain function at low oxygen levels thus extending hypoxia tolerance limits or permit them to defend against the metabolic consequences of oxygen levels that fall below a threshold where metabolic functions cannot be maintained. The aim of this volume is two fold. First this book will review and synthesize the adaptive behavioural morphological physiological biochemical and molecular strategies used by fish to survive hypoxia exposure and place them within an environmental and ecological context. Second through the development of a synthesis chapter this book will serve as the cornerstone for directing future research into the effects of hypoxia exposures on fish physiology and biochemistry.

Encyclopedia of Fish Physiology, 2011-06-01

Fish form an extremely diverse group of vertebrates. At a conservative estimate at least 40% of the world's vertebrates are fish. On the one hand they are united by their adaptations to an aquatic environment and on the other they show a variety of adaptations to differing environmental conditions often to extremes of temperature salinity oxygen level and water chemistry. They exhibit an array of behavioural and reproductive systems. Interesting in their own right this suite of adaptive physiologies provides many model systems for both comparative vertebrate and human physiologists. This four volume encyclopedia covers the diversity of fish physiology in over 300 articles and provides entry level information for students and summary overviews for researchers alike. Broadly organised into four themes articles cover Functional Thematic and Phylogenetic Physiology and Fish Genomics. Functional articles address the traditional aspects of fish physiology that are common to all areas of vertebrate physiology including Reproduction Respiration Neural Sensory Central Effector Endocrinology Renal Cardiovascular Acid base Balance Osmoregulation Ionoregulation Digestion Metabolism Locomotion and so on. Thematic Physiology articles are carefully selected and fewer in number. They provide a level of integration that goes beyond the coverage in the Functional Physiology topics and include discussions of Toxicology Air breathing Migrations Temperature Endothermy etc. Phylogenetic Physiology articles bring together information that bridges the physiology of certain groupings of fishes where the knowledge base has a sufficient depth and breadth and include articles on Ancient Fishes Tunas Sharks etc. Genomics articles describe the underlying genetic component of fish physiology and highlight their suitability and use as model organisms for the study of disease stress and physiological adaptations and reactions to external conditions. Winner of a 2011 PROSE Award Honorable Mention for Multivolume Science Reference from the Association of American Publishers. The definitive encyclopedia for the field of fish physiology. Three volumes which comprehensively cover the entire field in over 300 entries written by experts. Detailed coverage of basic functional physiology of fishes physiological themes in fish biology and comparative physiology.

amongst taxonomic Groups Describes the genomic bases of fish physiology and biology and the use of fish as model organisms in human physiological research Includes a glossary of terms

The 50th Anniversary Issue of Fish Physiology, 2023-11-09 The series Fish Physiology recently celebrated its 50th Anniversary In total the editors of the series have produced a total of 47 books several volumes have two books that contain almost 500 chapters since the inaugural volume published in 1969 The content of the Fish Physiology volumes has evolved over time The initial volumes were devoted to understanding the basic mechanisms and principles of fish physiology with a focus on a few model species and some application to natural environmental conditions Then as the field better understood mechanisms the approach was broadened to not only delve deeper into system physiology e g chapters in early volumes were expanded to become books but interspecific differences in physiology were explored permitting a more evolutionary framework Finally as interspecific physiological mechanisms were further resolved it became possible to discuss physiology in light of a changing world Thus physiology can now inform on conservation sustainability and management as exemplified with the most recent volumes This anniversary issue celebrates the series by highlighting some of the very important early work in the field that was published in the Series In particular we wished to re introduce new researchers to this research that has stood the test of time and that shaped the field Each re published chapter is preceded by a short review written by experts in the field to provide an overview introduction of each selected chapter discuss what is particularly noteworthy or important in the particular chapter and discuss why in their opinion this chapter has become a classic in its own right and how it has inspired the field of fish physiology today Reviews written by experts in the field of some of the early influential chapters from the series Fish Physiology Highlights how some of this early work in the series Fish Physiology has stood the test of time and shaped the field today Reintroduces some of the early influential work in the series Fish Physiology to new researchers in the field

Fish Physiology: The Physiology of Tropical Fishes Adalberto Luis Val, Vera Maria Fonseca de Almeida e Val, David J. Randall, 2005-08-18 The Physiology of Tropical Fishes is the 21st volume of the well known Fish Physiology series and consists of 12 chapters The purpose of the book is to consolidate and integrate what is known about tropical fishes marine and freshwater species The twelve chapters focus on the physiological adaptations acquired during the evolutionary process to cope with warm and shallow hypoxic waters from tropical and neotropical hydrographic basins as well as with the intertidal and coral reef habitats which occur in abundance in tropical seas The special characteristics of tropical fish fauna will be issued in order to explain the tropical fish radiation which gave rise to such extreme fish diversity This present volume is a voyage through the tropical region reviewing the fish diversity of the main tropical freshwater sheds including the major tropical rivers and lakes the major dams and marine environments State of the art information on tropical fish physiology Written by specialists working in the Tropics Offers a diverse depiction of the various tropical fishes and the environment where they inhabit 12 innovative chapters covering a concise view of growth rate biological rhythms feeding plasticity cardio

respiratory design and function diversity of structure and much more **Gills. Pt. A** William Stewart Hoar, David J. Randall, 1984 *Stressors in the Marine Environment* Martin Solan, Nia M. Whiteley, 2016 A multitude of direct and indirect human influences have significantly altered the environmental conditions composition and diversity of marine communities However understanding and predicting the combined impacts of single and multiple stressors is particularly challenging because observed ecological feedbacks are underpinned by a number of physiological and behavioural responses that reflect stressor type severity and timing Furthermore integration between the traditional domains of physiology and ecology tends to be fragmented and focused towards the effects of a specific stressor or set of circumstances This novel volume summarises the latest research in the physiological and ecological responses of marine species to a comprehensive range of marine stressors including chemical and noise pollution ocean acidification hypoxia UV radiation thermal and salinity stress before providing a perspective on future outcomes for some of the most pressing environmental issues facing society today *Stressors in the Marine Environment* synthesises the combined expertise of a range of international researchers providing a truly interdisciplinary and accessible summary of the field It is essential reading for graduate students as well as professional researchers in environmental physiology ecology marine biology conservation biology and marine resource management It will also be of particular relevance and use to the regulatory agencies and authorities tasked with managing the marine environment including social scientists and environmental economists Fish Physiology Jeffrey G. Richards, William Stewart Hoar, Anthony Peter Farrell, David J. Randall, Colin J. Brauner, 1969 *Fish Physiology: The Physiology of polar fishes* William Stewart Hoar, 1969 Insights in aquatic physiology: 2021 Pung Pung Hwang, Anna Di Cosmo, Silvia Franzellitti, 2023-05-24 *Endocrine regulation and physiological adaptation of stress response in aquatic organisms* Yiming Li, Yi-Feng Li, Marco António Campinho, Juan Fuentes, 2024-04-16 **Fish Physiology** William Stewart Hoar, David J. Randall, 1969 *Fish Physiology, Toxicology, and Water Quality* David Randall, Dung Yuk Man Mandy, 2006 Surviving Hypoxia Peter W. Hochachka, Peter L. Lutz, Thomas J. Sick, Myron Rosenthal, 1993-03-24 *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

The physiology of developing fish William Stewart Hoar, David J. Randall, 1988 *Fish Larval Physiology* Roderick Nigel Finn, B.G. Kapoor, 2008-01-07 This book is intended as a resource for students and researchers interested in developmental biology and physiology and specifically addresses the larval stages of fish Fish larvae and fish embryos are not small juveniles or adults Rather they are transitional organisms that bridge the critical gap between the single-celled egg and sexually immature juvenile Fish larvae represent the stage of the life cycle that is used for differentiation feeding and distribution The book aims at providing a single volume treatise that explains how fish larvae develop and differentiate how they regulate salt water and acid base balance how they transport and exchange gases acquire and utilise energy how they sense their environment and move in their aquatic medium how they control and defend themselves and finally how they grow up

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

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