

Animal Eyes Oxford Animal Biology

Vision is the sense by which we and other animals obtain most of our information about the world around us. Darwin appreciated that at first sight it seems absurd that the human eye could have evolved by natural selection. But we now know far more about vision, the many times it has independently evolved in nature, and the astonishing variety of ways to see. The human eye, with a lens forming an image on a sensitive retina, represents just one. Scallops, shrimps, and lobsters all use mirrors in different ways. Jumping spiders scan with their front-facing eyes to check whether the object in front is an insect to eat, another spider to mate with, or a predator to avoid. Mantis shrimps can even measure the polarization of light. Animal eyes are amazing structures, often involving precision optics and impressive information processing, mainly using wet protein - not the substance an engineer would choose for such tasks. In *Eyes to See*, Michael Land, one of the leading world experts on vision, explores the varied ways in which sight has evolved and is used in the natural world. Land and his colleagues have used to uncover its secrets. He also discusses human vision, including his experiments on how our eye movements help us to do everyday tasks, as well as skilled ones such as sight-reading music or driving. He ends by considering the fascinating problem of how the constantly shifting images from our eyes are converted in the brain into the steady and integrated conscious view of the world we experience.

"This publication is issued on the occasion of the exhibition Book of Beasts: The Bestiary in the Medieval World, on view at the J. Paul Getty Museum at the Getty Center, Los Angeles, from May 14 to August 18, 2019."

This book explores in detail how and why animals, including humans, cooperate with one another in conflicts with other members of their own species, and examines the difference such help makes to their lives and to the nature of the societies in which they live.

Arising from the 2019 Darwin College Lectures, this book presents essays from seven prominent public intellectuals on the theme of vision. Each author examines this theme through the lens of their own particular area of expertise, making for a lively interdisciplinary volume including chapters on neuroscience, colour perception, biological evolution, astronomy, the future of technology, computer vision, and the visionary core of science. Featuring contributions by professors of neuroscience Paul Fletcher and Anya Hurlbert, professor of zoology Dan-Eric Nilsson, the futurist Sophie Hackford, Microsoft distinguished scientist Andrew Blake, theoretical physicist and author Carlo Rovelli, and Dr Carolin Crawford, the Public Astronomer at the University of Cambridge, this volume will be of interest to anybody curious about how we see the world.

Animals perform many athletic tasks to an amazing degree of accomplishment: not only spectacular feats of running and jumping but also routine actions that ensure survival such as feeding, vocalization, diving, flying, and many more. The study of performance capacity (defined as the ability of an animal to conduct a key task) is of great interest to both ecologists and evolutionary biologists. At an ecological level, how well individuals perform often dictates opportunities for reproduction, occupation of preferred territories, or capturing prey. Therefore, performance capacities can be a key determinant of variation in fitness within animal populations. At an evolutionary level, variation in function often follows closely from variation in form, and therefore enables animals to invade novel habitats, or to overtake other species. This novel book examines how and why animal athletes have evolved. It uses examples from across the animal kingdom and integrates them in the broader context of ecology and evolution, thereby identifying common themes that transcend taxonomic divisions. Animal Athletes is an accessible textbook of particular relevance to undergraduates, graduate students, researchers, and professionals in the fields of evolutionary biology, ecology, vertebrate morphology, and functional morphology.

The Evolution of the Eye

Convergent Evolution

The Science Behind the Fables

How Animals Illuminate the Wonder of Our Human Senses

Animal Rights

Respiratory Biology of Animals

This is a comprehensive survey of binocular vision, with an emphasis on its role in the perception of a three-dimensional world. The central theme is biological vision. Machine vision and computational models are discussed where they contribute to an understanding of living systems.

Animal Osmoregulation collates a widely dispersed literature to produce a comprehensive and authoritative synthesis of the field, providing detailed examples of osmoregulatory processes at the organismal, organ and cellular level. It incorporates clear background information on ion regulation and transport (specifically in the light of recent molecular studies) and illustrates the physical principles to which each organism must adhere, as well as thephylegenetic constraints within which it must operate.

This book presents interdisciplinary research to examine the ongoing debates around nonhuman animals in urban spaces. It explores how we can better appreciate and accommodate animals in the city, while also exploring the ecological, health, ethical, and cultural implications of the same. The book addresses seven interrelated themes such as blurred boundaries between the human and the nonhuman, the right of nonhuman species to the city, interactions between the human and nonhuman animals, the fabric of urban space, human and nonhuman complex systems, and collective welfare that forms the basis of a transpecies urban theory. It explains how a holistic understanding of the city requires that these blurred boundaries are acknowledged and critically examined. Chapters analytically consider the need to bring interspecies relationships to the fore to tackle questions of legitimacy and who has the "right" to the city. These also consider important intersections between the economic, political, social, and cultural aspects of the urban experience. The research contained in this book focuses on the development of an urban theory that would eradicate the divide between humans and other species in cities, and it depicts nonhuman animals as social actors that have voices within urban spaces. With global insights on human–animal relationships in a contemporary context, this book will be useful reading for scholars and students of urban studies, animal sciences, animal law, animals and public policy, anthropology, and environmental studies who are interested in the study of animals in cities.

This textbook is intended for use in a course for undergraduate students in biology, neuroscience or psychology who have had an introduction on the structure and function of the nervous system. Its primary purpose is to provide a working vocabulary and knowledge of the biology of vision and to acquaint students with the major themes in biological vision research. Part I treats the eye as an image-forming organ and provides an overview of the projections from the retina to key visual structures of the brain.

Part II examines the functions of the retina and its central projections in greater detail, building on the introductory material of Part I. Part III treats certain special topics in vision that require this detailed knowledge of the structure and properties of the retina and visual projections.

The perfect study companion, Animal Biology and Care, 3rd Edition is specifically designed for students on animal care, animal nursing assistant and veterinary care assistant courses. This edition is fully updated with new course content, a refreshed design and colour illustrations throughout. Basic biological theory is introduced with diagrams for visual learners while photographs demonstrate the common practical procedures carried out by animal care assistants. Key features include: New content on exotic species, recognising the increasing number of these animals kept as pets. Extensive coverage of the Animal Welfare Act 2006 and recent advances in animal welfare. Written in line with course curricula, chapter summaries help you to remember key points and learning objectives. A companion website has interactive MCQs to help you test your knowledge. Divided into three main sections covering animal science and genetics, health and husbandry and nursing procedures, this book will help lay the foundations for a successful career in animal care and management!

Book of Beasts

Comparative Behavior, Biology, and Evolution of Vision

The Optics of Life

Animal Camouflage

Binocular Vision and Stereopsis

Evolutionary and Functional Morphology

There are few creatures more beautiful, aloof, and fascinating than giraffes. Their social and ecological impact has been documented by many researchers. However, the inner workings of extant giraffes are less well known. That is why Graham Mitchell decided to write How Giraffes Work: a comprehensive overview of the anatomy, physiology, and biochemistry--in short, the normal functions--of a free-living, wild animal in its natural environment. A zoologist, veterinarian, and physiologist, Mitchell explains how giraffes get through their day. Additionally, he takes readers through the evolution of their physical characteristics, such as their size, shape, and coat markings. His approach integrates history with the physiology, anatomy, biochemistry, behavior, evolution, genetics, ecology, climate science, and more. Each chapter follows the discovery and utility of a different characteristic of giraffes. Illustrated with over two hundred figures and diagrams, the book explains how giraffes might have evolved and survived over many millions of years as well as how our perception of them has changed throughout history. So, how do giraffes work? The answers lie in a story filled not only with the details of their internal working but also with the labors of the extraordinary scientists who have put so many pieces of this puzzle together.

This book provides a series of comprehensive views on various important aspects of vertebrate photoreceptors. The vertebrate retina is a tissue that provides unique experimental advantages to neuroscientists. Photoreceptor neurons are abundant in this tissue and they are readily identifiable and easily isolated. These features make them an outstanding model for studying neuronal mechanisms of signal transduction, adaptation, synaptic transmission, development, differentiation, diseases and regeneration. Thanks to recent advances in genetic analysis, it also is possible to link biochemical and physiological investigations to understand the molecular mechanisms of vertebrate photoreceptors within a functioning retina in a living animal. Photoreceptors are the most deeply studied sensory receptor cells, but readers will find that many important questions remain. We still do not know how photoreceptors, visual pigments and their signaling pathways evolved, how they were generated and how they are maintained. This book will make clear what is known and what is not known. The chapters are selected from fields of vertebates that have contributed to a broad understanding of the birth, development, structure, function and death of photoreceptor neurons. The underlying common word in all of the chapters that is used to describe these mechanisms is "molecule". Only with this word can we understand how these highly specific neurons function and survive. It is challenging for even the foremost researchers to cover all aspects of the subject. Understanding photoreceptors from several different points of view that share a molecular perspective will provide readers with a useful interdisciplinary perspective.

In the last decade, research on the previously dormant field of camouflage has advanced rapidly, with numerous studies challenging traditional concepts, investigating previously untested theories and incorporating a greater appreciation of the visual and cognitive systems of the observer. Using studies of both real animals and artificial systems, this book synthesises the current state of play in camouflage research and understanding. It introduces the different types of camouflage and how they work, including background matching, disruptive coloration and obliterative shading. It also demonstrates the methodologies used to study them and discusses how camouflage relates to other subjects, particularly with regard to what it can tell us about visual perception. The mixture of primary research and reviews shows students and researchers where the field currently stands and where exciting and important problems remain to be solved, illustrating how the study of camouflage is likely to progress in the future.

The visual world of animals is highly diverse and often very different from that of humans. This book provides an extensive review of the latest behavioral and neurobiological research on animal vision, detailing fascinating species similarities and differences in visual processing.

Why do we find polar bears only in the Arctic and penguins only in the Antarctic? Why do oceanic islands often have many types of birds but no large native mammals? As Charles Darwin and Alfred Russel Wallace travelled across distant lands studying the wildlife they both noticed that the distribution of plants and animals formed striking patterns - patterns that held strong clues to the past of the planet. The study of the spatial distribution of living things is known as biogeography. It is a field that could be said to have begun with Darwin and Wallace. In this lively book, Denis McCarthy tells the story of biogeography, from the 19th century to its growth into a major field of interdisciplinary research in the present day. It is a story that encompasses two great, insightful theories that were to provide the explanations to the strange patterns of life across the world - evolution, and plate tectonics. We find animals and plants where we do because, over time, the continents have moved, separating and coalescing in a long, slow dance; because sea levels have risen, cutting off one bit of land from another, and fallen, creating land bridges; because new and barren volcanic islands have risen up from the sea; and because animals and plants vary greatly in their ability to travel, and separation has caused the formation of new species. The story of biogeography is the story of how life has responded and has in turn altered the ever changing Earth. It is a narrative that includes many fascinating tales - of pygmy mammoths and elephant birds; of changing landscapes; of radical ideas by bold young scientists first dismissed and later, with vastly growing evidence, widely accepted. The story is not yet done: there are still questions to be answered and biogeography is a lively area of research and debate. But our view of the planet has been changed profoundly by biogeography and its related fields: the emerging understanding is of a deeply interconnected system in which life and physical forces interact dynamically in space and time.

How Giraffes Work

Statistics for Veterinary and Animal Science

Eyes to See

The Bestiary in the Medieval World

Gene Sharing and Evolution

Banish your fears of statistical analysis using this clearlywritten and highly successful textbook. Statistics forVeterinary and Animal Science Third Edition is an introductorytext which assumes no previous knowledge of statistics. Itstarts with very basic methodology and builds on it to encompasssome of the more advanced techniques that are currently used. This book will enable you to handle numerical data and criticallyappraise the veterinary and animal science literature. Written in anon-mathematical way, the emphasis is on understanding theunderlying concepts and correctly interpreting computer output, andnot on working through mathematical formulae. Key features: Flow charts are provided to enable you to choose the correctstatistical analyses in different situations Numerous real worked examples are included to help you masterthe procedures Two statistical packages, SPSS and Stata, are used to analysedata to familiarise you with typical computer output The data sets from the examples in the book are available aselectronic files to download from the book's companionwebsite in ASCII, Excel, SPSS, and SAS formats This book provides you with a series of comprehensive views on various important aspects of vertebrate photoreceptors. The vertebrate retina is a tissue that provides unique experimental advantages to neuroscientists. Photoreceptor neurons are abundant in this tissue and they are readily identifiable and easily isolated. These features make them an outstanding model for studying neuronal mechanisms of signal transduction, adaptation, synaptic transmission, development, differentiation, diseases and regeneration. Thanks to recent advances in genetic analysis, it also is possible to link biochemical and physiological investigations to understand the molecular mechanisms of vertebrate photoreceptors within a functioning retina in a living animal. Photoreceptors are the most deeply studied sensory receptor cells, but readers will find that many important questions remain. We still do not know how photoreceptors, visual pigments and their signaling pathways evolved, how they were generated and how they are maintained. This book will make clear what is known and what is not known. The chapters are selected from fields of vertebates that have contributed to a broad understanding of the birth, development, structure, function and death of photoreceptor neurons. The underlying common word in all of the chapters that is used to describe these mechanisms is "molecule". Only with this word can we understand how these highly specific neurons function and survive. It is challenging for even the foremost researchers to cover all aspects of the subject. Understanding photoreceptors from several different points of view that share a molecular perspective will provide readers with a useful interdisciplinary perspective.

Adopts a broad, cross-taxonomic approach to animal movement across both temporal and spatial scales; addresses how and why animals move, and in what ways they differ in their locomotion and navigation performance; synthesizes our current knowledge of the genetics of movement/migration, including gene flow and local adaptations; provides a future perspective on how patterns of animal migration may change over time, together with the potential evolutionary consequences.--Provided by publisher
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 swimming, and flight are discussed in a chapter on the emerging demands of growth and reproduction in another. A chapter on 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 comprehensive, 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.

The animal world is immensely diverse, and our understanding of it has been greatly enhanced by analysis of DNA and the study of evolution and development ('evo-devo'). In this Very Short Introduction Peter Holland presents a modern tour of the animal kingdom. Beginning with the definition of animals (not obvious in biological terms), he takes the reader through the high-level groupings of animals (phyla) and new views on their evolutionary relationships based on molecular data, together with an overview of the biology of each group of animals. The phylogenetic view is central to zoology today and the volume will be of great value to all students of the life sciences, as well as providing a concise summary for the interested general reader. ABOUT THE SERIES: The Very Short Introductions series from Oxford University Press contains hundreds of titles in almost every subject area. These pocket-sized books are the perfect way to get ahead in a new subject quickly. Our expert authors combine facts, analysis, perspective, new ideas, and enthusiasm to make interesting and challenging topics highly readable. One of the only books to treat the whole spider, from its behavior and physiology to its neurobiology and reproductive characteristics. Biology of Spiders is considered a classic in spider literature. First published in German in 1979, the book is now in its third edition, and has established itself as the supreme authority on these fascinating creatures. Containing five hundred new references, this book incorporates the latest research while dispelling many oft-heard myths and misconceptions that surround spiders. Of special interest are chapters on the structure and function of spider webs and silk, as well as those on spider venom. A new subchapter on tarantulas will appeal especially to tarantula keepers and breeders. The highly accessible text is supplemented by exceptional, high-quality photographs, many of them originals, and detailed diagrams. It will be of interest to arachnologists, entomologists, and zoologists, as well as to academics, students of biology, and the general reader curious about spiders.

Through Our Eyes Only

Pheromones and Animal Behavior

What Everyone Needs to Know

The Search for Animal Consciousness

Animal Athletes

Mammals: a Very Short Introduction

Through Our Eyes Only is an immensely engaging exploration of one of the greatest remaining biological mysteries: the possibility of conscious experiences in non-human animals. Dawkins argues that the idea of consciousness in other species has now progressed from a vague possibility to a plausible, scientifically respectable view. Written in an accessible and entertaining style, this book aims to show how near -- and how far -- we are to understanding what goes on in the minds of other animals. 'Her approach ... is impeccable ... Her writing is highly accessible, lively and illustrative.' - Booklist on the hardback edition.

The first modern scholarly synthesis of animal domestication Across the globe and at different times in the past millennia, the evolutionary history of domesticated animals has been greatly affected by the myriad, complex, and diverse interactions humans have had with the animals closest to them. The Process of Animal Domestication presents a broad synthesis of this subject, from the rich biology behind the initial stages of domestication to how the creation of breeds reflects cultural and societal transformations that have impacted the biosphere. Marcelo Sánchez-Villagra draws from a wide range of fields, including evolutionary biology, zooarchaeology, ethnology, genetics, developmental biology, and evolutionary morphology to provide a fresh perspective to this classic topic. Relying on various conceptual and technical tools, he examines the natural history of phenotypes and their developmental origins. He presents case studies involving mammals, birds, fish, and insect species, and he highlights the importance of domestication for the comprehension of evolution, anatomy, ontogeny, and dozens of fundamental biological processes. Bringing together the most current developments, The Process of Animal Domestication will interest a wide range of readers, from evolutionary biologists, developmental biologists, and geneticists to anthropologists and archaeologists.

"Comprehensive, contemporary, and engaging, Animal Physiology provides evolutionary and ecological context to help students make connections across all levels of physiological scale"--

Animal Eyes aims to provide a comprehensive account of all known types of eye. It takes the diversity of optical mechanisms as a framework, but many other aspects of the structure and function of eyes are examined. Visual ecology, for example, the way that eyes are specifically adapted to thelifestyles of the animals that bear them, is another important theme. The 'design philosophy' of eyes is explored, too: what are the physical constraints on the way that an eye performs its functions, and how are these addressed by the different types of eye? Early and closing chapters look at theproperties of light critical to vision, and factors in eye adaptation like spatial resolution, sensitivity, and movement, while the central sections assess the capabilities of a wide variety of eye types.

Defining for fans of The Soul of an Octopus and The Genius of Birds, this "masterpiece of science and nature writing" (The Washington Post) explores how we process the world around us through the lens of the incredible sensory capabilities of thirteen animals, revealing that we are not limited to merely five senses. There is a scientific revolution stirring in the field of human perception. Research has shown that the extraordinary sensory powers of our animal friends can help us better understand the same powers that lie dormant within us. From the hairy-twig mantis shrimp with its ability to see a vast range of colors, to the bloodhound and its hundreds of millions of scent receptors; from the orb-weaving spider whose eyes recognize not only space but time, to the cheetah whose ears are responsible for its perfect agility, these astonishing animals hold the key to better understanding how we make sense of the world around us. "An appealingly written, enlightening, and sometimes eerie journey into the extraordinary possibilities for the human senses" (Kirkus Reviews, starred), Sentient will change the way you look at humanity.

The Animal Kingdom: A Very Short Introduction

Mechanisms and Function

Aesop's Animals

Here Be Dragons

Chemical Signals and Signatures

An Ecological and Evolutionary Approach

Using modern phylogenetic reasoning based on an extensive review of morphology, including ultrastructure, and embryology, each phylum is analysed to ascertain its monophyly and hence its ancestral characters.

Optics—a field of physics focusing on the study of light—is also central to many areas of biology, including vision, ecology, botany, animal behavior, neurobiology, and molecular biology. The Optics of Life introduces the properties of light and the units and geometry of measurement. He then explores how light is created and propagates and how it interacts with matter, covering topics such as absorption, scattering, fluorescence, and polarization. Johnsen also provides a tutorial on how to measure light as well as an informative discussion of quantum mechanics. The Optics of Life features a host of examples drawn from nature and everyday life, and several appendices that offer further practical guidance for researchers. This concise book uses a minimum of equations and jargon, explaining the basic physics of light in a succinct and lively manner. It is the essential primer for working biologists and for anyone seeking an accessible introduction to optics. Some images inside the book are unavailable due to digital copyright restrictions.

With fascinating, spectacularly beautiful images, the book piques readers' curiosity about the diversity of visual organs. This book is the result of a dual approach - scientific as well as aesthetic. The compelling images are accompanied by an easy-to-read, understandable text, aimed at both scientists and the educated public, and generally anyone interested in the beauty of nature. Thanks to this combination, the book presents the staggering diversity of eyes in the animal kingdom and provides countless insights into the intriguing mechanisms at work - from simple pigment cups to independently flexible, telescopic, facet and lens eyes. Educational, exciting, entertaining till the last page, this is a book for anyone who is interested in evolution, nature and the miracle of life.

Animal life, now and over the past half billion years, is incredibly diverse. Describing and understanding the evolution of this diversity of body plans - from vertebrates such as humans and fish to the numerous invertebrate groups including sponges, insects, molluscs, and the many groups of worms - is a major goal of evolutionary biology. In this book, a group of leading researchers adopt a modern, integrated approach to describe how current molecular genetic techniques and disciplines as diverse as palaeontology, embryology, and genomics have been combined, resulting in a dramatic renaissance in the study of animal evolution. The last decade has seen growing interest in evolutionary biology fuelled by a wealth of data from molecular biology. Modern phylogenies integrating evidence from molecules, embryological data, and morphology of living and fossil taxa provide a wide consensus of the major branching patterns of the tree of life; moreover, the links between phenotype and genotype are increasingly well understood. This has resulted in a reliable tree of relationships that has been widely accepted and has spawned numerous new and exciting questions that require a reassessment of the origins and radiation of animal life. The focus of this volume is at the level of major animal groups, the morphological innovations that define them, and the mechanisms of change to their embryology that have resulted in their evolution. Current research themes and future prospects are highlighted including phylogeny reconstruction, comparative developmental biology, the value of different sources of data and the importance of fossils, homology assessment, character evolution, phylogeny of major groups of animals, and genome evolution. These topics are integrated in the light of a 'new animal phylogeny', to provide fresh insights into the patterns and processes of animal evolution. Animal Evolution provides a timely and comprehensive statement of progress in the field for academic researchers requiring an authoritative, balanced and up-to-date overview of the topic. It is also intended for both upper level undergraduate and graduate students taking courses in animal evolution, molecular phylogenetics, evo-devo, comparative genomics and associated disciplines.

Animal EyesOUP Oxford

Secret Worlds

Coalitions and Alliances in Humans and Other Animals

Functional Molecular Bases

Vision

The Astonishing Variety of Vision in Nature

Animal Physiology

Despite originating more than two-and-a-half thousand years ago, Aesop's Fables are still passed on from parent to child, and are embedded in our collective consciousness. The morals we have learned from these tales continue to inform our judgements, but have the stories also informed how we regard their animal protagonists? If so, is there any truth behind the stereotypes? Are wolves deceptive villains? Are crows insightful geniuses? And could a tortoise really beat a hare in a race? In Aesop's Animals, zoologist Jo Wimpenny turns a critical eye to the fables to discover whether there is any scientific truth to Aesop's portrayal of the animal kingdom. She brings the tales into the twenty-first century, introducing the latest findings on some of the most fascinating branches of ethological research – the study of why animals do the things they do. In each chapter she interrogates a classic fable and a different topic – future planning, tool use, self-recognition, cooperation and deception – concluding with a verdict on the veracity of each fable's portrayal from a scientific perspective. By sifting fact from fiction in one of the most beloved texts of our culture, Aesop's Animals explores and challenges our preconceived notions about animals, the way they behave, and the roles we both play in our shared world.

Explains how animals use chemical communication, emphasising the evolutionary context and covering fields from ecology to neuroscience and chemistry.

In Gene Sharing and Evolution Platigorsky explores the generality and implications of gene sharing throughout evolution and argues that most if not all proteins perform a variety of functions in the same and in different species, and that this is a fundamental necessity for evolution.

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.

Visual ecology is the study of how animals use visual systems to meet their ecological needs, how these systems have evolved, and how they are specialized for particular visual tasks. Visual Ecology provides the first up-to-date synthesis of the field to appear in more than three decades. Featuring some 225 illustrations, including more than 140 in color, spread throughout the text, this comprehensive and accessible book begins by discussing the basic properties of light and the optical environment. It then looks at how photoreceptors intercept light and convert it to usable biological signals, how the pigments and cells of vision vary among animals, and how the properties of these components affect a given receptor's sensitivity to light. The book goes on to examine how eyes and photoreceptors become specialized for an array of visual tasks, such as navigation, evading prey, mate choice, and communication. A timely and much-needed resource for students and researchers alike, Visual Ecology also includes a glossary and a wealth of examples drawn from the full diversity of visual systems. The most up-to-date overview of visual ecology available Features some 225 illustrations, including more than 140 in color, spread throughout the text Guides readers from the basic physics of light to the role of visual systems in animal behavior Includes a glossary and a wealth of real-world examples

An Introduction to the Biology of Vision

Sentient

Animal Eyes

The Diversity of Protein Functions

A Biologist's Guide to Light in Nature

Animal Osmoregulation

An analysis of convergent evolution from molecules to ecosystems, demonstrating the limited number of evolutionary pathways available to life. Charles Darwin famously concluded On the Origin of Species with a vision of "endless forms most beautiful" continually evolving. More than 150 years later many evolutionary biologists see not endless forms but the same, or very similar, forms evolving repeatedly in many independent species lineages. A porpoise's fishlike fins, for example, are not inherited from fish ancestors but are independently derived convergent traits. In this book, George McGhee describes the ubiquity of the phenomenon of convergent evolution and connects it directly to the concept of evolutionary constraint--the idea that the number of evolutionary pathways available to life are not endless, but quite limited. Convergent evolution occurs on all levels, from tiny organic molecules to entire ecosystems of species. McGhee demonstrates its ubiquity in animals, both herbivore and carnivore; in plants; in ecosystems; in molecules, including DNA, proteins, and enzymes; and even in minds, describing problem-solving behavior and group behavior as the products of convergence. For each species example, he provides an abbreviated list of the major nodes in its phylogenetic classification, allowing the reader to see the evolutionary relationship of a group of species that have independently evolved a similar trait by convergent evolution. McGhee analyzes the role of functional and developmental constraints in producing convergent evolution, and considers the scientific and philosophical implications of convergent evolution for the predictability of the evolutionary process.

"The evolution of the eye spans 3.75 billion years from single cell organisms with eyespots to Metazoa with superb camera style eyes. At least ten different ocular models have evolved independently into myriad optical and physiological masterpieces. The story of the eye reveals evolution's greatest triumph and sweetest gift. This book describes its journey"--Provided by publisher.

Marlin Stevens explores the extraordinary variety of senses in the animal kingdom, and discusses the cutting-edge science that is shedding light on these secret worlds. Our senses of vision, smell, taste, hearing, and touch are essential for us to respond to threats, communicate and interact with the world around us. This is true for all animals - their sensory systems are key to survival, and without them animals would be completely helpless. However, the sensory systems of other animals work very differently from ours. For example, many animals from spiders to birds can detect and respond to ultraviolet light, to which we are blind. Other animals, including many insects, rodents, and bats can hear high-frequency ultrasonic sounds well beyond our own hearing range. Many other species have sensory systems that we lack completely, such as the magnetic sense of birds, turtles, and other animals, or the electric sense of many fish. These differences in sensory ability have a major bearing on the ways that animals behave and live in different environments, and also affect their evolution and ecology. In this book, Marlin Stevens explores the remarkable sensory systems that exist in nature, and what they are used for. Discussing how different animal senses work, he also considers how they evolve, how they are shaped by the environment in which an animal lives, and the pioneering research that has uncovered how animals use their senses. Throughout, he celebrates the remarkable diversity of life, and shows how the study of sensory systems has shed light on

some of the most important issues in animal behaviour, physiology, and evolution.

A survey of animal rights issues addresses a variety of topics surrounding research animals, companion animals, wild animals, work animals, and animals used for food, as well as discussing the animal rights movement and its key figures and organizations.

From a modest beginning in the form of a little shrew-like, nocturnal, insect eating ancestor that lived 200 million years ago, mammals evolved into the huge variety of different kinds of animals we see today. Many species are still small, and follow the lifestyle of the ancestor, but others have adapted to become large grazers and browsers, like the antelopes, cattle, rhinos, and elephants, or the lions, hyaenas, and wolves that prey upon them. Yet others evolved to be specialist termite eaters able to dig into the hardest mounds, or tunnel creating burrowers, and a few took to the skies as gliders and the bats. Many live partly in the water, such as otters, beavers, and hippos, while whales and dugongs remain permanently in the seas, incapable of ever emerging onto land. In this Very Short Introduction Tom Kemp explains how it is a tenfold increase in metabolic rate - endothermy or "warm-bloodedness" - that lies behind the high levels of activity, and the relatively huge brain associated with complex, adaptable behaviour that epitomizes mammals. He describes the remarkable fossil record, revealing how and when the mammals gained their characteristics, and the tortuous course of their subsequent evolution, during which many bizarre forms such as sabre-toothed cats, and 30-tonne, 6-m high browsers arose and disappeared. Describing the wonderful adaptations that mammals evolved to suit their varied modes of life, he also looks at those of the mainly arboreal primates that culminated ultimately in Homo sapiens. ABOUT THE SERIES: The Very Short Introductions series from Oxford University Press contains hundreds of titles in almost every subject area. These pocket-sized books are the perfect way to get ahead in a new subject quickly. Our expert authors combine facts, analysis, perspective, new ideas, and enthusiasm to make interesting and challenging topics highly readable.

How the study of animal and plant distributions revolutionized our views of life and Earth

Visual Ecology

Energy for Animal Life

Animals in the City

Animal Evolution

How Animals See the World

Oxygen uptake for metabolic energy demand and the elimination of the resulting carbon dioxide is one of the essential processes in all higher life forms; in the case of animals, everything from protozoans to insects and vertebrates including humans. Respiratory Biology of Animals provides a contemporary and truly integrative approach to the topic, adopting a strong evolutionary theme. It covers aerobic metabolism at all levels, from gas exchange organs such as skin, gills, and lungs to mitochondria - the site of cellular respiration. The book also describes the functional morphology and physiology of the circulatory system, which often contains gas-carrying pigments and is important for pH regulation in the organism. A final section describes the evolution of animal respiratory systems. Throughout the book, examples are selected from the entire breadth of the animal kingdom, identifying common themes that transcend taxonomy.

Animal Movement Across Scales

The extraordinary senses of animals

Evolution's Witness

Vertebrate Photoreceptors

Limited Forms Most Beautiful

Genomes, Fossils, and Trees