

# FILE AVIAN MOLECULAR EVOLUTION AND SYSTEMATICS

## **Avian Molecular Evolution and Systematics**

The use of DNA and other biological macromolecules has revolutionized systematic studies of evolutionary history. Methods that use sequences of nucleotides and amino acids are now routinely used as data for addressing evolutionary questions that, although not new questions, have defied description and analysis. The world-renowned contributors use these new methods to unravel particular aspects of the evolutionary history of birds. Avian Molecular Evolution and Systematics presents an overview of the theory and application of molecular systematics, focusing on the phylogeny and evolutionary biology of birds. New, developing areas in the phylogeny of birds at multiple taxonomic areas are covered, as well as methods of analysis for molecular data, evolutionary genetics within and between bird populations, and the application of molecular-based phylogenies to broader questions of evolution. Contains authoritative contributions from leading researchers Discusses the utility of different molecular markers for questions of avian evolution, involving populations and higher-level taxa Applies molecular-based phylogenies of birds and molecular population genetics data to broad questions of organismal and molecular evolution. Compares and contrasts molecular and morphological data sets

## **Higher Order Avian Systematics**

Birds catch the public imagination like no other group of animals; in addition, birders are perhaps the largest non-professional naturalist community. Genomics and associated bioinformatics have revolutionised daily life in just a few decades. At the same time, this development has facilitated the application of genomics technology to ecological and evolutionary studies, including biodiversity and conservation at all levels. This book reveals how the exciting toolbox of genomics offers new opportunities in all areas of avian biology. It presents contributions from prominent experts at the intersection of avian biology and genomics, and offers an ideal introduction to the world of genomics for students, biologists and bird enthusiasts alike. The book begins with a historical perspective on how genomic technology was adopted by bird ecology and evolution research groups. This led, as the book explains, to a revised understanding of avian evolution, with exciting consequences for biodiversity research as a whole. Lastly, these impacts are illustrated using seminal examples and the latest discoveries from avian biology laboratories around the world.

## **Phylogeny and Classification of Birds**

Stronger than the others, worse than the undead. Adam awakes to discover that he has been miraculously cured of the dreaded zombie virus. He is the First Subject, born from the experiments of a group known as the Charon Initiative. As the first of a new breed of mankind, Adam must struggle to find a place for himself in this strange new world. All he knows about himself is that he is a good man. Then a Second Subject is chosen, and this person may prove to be something very different compared to Adam. The question becomes: Did we ever consider the kind of people we are bringing back from the dead?

## **Avian Genomics in Ecology and Evolution**

The Tropics are home to the greatest biodiversity in the world, but tropical species are at risk due to anthropogenic activities, mainly land use change, habitat loss, invasive species, and pathogens. Over the past

20 years, the avian malaria and related parasites (Order: Haemosporida) systems have received increased attention in the tropical regions from a diverse array of research perspectives. However, to date no attempts have been made to synthesize the available information and to propose new lines of research. This book provides such a synthesis by not only focusing on the antagonistic interactions, but also by providing conceptual chapters on topics going from avian haemosporidians life cycles and study techniques, to chapters addressing current concepts on ecology and evolution. For example, a chapter synthesizing basic biogeography and ecological niche model concepts is presented, followed by one on the island biogeography of avian haemosporidians. Accordingly, researchers and professionals interested in these antagonistic interaction systems will find both an overview of the field with special emphasis on the tropics, and access to the necessary conceptual framework for various topics in ecology, evolution and systematics. Given its conceptual perspective, the book will appeal not only to readers interested in avian haemosporidians, but also to those more generally interested in the ecology, evolution and systematics of host-parasite interactions.

## **The First Two**

Lists all those species of birds that have been recorded from the Australian mainland, Tasmania, island territories and surrounding waters. Based on the authors' original book *The Taxonomy and Species of Birds of Australia and its Territories*, it includes any new species for which records have been accepted by the Records Appraisal Committee of Birds Australia. It also includes all extant and recently extinct (post-1800) native species, as well as new species, accepted vagrants and introduced species that have become established and continue to survive in the wild.

## **Avian Malaria and Related Parasites in the Tropics**

Aus dem Inhalt: Peter Janich: Where does biology get its objects from? Mathias Gutmann: The status of organism: Towards a constructivist theory of organism Walter Bock: Explanations in a historical science Christine Hertler: Organism and morphology: Methodological differences between functional and constructional morphology Dominique G. Homberger: Similarities and differences: The distinctive approaches of systematics and comparative anatomy towards homology and analogy Raphael Falk: The organism as a necessary entity of evolution Franz M. Wuketits: The organism's place in evolution: Darwin's views and contemporary organismic theories Christian Kummer: The development of organismic structure and the philosophy behind Giuseppe Serponti: The butterfly and the lion Harald Riedl: Organism - Ecosystem - Biosphere: Some comments on the organismic concept Sievert Lorenzen: How to advance from the theory of natural selection towards the General Theory of Self-Organization Antonio Lima-de-Faria: The evolutionary periodicity of flight Hans-Rainer Duncker: The evolution of avian ontogenies: Determination of molecular evolution by integrated complex functional systems and ecological conditions Winfried Stefan Peters & Bernd Herkner: An outline of a theory of the constructional constraints governing early organismic evolution Werner E. G. Mueller e.a.: Monophyly of Metazoa: Phylogenetic analyses of genes encoding SerThr-kinases and a receptor Tyr-kinase from Porifera [sponges] Karl Edlinger: The evolution of the mollusc construction: Living organisms as energy-transforming systems Michael Gudo: A structural-functional approach to the soft bodies of rugose corals.

## **Systematics and Taxonomy of Australian Birds**

*Avian Genetics: A Population and Ecological Approach* is a collection of papers that deals with the study of birds in relation to the synthetic theory of evolution. This book studies the ecology, demography, behavior, and geographical distribution of birds; the text also discusses quantitative, chromosomal, biochemical, and population genetics. Part I reviews the various genetic interactions, including an analysis of DNA sequence variation. The different and newer techniques are compared such as the works of Sibley, Quinn, and White. Part II describes the molding genetic variation and covers topics such as inbreeding; gene flow and the genetic structure of populations; non-random mating; and the process of selection in natural populations of birds. Part III covers actual genetic case histories, including quantitative ecological genetics of great tits;

genetic evolution of house sparrows; and presentation of evidence for sexual selection by female choice in the Arctic Skua. This book also presents future research in subjects such as the neutrality-selection controversy or genetics and conservation. This text can be beneficial for ecologists, ornithologists, animal conservationists, and population biologists studying birds.

## **Evolutionary Biochemistry of Proteins**

This book should be of value to anyone interested in bird evolution and taxonomy, biogeography, distributional history, dispersal and migration patterns. It provides an up-to-date synthesis of current knowledge on species formation, and the factors influencing current distribution patterns. It draws heavily on new information on Earth history, including past glacial and other climatic changes, on new developments in molecular biology and palaeontology, and on recent studies of bird distribution and migration patterns, to produce a coherent account of the factors that have influenced bird species diversity and distribution patterns worldwide. Received the Best Bird Book of the Year award for 2004 from British Birds magazine. \* Winner of the British Birds/British Trust for Ornithology, Bird Book of the Year 2004! \* The first book to deal comprehensively with bird speciation and biogeography \* Up-to-date synthesis of new information \* Clearly written \* No previous book covers the same ground \* Many maps and diagrams \* Makes difficult and widely scattered information accessible and easily understood \* A sound base for future research \* Takes full account of recent developments in molecular biology

## **Organisms, Genes and Evolution**

Birds are among the most successful vertebrates on Earth. An important part of our natural environment and deeply embedded in our culture, birds are studied by more professional ornithologists and enjoyed by more amateur enthusiasts than ever before. However, both amateurs and professionals typically focus on birds' behaviour and appearance and only superficially understand the characteristics that make birds so unique. The Inner Bird introduces readers to the avian skeleton, then moves beyond anatomy to discuss the relationships between birds and dinosaurs and other early ancestors. Gary Kaiser examines the challenges scientists face in understanding avian evolution - even recent advances in biomolecular genetics have failed to provide a clear evolutionary story. Using examples from recently discovered fossils of birds and near-birds, Kaiser describes an avian history based on the gradual abandonment of dinosaur-like characteristics, and the related acquisition of avian characteristics such as sophisticated flight techniques and the production of large eggs. Such developments have enabled modern birds to invade the oceans and to exploit habitats that excluded dinosaurs for millions of years. While ornithology is a complex discipline that draws on many fields, it is nevertheless burdened with obsolete assumptions and archaic terminology. The Inner Bird offers modern interpretations for some of those ideas and links them to more current research. It should help anyone interested in birds to bridge the gap between long-dead fossils and the challenges faced by living species.

## **A Molecular Perspective on the Evolution of North American Songbirds**

A new edition of the illustrated compendium that is "a gift to serious dinosaur enthusiasts" (Science). What do we know about dinosaurs, and how do we know it? How did they grow, move, eat, and reproduce? Were they warm-blooded or cold-blooded? How intelligent were they? How are the various groups of dinosaurs related to each other, and to other kinds of living and extinct vertebrates? What can the study of dinosaurs tell us about the process of evolution? And why did typical dinosaurs become extinct? These questions and more are addressed in this new, expanded edition of *The Complete Dinosaur*. Written by leading experts on the "fearfully great" reptiles, the book covers what we have learned about dinosaurs, from the earliest discoveries to the most recent controversies. Where scientific contention exists, the editors have let the experts agree to disagree. *The Complete Dinosaur* is a feast for serious dinosaur lovers, from the enthusiastic amateur to the professional paleontologist. Praise for the first edition: "An excellent encyclopedia that serves as a nice bridge between popular and scholarly dinosaur literature." —Library Journal (starred review) "Stimulating armchair company for cold winter evenings. . . . Best of all, the book treats dinosaurs as intellectual fun."

—New Scientist “Useful both as a reference and as a browse-and-enjoy compendium.” —Natural History “Copiously illustrated and scrupulously up-to-date.” —Publishers Weekly “The amount of information in [these] pages is amazing. This book should be on the shelves of dinosaur freaks as well as those who need to know more about the paleobiology of extinct animals. It will be an invaluable library reference.” —American Reference Books Annual

## **Avian Genetics**

Aspects of reproduction covered in this volume include classification and phylogeny as revealed by molecular biology; anatomy of the male reproductive tract and organs; anatomy and evolution of copulatory structures; development and anatomy of the female reproductive tract; endocrinology of reproduction; ovarian dynamics and follicle development; spermatogenesis and testicular cycles; avian spermatozoa: structure and phylogeny; testis size, sperm size and sperm competition and lastly, fertilization.

## **Speciation and Biogeography of Birds**

This is the first re-appraisal in 50 years of concepts of development made in birds. This book is a case study in evolutionary diversification of life histories. Although birds have a rather uniform body plan and physiology, they exhibit marked variation in development type, parental care, and rate of growth. Altricial birds are fully dependent on their parents for warmth and nutrition and begin posthatching life in a more or less embryonic condition. At the other extreme, such superprecocial species as the megapodes are independent of all parental care from hatching, and the neonate, able to fly, resembles an adult bird. This book thus attempts to present an integrative perspective of organism biology, ecology, and evolution.

## **Molecular Ecology and Evolution: The Organismal Side**

This edited volume provides an authoritative synthesis of knowledge about the history of life. All the major groups of organisms are treated, by the leading workers in their fields. With sections on: The Importance of Knowing the Tree of Life; The Origin and Radiation of Life on Earth; The Relationships of Green Plants; The Relationships of Fungi; and The Relationships of Animals. This book should prove indispensable for evolutionary biologists, taxonomists, ecologists interested in biodiversity, and as a baseline sourcebook for organismic biologists, botanists, and microbiologists. An essential reference in this fundamental area.

## **The Inner Bird**

The incorporation of molecular methods in ecological research has added an exciting new dimension to conventional studies, and opened windows into previously intractable areas of research, at the interface between ecology and genetics. Using these new methods it has now become routine to use genetic markers to study ecological phenomena, from molecular sexing of individuals and parentage of offspring, through to population structure of species and phylogenetic relationships of taxa. These methods have stimulated an explosion of empirical and analytical developments in molecular ecology, which have in turn, increasingly attracted students and professional biologists eager to employ them in their studies. *Molecular Methods in Ecology* traces the development of molecular ecology by reviewing basic molecular biological techniques and earlier methods such as protein electrophoresis, DNA-DNA hybridisation, restriction analysis of DNA, and DNA fingerprinting. Later chapters review methods using newer classes of markers such as microsatellites, introns, MHC, SSRs and AFLP markers in plants and molecular sexing in animals. The strengths and limitations of methods are discussed and guidance is provided in selecting the most appropriate methods for particular problems in ecology. This book will provide both postgraduates and researchers with a guide to choosing and employing appropriate methodologies for successful research in the field of molecular ecology. Provides up-to-date summaries of the latest molecular approaches in this rapidly expanding field. Gives guidance on the appropriate choice of methods for particular problems in ecology, and their strengths

and limitations. Provides brief laboratory protocols for each molecular method and summaries of software available for analysis of data in molecular ecology. Outlines examples of the latest research results from studies of both plants and animals, integrated within the framework of molecular ecology.

## **The Complete Dinosaur**

Living Dinosaurs offers a snapshot of our current understanding of the origin and evolution of birds. After slumbering for more than a century, avian palaeontology has been awakened by startling new discoveries on almost every continent. Controversies about whether dinosaurs had real feathers or whether birds were related to dinosaurs have been swept away and replaced by new and more difficult questions: How old is the avian lineage? How did birds learn to fly? Which birds survived the great extinction that ended the Mesozoic Era and how did the avian genome evolve? Answers to these questions may help us understand how the different kinds of living birds are related to one another and how they evolved into their current niches. More importantly, they may help us understand what we need to do to help them survive the dramatic impacts of human activity on the planet.

## **Reproductive Biology and Phylogeny of Birds, Part A:**

Sequenced biological macromolecules have revitalized systematic studies of evolutionary history. Molecular Systematics of Fishes is the first authoritative overview of the theory and application of these sequencing data to fishes. This volume explores the phylogeny of fishes at multiple taxonomic levels, uses methods of analysis of molecular data that apply both within and between fish populations, and employs molecule-based phylogenies to address broader questions of evolution. Targeted readers include ichthyologists, marine scientists, and all students, faculty, and researchers interested in fish evolution and ecology and vertebrate systematics. Key Features \* Focuses on the phylogeny and evolutionary biology of fishes \* Contains phylogenies of fishes at multiple taxonomic levels \* Applies molecule-based phylogenies to broader questions of evolution \* Includes methods for critique of analysis of molecular data.

## **Avian Growth and Development**

After having read this book you will never see birds in the same way again. The unexpected patterns displayed by a bird's body have been seen as bizarre events that demanded little attention or were described as 'amazing curiosities'. None of these surprising features seem to be fortuitous. They appear to be an integral part of a rigid order and a coherent geometry, which is directed by simple gene interactions and molecular cascades occurring at various cellular levels, and at different times, during the organism's development. A novel geometry unfolds in front of your eyes, giving the body configurations another meaning. Lima-de-Faria is Professor Emeritus of Molecular Cytogenetics at Lund University, Lund, Sweden. This is his sixth book dealing with the molecular organization of the chromosome and its implications for the understanding of the mechanisms responsible for biological evolution.

## **Assembling the Tree of Life**

For centuries biologists have tried to understand the underpinnings of avian migration: where birds go and why, why some migrate and some do not, how they adapt to a changing environment, and how migratory systems evolve. Twenty-five years ago the answers to many of these questions were addressed by a collection of migration experts in Keast and Morton's classic work *Migrant Birds in the Neotropics*. In 1992, Hagan and Johnston published a follow-up book, *Ecology and Conservation of Neotropical Migrant Landbirds*. In *Birds of Two Worlds* Russell Greenberg and Peter Marra bring together the world's experts on avian migration to discuss its ecology and evolution. The contributors move the discussion of migration to a global stage, looking at all avian migration systems and delving deeper into the evolutionary foundations of migratory behavior. Readers interested in the biology, behavior, ecology, and evolution of birds have waited a decade to see a worthy successor to the earlier classics. *Birds of Two Worlds* will complete the trilogy and

become indispensable for ornithologists, evolutionary biologists, serious birders, and public and academic libraries.

## **Molecular Methods in Ecology**

The biology of birds is diverse and frequently differs significantly from that of other vertebrates. Many birds migrate or fly at high altitudes, while egg-laying and feather production places high demands on nutrient uptake and storage. This book is the only comprehensive and up-to-date survey of avian biochemistry and molecular biology available. It emphasises the similarities and differences between birds and other vertebrates, concentrating on new developments. The first section deals with protein, lipid and carbohydrate metabolism, its hormonal control and the adaptations that occur in birds. The second covers the avian genome, gene expression, and avian immunology. Growth and embryological development are also discussed. *Avian Biochemistry and Molecular Biology* will be of interest to all those working on birds, especially postgraduate students and researchers.

## **Living Dinosaurs**

*Avian Biology* is a collection of papers that deals with biological aspects of birds such as their classification and habitat behavior. One paper reviews how birds are classified through practical systematics, study of fossils, and some of the problems encountered in the arrangement of major groups. Another paper discusses the origin and evolution of birds from their reptilian predecessors to their current evolutionary rates. Evolutionary rates vary depending on access to new habitats; if the environment is static, evolutionary rates can also slow down. One author discusses the inter-relations of sea birds with their marine environment, including coastal areas and the biological properties of the surface water. Another author describes the biology of desert birds relating to nomadism behavior and physical adaptations especially to the arid environment. The author also describes the cooling mechanism of these desert birds. Another paper evaluates the ecological aspect of behavior that includes foraging, habitat selection, mating, and flocking cohesion. Avian biologists, zoologists, and readers who have a general interest in birds will find this book useful.

## **Molecular Systematics of Fishes**

The study of evolution at the molecular level has given the subject of evolutionary biology a new significance. Phylogenetic 'trees' of gene sequences are a powerful tool for recovering evolutionary relationships among species, and can be used to answer a broad range of evolutionary and ecological questions. They are also beginning to permeate the medical sciences. In this book, the authors approach the study of molecular evolution with the phylogenetic tree as a central metaphor. This will equip students and professionals with the ability to see both the evolutionary relevance of molecular data, and the significance evolutionary theory has for molecular studies. The book is accessible yet sufficiently detailed and explicit so that the student can learn the mechanics of the procedures discussed. The book is intended for senior undergraduate and graduate students taking courses in molecular evolution/phylogenetic reconstruction. It will also be a useful supplement for students taking wider courses in evolution, as well as a valuable resource for professionals. First student textbook of phylogenetic reconstruction which uses the tree as a central metaphor of evolution. Chapter summaries and annotated suggestions for further reading. Worked examples facilitate understanding of some of the more complex issues. Emphasis on clarity and accessibility.

## **Molecular Geometry of Body Pattern in Birds**

"*Mesozoic Birds* is the first book to bring together world-renowned specialists on fossil birds and their importance to avian origins and, more importantly, it stresses a unified approach (cladistics) and presents the most anatomically detailed analyses available to date. No other study or collection of studies has ever done so much. How could the project not be welcomed by its audience of paleontologists, ornithologists, and evolutionary biologists!"—David Weishampel, editor of *The Dinosauria* "This is the first comprehensive

volume dedicated to the relationships and evolution of the birds that lived during the Age of Dinosaurs. Its wealth of information and its diversity of viewpoints will ensure that this indispensable volume is used and discussed for many years to come."—Kevin Padian, University of California, Berkeley

## **Molecular Systematics**

Knowledge of the evolutionary history of birds has much improved in recent decades. Fossils from critical time periods are being described at unprecedented rates and modern phylogenetic analyses have provided a framework for the interrelationships of the extant groups. This book gives an overview of the avian fossil record and its paleobiological significance, and it is the only up-to-date textbook that covers both Mesozoic and more modern-type Cenozoic birds in some detail. The reader is introduced to key features of basal avians and the morphological transformations that have occurred in the evolution towards modern birds. An account of the Cenozoic fossil record sheds light on the biogeographic history of the extant avian groups and discusses fossils in the context of current phylogenetic hypotheses. This review of the evolutionary history of birds not only addresses students and established researchers, but it may also be a useful source of information for anyone else with an interest in the evolution of birds and a moderate background in biology and geology.

## **Birds of Two Worlds**

In December 2004, the National Academy of Sciences sponsored a colloquium on "Systematics and the Origin of Species" to celebrate Ernst Mayr's 100th anniversary and to explore current knowledge concerning the origin of species. In 1942, Ernst Mayr, one of the twentieth century's greatest scientists, published *Systematics and the Origin of Species*, a seminal book of the modern theory of evolution, where he advanced the significance of population variation in the understanding of evolutionary process and the origin of new species. Mayr formulated the transition from Linnaeus's static species concept to the dynamic species concept of the modern theory of evolution and emphasized the species as a community of populations, the role of reproductive isolation, and the ecological interactions between species. In addition to a preceding essay by Edward O. Wilson, this book includes the 16 papers presented by distinguished evolutionists at the colloquium. The papers are organized into sections covering the origins of species barriers, the processes of species divergence, the nature of species, the meaning of "species," and genomic approaches for understanding diversity and speciation.

## **Avian Biochemistry and Molecular Biology**

Based on the latest phylogenetic studies, this book reveals the remarkable new history of how passerines diversified and dispersed across the entire world.

## **Avian Biology**

In *Speciation in Birds*, Trevor Price, a University of Chicago professor and leading expert in the field, has written the most authoritative and modern synthesis on the subject to date. In clear and engaging prose and through beautiful illustrations, Price shows us why the field is as exciting and vibrant as ever. He evaluates the roles of natural selection and sexual selection. He asks how speciation contributes to some of the great patterns in species diversity such as the large number of species in the tropics, and the many endemic species on isolated islands. Throughout the book, Price emphasizes the integration of behavior, ecology, and genetics.

## **Molecular Evolution**

The earth's biodiversity currently faces an extinction crisis that is unprecedented. Conservationists attempt to

intervene in the extinction process either locally by protecting or restoring important species and habitats, or at national and international levels by influencing key policies and promoting debate. Reliable information is the foundation upon which these efforts are based, which places research at the heart of biodiversity conservation. The role of research in such conservation is diverse. It includes understanding why biodiversity is important, defining 'units' of biodiversity, priority-setting for species and sites, managing endangered and declining populations, understanding large-scale processes, making predictions about the future and interfacing with training, education, public awareness and policy initiatives. Using examples from a wide range of bird conservation work worldwide, researchers consider the principles underlying these issues, and illustrate how these principles have been applied to address actual conservation problems for students, practitioners and researchers in conservation biology.

## **Mesozoic Birds**

Phylogeography is a discipline concerned with various relationships between gene genealogies—phylogenetics—and geography. This book captures the conceptual and empirical richness of the field, and also the sense of genuine innovation that phylogeographic perspectives have brought to evolutionary studies.

## **Avian Evolution**

Synthesizing theoretical & empirical analyses of the processes that help shape these unique ecosystems, 'Tropical Rainforests' looks at the effects of evolutionary histories, past climate change, & ecological dynamics on the origin & maintenance of tropical rainforest communities.

## **Systematics and the Origin of Species**

Viral Ecology defines and explains the ecology of viruses by examining their interactions with their hosting species, including the types of transmission cycles that have evolved, encompassing principal and alternate hosts, vehicles, and vectors. It examines virology from an organismal biology approach, focusing on the concept that viral infections represent areas of overlap in the ecology of viruses, their hosts, and their vectors. The relationship between viruses and their hosting species The concept that viral interactions with their hosts represents a highly evolved aspect of organismal biology The types of transmission cycles which exist for viruses, including their hosts, vectors, and vehicles The concept that viral infections represent areas of overlap in the ecology of the viruses, their hosts, and their vectors

## **The Largest Avian Radiation**

This book presents an up-to-date, detailed and thorough review of the most fascinating ecological findings of bird migration. It deals with all aspects of this absorbing subject, including the problems of navigation and vagrancy, the timing and physiological control of migration, the factors that limit their populations, and more. Author, Ian Newton, reveals the extraordinary adaptability of birds to the variable and changing conditions across the globe, including current climate change. This adventurous book places emphasis on ecological aspects, which have received only scant attention in previous publications. Overall, the book provides the most thorough and in-depth appraisal of current information available, with abundant tables, maps and diagrams, and many new insights. Written in a clear and readable style, this book appeals not only to migration researchers in the field and Ornithologists, but to anyone with an interest in this fascinating subject. \* Hot ecological aspects include: various types of bird movements, including dispersal and nomadism, and how they relate to food supplies and other external conditions \* Contains numerous tables, maps and diagrams, a glossary, and a bibliography of more than 2,700 references \* Written by an active researcher with a distinguished career in avian ecology, including migration research



## Speciation in Birds

Biological diversity, or biodiversity, refers to the universal attribute of all living organisms that each individual being is unique - that is, no two organisms are identical. The biology of biodiversity must include all the aspects of evolutionary and ecological sciences analyzing the origin, changes, and maintenance of the diversity of living organisms. Today biodiversity, which benefits human life in various ways, is threatened by the expansion of human activities. Biological research in biodiversity contributes not only to understanding biodiversity itself but also to its conservation and utilization. The Biology of Biodiversity was the specialty area of the 1998 International Prize for Biology. The International Prize for Biology was established in 1985 in commemoration of the sixty-year reign of the Emperor Showa and his longtime devotion to biological research. The 1998 Prize was awarded to Professor Otto Thomas Solbrig, Harvard University, one of the authors of this book. In conjunction with the awarding of the International Prize for Biology, the 14th International Symposium with the theme of The Biology of Biodiversity was held in Hayama on the 9th and 10th of December 1998, with financial support by an international symposium grant from the Ministry of Education, Science, Sports and Culture of Japan. The invited speakers were chosen so as to cover four basic aspects of biodiversity: species diversity and phylogeny, ecological biodiversity, development and evolution, and genetic diversity of living organisms including human beings.

## Molecular Systematics of the Avian Superfamily Sylvioidea with Special Regard to the Families Acrocephalidae and Locustellidae (Aves: Passeriformes)

Drawn from a 2005 international symposium, these essays explore current tyrannosaurid current research and discoveries regarding *Tyrannosaurus rex*. The opening of an exhibit focused on “Jane,” a beautifully preserved tyrannosaur collected by the Burpee Museum of Natural History, was the occasion for an international symposium on tyrannosaur paleobiology. This volume, drawn from the symposium, includes studies of the tyrannosaurids *Chingkankousaurus fragilis* and “Sir William” and the generic status of *Nanotyrannus*; theropod teeth, pedal proportions, brain size, and craniocervical function; soft tissue reconstruction, including that of “Jane”; paleopathology and tyrannosaurid claws; dating the “Jane” site; and tyrannosaur feeding and hunting strategies. *Tyrannosaurid Paleobiology* highlights the far ranging and vital state of current tyrannosaurid dinosaur research and discovery. “Despite being discovered over 100 years ago, *Tyrannosaurus rex* and its kin still inspire researchers to ask fundamental questions about what the best known dinosaur was like as a living, breathing animal. *Tyrannosaurid Paleobiology* present a series of wide-ranging and innovative studies that cover diverse topics such as how tyrannosaurs attacked and dismembered prey, the shapes and sizes of feet and brains, and what sorts of injuries individuals sustained and lived with. There are also examinations of the diversity of tyrannosaurs, determinations of exactly when different kinds lived and died, and what goes into making a museum exhibit featuring tyrannosaurs. This volume clearly shows that there is much more to the study of dinosaurs than just digging up and cataloguing old bones.”  
—Donald M. Henderson, Royal Tyrrell Museum of Palaeontology

## Conserving Bird Biodiversity

Phylogeography

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