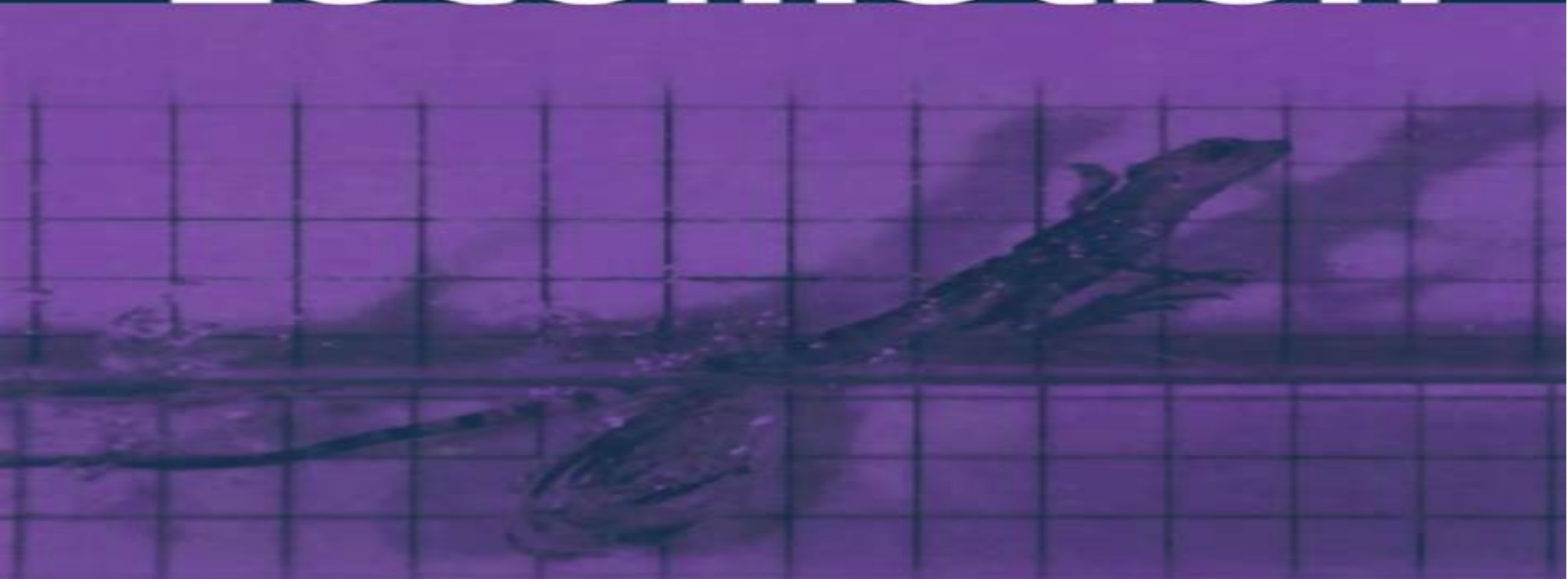


Andrew A. Biewener

Animal Locomotion



OXFORD ANIMAL BIOLOGY SERIES

Animal Locomotion Oxford Animal Biology Series

R. McNeill Alexander



Animal Locomotion Oxford Animal Biology Series:

Animal Locomotion Andrew A. Biewener, 2003-06-19 This book provides a clear foundation based on physical biology and biomechanics for understanding the underlying mechanisms by which animals have evolved to move in their physical environment. It integrates the biomechanics of animal movement with the physiology of animal energetics and the neural control of locomotion. The author also communicates a sense of the awe and fascination that comes from watching the grace, speed, and power of animals in motion. Movement is a fundamental distinguishing feature of animal life, and a variety of extremely effective mechanical and physiological designs have evolved. Common themes are observed for the ways in which animals successfully contend with the properties of a given physical environment across diversity of life forms and varying locomotor modes. Understanding the common principles of design that span a diverse array of animals requires a broad comparative and integrative approach to their study. This theme persists throughout the book as various modes and mechanisms of animal locomotion are covered. Since an animal's size is equally critical to its functional design, the effects of scale on locomotor energetics and mechanics are also discussed. Biewener begins by examining the underlying machinery for movement: skeletal muscles used for force generation, skeletons used for force transmission, and spring-like elements used for energy savings. He then describes the basic mechanisms that animals have evolved to move over land, in and on the surface of the water, and in the air. Common fluid dynamic principles are discussed as background to both swimming and flight. In addition to discussing the locomotor mechanisms of complex animals, the locomotor movement of single cells is also covered. Common biochemical features of cellular metabolism are then reviewed before discussing the energetic aspects of various locomotor modes. Strategies for conserving energy and moving economically are again highlighted in this section of the book. Emphasis is placed on comparisons of energetic features across locomotor modes. The book concludes with a discussion of the neural control of animal locomotion. The basic neurosensory and motor elements common to vertebrates and arthropods are discussed, and features of sensorimotor organization and function are highlighted. These are then examined in the context of specific examples of how animals control the rhythmic patterns of limb and body movement that underlie locomotor function and stability.

Animal Locomotion Andrew Biewener, Sheila Patek, 2018-03-23 Animals have evolved remarkable biomechanical and physiological systems that enable their rich repertoire of motion. *Animal Locomotion* offers a fundamental understanding of animal movement through a broad comparative and integrative approach, including basic mathematics and physics, examination of new and enduring literature, consideration of classic and cutting-edge methods, and a strong emphasis on the core concepts that consistently ground the dizzying array of animal movements. Across scales and environments, this book integrates the biomechanics of animal movement with the physiology of animal energetics and the neural control of locomotion. This second edition has been thoroughly revised, incorporating new content on non-vertebrate animal locomotor systems, studies of animal locomotion that have inspired robotic designs, and a new chapter on the use of

evolutionary approaches to locomotor mechanisms and performance

Energy for Animal Life R. McNeill

Alexander,1999-01-28 The Oxford Animal Biology Series is an innovative new series of supplementary undergraduate texts in comparative animal biology Topics within each book are addressed using examples from throughout the animal kingdom looking for parallels that transcend taxonomy Further reading sections will guide the student into the literature at greater depth The series will be international in scope both in terms of the species used as examples and in references to scientific work Energy for Animal Life the first book in the series is about how animals get energy and how they use it a central topic in our understanding of animal biology Life depends on energy and much of the activity of animals is devoted to getting the food which is their energy source It encompasses the food chain from solar radiation and photosynthesis to food sources for herbivores and for carnivores and compares the merits of different designs of digestive system and of different strategies for finding and choosing food Of course animal energy isn't simply a question of feeding and several chapters in turn look at energy use The energy costs of motion of running swimming and flight are discussed in one chapter and the energetic demands of growth and reproduction in another A chapter on body temperature shows how the processes of life go faster at higher temperatures and discusses how animals regulate their temperature A final chapter draws all of these aspects of energy use together and considers the energy budgets of several different animals assessing the different energy gains and costs of their everyday activities in the wild The book is truly comparative drawing on examples from a wide range of animal species and lots of practical information on relevant experiments is included The style is very accessible and suitable as supplementary reading for first and second year undergraduates taking a degree course in biological sciences

Computational Modeling and Simulation of Quadrupedal Animal Movement Gina Bertocci,John R.

Hutchinson,Denis J. Marcellin-Little,Marcus G. Pandy,2022-08-17

Animal Osmoregulation Timothy J. Bradley,2009

Osmoregulation and water balance are essential topics in animal physiology This book starts with the physical properties of water and the influence that it has on biological design It then looks at the effect of the environment on physiology Finally it studies how the evolutionary history of the animal influences the solution employed Animal Architecture Michael Henry Hansell,2005-01-27 Construction behaviour occurs across the entire spectrum of the animal kingdom and affects the survival of both builders and other organisms associated with them Animal Architecture provides a comprehensive overview of the biology of animal building The book recognizes three broad categories of built structure homes traps and courtship displays Even though some of these structures are complex and very large the behaviour required to build them is generally simple and the anatomy for building unspecialized Standardization of building materials helps to keep building repertoires simple while self organizing effects help create complexity In a case study approach to function insects demonstrate how homes can remain operational while they grow spiderwebs illustrate mechanical design and the displays of bowerbirds raise the possibility of persuasion through design rather than just decoration Studies of the costs to builders provide evidence of

optimal designs and of trade offs with other life history traits As ecosystem engineers the influence of builders is extensive and their effect is generally to enhance biodiversity through niche construction Animal builders can therefore represent model species for the study of the emerging subject of environmental inheritance Building and in particular building with silk has been demonstrated to have important evolutionary consequences This book is intended for students and researchers in comparative animal biology but will also be of relevance and use to the increasing numbers of architects and civil engineers interested in developing ideas from the animal kingdom

Animal Eyes Michael F. Land, Dan-Eric Nilsson, 2012-03-01
Animal Eyes provides a comparative account of all known types of eye in the animal kingdom outlining their structure and function with an emphasis on the nature of the optical systems and the physical principles involved in image formation A universal theme throughout the book is the evolution and taxonomic distribution of each type of eye and the roles of different eye types in the behaviour and ecology of the animals that possess them In comparing the specific capabilities of eyes it considers the factors that lead to good resolution of detail and the ability to function under a wide range of light conditions This new edition is fully updated throughout incorporating more than a decade of new discoveries and research

Animal Architecture Mike Hansell, 2004-12-23
Construction behaviour occurs across the entire spectrum of the animal kingdom and affects the survival of both builders and other organisms associated with them Animal Architecture provides a comprehensive overview of the biology of animal building The book recognizes three broad categories of built structure homes traps and courtship displays Even though some of these structures are complex and very large the behaviour required to build them is generally simple and the anatomy for building unspecialized Standardization of building materials helps to keep building repertoires simple while self organizing effects help create complexity In a case study approach to function insects demonstrate how homes can remain operational while they grow spiderwebs illustrate mechanical design and the displays of bowerbirds raise the possibility of persuasion through design rather than just decoration Studies of the costs to builders provide evidence of optimal designs and of trade offs with other life history traits As ecosystem engineers the influence of builders is extensive and their effect is generally to enhance biodiversity through niche construction Animal builders can therefore represent model species for the study of the emerging subject of environmental inheritance Building and in particular building with silk has been demonstrated to have important evolutionary consequences This book is intended for students and researchers in comparative animal biology but will also be of relevance and use to the increasing numbers of architects and civil engineers interested in developing ideas from the animal kingdom

Insect Ecomorphology Oliver Betz, 2025-02-25
Insect Ecomorphology Linking Functional Insect Morphology to Ecology and Evolution offers the most up to date knowledge and understanding of the morphology of insects and the functional basis of their diversity This book covers the form and function of insect body structures synthesized with their physiological performance capabilities biological roles and evolutionary histories Written by international experts this book provides a modern outline of the topic exploring the

ecomorphology of functional systems such as insect feeding locomotion sensing and reproduction The combination of conceptual and review chapters methodological approaches and case studies enables readers to delve into active research fields and attain a general idea of the explanatory power of the form function performance paradigm The book uncovers key structures of the different regions of the insect body elucidates how they function and investigates their ecological and evolutionary implications Insect Ecomorphology Linking Functional Insect Morphology to Ecology and Evolution is a vital resource for entomologists biologists and zoologists especially those seeking to better understand the morphology and physiological impacts tying insects to environments and evolution Integrates traditionally separate fields of research with the aim of understanding insect morphology ecology and evolution Considers the impacts of insect ecomorphology on biomimetic applications Includes conceptual and methodological chapters to help readers appreciate the ways in which ecomorphological studies are performed

Advanced Topics on Computer Vision, Control and Robotics in Mechatronics Osslan Osiris Vergara Villegas, Manuel Nandayapa, Israel Soto, 2018-04-28 The field of mechatronics which is the synergistic combination of precision mechanical engineering electronic control and systems thinking in the design of products and manufacturing processes is gaining much attention in industries and academics It was detected that the topics of computer vision control and robotics are imperative for the successful of mechatronics systems This book includes several chapters which report successful study cases about computer vision control and robotics The readers will have the latest information related to mechatronics that contains the details of implementation and the description of the test scenarios

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web register in which he or she is speaking this utterance is grammatical i e produced by the grammar of a native speaker for speakers of several different dialects of english and appropriate in different registers for those dialects a descriptive grammar therefore will specify many rules for structures in which no native speaker will

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sep 11 2022 the script has even transitioned to the screen licensing a few of their singles for use on u s shows such as 90210 and the vampire diaries and u k programs

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observing mitosis lab background in a growing plant root the cells at the tip of the root are constantly dividing to allow the root to grow because each cell divides independently of the others a root tip contains cells at different stages of the cell cycle

this makes a root tip an excellent tissue to study the stages of cell division

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these regions of growth are good for studying the cell cycle because at any given time you can find cells that are undergoing mitosis in order to examine cells in the tip of an onion root a thin slice of the root is placed onto a microscope slide and stained so the chromosomes will be visible the cells you ll be looking at in this activity

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compare and contrast mitosis and meiosis both mitosis and meiosis are involved in making new cells both start with diploid 2 sets of chromosomes o interphase occurs before both duplicating chromosomes before division o both mitosis and meiosis go through pmat prophase metaphase anaphase telophase meiosis goes through pmat twice i

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the cell cycle results in the formation of two genetically identical daughter cells from the division of a parent cell in this lab you will be observing plant cells onion in the various stages of mitosis and make time calculations based on the data you collect

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observing mitosis analysis and conclusion questions 1 mitosis is much the same in animal cells as in the plant cells you have examined what can you infer from this about the origins of mitosis a i can infer that the start of cell all came from one cell and where that cell came from we do not know but it was the start from that cell it when through the process of binary fission

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mitosis phases of mitosis mitosis questions bacterial binary fission science biology library cell division the cell cycle and mitosis mitosis questions google classroom this cell is in which stage of mitosis choose 1 answer a b c d e

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mitosis introduction in this lab you will examine the dividing root tip cells of an onion you will examine the specimen to identify the various phases of the cell cycle to see which phases cells spend more time in and you will answer related analysis questions to further your understanding of the eukaryotic cell cycle pre lab

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sep 14 2021 the process of mitosis is only a short period of the lifespan of cells mitosis is traditionally divided into four stages prophase metaphase anaphase and telophase the actual events of mitosis are not discreet but occur in a continuous sequence separation of mitosis into four stages is merely convenient for our discussion and organization

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jul 25 2019 procedure 1 create a data table with the following headings across the top number of cells percentage of all

cells time min and the stages of mitosis down the side prophase metaphase anaphase telophase 2 carefully put the slide on the microscope and focus it under low power 40x is preferred 3

dna observing mitosis name siti nur fazlina noordeen - Mar 07 2022

feb 23 2022 many cells will be in various stages of mitosis number of words 244 words aim to study the image of onion cells under a microscope and identify actively dividing cells throughout mitosis during the cell cycle s phases materials and methods refer to the practical activity handout dna observing mitosis results

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discuss the answers to the questions with a partner think pair share and then the class activity 2 observe the stages of mitosis in onion root cells plant cells also use mitosis for growth maintenance and repair

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after completing this lab exercise you should be able to identify and describe the stages of the cell cycle mitosis and meiosis recognizing the events that occur during each stage distinguish between mitosis and cytokinesis as they take place in animal and plant cells

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the onion root is also a good place because this is the area where the plant is growing remember that when cells divide each new cell needs an exact copy of the dna in the parent cell this is why mitosis is only visible in cells that are dividing like the whitefish embryo and the onion root tip mitosis can take several hours to complete

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exercise 1 observing mitosis under the microscope examine prepared slides of both plant cells onion allium root tip and animal cells whitefish blastula under the microscope at 400x

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in general mitosis occurs through several stages that include prophase divided into prophase and prometaphase metaphase anaphase telophase because of the rapid rate at which onion root tips grow as a result of rapid cell division it s possible to observe and identify the different stages of mitosis

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observe mitosis in root tips practical activities have been safety checked but not trialled by cleapss users may need to adapt the risk assessment information to local circumstances core practical 3 observe mitosis in root tips objectives know how to prepare a temporary slide of a root tip to observe mitosis

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feb 7 2017 view under a microscope and identify the stages of mitosis results calculations the percentage of cells in each

stage of mitosis can be observed and noted down a mitotic index can also be formed number of cells containing visible chromosomes total number of cells in the field of view conclusion

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exercise 2 observing mitosis in cells in this exercise you will observe the steps of mitosis in both plant and animal cells

procedure review the images of onion root tip cells undergoing the different phases of mitosis shown in figure 10 figure 10

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to study and demonstrate the mitotic type of cell division using the onion root tip cells mitosis results in the formation of two daughter cells that are identical to each other learn how the experiment is carried out

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