

Microbial Ecology

AN EVOLUTIONARY APPROACH



J Vaun McArthur

Microbial Ecology An Evolutionary Approach

Martin Curd, Stathis Psillos



Microbial Ecology An Evolutionary Approach:

Microbial Ecology J Vaun McArthur, 2006-02-01 Based on the thesis that insights into both evolution and ecology can be obtained through the study of microorganisms Microbial Ecology examines microbiology through the lens of evolutionary ecology Measured from a microbial perspective this text covers such topics as optimal foraging genome reduction novel evolutionary mechanisms bacterial speciation and r and K selection Numerous aspects of microbial existence are also discussed and include species competition predation parasitism mutualism microbial communication through quorum sensing and other The result is a context for understanding microbes in nature and a framework for microbiologists working in industry medicine and the environment Applies evolutionary ecological concepts to microbes Addresses individual population and community ecology Presents species concepts and offers insights on the origin of life and modern microbial ecology Examines topics such as species interactions nutrient cycling quorum sensing and cheating *Microbial Ecology: An Evolutionary Approach (Hb)* McArthur, 2008-01-01 Microbial Ecology Larry L. Barton, Diana E. Northup, 2011-10-14 This book covers the ecological activities of microbes in the biosphere with an emphasis on microbial interactions within their environments and communities In thirteen concise and timely chapters Microbial Ecology presents a broad overview of this rapidly growing field explaining the basic principles in an easy to follow manner Using an integrative approach it comprehensively covers traditional issues in ecology as well as cutting edge content at the intersection of ecology microbiology environmental science and engineering and molecular biology Examining the microbial characteristics that enable microbes to grow in different environments the book provides insights into relevant methodologies for characterization of microorganisms in the environment The authors draw upon their extensive experience in teaching microbiology to address the latest hot button topics in the field such as Ecology of microorganisms in natural and engineered environments Advances in molecular based understanding of microbial phylogeny and interactions Microbially driven biogeochemical processes and interactions among microbial populations and communities Microbial activities in extreme or unusual environments Ecological studies pertaining to animal plant and insect microbiology Microbial processes and interactions associated with environmental pollution Designed for use in teaching Microbial Ecology offers numerous special features to aid both students and instructors including Information boxes that highlight key microbial ecology issues Microbial Spotlights that focus on how prominent microbial ecologists became interested in microbial ecology Examples that illustrate the role of bacterial interaction with humans Exercises to promote critical thinking Selected reading lists Chapter summaries and review questions for class discussion Various microbial interactions and community structures are presented through examples and illustrations Also included are mini case studies that address activities of microorganisms in specific environments as well as a glossary and key words All these features make this an ideal textbook for graduate or upper level undergraduate students in biology microbiology ecology or environmental science It also serves as a highly useful reference

for scientists and environmental professionals Microbial Ecological Theory Lesley A. Ogilvie, Penny R. Hirsch, 2012 The vast explosion of high resolution molecular data in the past few years has provided an unprecedented glimpse into the microbial world This book synthesizes current viewpoints and knowledge on microbial ecological theory The book has assembled a collection of essays by a diverse group of well respected scientists who merge the boundaries of ecology and microbiology to explore some of the central tenets of macro ecological theory with a microbial perspective The contributors explore the mainstays of macro ecology asking questions such as do microbes have biogeography and does a microbial species concept exist Additionally the book shows how high resolution molecular data is informing and underpinning the evolution of microbial ecological theory It demonstrates how the application of macro ecological theory to the microbial world is not only enhancing our understanding of microbial ecology but it also provides a reference point for the development of new theories Written for graduate students and academic researchers the book encourages cross disciplinary thinking and provides direction and perspective on the still fledgling field of microbial ecological theory It is highly recommended for all microbiology libraries Microbial Ecology in Sustainable Agroecosystems Tanya E. Cheeke, David C. Coleman, Diana H. Wall, 2012-07-17 While soil ecologists continue to be on the forefront of research on biodiversity and ecosystem function there are few interdisciplinary studies that incorporate ecological knowledge into sustainable land management practices Conventional high fossil fuel input based agricultural systems can reduce soil biodiversity alter soil community structure

The Social Biology of Microbial Communities Institute of Medicine, Board on Global Health, Forum on Microbial Threats, 2013-01-10 Beginning with the germ theory of disease in the 19th century and extending through most of the 20th century microbes were believed to live their lives as solitary unicellular disease causing organisms This perception stemmed from the focus of most investigators on organisms that could be grown in the laboratory as cellular monocultures often dispersed in liquid and under ambient conditions of temperature lighting and humidity Most such inquiries were designed to identify microbial pathogens by satisfying Koch's postulates 3 This pathogen centric approach to the study of microorganisms produced a metaphorical war against these microbial invaders waged with antibiotic therapies while simultaneously obscuring the dynamic relationships that exist among and between host organisms and their associated microorganisms only a tiny fraction of which act as pathogens Despite their obvious importance very little is actually known about the processes and factors that influence the assembly function and stability of microbial communities Gaining this knowledge will require a seismic shift away from the study of individual microbes in isolation to inquiries into the nature of diverse and often complex microbial communities the forces that shape them and their relationships with other communities and organisms including their multicellular hosts On March 6 and 7 2012 the Institute of Medicine's IOM's Forum on Microbial Threats hosted a public workshop to explore the emerging science of the social biology of microbial communities Workshop presentations and discussions embraced a wide spectrum of topics experimental systems and theoretical perspectives representative of the

current multifaceted exploration of the microbial frontier Participants discussed ecological evolutionary and genetic factors contributing to the assembly function and stability of microbial communities how microbial communities adapt and respond to environmental stimuli theoretical and experimental approaches to advance this nascent field and potential applications of knowledge gained from the study of microbial communities for the improvement of human animal plant and ecosystem health and toward a deeper understanding of microbial diversity and evolution The Social Biology of Microbial Communities Workshop Summary further explains the happenings of the workshop

Comparative Ecology of Microorganisms and Macroorganisms John H. Andrews, 2017-06-27 This second edition textbook offers an expanded conceptual synthesis of microbial ecology with plant and animal ecology Drawing on examples from the biology of microorganisms and macroorganisms this textbook provides a much needed interdisciplinary approach to ecology The focus is the individual organism and comparisons are made along six axes genetic variation nutritional mode size growth life cycle and influence of the environment When it was published in 1991 the first edition of Comparative Ecology of Microorganisms and Macroorganisms was unique in its attempt to clearly compare fundamental ecology across the gamut of size The explosion of molecular biology and the application of its techniques to microbiology and organismal biology have particularly demonstrated the need for interdisciplinary understanding This updated and expanded edition remains unique It treats the same topics at greater depth and includes an exhaustive compilation of both the most recent relevant literature in microbial ecology and plant animal ecology as well as the early research papers that shaped the concepts and theories discussed Among the completely updated topics in the book are phylogenetic systematics search algorithms and optimal foraging theory comparative metabolism the origins of life and evolution of multicellularity and the evolution of life cycles From Reviews of the First Edition John Andrews has succeeded admirably in building a bridge that is accessible to all ecologists Ecology I recommend this book to all ecologists It is a thoughtful attempt to integrate ideas from and develop common themes for two fields of ecology that should not have become fragmented American Scientist Such a synthesis is long past due and it is shameful that ecologists both big and little have been so parochial The Quarterly Review of Biology

Approaches to Plant Evolutionary Ecology Gregory Paul Cheplick, 2015 Plant evolutionary ecology is a rapidly growing discipline which emphasizes that populations adapt and evolve not in isolation but in relation to other species and abiotic environmental features such as climate Although it departs from traditional evolutionary and ecological fields of study the field is connected to branches of ecology genetics botany conservation and to a number of other fields of applied science primarily through shared concepts and techniques However most books regarding evolutionary ecology focus on animals creating a substantial need for scholarly literature with an emphasis on plants *Approaches to Plant Evolutionary Ecology* is the first book to specifically explore the evolutionary characteristics of plants filling the aforementioned gap in the literature on evolutionary ecology Renowned plant ecologist Gregory P Cheplick summarizes and synthesizes much of the primary

literature regarding evolutionary ecology providing a historical context for the study of plant populations from an evolutionary perspective The book also provides summaries of both traditional common gardens reciprocal transplants and modern molecular genetic approaches used to address questions about plant adaptation to a diverse group of abiotic and biotic factors Cheplick provides a rigorously written introduction to the rapidly growing field of plant evolutionary ecology that will appeal to undergraduate and graduate students with an interest in ecology and evolution as well as educators who are teaching courses on related topics

Marine Microbiology Colin B. Munn, 2019-11-26 The third edition of this bestselling text has been rigorously updated to reflect major new discoveries and concepts since 2011 especially progress due to extensive application of high throughput sequencing single cell genomics and analysis of large datasets Significant advances in understanding the diversity and evolution of bacteria archaea fungi protists and viruses are discussed and their importance in marine processes is explored in detail Now in full colour throughout all chapters have been significantly expanded with many new diagrams illustrations and boxes to aid students interest and understanding Novel pedagogy is designed to encourage students to explore current high profile research topics Examples include the impacts of rising CO₂ levels on microbial community structure and ocean processes interactions of microbes with plastic pollution symbiotic interactions and emerging diseases of marine life This is the only textbook addressing such a broad range of topics in the specific area of marine microbiology now a core topic within broader Marine Science degrees A Companion Website provides additional online resources for instructors and students including a summary of key concepts and terminology for each chapter links to further resources and flashcards to aid self assessment

Eco-Evolutionary Dynamics , 2014-08-12 The theme of this volume is to discuss Eco evolutionary Dynamics Updates and informs the reader on the latest research findings Written by leading experts in the field Highlights areas for future investigation

Marine Mammal Biology A. Rus Hoelzel, 2009-04-01 This book provides a general introduction to the biology of marine mammals and an overview of the adaptations that have permitted mammals to succeed in the marine environment Each chapter written by experts in their field will provide an up to date review and present the major discoveries and innovations in the field Important technical advances such as satellite telemetry and time depth recorders will be described in boxes

The Pangenome Hervé Tettelin, Duccio Medini, 2020-04-30 This open access book offers the first comprehensive account of the pan genome concept and its manifold implications The realization that the genetic repertoire of a biological species always encompasses more than the genome of each individual is one of the earliest examples of big data in biology that opened biology to the unbounded The study of genetic variation observed within a species challenges existing views and has profound consequences for our understanding of the fundamental mechanisms underpinning bacterial biology and evolution The underlying rationale extends well beyond the initial prokaryotic focus to all kingdoms of life and evolves into similar concepts for metagenomes phenomes and epigenomes The book s respective chapters address a range of topics from the serendipitous

emergence of the pan genome concept and its impacts on the fields of microbiology vaccinology and antimicrobial resistance to the study of microbial communities bioinformatic applications and mathematical models that tie in with complex systems and economic theory Given its scope the book will appeal to a broad readership interested in population dynamics evolutionary biology and genomics

The Routledge Companion to Philosophy of Science Martin Curd, Stathis Psillos, 2008-01-31 This indispensable reference source and guide to the major themes debates problems and topics in philosophy of science contains fifty five specially commissioned entries by a leading team of international contributors Organized into four parts it covers historical and philosophical context debates concepts the individual sciences The Companion covers everything students of philosophy of science need to know from empiricism explanation and experiment to causation observation prediction and more and contains many helpful features including a section on the individual sciences including chapters on the philosophy of biology chemistry physics and psychology further reading and cross referencing at the end of each chapter

Microbial Production Hideharu Anazawa, Sakayu Shimizu, 2014-02-20 Microbial production From genome design to cell surface engineering affords a comprehensive review of novel technology and approaches being implemented for manufacturing microorganisms written by specialists in both academia and industry This book is divided into three sections the first includes technology for improvement of fermentation strains and many supporting technologies and information the second examines novel technology useful for analysis of cell activities analyzing gene function and designing genomes of producer strains and finally a discussion of the practical application of the techniques and success case studies in many fields of bio production such as microbiological production pharmaceuticals chemicals foods and cosmetics

Processes in Microbial Ecology David L. Kirchman, 2012-02-02 Microbial ecology is the study of interactions among microbes in natural environments and their roles in biogeochemical cycles food web dynamics and the evolution of life This book presents the basic principles of microbial ecology using examples from aquatic freshwater and marine and terrestrial ecosystems

Principles of Microbial Diversity James W. Brown, 2014-12-16 Every speck of dust drop of water and grain of soil and each part of every plant and animal contain their own worlds of microbes Designed as a key text for upper level undergraduates majoring in microbiology genetics or biology Principles of Microbial Diversity provides a solid curriculum for students to explore the enormous range of biological diversity in the microbial world Within these richly illustrated pages author and professor James W Brown provides a practical guide to microbial diversity from a phylogenetic perspective in which students learn to construct and interpret evolutionary trees from DNA sequences He then offers a survey of the tree of life that establishes the necessary basic knowledge about the microbial world Finally the author draws the student's attention to the universe of microbial diversity with focused studies of the contributions that specific organisms make to the ecosystem Principles of Microbial Diversity fills an empty niche in microbiology textbooks by providing an engaging cutting edge view of the microbial zoo that exists around us covering bacteria archaea eukaryotes and viruses

Metagenomics and Microbial

Ecology Surajit De Mandal, Amrita Kumari Panda, N. Senthil Kumar, Satpal Singh Bisht, Fengliang Jin, 2021-11 Metagenomics and Microbial Ecology Techniques and Applications explore the most recent advances in metagenomics research in the landscape of next generation sequencing technologies

An Introduction to Behavioural Ecology Nicholas B. Davies, John R. Krebs, 1993-05-06 The third edition of this successful textbook looks again at the influence of natural selection on behavior an animal's struggle to survive by exploiting resources avoiding predators and maximizing reproductive success In this edition new examples are introduced throughout many illustrated with full color photographs In addition important new topics are added including the latest techniques of comparative analysis the theory and application of DNA fingerprinting techniques extensive new discussion on brood parasite host coevolution the latest ideas on sexual selection in relation to disease resistance and a new section on the intentionality of communication Written in the lucid style for which these two authors are renowned the text is enhanced by boxed sections illustrating important concepts and new marginal notes that guide the reader through the text This book will be essential reading for students taking courses in behavioral ecology The leading introductory text from the two most prominent workers in the field Second colour in the text New section of four colour plates Boxed sections to illustrate difficult and important points New larger format with marginal notes to guide the reader through the text Selected further reading at the end of each chapter

Microbial Metagenomics, Metatranscriptomics, and Metaproteomics, 2013-10-08 This new volume of Methods in Enzymology continues the legacy of this premier serial with quality chapters authored by leaders in the field This volume covers microbial metagenomics metatranscriptomics and metaproteomics and includes chapters on such topics as in solution FISH for single cell genome preparation preparation of BAC libraries from marine microbial community DNA and preparation of microbial community cDNA for metatranscriptomic analysis in marine plankton

Molecular Ecology and Evolution: Approaches and Applications B. Schierwater, B. Streit, G.P. Wagner, R. DeSalle, 2013-06-29 The past 25 years have witnessed a revolution in the way ecologists and evolutionary biologists approach their disciplines Modern molecular techniques are now reshaping the spectrum of questions that can be addressed while studying the mechanisms and consequences of the ecology and evolution of living organisms Molecular Ecology and Evolution Approaches and Applications describes from a molecular perspective several methodological and technical approaches used in the fields of ecology evolution population biology molecular systematics conservation genetics and development Modern techniques are introduced and older more classic ones refined The advantages limitations and potentials of each are discussed in detail and thereby illustrate the widening range of cross field research and applications which this modern technology is stimulating This book will serve as an important textbook for graduate and advanced undergraduate students and as a key reference work for researchers

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