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K0CD46 - ANDREA LAYLAH

Trait-based ecology is rapidly expanding. This comprehensive and accessible guide covers the main concepts and tools in functional ecology.

At a glance, most species seem adapted to the environment in which they live. Yet species relentlessly evolve, and populations within species evolve in different ways. Evolution, as it turns out, is much more dynamic than biologists realized just a few decades ago. In Relentless Evolution, John N. Thompson explores why adaptive evolution never ceases and why natural selection acts on species in so many different ways. Thompson presents a view of life in which ongoing evolution is essential and inevitable. Each chapter focuses on one of the major problems in adaptive evolution: How fast is evolution? How strong is natural selection? How do species co-opt the genomes of other species as they adapt? Why does adaptive evolution sometimes lead to more, rather than less, genetic variation within populations? How does the process of adaptation drive the evolution of new species? How does coevolution among species continually reshape the web of life? And, more generally, how are our views of adaptive evolution changing? Relentless Evolution draws on studies of all the major forms of life—from microbes that evolve in microcosms within a few weeks to plants and animals that sometimes evolve in detectable ways within a few decades. It shows evolution not as a slow and stately process, but rather as a continual and sometimes frenetic process that favors yet more evolutionary change.

AcknowledgmentsCh. 1: Of Entangled Banks and Humble Bees Ch. 2: From Micro to Macro and Back Again Ch. 3: Communities on Small Spatial and Temporal Scales Ch. 4: Communities as Linear Systems Ch. 5: Communities as Nonlinear Systems Ch. 6: Macroecology: Expanding the Spatial Scale of Community Ecology Ch. 7: Geographic Range Structure: Niches Written in Space Ch. 8: Geographic Assembly of Local Communities Ch. 9: The Evolution of Species Diversity at the Macroscale Ch. 10: The Macroscopic Perspective and the Future of Ecology Literature Cited Index Copyright © Libri GmbH. All rights reserved.

Evolutionary Community Ecology develops a unified framework for understanding the structure of ecological communities and the dynamics of natural selection that shape the evolution of the species inhabiting them. All species engage in interactions with many other species, and these interactions regulate their abundance, define their trajectories of natural selection, and shape their movement decisions. Mark McPeek synthesizes the ecological and evolutionary dynamics generated by species interactions that structure local biological communities and regional metacommunities. McPeek explores the ecological performance characteristics needed for invasibility and coexistence of species in complex networks of species interactions. This species interaction framework is then extended to examine the ecological dynamics of natural selection that drive coevolution of interacting species in these complex interaction networks. The models of natural selection resulting from species interactions are used to evaluate the ecological conditions that foster diversification at multiple trophic levels. Analyses show that diversification depends on the ecological context in which species interactions occur and the types of traits that define the mechanisms of those species interactions. Lastly, looking at the mechanisms of speciation that affect species richness and diversity at various spatial scales and the consequences of past climate change over the Quaternary period, McPeek considers how metacommunity structure is shaped at regional and biogeographic scales. Integrating evolutionary theory into the study of community ecology, Evolutionary Community Ecology provides a new framework for predicting how communities are organized and how they may change over time.

Recent empirical studies demonstrate that feedbacks between ecological and evolutionary processes can alter the demographic and trait dynamics of natural communities. These feedbacks occur when one or more focal populations evolve in traits that affect their own or other populations' densities in the community. The demographic response of the community, in turn, alters the selection pressures and trait evolution of these focal populations. In light of this empirical evidence, a new challenge is to analyze when and how these feedbacks affect dynamics to fully understand natural communities. To address this challenge, I use mathematical models to address three main problems concerning communities with feedbacks between ecological and evolutionary processes. These three problems differ in their scope, ranging in generality from focusing on a specific type of interaction to communities with any type of interaction, as well as in their scale, from local to global dynamics. In the first chapter, I provide an introduction to the general problem and summarize my main results. In the second chapter, I focus on a simple three-species community involving intraguild predation, and address how the evolution of the predator can affect the dynamics of the community structure. In the third chapter, I develop results to identify the conditions that enable coexistence of populations in general mathematical models of ecological communities with feedbacks. Specifically, I use permanence as a notion of coexistence, which ensures that if all population densities start positive then every population stays sufficiently away from extinction after some time. Finally, in the fourth chapter, I develop a general theory on how eco-evolutionary feedbacks alter local community stability. Importantly, using this theory, I highlight that these feedbacks lead to stable communities that would be unstable in the absence of the feedbacks, and vice versa. Chapters 2-4 were done in collaboration with my advisor, Sebastian J. Schreiber and Chapter 4 was also done in collaboration with Michael H. Cortez. By applying existing mathematical tools to important questions in ecology and developing new ecologically-inspired tools in math, this work contributes to a growing body of theory aimed at understanding the role of eco-evolutionary feedbacks on community dynamics.

The study of parasitoid communities has direct relevance to general ecological theory and to the applied practice of biological control. Yet, despite the existence of a large and active international research community involved in the study of parasitoids, until now no books devoted to the theme of parasitoid community ecology have been available. Here, with a healthy mix of general discussions and specific examples such as tortricids and weevils, the authors constructively review and evaluate our understanding of these often very complex systems. The book emphasizes basic science, linking the discussion to wider areas such as population dynamics, food webs, competition, and community structure. The more applied end of the subject is covered in a section exclusively devoted to biological control. This book, the first to deal entirely with ecological aspects of parasitoid biology, offers summaries of the state of the field by leading researchers and identifies critical areas in need of further investigation. Students, researchers, and teachers in the field of ecology, animal behavior, entomology, forestry, and agriculture will all want to have a copy of the book on their shelves

Although biologists recognize evolutionary ecology by name, many only have a limited understanding of its conceptual roots and historical development. Conceptual Breakthroughs in Evolutionary Ecology fills that knowledge gap in a thought-provoking and readable format. Written by a world-renowned evolutionary ecologist, this book embodies a unique blend of expertise in combining theory and experiment, population genetics and ecology. Following an easily-accessible structure, this book encapsulates and chronologizes the history behind evolutionary ecology. It also focuses on the integration of age-structure and density-dependent selection into an understanding of life-history evolution. Covers over 60 seminal breakthroughs and paradigm shifts in the field of evolutionary biology and ecology Modular format permits ready access to each described subject Historical overview of a field whose concepts are central to all of biology and relevant to a broad audience of biologists, science historians, and philosophers of science

Students often find it difficult to grasp fundamental ecologicaland evolutionary concepts because of their inherently mathematicalnature. Likewise, the application of ecological and evolutionarytheory often requires a high degree of mathematical competence. This book is a first step to addressing these difficulties,providing a broad introduction to the key methods and underlyingconcepts of mathematical models in ecology and evolution. The bookis intended to serve the needs of undergraduate and postgraduateecology and evolution students who need to access the mathematicaland statistical modelling literature essential to theirsubjects. The book assumes minimal mathematics and statistics knowledgewhilst covering a wide variety of methods, many of which are at thefore-front of ecological and evolutionary research. The book alsohighlights the applications of modelling to practical problems suchas sustainable harvesting and biological control. Key features: Written clearly and succinctly, requiring minimal in-depthknowledge of mathematics Introduces students to the use of computer models in bothfields of ecology and evolutionary biology Market - senior undergraduate students and beginningpostgraduates in ecology and evolutionary biology

For sophomore- to junior-level courses in Evolution, with an Introductory Biology prerequisite. This text introduces biology majors to the basic concepts of the fields comprising Darwinian biology: population genetics, population ecology, community ecology, macroevolution, physiological ecology, systematics, and functional morphology. The general theme is the interconnectedness of organism, environment, and evolution. Just as biochemistry and molecular biology provide the foundation for our understanding of the cell, evolutionary biology and ecology are used to construct a foundation for understanding the organism. Using evocative language and an eye-catching magazine format, the authors aim to prepare undergraduates for more advanced specialist courses in Darwinian biology as they pursue their degrees.

Community ecology has undergone a transformation in recent years, from a discipline largely focused on processes occurring within a local area to a discipline encompassing a much richer domain of study, including the linkages between communities separated in space (metacommunity dynamics), niche and neutral theory, the interplay between ecology and evolution (eco-evolutionary dynamics), and the influence of historical and regional processes in shaping patterns of biodiversity. To fully understand these new developments, however, students continue to need a strong foundation in the study of species interactions and how these interactions are assembled into food webs and other ecological networks. This new edition fulfils the book's original aims, both as a much-needed up-to-date and accessible introduction to modern community ecology, and in identifying the important questions that are yet to be answered. This research-driven textbook introduces state-of-the-art community ecology to a new generation of students, adopting reasoned and balanced perspectives on as-yet-unresolved issues. Community Ecology is suitable for advanced undergraduates, graduate students, and researchers seeking a broad, up-to-date coverage of ecological concepts at the community level.

This is a book about the natural history of oxygen-free environments and their microbial inhabitants. Life originated in the pre-oxic world, and anoxic conditions still persist in many places on Earth such as lake sediments, the guts of ruminants, and the deep waters of some marine basins. Drawing on evidence from a variety of scientific disciplines, the authors describe the forces known to shape the structure, function, heterogeneity, and evolution of anaerobic communities. The approach taken is all-embracing: from the origin and maintenance of anoxic habitats throughout Earth's history, through the origin of prokaryotes, eukaryotes, and eukaryotic organelles, to the development of microbial communities. Particular emphasis is placed on exploring the energy-yielding pathways which have evolved in anaerobic micro-organisms and how this metabolic repertoire dictates the syntrophic and competitive interactions which largely determine anaerobic microbial community structure. Interactions with the oxic world are explored in the last chapter. The ecological and evolutionary significance of the arrival of oxygen in the Proterozoic is discussed in detail, especially as it eventually led to the possibility of long food chains. This volume synthesizes major areas of microbial ecology and will interest students and researchers working in this and related fields.

Quaternary Ecology, Evolution, and Biogeography is an introduction on the study of the ecological and evolutionary processes that have shaped our present biosphere under the influence of glacial-interglacial cycles. Written by a renowned ecologist with paleoecological expertise, the book reviews the climactic changes that have occurred during the last million years, along with the responses of organisms and ecosystems. The book offers an un-

derstanding of the evolutionary origin of extant biodiversity, its biogeographical patterns, and the composition of modern ecological communities. In addition, it explores human evolution and the influence of our activities on the biosphere, especially in the last millennia. The valuable resource is intended for a wide audience, including researchers and students in natural sciences. It offers the latest information on how studying the past can contribute to our understanding of present climate issues for a better future.

Community ecology is the study of the interactions between populations of co-existing species. This book provides a survey of the state-of-the-art in theory and applications of community ecology, with special attention to topology, dynamics, the importance of spatial and temporal scale, as well as applications to emerging problems in human-dominated ecosystems (including the restoration and reconstruction of viable communities). It adopts a mainly theoretical approach and focuses on the use of network-based theory which remains little explored in standard community ecology textbooks. The book includes discussion of the effects of biotic invasions on natural communities, the linking of ecological network structure to empirically measured community properties and dynamics, the effects of evolution on community patterns and processes, and the integration of fundamental interactions into ecological networks. A final chapter indicates future research directions for the discipline. This book provides ideal graduate seminar course material.

This book describes the evolutionary and ecological consequences of reproductive competition for scarabaeine dung beetles. As well as giving us insight into the private lives of these fascinating creatures, this book shows how dung beetles can be used as model systems for improving our general understanding of broad evolutionary and ecological processes, and how they generate biological diversity. Over the last few decades we have begun to see further than ever before, with our research efforts yielding new information at all levels of analysis, from whole organism biology to genomics. This book brings together leading researchers who contribute chapters that integrate our current knowledge of phylogenetics and evolution, developmental biology, comparative morphology, physiology, behaviour, and population and community ecology. Dung beetle research is shedding light on the ultimate question of how best to document and conserve the world's biodiversity. The book will be of interest to established researchers, university teachers, research students, conservation biologists, and those wanting to know more about the dung beetle taxon.

As a novel endeavour in ecological science, this book focuses on amajor issue in organismal life on Earth:species coexistence. Thebook crosses the usual disciplinary boundaries betweenpalaeobiology, ecology and evolutionary biology and provides atimely overview of the patterns and processes of species diversityand coexistence on a range of spatio-temporal scales. In thisunique synthesis, the author offers a critical and penetratingexamination of the concepts and models of coexistence and communitystructure, thus making a valuable contribution to the field ofcommunity ecology. There is an emphasis on clarity andaccessibility without sacrificing scientific rigour, making thisbook suitable for both advanced students and individual researchersin ecology, palaeobiology and environmental and evolutionarybiology. Comprehensive and contemporary synthesis. Pulls together the aggregate influence of evolution and ecologyon patterns in communities. Balanced mix of theory and empirical work. Clearly structured chapters with short introduction andsummary.

A pluralistic approach to community ecology.

Students often find it difficult to grasp fundamental ecological and evolutionary concepts because of their inherently mathematical nature. Likewise, the application of ecological and evolutionary theory often requires a high degree of mathematical competence. This book is a first step to addressing these difficulties, providing a broad introduction to the key methods and underlying concepts of mathematical models in ecology and evolution. The book is intended to serve the needs of undergraduate and postgraduate ecology and evolution students who need to access the mathematical and statistical modelling literature essential to their subjects. The book assumes minimal mathematics and statistics knowledge whilst covering a wide variety of methods, many of which are at the fore-front of ecological and evolutionary research. The book also highlights the applications of modelling to practical problems such as sustainable harvesting and biological control. Key features: Written clearly and succinctly, requiring minimal in-depth knowledge of mathematics Introduces students to the use of computer models in both fields of ecology and evolutionary biology Market - senior undergraduate students and beginning postgraduates in ecology and evolutionary biology

The seemingly innocent observation that the activities of organisms bring about changes in environments is so obvious that it seems an unlikely focus for a new line of thinking about evolution. Yet niche construction--as this process of organism-driven environmental modification is known--has hidden complexities. By transforming biotic and abiotic sources of natural selection in external environments, niche construction generates feedback in evolution on a scale hitherto underestimated--and in a manner that transforms the evolutionary dynamic. It also plays a critical role in ecology, supporting ecosystem engineering and influencing the flow of energy and nutrients through ecosystems. Despite this, niche construction has been given short shrift in theoretical biology, in part because it cannot be fully understood within the framework of standard evolutionary theory. Wedding evolution and ecology, this book extends evolutionary theory by formally including niche construction and ecological inheritance as additional evolutionary processes. The authors support their historic move with empirical data, theoretical population genetics, and conceptual models. They also describe new research methods capable of testing the theory. They demonstrate how their theory can resolve long-standing problems in ecology, particularly by advancing the sorely needed synthesis of ecology and evolution, and how it offers an evolutionary basis for the human sciences. Already hailed as a pioneering work by some of the world's most influential biologists, this is a rare, potentially field-changing contribution to the biological sciences.

This edited volume in the Theoretical Ecology series addresses the historical development and evolution of theoretical ideas in the field of ecology. Not only does Ecological Paradigms Lost recount the history of the discipline by practitioners of the science of ecology, it includes commentary on these historical reflections by philosophers of science. Even though the theories discussed are, in many cases, are at the forefront of research, the language and approach make this material accessible to non-theoreticians. The book is structured in 5 major sections including population ecology, epidemiology, community ecology, evolutionary biology and ecosystem ecology. In each section a chapter by an eminent, experienced ecologist is complemented by analysis from a newer, cutting-edge researcher. Reflection on the past and future of ecology A historical overview of major ideas in the field of ecology Pairing of historical views by ecologists along with a philosophical commentary directed at the practicing scientists' views by a philosopher of science Historical analysis by practicing ecologists including anectodal experiences that are rarely recorded Based on a very popular symposium at the 2002 Ecological Society of America annual meeting in Tucson, AZ

As the practical application of ecological restoration continues to grow, there is an increasing need to connect restoration practice to areas of underlying ecological theory. Foundations of Restoration Ecology is an important milestone in the field, bringing together leading ecologists to bridge the gap between theory and practice by translating elements of ecological theory and current research themes into a scientific framework for the field of restoration ecology. Each chapter addresses a particular area of ecological theory, covering traditional levels of biological hierarchy (such as population genetics, demography, community ecology) as well as topics of central relevance to the challenges of restoration ecology (such as species interactions, fine-scale heterogeneity, successional trajectories, invasive species ecology, ecophysiology). Several chapters focus on research tools (research design, statistical analysis, modeling), or place restoration ecology research in a larger context (large-scale ecological phenomena, macroecology, climate change and paleoecology, evolutionary ecology). The book makes a compelling case that a stronger connection between ecological theory and the science of restoration ecology will be mutually beneficial for both fields: restoration ecology benefits from a stronger grounding in basic theory, while ecological theory benefits from the unique opportunities for experimentation in a restoration context. Foundations of Restoration Ecology advances the science behind the practice of restoring ecosystems while exploring ways in which restoration ecology can inform basic ecological questions. It provides the first comprehensive overview of the theoretical foundations of restoration ecology, and is a must-have volume for anyone involved in restoration research, teaching, or practice.

This is an up-to-date study of patterns and processes involving two or more species. The book strikes a balance between plant and animal species and among studies of marine, freshwater and terrestrial communities.

Metacommunity ecology links smaller-scale processes that have been the provenance of population and community ecology—such as birth-death processes, species interactions, selection, and stochasticity—with larger-scale issues such as dispersal and habitat heterogeneity. Until now, the field has focused on evaluating the relative importance of distinct processes, with niche-based environmental sorting on one side and neutral-based ecological drift and dispersal limitation on the other. This book moves beyond these artificial categorizations, showing how environmental sorting, dispersal, ecological drift, and other processes influence metacommunity structure simultaneously. Mathew Leibold and Jonathan Chase argue that the relative importance of these processes depends on the characteristics of the organisms, the strengths and types of their interactions, the degree of habitat heterogeneity, the rates of dispersal, and the scale at which the system is observed. Using this synthetic perspective, they explore metacommunity patterns in time and space, including patterns of coexistence, distribution, and diversity. Leibold and Chase demonstrate how these processes and patterns are altered by micro- and macroevolution, traits and phylogenetic relationships, and food web interactions. They then use this scale-explicit perspective to illustrate how metacommunity processes are essential for understanding macroecological and biogeographical patterns as well as ecosystem-level processes. Moving seamlessly across scales and subdisciplines, Metacommunity Ecology is an invaluable reference, one that offers a more integrated approach to ecological patterns and processes.

Cover -- Title -- Copyright -- Dedication -- Contents -- Acknowledgments -- 1. Ecological Opportunities, Communities, and Evolution -- 2. The Community of Ecological Opportunities -- 3. Evolving in the Community -- 4. New Species for the Community -- 5. Differentiating in the Community -- 6. Moving among Communities -- 7. Which Ways Forward? -- Literature Cited -- Index

By investigating a simple question, a philosopher of science and a molecular biologist offer an accessible understanding of microbial communities and a motivating theory for future research in community ecology. Microorganisms, such as bacteria, are important determinants of health at the individual, ecosystem, and global levels. And yet many aspects of modern life, from the overuse of antibiotics to chemical spills and climate change, can have devastating, lasting impacts on the communities formed by microorganisms. Drawing on the latest scientific research and real-life examples such as attempts to reengineer these communities through microbial transplantation, the construction of synthetic communities of microorganisms, and the use of probiotics, this book explores how and why communities of microorganisms respond to disturbance, and what might lead to failure. It also unpacks related and interwoven philosophical questions: What is an organism? Can a community evolve by natural selection? How can we make sense of function and purpose in the natural world? How should we think about regeneration as a phenomenon that occurs at multiple biological scales? Provocative and nuanced, this primer offers an accessible conceptual and theoretical understanding of regeneration and evolution at the community level that will be essential across disciplines including philosophy of biology, conservation biology, microbiomics, medicine, evolutionary biology, and ecology.

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.

This multi-author text has been planned as a companion to the successful volumes on theoretical ecology, behavioural ecology and physiological ecology mentioned elsewhere in this catalogue. The editors have covered the main approaches in community ecology.

This informative book, first published in 1987, presents the theories of community ecology within the context of a natural example. The text describes and examines issues in community ecology and shows how research on salamanders has helped to solve some of the problems surrounding the theories. Salamanders exist in stable populations of the kind assumed in community theory and are more appropriate than most other animals for re-

search on the applications of that theory. The interesting and meaningful results, collected from observation on these excellent subjects posed challenges to beliefs within community ecology. Life histories of salamanders, fieldwork in distinctly differing habitats, competition, predation and evolution are discussed in an easily readable text. Professional ecologists and students of community ecology and herpetology will be interedted in the information synthesised in this book.

The evolution of species abundance and diversity; Competitive strategies of resource allocation; Community structure; Outlook.

Piper is an economically and ecologically important genus of plant that includes a fascinating array of species for studying natural history, natural products chemistry, community ecology, and evolutionary biology. The diversification of this taxon is unique and of great importance in understanding the evolution of plants. The diversity and ecological relevance of this genus makes it an obvious candidate for ecological and evolutionary studies, but surprisingly, most research on Piper spp. to-date has focused on the more economically important plants P. nigrum (black pepper), P. methysticum (kava), and P. betle (betel leaf). While this book does address the applied techniques of studying Piper, its focus is more on Piper in its natural setting. Piper: A Model Genus for Studies of Phytochemistry, Ecology, and Evolution synthesizes existing data and provides an outline for future investigations of the chemistry, ecology, and evolution of this taxon, while examining its key themes of Piper as a model genus for ecological and evolutionary studies, the important ecological roles of Piper species in lowland wet forests, and the evolution of distinctive Piper attributes. This volume has a place in the libraries of those studying or working in the fields of ecology, evolutionary biology, natural products chemistry, invasive species biology, pharmaceutics, and ethnobotany.

Now that so many ecosystems face rapid and major environmental change, the ability of species to respond to these changes by dispersing or moving between different patches of habitat can be crucial to ensuring their survival. Understanding dispersal has become key to understanding how populations may persist. Dispersal Ecology and Evolution provides a timely and wide-ranging overview of the fast expanding field of dispersal ecology, incorporating the very latest research. The causes, mechanisms, and consequences of dispersal at the individual, population, species, and community levels are considered. Perspectives and insights are offered from the fields of evolution, behavioural ecology, conservation biology, and genetics. Throughout the book theoretical approaches are combined with empirical data, and care has been taken to include examples from as wide a range of species as possible - both plant and animal.

Although evolutionary developmental biology is a new field, its origins lie in the last century; the search for connections between embryonic development (ontogeny) and evolutionary change (phylogeny) has been a long one. Evolutionary developmental biology is however more than just a fusion of the fields of developmental and evolutionary biology. It forges a unification of genomic, developmental, organismal, population and natural selection approaches to evolutionary change. It is concerned with how developmental processes evolve; how evolution produces novel structures, functions and behaviours; and how development, evolution and ecology are integrated to bring about and stabilize evolutionary change. The previous edition of this title, published in 1992, defined the terms and laid out the field for evolutionary developmental biology. This field is now one of the most active and fast growing within biology and this is reflected in this second edition, which is more than twice the length of the original and brought completely up to date. There are new chapters on major transitions in animal evolution, expanded coverage of comparative embryonic development and the inclusion of recent advances in genetics and molecular biology. The book is divided into eight parts which: place evolutionary developmental biology in the historical context of the search for relationships between development and evolution; detail the historical background leading to evolutionary embryology; explore embryos in development and embryos in evolution; discuss the relationship between embryos, evolution, environment and ecology; discuss the dilemma for homology of the fact that development evolves; deal with the importance of understanding how embryos measure time and place both through development and evolutionarily through heterochrony and heterotrophy; and set out the principles and processes that underlie evolutionary developmental biology. With over one hundred illustrations and photographs, extensive cross-referencing between chapters and boxes for ancillary material, this latest edition will be of immense interest to graduate and advanced undergraduate students in cell, developmental and molecular biology, and in zoology, evolution, ecology and entomology; in fact anyone with an interest in this new and increasingly important and interdisciplinary field which unifies biology.

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.

This volume presents an overview of current accomplishments and future directions in ecological theory. The twenty-three chapters cover a broad range of important topics, from the physiology and behavior of individuals or groups of organisms, through population dynamics and community structure, to the ecology of ecosystems and the geochemical cycles of the entire biosphere. The authors focus on ways in which theory, whether expressed mathematically or verbally, can contribute to defining and solving fundamental problems in ecology. A second aim is to highlight areas where dialogue between theorists and empiricists is likely to be especially rewarding. The authors are R. M. Anderson, C. W. Clark, M. L. Cody, J. E. Cohen, P. R. Ehrlich, M. W. Feldman, M. E. Gilpin, L. J. Gross, M. P. Hassell, H. S. Horn, P. Kareiva, M.A.R. Koehl, S. A. Levin, R. M. May, L. D. Mueller, R. V. O'Neill, S. W. Pacala, S. L. Pimm, T. M. Powell, H. R. Pulliam, J. Roughgarden, W. H. Schlesinger, H. H. Shugart, S. M. Stanley, J. H. Steele, D. Tilman, J. Travis, and D. L. Urban. Originally published in 1989. The Princeton Legacy Library uses the latest print-on-demand technology to again make available previously out-of-print books from the distinguished backlist of Princeton University Press. These editions preserve the original texts of these important books while presenting them in durable paperback and hardcover editions. The goal of the Princeton Legacy Library is to vastly increase access to the rich scholarly heritage found in the thousands of books published by Princeton University Press since its founding in 1905.

This novel, interdisciplinary text achieves an integration of empirical data and theory with the aid of mathematical models and statistical methods. The emphasis throughout is on spatial ecology and evolution, especially on the interplay between environmental heterogeneity and biological processes. The book provides a coherent theme by interlinking the modelling approaches used for different subfields of spatial ecology: movement ecology, population ecology, community ecology, and genetics and evolutionary ecology (each being represented by a separate chapter). Each chapter starts by describing the concept of each modelling approach in its biological context, goes on to present the relevant mathematical models and statistical methods, and ends with a discussion of the benefits and limitations of each approach. The concepts and techniques discussed throughout the book are illustrated throughout with the help of empirical examples. This is an advanced text suitable for any biologist interested in the integration of empirical data and theory in spatial ecology/evolution through the use of quantitative/statistical methods and mathematical models. The book will also be of relevance and use as a textbook for graduate-level courses in spatial ecology, ecological modelling, theoretical ecology, and statistical ecology.

Community ecology: the study of the patterns and processes involving two or more species - has developed rapidly in the last two decades, driven by new and more sophisticated research techniques, advances in mathematical theory and modeling, and the increasing pressure on the environment wrought by humans. Once a purely descriptive science, it is now one of the most forward-looking areas of scientific inquiry. Morin skillfully guides the reader through the main tenets and central concepts of community ecology - competition, predation, food webs, indirect effects, habitat selection, diversity, and succession. In an attempt to introduce the reader to the most balanced coverage possible, Morin includes examples drawn from both the aquatic and terrestrial realm and from both plant and animal species. Balancing theory with experimentation and drawing on exciting new studies to complement the historical foundations of the discipline, he also stresses that both the empirical and theoretical approaches are necessary to drive ecology foward into the new millenium. The final chapter on applied community ecology ably demonstrates how community ecological processes have a wide environmental relevance. Although in its infancy, the application of community ecology to emerging problems in human-dominated ecosystems could mitigate problems as diverse as management strategies for important diseases transmitted by animals and the restoration and reconstruction of viable communities. Required reading for all students and practitioners interested in community phenomena, Community Ecology marks an important contribution to the development of this protean discipline. The first serious textbook for a decade on one of the keystone subdisciplines of ecology. Broad taxonomic and habitat coverage. Section on implications of community ecology for environmental issues.

A plethora of different theories, models, and concepts make up the field of community ecology. Amid this vast body of work, is it possible to build one general theory of ecological communities? What other scientific areas might serve as a guiding framework? As it turns out, the core focus of community ecology—understanding patterns of diversity and composition of biological variants across space and time—is shared by evolutionary biology and its very coherent conceptual framework, population genetics theory. The Theory of Ecological Communities takes this as a starting point to pull together community ecology's various perspectives into a more unified whole. Mark Vellend builds a theory of ecological communities based on four overarching processes: selection among species, drift, dispersal, and speciation. These are analogues of the four central processes in population genetics theory—selection within species, drift, gene flow, and mutation—and together they subsume almost all of the many dozens of more specific models built to describe the dynamics of communities of interacting species. The result is a theory that allows the effects of many low-level processes, such as competition, facilitation, predation, disturbance, stress, succession, colonization, and local extinction to be understood as the underpinnings of high-level processes with widely applicable consequences for ecological communities. Reframing the numerous existing ideas in community ecology, The Theory of Ecological Communities provides a new way for thinking about biological composition and diversity.