

Infectious Disease and Host–Pathogen Evolution



Edited by
Krishna R. Dronamraju

CAMBRIDGE

Infectious Disease And Host Pathogen Evolution

Jean-Pierre Gorvel



Infectious Disease And Host Pathogen Evolution:

Infectious Disease and Host-Pathogen Evolution Krishna R. Dronamraju, 2004-04-05 This book originally published in 2004 is concerned with the links between human evolution and infectious disease. It has long been recognised that an important factor in human evolution has been the struggle against infectious disease and more recently it was revealed that complex genetic polymorphisms are the direct result of that struggle. As molecular biological techniques become more sophisticated, a number of breakthroughs in the area of host pathogen evolution led to an increased interest in this field. From the historical beginnings of J B S Haldane's original hypothesis to more recent research, this book strives to evaluate infectious diseases from an evolutionary perspective. It provides a survey of information regarding host pathogen evolution related to major infectious diseases and parasitic infections including malaria, influenza and leishmaniasis. Written by leading authorities in the field and edited by a former pupil of Haldane, *Infectious Disease and Host Pathogen Evolution* will be valuable for those working in related areas of microbiology, parasitology, immunology and infectious disease medicine as well as genetics, evolutionary biology and epidemiology.

Infectious Disease and Host-pathogen Evolution Krishna R. Dronamraju, 2004. It has long been recognised that an important factor in human evolution has been the struggle against infectious disease and more recently it has been revealed that complex genetic polymorphisms are the direct result of that struggle. As molecular biological techniques become more sophisticated, a number of breakthroughs in the area of host pathogen evolution have led to an increased interest in this field. From the historical beginnings of J B S Haldane's original hypothesis to current research, this book strives to evaluate infectious diseases from an evolutionary perspective. It provides a survey of the latest information regarding host pathogen evolution related to major infectious diseases and parasitic infections including malaria, influenza and leishmaniasis. Written by leading authorities in the field and edited by a former pupil of Haldane, *Infectious Disease and Host Pathogen Evolution* will be a valuable reference for those working in related areas of microbiology, parasitology, immunology and infectious disease medicine as well as genetics, evolutionary biology and epidemiology.

Infectious Disease Ecology of Wild Birds Jennifer C. Owen, Dana M. Hawley, Kathryn P. Huyvaert, 2021-06-30. Birds are the most diverse group of land vertebrates and have evolved to exploit almost every terrestrial niche on earth. They also serve as a natural reservoir for an array of different pathogens that pose serious health risks to human and domestic animal populations, including West Nile virus, highly pathogenic avian influenza viruses, Newcastle Disease virus and numerous enteric pathogens. Avian diseases are also critically important to the conservation of endemic bird species in many places around the world. This accessible textbook focuses on the dynamics of infectious diseases for wild avian hosts across every level of ecological hierarchy, from the way pathogens interact with the physiology and behavior of individual hosts, the evolutionary and ecological dynamics of the host-parasite interactions occurring within populations, up to the complex biotic and abiotic interactions occurring within biological communities and ecosystems.

Parasite bird interactions are also increasingly occurring in rapidly changing global environments thus their ecology is also changing and this shapes the complex ways by which parasites influence the inter connected health of birds humans and shared ecosystems Given the key role of birds in ecological communities more broadly and as the primary host to so many zoonotic pathogens an understanding of the ecological and evolutionary principles underlying the maintenance amplification transmission and dispersal of these infectious agents is crucial to understanding how to mitigate the negative global impacts of the ever increasing number of emerging infectious diseases Although the topics and principles discussed in this book relate to birds they have a far wider relevance and can also be applied to non avian wildlife host pathogen systems The COVID 19 pandemic has shown that understanding of disease ecology in wild animal populations is paramount to global health

Infectious Disease Ecology of Wild Birds is suitable for both senior undergraduate and graduate students taking courses in avian disease ecology ecoimmunology ecology and conservation It will also appeal to the many professional parasitologists ecoimmunologists ornithologists behavioural ecologists conservation biologists and wildlife biologists requiring a concise overview of the topic

The Changing Face of Disease C.G. Nicholas Mascie-Taylor, Jean Peters, Stephen T. McGarvey, 2004-02-11 Disease is an ever present threat faced by all human societies Today this concept has become an influential area of study known as the global burden of disease which encompasses contemporary health concerns such as the economic costs of disease the societal impact of illness in developing nations and infectious diseases resulting from lifestyle

Evolution in Health and Disease Stephen C. Stearns, Jacob C. Koella, 2008 This work explores and analyses the ways in which our ancient genes contend with and influence modern human life It offers coverage of the points of contact between evolutionary biology and medical science

Disease Evolution Zhilan Feng, Ulf Dieckmann, Simon A. Levin, Infectious diseases are continuing to threaten humankind While some diseases have been controlled new diseases are constantly appearing Others are now reappearing in forms that are resistant to drug treatments A capacity for continual re adaptation furnishes pathogens with the power to escape our control efforts through evolution This makes it imperative to understand the complex selection pressures that are shaping and reshaping diseases Modern models of evolutionary epidemiology provide powerful tools for creating expressing and testing such understanding Bringing together international leaders in the field this volume offers a panoramic tour of topical developments in understanding the mechanisms of disease evolution The volume's first part elucidates the general concepts underlying models of disease evolution Methodological challenges addressed include those posed by spatial structure stochastic dynamics disease phases and classes single and multi drug resistance the heterogeneity of host populations and tissues and the intricate coupling of disease evolution with between host and within host dynamics The book's second part shows how these methods are utilized for investigating the dynamics and evolution of specific diseases including HIV AIDS tuberculosis SARS malaria and human rhinovirus infections This volume is particularly suited for introducing young scientists and established researchers with

backgrounds in mathematics computer science or biology to the current techniques and challenges of mathematical evolutionary epidemiology **Evolution in Action: Past, Present and Future** Wolfgang Banzhaf, Betty H.C.

Cheng, Kalyanmoy Deb, Kay E. Holekamp, Richard E. Lenski, Charles Ofria, Robert T. Pennock, William F. Punch, Danielle J. Whittaker, 2020-07-08 This edited research monograph brings together contributions from computer scientists biologists and engineers who are engaged with the study of evolution and how it may be applied to solve real world problems It also serves as a Festschrift dedicated to Erik D Goodman the founding director of the BEACON Center for the Study of Evolution in Action a pioneering NSF Science and Technology Center headquartered at Michigan State University The contributing authors are leading experts associated with the center and they serve in top research and industrial establishments across the US and worldwide Part I summarizes the history of the BEACON Center with refreshingly personal chapters that describe Erik s working and leadership style and others that discuss the development and successes of the center in the context of research funding projects and careers The chapters in Part II deal with the evolution of genomes and evolvability The contributions in Part III discuss the evolution of behavior and intelligence Those in Part IV concentrate on the evolution of communities and collective dynamics The chapters in Part V discuss selected evolutionary computing applications in domains such as arts and science automated program repair cybersecurity mechatronics and genomic prediction Part VI deals with evolution in the classroom using creativity in research and responsible conduct in research training The book concludes with a special chapter from Erik Goodman a short biography that concentrates on his personal positive influences and experiences throughout his long career in academia and industry Evolution and Medicine Robert Perlman, 2013-05-30 Evolution and Medicine provides an accessible introduction to the new field of evolutionary medicine Evolutionary concepts help explain why we remain vulnerable to disease how pathogens and cancer cells evolve and how the diseases that affected our evolutionary ancestors have shaped our biology The book interweaves the presentation of evolutionary principles with examples that illustrate how an evolutionary perspective enhances our understanding of disease It discusses the theory of evolution by natural selection the genetic basis of evolutionary change evolutionary life history theory and host pathogen coevolution and uses these concepts to provide new insights into diseases such as cystic fibrosis cancer sexually transmitted diseases and malaria incorporating the latest research in rapidly developing fields such as epigenetics and the study of the human microbiome The book concludes with a discussion of the ways in which recent culturally constructed changes in the human environment are increasing the prevalence of man made diseases such as diabetes and cardiovascular diseases and are exacerbating socioeconomic disparities in health Just as evolutionary biology is concerned with populations and with changes in populations over time evolutionary medicine is concerned with the health of populations Evolution and Medicine emphasizes the role of demographic processes in evolution and disease and stresses the importance of improving population health as a strategy for improving the health of individuals This accessible text is written primarily for physicians biomedical

scientists and both premedical and medical students and will appeal to all readers with a background or interest in medicine

Human Evolutionary Biology Michael P. Muehlenbein, 2010-07-29 Wide ranging and inclusive this text provides an invaluable review of an expansive selection of topics in human evolution variation and adaptability for professionals and students in biological anthropology evolutionary biology medical sciences and psychology The chapters are organized around four broad themes with sections devoted to phenotypic and genetic variation within and between human populations reproductive physiology and behavior growth and development and human health from evolutionary and ecological perspectives An introductory section provides readers with the historical theoretical and methodological foundations needed to understand the more complex ideas presented later Two hundred discussion questions provide starting points for class debate and assignments to test student understanding

Microbial Evolution and Co-Adaptation Institute of Medicine, Board on Global Health, Forum on Microbial Threats, 2009-05-10 Dr Joshua Lederberg scientist Nobel laureate visionary thinker and friend of the Forum on Microbial Threats died on February 2 2008 It was in his honor that the Institute of Medicine's Forum on Microbial Threats convened a public workshop on May 20 21 2008 to examine Dr Lederberg's scientific and policy contributions to the marketplace of ideas in the life sciences medicine and public policy The resulting workshop summary *Microbial Evolution and Co Adaptation* demonstrates the extent to which conceptual and technological developments have within a few short years advanced our collective understanding of the microbiome microbial genetics microbial communities and microbe host environment interactions

Bacterial Pathogenesis Brenda A. Wilson, Malcolm Winkler, Brian T. Ho, 2020-08-11 This highly anticipated update of the acclaimed textbook draws on the latest research to give students the knowledge and tools to explore the mechanisms by which bacterial pathogens cause infections in humans and animals Written in an approachable and engaging style the book uses illustrative examples and thought provoking exercises to inspire students with the potential excitement and fun of scientific discovery Completely revised and updated and for the first time in stunning full color *Bacterial Pathogenesis A Molecular Approach Fourth Edition* builds on the core principles and foundations of its predecessors while expanding into new concepts key findings and cutting edge research including new developments in the areas of the microbiome and CRISPR as well as the growing challenges of antimicrobial resistance All new detailed illustrations help students clearly understand important concepts and mechanisms of the complex interplay between bacterial pathogens and their hosts Study questions at the end of each chapter challenge students to delve more deeply into the topics covered and hone their skills in reading interpreting and analyzing data as well as devising their own experiments A detailed glossary defines and expands on key terms highlighted throughout the book Written for advanced undergraduate graduate and professional students in microbiology bacteriology and pathogenesis this text is a must have for anyone looking for a greater understanding of virulence mechanisms across the breadth of bacterial pathogens

Primates, Pathogens, and Evolution Jessica F. Brinkworth, Kate Pechenkina, 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 **Ecology of**

Invertebrate Diseases Ann E. Hajek, David I. Shapiro-Ilan, 2018-01-16 A rapidly growing interdisciplinary field disease ecology merges key ideas from ecology medicine genetics immunology and epidemiology to study how hosts and pathogens interact in populations communities and entire ecosystems Bringing together contributions from leading international experts on the ecology of diseases among invertebrate species this book provides a comprehensive assessment of the current state of the field Beginning with an introductory overview of general principles and methodologies the book continues with in depth discussions of a range of critical issues concerning invertebrate disease epidemiology molecular biology vectors and pathogens Topics covered in detail include Methods for studying the ecology of invertebrate diseases and pathogens Invertebrate pathogen ecology and the ecology of pathogen groups Applied ecology of invertebrate pathogens Leveraging the ecology of invertebrate pathogens in microbial control Prevention and management of infectious diseases of aquatic invertebrates Ecology of Invertebrate Diseases is a necessary and long overdue addition to the world literature on this vitally important subject This volume belongs on the reference shelves of all those involved in the environmental sciences genetics microbiology marine biology immunology epidemiology fisheries and wildlife science and related disciplines

Intracellular Pathogens in Membrane Interactions and Vacuole Biogenesis Jean-Pierre Gorvel, 2004-01-31 This book provides information on the molecular interactions between host cell organelles and pathogens which have developed strategies to survive within infected cells Chapters are grouped into five sections I Endocytosis and phagocytosis Collectively

the chapters of this section review basic knowledge regarding intracellular organelles are involved in membrane interactions with pathogen containing vacuoles II Professional and non professional phagocytes Here the authors describe the major differences between the two host cell types which can be infected by microorganisms III Maturation pathways of bacteria containing vacuoles Molecular interactions between vacuoles and intracellular organelles leading to the search of the Holy Grail the replication niche are described IV Host response Host cells are able to react against intruders and eventually mount host responses In these chapters the various types of host response mechanisms against intracellular intruders are reviewed V Co evolution In these final chapters the question is addressed of whether knowledge of bacteria host cell interactions will be acquired fast enough to find the necessary tools for controlling microorganism development **On Human Nature**

Michel Tibayrenc, Francisco J. Ayala, 2016-09-12 On Human Nature Biology Psychology Ethics Politics and Religion covers the present state of knowledge on human diversity and its adaptive significance through a broad and eclectic selection of representative chapters This transdisciplinary work brings together specialists from various fields who rarely interact including geneticists evolutionists physicians ethologists psychoanalysts anthropologists sociologists theologians historians linguists and philosophers Genomic diversity is covered in several chapters dealing with biology including the differences in men and apes and the genetic diversity of mankind Top specialists known for their open mind and broad knowledge have been carefully selected to cover each topic The book is therefore at the crossroads between biology and human sciences going beyond classical science in the Popperian sense The book is accessible not only to specialists but also to students professors and the educated public Glossaries of specialized terms and general public references help nonspecialists understand complex notions with contributions avoiding technical jargon Provides greater understanding of diversity and population structure and history with crucial foundational knowledge needed to conduct research in a variety of fields such as genetics and disease Includes three robust sections on biological psychological and ethical aspects with cross fertilization and reciprocal references between the three sections Contains contributions by leading experts in their respective fields working under the guidance of internationally recognized and highly respected editors Health and Lifestyle Change

Rebecca Huss-Ashmore, Joan Schall, Mary Hediger, 1992-06-29 The health impacts of changing behavior and lifestyle in a range of prehistoric historic and extant populations are examined in this volume Of particular interest to the authors is the identification of issues that link past and present and the ability of research on disease in the past to shed light on modern health problems MASCA Vol 9 Biology, Evolution, and Human Nature Timothy H. Goldsmith, William F.

Zimmerman, 2000-11-16 Dieses Buch bietet eine ausgewogene Darstellung der Kerntheorien und Grundlagen des Evolutionsgedankens und macht deutlich wie diese Theorien das menschliche Verhalten beeinflussen Aus evolutionsgeschichtlicher Sicht werden die Verbindungen zwischen den einzelnen Stufen biologischer Komplexität zurckverfolgt von den Genen ber das Nervensystem bis hin zu Tiergesellschaften und menschlichen Kulturen Analysiert wird die

Geschichte der Evolutionstheorie von Darwin bis zur Gegenwart wobei ein besonderer Schwerpunkt auf der Molekularbiologie und der evolutionären Sozialtheorie liegt. Enthalten sind auch neue Arbeiten zu Primatengesellschaften und der Entwicklungsgeschichte des Menschen. Geschrieben von zwei hervorragenden Dozenten auf dem Gebiet der menschlichen Ethologie. 12 00 Host Adaptation, Virulence, and Evolution Javid Ahmad Parray, Niraj Singh, Wen-Jun Li, 2025-02-24. Microbial Genomics: Host Adaptation, Virulence, and Evolution covers different aspects of microbial genomics, metagenomics, and functional studies of microbes that have provided a significant understanding of microbial host interactions, virulence function, host adaptation mechanisms, including microbial evolution. Microbial Genomics: Host Adaptation, Virulence, and Evolution is a comprehensive source on the latest updates and applications of microbial genomics information to understand the plant-microbe interaction, host adaptation, virulence, nature of the infectious pathogen, microbial evolution, host-pathogen interactions, contribute to shaping the genetic diversity of both organisms. Sections include an introduction to Microbial Genomics followed by sections on Plant Microbiome, Genome Editing, Prospecting and Approaches, Microbial virulence and disease incidence. The final section of the book covers Microbial Genomics and evolutionary concepts. Microbial Genomics: Host Adaptation, Virulence, and Evolution is a valuable resource for faculty members, researchers, and undergraduate and postgraduate students at universities, medical research labs, industries, and government agencies that are interested in the microbial science specific to the microbial genome, virulence function of pathogenic microbes, host adaptation, evolution of microbes, and all other disciplines related to molecular microbiology. Presents the latest developments and progress on microbial genome and metagenome research and findings. Assesses the advancements in the study of microbial virulence, gene function, adaptation, and infectious pathogen evolution. Provides insights about the progress and prospect of microbial genome editing. **Malaria** Krishna R. Dronamraju, Paolo Arese, 2006-06-26. This book was originally conceived at a conference at the University of Turin in Italy. The conference was organized to examine the so-called Malaria Hypothesis, that is to say the higher fitness of the sickle cell heterozygotes in a malarial environment and to pay tribute to the proponent of that hypothesis, J. B. S. Haldane. Contributors to this book examine certain genetic and evolutionary aspects of malaria, which is a major killer of human populations, especially in Africa and Asia. There were attempts to discredit Haldane's contribution from two directions: a) it has been suggested that the Malaria Hypothesis was known long before Haldane and that there was nothing original about his idea (Lederberg 1999) and that b) the hypothesis of heterozygote superiority was first suggested by the Italian biologist Giuseppe Montalenti, who communicated his idea to Haldane (Allison 2004). Surely both c) not be right. In fact, the evidence presented in this book clearly indicates that both are wrong. Haldane's malaria hypothesis has stimulated a great deal of research on the genetic, evolutionary, and epidemiological aspects of malaria during the last 50 years. It has opened up a whole new chapter in the study of infectious diseases. It deserves serious consideration. For helpful discussions, we thank Lucio Luzzatto, Alberto Piazza, Guido Modiano, and

David Roberts *Cognition-Based Evolution* William B. Miller, 2023-06-23 Cognition Based Evolution is the first comprehensive alternative to 20th century Neodarwinism proposing a radical 21st century evolutionary framework with a novel point of origination all cells are intelligent and must measure uncertain environmental information to sustain themselves In Cognition Based Evolution life is defined by cognition From this differential stance evolutionary biology transforms into the science of why how what and with whom cells measure and communicate under stressful environmental conditions Life s context is uncertain environmental information communication is its means and genes are its tools Evolution is its yield as continuous non random self referential cellular problem solving

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