



# [Books] Evolution And Vertebrate Immunity: The Antigen-Receptor And Mhc Gene Families (University Of Texas Medical Branch Series In Biomedical Science)

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**Evolution and Vertebrate Immunity: The Antigen-Receptor and Mhc Gene Families (University of Texas Medical Branch Series in Biomedical Science)** is a comprehensive and up-to-date overview of the current knowledge of avian immunology. From the ontogeny of the avian immune system to practical application in vaccinology, the book encompasses all aspects of innate and adaptive immunity in chickens. In addition, chapters are devoted to the immunology of other commercially important species such as turkeys and ducks, and to ecimmunology summarizing the knowledge of immune responses in free-living birds often in relation to reproductive success. The book contains a detailed description of the avian innate immune system, encompassing the mucosal, enteric, respiratory and reproductive systems. The diseases and disorders it covers include immunodpressive diseases and immune evasion, autoimmune diseases, and tumors of the immune system. Practical aspects of vaccination are examined as well. Extensive appendices summarize resources for scientists including cell lines, inbred chicken lines, cytokines, chemokines, and monoclonal antibodies. The world-wide importance of poultry protein for the human diet, as well as the threat of avian influenza pandemics like H5N1 and heavy reliance on vaccination to protect commercial flocks makes this book a vital resource. This book provides crucial information not only for poultry health professionals and avian biologists, but also for comparative and veterinary immunologists, graduate students and veterinary students with an interest in avian immunology. With contributions from 33 of the foremost international experts in the field, this book provides the most up-to-date review of avian immunology so far Contains a detailed description of the avian innate immune system reviewing constitutive barriers, chemical and cellular responses; it includes a comprehensive review of avian Toll-like receptors Contains a wide-ranging review of the "ecimmunology" of free-living avian species, as applied to studies of population dynamics, and reviews methods and resources available for carrying out such research

**Origin and Evolution of the Vertebrate Immune System**-L. Du Pasquier 2012-12-06 The comparative approach to immunology can be traced to the era of Pasteur and Metchnikov in which observations regarding foreign recognition in invertebrates was a factor in the develop ment of the principal concepts that created the foundation of what now is the broad field of immunology. With each major experimental and conceptual breakthrough, the classical, albeit essential, question has been asked "are the immune systems of phylogenetically primitive vertebrates and invertebrates similar to that of mammals?" Somewhat surprisingly for the jawed vertebrates, the general answer has been a qualified form of "yes", whereas for agnathans and invertebrate phyla it has been "no" so far. The apparent abruptness in the appearance of the immune system of vertebrates is linked to the introduction of the somatic generation of the diversity of its antigen specific receptors. Therefore the questions regarding the origin and evolution of the specific immune system revolve around this phenomenon. With respect to the origin of the system (aside from the origin of the rearranging machinery itself, the study of which is still in its infancy) one can ask questions about the cellular and molecular contexts in which the mechanism was introduced.

**The Evolution of the Immune System**-Davide Malagoli 2016-07-21 The Evolution of the Immune System: Conservation and Diversification is the first book of its kind that prompts a new perspective when describing and considering the evolution of the immune system. Its unique approach summarizes, updates, and provides new insights on the different immune receptors, soluble factors, and immune cell effectors. Helps the reader gain a modern idea of the evolution of the immune systems in pluricellular organisms Provides a complete overview of the most studied and hot topics in comparative and evolutionary immunology Reflects the organisation of the immune system (cell-based, humoral [innate], humoral [adaptive]) without introducing further and misleading levels of organization Brings concepts and ideas on the evolution of the immune system to a wide readership

**Amphioxus Immunity**-An-Long Xu 2015-12-31 Amphioxus Immunity: Tracing the Origin of Human Immunity covers a remarkable range of information about Amphioxus and its evolutionary context. This compilation of what is currently known about Amphioxus, with a sharp focus on its immune system, includes 13 topics, such as: Amphioxus as a model for understanding the evolution of vertebrates basic knowledge of immunology immune organs and cells of amphioxus a genomic and transcriptomic view of the Amphioxus immunity pattern recognition system in Amphioxus transcription factors in Amphioxus the complement system of Amphioxus the oxidative burst system in Amphioxus immune effectors in Amphioxus lipid signaling of immune response in Amphioxus apoptosis in amphioxus; primitive adaptive immune system of Amphioxus and future research directions This valuable reference book is loaded with information that will be useful for anyone who wishes to learn more about the origin of vertebrates and adaptive immunity. Provides new evidence on the origin of the adaptive immune system, the evolution of innate immunity, and evolution-stage specific immune defense mechanisms Not only presents the cells and molecules involved in the adaptive immune response in Amphioxus, but also characterizes the origination and evolution of the gene families and pathways involved in innate immunity Includes much pioneering work, from the molecular, genomic, and cellular to the individual level

**Immunology and Evolution of Infectious Disease**-Steven A. Frank 2020-10-06 From HIV to influenza, the battle between infectious agents and the immune system is at the heart of disease. Knowledge of how and why parasites vary to escape recognition by the immune system is central to vaccine design, the control of epidemics, and our fundamental understanding of parasite ecology and evolution. As the first comprehensive synthesis of parasite variation at the molecular, population, and evolutionary levels, this book is essential reading for students and researchers throughout biology and biomedicine. The author uses an evolutionary perspective to meld the terms and findings of molecular biology, immunology, pathogen biology, and population dynamics. This multidisciplinary approach offers newcomers a readable introduction while giving specialists an invaluable guide to allied subjects. Every aspect of the immune response is presented in the functional context of parasite recognition and defense—an emphasis that gives structure to a tremendous amount of data and brings into sharp focus the great complexity of immunology. The problems that end each chapter set the challenge for future research, and the text includes extensive discussion of HIV, influenza, foot-and-mouth disease, and many other pathogens. This is the only book that treats in an integrated way all factors affecting variation in infectious disease. It is a superb teaching tool and a rich source of ideas for new and experienced researchers. For molecular biologists, immunologists, and evolutionary biologists, this book provides new insight into infectious agents, immunity, and the evolution of infectious disease.

**Self and Nonself**-Carlos López-Larrea 2012-03-07 In 1960 Sir Frank Macfarlane Burnet received the Nobel Prize in Physiology and Medicine. He titled his Nobel Lecture "Immunological Recognition of Self" emphasizing the central argument of immunological tolerance in "How does the vertebrate organism recognize self from nonself in this the immunological sense—and how did the capacity evolve." The concept of self is linked to the concept of biological self identity. All organisms, from bacteria to higher animals, possess recognition systems to defend themselves from nonself. Even in the context of the limited number of metazoan phyla that have been studied in detail, we can now describe many of the alternative mechanism of immune recognition that have emerged at varying points in phylogeny. Two different arms—the innate and adaptive immune system—have emerged at different moments in evolution, and they are conceptually different. The ultimate goals of immune biology include reconstructing the molecular networks underlying immune processes.

**Innate Immunity in Aquatic Vertebrates**-Leon Grayfer 2020-01-17

**Insect Infection and Immunity**-Jens Rolff 2009-06-25 The study of insect immune systems has accelerated rapidly in recent years & is now becoming an important interdisciplinary field. This book provides a coherent synthesis & is clearly structured around three broadly themed sections: mechanisms & interactions, & evolutionary ecology.

**The Primordial VRM System and the Evolution of Vertebrate Immunity**-John Stewart 1994 This book discusses the evolutionary origin of immunoglobulins and T-cell receptors. The complex interactions between B and T cells in response to external antigens are the major focus of contemporary immunology. This book argues that these interactions may be relatively late evolutionary developments, due to the redeployment of a system invented for other reasons. In other words immunoglobulins did not arise in evolution to fight infection. The author theorizes that the system of variable region moleculars (VRM) arose at the time of the first vertebrates by an endogenous, self-organizing process. This primordial VRM system instituted a molecular ecology, a function so vital that from then on no vertebrate has been able to do without it.

**M1/M2 Macrophages: The Arginine Fork in the Road to Health and Disease**-Charles Dudley Mills 2015-03-23 Macrophages have unique and diverse functions necessary for survival. And, in humans (and other species), they are the most abundant leukocytes in tissues. The Innate functions of macrophages that are best known are their unusual ability to either "Kill" or "Repair". Since killing is a destructive process and repair is a constructive process, it was stupefying how one cell could exhibit these 2 polar - opposite functions. However, in the late 1980's, it was shown that macrophages have a unique ability to enzymatically metabolize Arginine to Nitric Oxide (NO, a gaseous non - specific killer molecule) or to Ornithine (a precursor of polyamines and collagen for repair). The dual Arginine metabolic capacity of macrophages provided a functional explanation for their ability to kill or repair. Macrophages predominantly producing NO are called M1 and those producing Ornithine are called M2. M1 and M2 - dominant responses occur in lower vertebrates, and in T cell deficient vertebrates being directly driven by Damage and Pathogen Associated Molecular Patterns (DAMP and PAMP). Thus, M1 and M2 are Innate responses that protect the host without Adaptive Immunity. In turn, M1/M2 is supplanting previous models in which T cells were necessary to "activate" or "alternatively activate" macrophages (the Th1/Th2 paradigm). M1 and M2 macrophages were named such because of the additional key findings that these macrophages stimulate Th1 and Th2 - like responses, respectively. So, in addition to their unique ability to kill or repair, macrophages also govern Adaptive Immunity. All of the foregoing would be less important if M1 or M2 - dominant responses were not observed in disease. But, they are. The best example to date is the predominance of M2 macrophages in human tumors where they act like wound repair macrophages and actively promote growth. More generally, humans have become M2 - dominant because sanitation, antibiotics and vaccines have lessened M1 responses. And, M2 dominance seems the cause of ever - increasing allergies in developed countries. Obesity represents a new and different circumstance. Surfeit energy (e.g., lipoproteins) causes monocytes to become M1 dominant in the vessel walls causing plaques. Because M1 or M2 dominant responses are clearly causative in many modern diseases, there is great potential in developing the means to selectively stimulate (or inhibit) either M1 or M2 responses to kill or repair, or to stimulate Th1 or Th2 responses, depending on the circumstance. The contributions here are meant to describe diseases of M1 or M2 dominance, and promising new methodologies to modulate the fungible metabolic machinery of macrophages for better health.

**Janeway's Immunobiology**-Murphy, Kenneth M. 2016-03-22 Explore the premier text for immunology at the advanced undergraduate, graduate, and medical school levels. Beginning students appreciate the book's clear writing and informative illustrations, while advanced students and working immunologists value its comprehensive scope and depth. This edition is thoroughly revised and up to date with significant developments in the field, especially on the topic of innate immunity.

**Insect Immunology**-Nancy E. Beckage 2011-04-28 This work is the first book-length publication on the topic of insect immunology since 1991, complementing earlier works by offering a fresh perspective on current research. Interactions of host immune systems with both parasites and pathogens are presented in detail, as well as the genomics and proteomics, approaches which have been lacking in other publications. Beckage provides comprehensive coverage of topics important to medical researchers, including *Drosophila* as a model for studying cellular and humoral immune mechanisms, biochemical mediators of immunity, and insect blood cells and their functions. Encompasses the most important topics of insect immunology including mechanisms, genes, proteins, evolution and phylogeny Provides comprehensive coverage of topics important to medical researchers including *Drosophila* as a model for studying cellular and humoral immune mechanisms, biochemical mediators of immunity, and insect blood cells and their functions Most up-to-date information published with contributions from international leaders in the field

**Advances in Comparative Immunology**-Edwin L. Cooper 2018-08-07 Immunologists, perhaps understandably, most often concentrate on the human immune system, an anthropocentric focus that has resulted in a dearth of information about the immune function of all other species within the animal kingdom. However, knowledge of animal immune function could help not only to better understand human immunology, but perhaps more importantly, it could help to treat and avoid the blights that affect animals, which consequently affect humans. Take for example the mass death of honeybees in recent years - their demise, resulting in much less pollination, poses a serious threat to numerous crops, and thus the food supply. There is a similar disappearance of frogs internationally, signaling ecological problems, among them fungal infections. This book aims to fill this void by describing and discussing what is known about non-human immunology. It covers various major animal phyla, its chapters organized in a progression from the simplest unicellular organisms to the most complex vertebrates, mammals. Chapters are written by experts, covering the latest findings and new research being conducted about each phylum. Edwin L. Cooper is a Distinguished Professor in the Laboratory of Comparative Immunology, Department of Neurobiology at UCLA's David Geffen School of Medicine.

**Lessons in Immunity**-Loriano Ballarin 2016-04-08 Lessons in Immunity: From Single-cell Organisms to Mammals stems from the activity of the Italian Association of Developmental and Comparative Immunobiology (IADCI), represented by the editors. This book is presented as a series of short overviews that report on the current state of various relevant fields of immunobiology from an evolutionary perspective. The overviews are written by authors directly involved in the research, and most are members of the IADCI or have otherwise been involved in the related research for their respective overview. This publication offers scientists and teachers an easy and updated reference tool. Provides simple and updated reviews on the immunobiology of a wide spectrum of organisms, considered in an evolutionary context Focuses on both cells and humoral components of a variety of non-classical model organisms Offers in a single volume many contributions which can help with understanding the evolution of immune responses and the main adaptations in animal phyla Presents a valuable holistic cross-sectional approach for teaching immunology and its applications

**Handbook of Vertebrate Immunology**-Paul-Pierre Pastoret 1998-05-21 This unique book provides a comprehensive and comparative guide to the immune systems of major vertebrate species, including domestic and wild animals of veterinary or medical interest, fish and amphibia. Data in this essential reference work has been compiled by world-renowned editors and an international group of authors. For each species, the information is presented in a structured "user-friendly" format allowing easy cross reference and comparison between the various species. This book will be considered the definitive reference work on vertebrate immunology and will be essential for scientists and professionals working in Immunology, Vaccinology or with Animal Models, for students of Veterinary or Human Medicine, Biology and researchers in Comparative Medicine and Physiology. Each section, devoted to a major animal group covers: \* Lymphoid organs and their anatomical disposition \* Leukocytes and their markers \* Leukocyte traffic and associated molecules \* Cytokines \* T cell receptors \* Immunoglobulins \* MHC antigens \* Ontogeny of the immune system \* Passive transfer of immunity \* Neonatal immune responses \* Non-specific immunity \* Complement system \* Mucosal immunity \* Immunodeficiencies \* Tumours of the immune system \* Autoimmunity

**Concepts of Biology**-Samantha Fowler 2018-01-07 Concepts of Biology is designed for the single-semester introduction to biology course for non-science majors, which for many students is their only college-level science course. As such, this course represents an important opportunity for students to develop the necessary knowledge, tools, and skills to make informed decisions as they continue with their lives. Rather than being mired down with facts and vocabulary, the typical non-science major student needs information presented in a way that is easy to read and understand. Even more importantly, the content should be meaningful. Students do much better when they understand why biology is relevant to their everyday lives. For these reasons, Concepts of Biology is grounded on an evolutionary basis and includes exciting features that highlight careers in the biological sciences and everyday applications of the concepts at hand.We also strive to show the interconnectedness of topics within this extremely broad discipline. In order to meet the needs of today's instructors and students, we maintain the overall organization and coverage found in most syllabi for this course. A strength of Concepts of Biology is that instructors can customize the book, adapting it to the approach that works best in their classroom. Concepts of Biology also includes an innovative art program that incorporates critical thinking and clicker questions to help students understand—and apply—key concepts.

**The Past and the Future of Human Immunity Under Viral Evolutionary Pressure**-Gkikas Magiorkinis 2019-12-04 There is a long-standing evolutionary battle between viruses and their hosts that continues to be waged. The evidence of this conflict can be found on both sides, with the human immune system being responsive to new viral challenges and viruses having developed often sophisticated countermeasures. The "arms race" between viruses and hosts can be thought as an example of the "Red Queen" race, an evolutionary hypothesis inspired from the dialogue of Alice with the Red Queen in Lewis Carroll's "Through the Looking-Glass". At the same time, viruses have a minimal genomic content as they have evolved to hitchhike biological machinery of their hosts (or other co-infecting viruses). The minimalistic viral genome could be thought as the result of a "Black Queen" evolution, a theory inspired from the card game Heart, where the winner is the one with the fewest points at the end. The effects of this arms race are evident in the evolution of the human immune system. This system is capable of responding to diverse viral challenges, utilizing both the ancient innate immune system and the more recently evolved adaptive immune system of jawed vertebrates. It is now well-known that the two systems are linked, with innate immunity hypothesized to have provided raw material for the emergence of the adaptive immune response. The adaptive immune

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response comprises several protein families (including B and T cell receptors, MHC and KIR proteins, for example) that are encoded by complex and variable genomic regions. This complexity enables for responsive genetic changes to occur in immune cells, such as the ability of genomic hypervariable regions in B cells to recombine in order to produce more specific antibodies. Indeed, the human immune system is thought to be continually evolving via various mechanisms such as changes in the genes encoding immune receptors and the regulatory sequences that control their expression. For example, there is some evidence that exogenous viral infections can alter the expression of endogenous retroviruses, some of which contribute to the immune response. Viral countermeasures can include encoding decoy receptors for the signalling molecules of the immune response, altering the gene expression of adaptive immune cells during chronic infection or using host enzymes to facilitate viral immune escape. As the articles herein show, the immune system continues to be challenged by viral infections and these challenges continue to shape how the immune system combats pathogens, thus viruses and human immunity are continuously part of "Red and Black Queen" evolutionary dynamics. We had the pleasure of working with Jonas Blomberg as a reviewer during the course of the Research Topic and his untimely passing was a great loss. Prof. Blomberg made significant contributions, including to the nomenclature of endogenous retroviruses (ERVs), the evolution and characterization of specific human ERV (HERV) and the contribution of ERVs to diseases such as cancer. It is with great respect for his contributions to the ERV field that we dedicate this eBook to his memory.

**Origin and Evolution of Biodiversity**-Pierre Pontarotti 2018-08-27 The book includes 19 selected contributions presented at the 21st Evolutionary Biology Meeting, which took place in Marseille in September 2017. The chapters are grouped into the following five categories: · Genome/Phenotype Evolution · Self/Nonself Evolution · Origin of Biodiversity · Origin of Life · Concepts The annual Evolutionary Biology Meetings in Marseille serve to gather leading evolutionary biologists and other scientists using evolutionary biology concepts, e.g. for medical research. The aim of these meetings is to promote the exchange of ideas to encourage interdisciplinary collaborations. Offering an up-to-date overview of recent findings in the field of evolutionary biology, this book is in invaluable source of information for scientists, teachers and advanced students.

**Airway Chemoreceptors in Vertebrates**-Giacomo Zaccone 2019-04-23 The book provides a comprehensive and up-to-date account of the information available on the morphological, physiological and evolutionary aspects of specialized cells distributed within the epithelia of the airways in the vertebrates. A lot of work has been done on the cell and molecular biology of these cells which are regarded as an oxygen recep

**Molecular Biology of the Cell**-Bruce Alberts 2004

**Innate Immunity of Plants, Animals and Humans**-Holger Heine 2007-12-07 This book has been cunningly designed to provide an overview of our current knowledge about the innate immune systems of these three types of organisms. It not only covers the innate immune mechanisms and responses of such diverse organisms as plants, Cnidaria, Drosophila, urochordates and zebrafish, but also the major receptor systems in mammals and humans. It delves too into the central defense mechanisms, antimicrobial peptides and the complement system.

**The Superorganism**-Bert Hölldobler 2009 The Pulitzer Prize-winning authors of *Ants* present a lavishly detailed account of the extraordinary lives of social insects that draws on more than two decades of research and offers insight into how bees, termites, and other insect societies thrive in systems of altruistic cooperation, complex communication, and labor division. 50,000 first printing.

**Across the Bridge**-Henry Gee 2018-07-04 Our understanding of vertebrate origins and the backbone of human history evolves with each new fossil find and DNA map. Many species have now had their genomes sequenced, and molecular techniques allow genetic inspection of even non-model organisms. But as longtime Nature editor Henry Gee argues in *Across the Bridge*, despite these giant strides and our deepening understanding of how vertebrates fit into the tree of life, the morphological chasm between vertebrates and invertebrates remains vast and enigmatic. As Gee shows, even as scientific advances have falsified a variety of theories linking these groups, the extant relatives of vertebrates are too few for effective genetic analysis. Moreover, the more we learn about the species that do remain—from sea-squirts to starfish—the clearer it becomes that they are too far evolved along their own courses to be of much use in reconstructing what the latest invertebrate ancestors of vertebrates looked like. Fossils present yet further problems of interpretation. Tracing both the fast-changing science that has helped illuminate the intricacies of vertebrate evolution as well as the limits of that science, *Across the Bridge* helps us to see how far the field has come in crossing the invertebrate-to-vertebrate divide—and how far we still have to go.

**Primates, Pathogens, and Evolution**-Jessica F. Brinkworth 2013-08-30 The immune systems of human and non-human primates have diverged over time, such that some species differ considerably in their susceptibility, symptoms, and survival of particular infectious diseases. Variation in primate immunity is such that major human pathogens - such as immunodeficiency viruses, herpesviruses and malaria-inducing species of Plasmodium - elicit striking differences in immune response between closely related species and within primate populations. These differences in immunity are the outcome of complex evolutionary processes that include interactions between the host, its pathogens and symbiont/commensal organisms. The success of some pathogens in establishing persistent infections in humans and other primates has been determined not just by the molecular evolution of the pathogen and its interactions with the host, but also by the evolution of primate behavior and ecology, microflora, immune factors and the evolution of other biological systems. To explore how interactions between primates and their pathogens have shaped their mutual molecular evolution, *Primates, Pathogens and Evolution* brings together research that explores comparative primate immune function, the emergence of major and neglected primate diseases, primate-microorganism molecular interactions, and related topics. This book will be of interest to anyone curious as to why infectious diseases manifest differently in humans and their closest relatives. It will be of particular interest to scholars specializing in human and non-human primate evolution, epidemiology and immunology, and disease ecology. *Primates, Pathogens and Evolution* offers an overview and discussion of current findings on differences in the molecular mechanics of primate immune response, as well as on pathogen-mediated primate evolution and human and non-human primate health.

**Avian Immunology**-Karel A. Schat 2012-12-02 The second edition of *Avian Immunology* provides an up-to-date overview of the current knowledge of avian immunology. From the ontogeny of the avian immune system to practical application in vaccinology, the book encompasses all aspects of innate and adaptive immunity in chickens. In addition, chapters are devoted to the immunology of other commercially important species such as turkeys and ducks, and to ecimmunology summarizing the knowledge of immune responses in free-living birds often in relation to reproductive success. The book contains a detailed description of the avian innate immune system, encompassing the mucosal, enteric, respiratory and reproductive systems. The diseases and disorders it covers include immunodpressive diseases and immune evasion, autoimmune diseases, and tumors of the immune system. Practical aspects of vaccination are examined as well. Extensive appendices summarize resources for scientists including cell lines, inbred chicken lines, cytokines, chemokines, and monoclonal antibodies. The world-wide importance of poultry protein for the human diet, as well as the threat of avian influenza pandemics like H5N1 and heavy reliance on vaccination to protect commercial flocks makes this book a vital resource. This book provides crucial information not only for poultry health professionals and avian biologists, but also for comparative and veterinary immunologists, graduate students and veterinary students with an interest in avian immunology. With contributions from 33 of the foremost international experts in the field, this book provides the most up-to-date review of avian immunology so far Contains a detailed description of the avian innate immune system reviewing constitutive barriers, chemical and cellular responses; it includes a comprehensive review of avian Toll-like receptors Contains a wide-ranging review of the "ecimmunology" of free-living avian species, as applied to studies of population dynamics, and reviews methods and resources available for carrying out such research

**Evolution and Vertebrate Immunity**-Garnett Kelson 1987

**Ranaviruses**-Matthew J. Gray 2015-04-27 This is the first book on ranaviruses. Ranaviruses are double-stranded DNA viruses that cause hemorrhagic disease in amphibians, reptiles, and fish. They have caused mass die-offs of ectothermic vertebrates in wild and captive populations around the globe. There is evidence that this pathogen is emerging and responsible for population declines in certain locations. Considering that amphibians and freshwater turtles are suitable hosts and the most imperiled vertebrate taxa in the world, ranaviruses can have significant impacts on biodiversity and ecosystem function. Additionally, many fish that are raised in aquaculture facilities and traded internationally are suitable hosts; thus, the potential economic impact of ranaviruses is significant. Ranaviruses also serve as a model for replication and gene function of large double-stranded DNA viruses. There is an urgent need to assemble the contemporary information on ranaviruses and provide guidance on how to assess their threats in populations. Through the Global Ranavirus Consortium, 24 experts from six countries were organized to write this volume, the first book on ranaviruses. The book begins with a discussion on the global extent of ranaviruses, case histories of infection and disease in ectothermic vertebrates, and current phylogeny. Basic principles of ranavirus ecology and evolution are covered next, with a focus on host-pathogen interactions and how the virus emerges in its environment. There are two chapters that will discuss the molecular biology of ranaviruses, host response to infection, and the genes responsible for immune system evasion. One chapter establishes standards for testing for infection and diagnosing ranaviral disease. The book ends by providing guidance on how to design ranavirus surveillance studies and analyze data to determine risk, and discussing the role of the Global Ranavirus Consortium in organizing research and outreach activities.

**Phylogenesis of Immune Functions**-Gregory W. Warr 1990-11-21 This volume discusses recent advances in research regarding the evolution of specific and non-specific defense responses in a taxonomically diverse array of species. Topics regarding invertebrates include the protective mechanisms (cellular and molecular) employed by insects, the protective roles of lectins, and the self-nonself discrimination revealed by tissue incompatibility reactions. With vertebrates, the evolution of the immunoglobulin-related superfamily of recognition molecules (including immunoglobulins and the major histocompatibility complex molecules) is examined over several chapters. Other topics reviewed include the evolution of nonimmunoglobulin mediators of defense (e.g., cytokines and eicosanoids), lymphocyte subpopulations (including effects of ambient temperature on function) and the phylogenetic emergence of natural killer cells. Phylogenesis of Immune Functions provides invaluable information for evolutionary biologists, as well as all immunologists and other researchers interested in discovering how inhabitants in our increasingly threatened biosphere protect themselves against environmental pathogens and toxins.

**Myxozoan Evolution, Ecology and Development**-Beth Okamura 2015-04-01 This book provides an up-to-date review of the biology of myxozoans, which represent a divergent clade of endoparasitic cnidarians. Myxozoans are of fundamental interest in understanding how early diverging metazoans have adopted parasitic lifestyles, and are also of considerable economic and ecological concern as endoparasites of fish. Synthesizing recent research, the chapters explore issues such as myxozoan origins; evolutionary trends and diversification; development and life cycles; interactions with hosts; immunology; disease ecology; the impacts of climate change on disease; risk assessment; emerging diseases; and disease mitigation. This comprehensive work will appeal to a wide readership, from invertebrate zoologists, evolutionary biologists and developmental biologists to ecologists and parasitologists. It will also be of great practical interest to fisheries and conservation biologists. The identification of key areas for future research will appeal to scientists at all levels.

**Understanding Immunology**-Alastair J. Cunningham 2012-12-02 Understanding Immunology deals with immunology and its unifying principles, based on the view that the immune system has evolved to combat infectious disease. This book describes the phylogenetic emergence of the immune system; immune reactions in invertebrates and vertebrates; antibody-antigen reactions and the induction of the antibody response; the development of the immune repertoire and self-tolerance; and memory and tolerance in T-cells. This text is organized into 15 chapters and begins with an overview of the immune system, paying particular attention to its basic requirements and properties. This book then discusses antibodies and antigens; the molecular biology of antibody formation; and the role of lymphocytes, lymphoid tissue, and antibody forming cells in the immune response. The following chapters focus on immunocompetent cells and the mechanisms of cell cooperation in the induction of the antibody response, properties of the cells responsible for memory, and the genetic basis of antibody diversity. The reader is also introduced to allelic inclusion and the ontogeny of the immune repertoire; differentiation of T-cells; and cancer and transplantation immunology. The remaining chapters explore aberrations of the immune system and immunity to infectious disease. A comparison of the strategies of vertebrates and invertebrates in adapting to unexpected changes in the environment concludes the book. This book will prove useful as an introduction to immunology to those with some background in biology, particularly, undergraduate or graduate students as well as established researchers in other fields.

**Hagfish Biology**-Susan L. Edwards 2015-09-14 With over 70 species still populating the world's oceans after approximately 500 million years, hagfishes are essential benthic organisms that play a vital role in understanding the evolutionary origins of vertebrate life and the maintenance of the oceanic ecosystem. Hagfish Biology is a long overdue book for communicating and furthering study on these unique animals. It provides an avenue of synergy among scientists interested in hagfish physiology, molecular and evolutionary biology, morphology, and protection. New high throughput sequencing technologies, advanced microscopy techniques, descriptions of hagfish embryology, and developments of techniques to understand ancient evolutionary relationships have led to a resurgence of interest in the hagfish as a key species in understanding the evolution of vertebrates. Inspired by these new research perspectives, this book compiles scientific information on hagfishes that is of interest to a range of fields such as ecology and evolution, comparative physiology, and conservation biology. A much-needed contribution, Hagfish Biology builds on previous knowledge while encouraging further expansion of scientific interest and learning about this fascinating yet understudied key evolutionary species. It introduces you to developing areas of research and provides beginning points for a larger conversation on hagfishes.

**Biology 2e**-Mary Ann Clark 2018 Biology 2e (2nd edition) is designed to cover the scope and sequence requirements of a typical two-semester biology course for science majors. The text provides comprehensive coverage of foundational research and core biology concepts through an evolutionary lens. Biology includes rich features that engage students in scientific inquiry, highlight careers in the biological sciences, and offer everyday applications. The book also includes various types of practice and homework questions that help students understand – and apply – key concepts. The 2nd edition has been revised to incorporate clearer, more current, and more dynamic explanations, while maintaining the same organization as the first edition. Art and illustrations have been substantially improved, and the textbook features additional assessments and related resources.

**Building the Most Complex Structure on Earth**-Nelson R. Cabej 2013-04-01 Building the Most Complex Structure on Earth provides readers with a basic biological education an easy and understandable introduction into a new epigenetic theory of development and evolution. This is a novel theory that describes the epigenetic mechanisms of the development and evolution of animals and explains the colossal evolution and diversification of animals from a new post-genetic perspective. Modern biology has demonstrated the existence of a common genetic toolkit in the animal kingdom, but neither the number of genes nor the evolution of new genes is responsible for the development and evolution of animals. The failure to understand how the same genetic toolkit is used to produce millions of widely different animal forms remains a perplexing conundrum in modern biology. The novel theory shows that the development and evolution of the animal kingdom are functions of epigenetic mechanisms, which are the competent users of the genetic toolkit. Provides a comprehensive view of the epigenetic aspects of reproduction, development, and evolution. Highly rigorous, but simple enough for readers with only a basic knowledge of biology.

**Biology for AP ® Courses**-Julianne Zedalis 2017-10-16 Biology for AP® courses covers the scope and sequence requirements of a typical two-semester Advanced

Placement® biology course. The text provides comprehensive coverage of foundational research and core biology concepts through an evolutionary lens. Biology for AP® Courses was designed to meet and exceed the requirements of the College Board's AP® Biology framework while allowing significant flexibility for instructors. Each section of the book includes an introduction based on the AP® curriculum and includes rich features that engage students in scientific practice and AP® test preparation; it also highlights careers and research opportunities in biological sciences.

**Body by Darwin**-Jeremy Taylor 2015-10-22 We think of medical science and doctors as focused on treating conditions—whether it's a cough or an aching back. But the sicknesses and complaints that cause us to seek medical attention actually have deeper origins than the superficial germs and behaviors we regularly fault. In fact, as Jeremy Taylor shows in *Body by Darwin*, we can trace the roots of many medical conditions through our evolutionary history, revealing what has made us susceptible to certain illnesses and ailments over time and how we can use that knowledge to help us treat or prevent problems in the future. In *Body by Darwin*, Taylor examines the evolutionary origins of some of our most common and serious health issues. To begin, he looks at the hygiene hypothesis, which argues that our obsession with anti-bacterial cleanliness, particularly at a young age, may be making us more vulnerable to autoimmune and allergic diseases. He also discusses diseases of the eye, the medical consequences of bipedalism as they relate to all those aches and pains in our backs and knees, the rise of Alzheimer's disease, and how cancers become so malignant that they kill us despite the toxic chemotherapy we throw at them. Taylor explains why it helps to think about heart disease in relation to the demands of an ever-growing, dense, muscular pump that requires increasing amounts of nutrients, and he discusses how walking upright and giving birth to ever larger babies led to a problematic compromise in the design of the female spine and pelvis. Throughout, he not only explores the impact of evolution on human form and function, but he integrates science with stories from actual patients and doctors, closely examining the implications for our health. As Taylor shows, evolutionary medicine allows us think about the human body and its adaptations in a completely new and productive way. By exploring how our body's performance is shaped by its past, *Body by Darwin* draws powerful connections between our ancient human history and the future of potential medical advances that can harness this knowledge.

**The Edge of Evolution**-Michael J. Behe 2008-06-17 The author of Darwin's Black Box draws on new findings in genetics to pose an argument for intelligent design that refutes Darwinian beliefs about evolution while offering alternative analyses of such factors as disease, random mutations, and the human struggle for survival. Reprint. 40,000 first printing.

**Evolution of Immune Reactions**-Petr Sima 1990-08-27 This book on phylogeny and immunity reconstructs the history and evolutionary pathways of immunity among the various forms of life. The authors argue that the immunity could have evolved different adequately successful patterns in the animal sub-regnum which are strictly determined by the morpho-physiological possibilities of the animals. They state that the vertebrate type of immunity evolved only in the chordate branch. The publication devotes special attention to the arthropods and molluscs, as they have attracted more investigative efforts than any other invertebrate taxa. The authors selected Agnatha, Chondrichthyes, and Osteichthyes from the vertebrate taxa in order to show where and how the morphofunctional basis of the truly adaptive immunity of the endothermic tetrapods gradually evolved. Each chapter gives the description of the origin and interrelationships of the representatives of the taxon in question. Also given are the main biological, morphological, non-morphological and immune attributes. Emphasized throughout the book is the central idea that immunological reactions are a part of the overall biological phenomena and should be studied only from this aspect. The authors express that the fields of comparative and evolutionary immunology will provide inspiration for further investigations in biomedicine in the near future.

**Immunobiology of the Shark**-Sylvia L. Smith 2014-12-04 Immunity studies in sharks over the past three decades have produced some remarkable discoveries. If one message rings true, it is that alternative animal model systems, such as sharks and their relatives, have contributed very substantially to a better understanding of the development evolution of our own immune system. *Immunobiology of the Shark* describes the cellular, genetic, and molecular specifics of immune systems in sharks. Diverse approaches were employed to study the immunobiology of the shark from basic microscopic observations to detailed genome annotation. The book also raises a

series of fascinating questions, which can be addressed experimentally using today's technology. This book will be a valuable resource for mainstream immunologists, comparative immunologists, geneticists, ecologists, evolutionary biologists, and investigators engaged in shark research. The book also aims to illustrate the magnificence of these animals as model systems and underscores the importance of their study to further understand their complex, and often enigmatic, biology.

**Evolutionary Worlds Without End**-Henry C. Plotkin 2010 In *Evolutionary Worlds without end*, Henry Plotkin considers whether there is any general theory in biology, including the social sciences, that is in any way equivalent to the general theories of physics. He starts by examining Ernest Rutherford's dictum as to what science is. In the later chapters he considers the possibility, within an historical framework, of a general theory being based upon selection processes. --

**Immune Interactions during the Reproductive Cycle**-Sinuhe Hahn 2015-07-03 Mammalian pregnancy represents a unique immunological riddle in that the mother does not reject her allogeneic fetus. In part this is largely due to a general sequestration or diminution of T cell activity, and an increased involvement of the innate immune system. The field of immunology is concerned primarily with how innate and adaptive mechanisms collaborate to protect vertebrates from infection. Although many cellular and molecular actors have evidently important roles, antibodies and lymphocytes are considered to be the principal players. Yet despite their importance, it would be definitely simplistic to conclude that they are solely essential for immunity overall. A major distinction between adaptive and innate immunity is the spontaneity of the innate immune response, which utilizes an already pre-existing but limited repertoire of responding modules. The slower onset of adaptive immunity compensates by its ability to recognize a much broader repertoire of foreign substances, and also by its power to constantly improve during a response, whereas innate immunity remains relatively unaffected. The interactions between the reproductive system and the immune system are of particular interest, since the reproductive system is unique in that its primary role is to assure the continuity of the species, while the immune system provides internal protection and thus facilitates continued health and survival. The modus operandi of these two morphologically diffuse systems involves widely distributed chemical signals in response to environmental input, and both systems must interact for the normal functioning of each. Furthermore, dysregulation of normal physiological interactions between the reproductive and immune systems can lead to severe pregnancy-related disorders or complications. On the other hand, by ameliorating auto-inflammatory conditions such as MS and RA, pregnancy may provide a unique insight into novel immune modulatory strategies. The scientific focus on reproductive-immune research has historically provided substantial insight into the interface between these two physiological systems. A translational research approach would involve a tight interaction between diverse scientific and clinical disciplines including immunology, obstetrics, haematology, haemostasis and endocrinology. With so much recent progress in the field, we believe that it is valuable and well-timed to review the broad variety of the relevant physiologic and pathologic aspects - from menstruation to fertilization and implantation, and from placentation and pregnancy per se to the post partum condition - in which the immune system takes part. We are looking forward to a wide and vivid discussion of these and related issues, and we sincerely expect that our readers profoundly benefit from new exciting insights and fruitful collaborations.

**Fish Defenses Vol. 1**-Giacomo Zaccone 2017-05-31 The greatest complexity of the immune response is shown by vertebrates which are endowed with innate and acquired immunity. Immunological studies performed mostly in mammals have been the reference for studies in other vertebrates. The study of immunological fish defenses has advanced considerably in recent decades. This has been due to the key status of fish in terms of the evolution of acquired immunity and due to the rapid expansion of aquaculture over this period, wherein disease control is of prime concern. Most of the chapters not only review the current advances on fish immune defenses, but also show perspective for future research. The book will be of interest to scientists involved in fish immunology, fisheries and aquaculture as well as for students of fish biology.