Ecological Genetics The Interface Proceedings In Life Sciences

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

Littoral gastropods of the families Littorinidae and Muricidae are well studied compared to most marine taxa, yet there remain many basic problems concerning their taxonomy, ecology and evolutionary biology. In other words, we know these snails well enough to realize just how little we really know about them. This awareness prompted the First European Meeting on Littorinid Biology held at the British Museum in London on 26th November 1986, and the discussion continued through the Second Meeting on Littorinid Biology, held at the Tjarno Marine Biological Laboratory, Sweden, from 4th to 8th July 1988. During the Tjiirno meeting, it was agreed to have a third meeting at Dale, Pembroke shire, U.K. in 1990. Twenty-two people attended the Tjarno meeting, and a further ten contributed as co-authors to the papers that were presented. These covered research in progress in a broad range of topics, and geo graphical areas. Unfortunately, Cesare Sacchi and Domenico Voltolina, as well as Elisabeth Boulding were not able to attend the meeting in person, but their contributions were ably presented by David Reid and Richard Palmer,

respectively. We also regret that one of us, C.E., and several of our Russian colleagues, did not have the opportunity to come.

First multi-year cumulation covers six years: 1965-70.

The leaf surface or phyllosphere is a major habitat for microorganisms. Microbes on or within leaves play important roles in plant ecology, and these microbes can be manipulated to enhance plant growth or reduce plant disease. This book presents a number of critical reviews by internationally recognized experts on the microbial ecology of leaves. Topics include methods of assessment of microbial populations on leaf surfaces, leaves as reservoirs of ice nucleation phenomenon, and leaves as microbial habitats in both aquatic and terrestrial environments. The book will be of interest to students and scientists in numerous disciplines, including botany, aerobiology, meteorology, ecology, agriculture, and microbiology.

Traditionally, studies in ecological genetics have involved both field observations and laboratory genetic analyses. Comparisons and cor relations between these two kinds of data have provided valuable in formation on the genetic strategies behind the evolutionary adapta tions of species and their component local populations. Indeed, much of our current understanding of the dynamics of evolutionary pro cesses has come fro~ syntheses of ecological and genetic information. Since the recent discovery of abundant markers in the form of protein polymorphisms, scientific interest in the connections between genetics and ecology has quickened considerably. This volume contains the proceedings of the Society for the Study of Evolution's symposium, Genetics and Ecology: The Interface, held at Ithaca College, Ithaca, New York, June 12-15, 1977. This particular topic was selected because of a general feeling that a significant integration of genetics and ecology has developed in the last decade or so. Host ecologists no longer believe that each species has a characteristic and constant birth, death, and develonment rate, habitat preference, and so on, but that these para~eters vary a~ong populations and are at least partially under genetic control and sub ject to natural selection. Similarly, few population geneticists still view any species as infinitely large, panmictic, constant in numbers, and distributed evenly throughout its range.

The idea of organizing a symposium on mathematical models in biology came to some colleagues, members of the Accademia dei Lincei, in order to point out the importance of mathematics not only for supplying instruments for the elaboration and the evaluation of experimental data, but also for discussing the possibility of developing mathematical formulations of biological problems. This appeared particularly appropriate for genetics, where mathematical models have been of historical importance. When the organizing work had started, it became clear to us that the classic studies of Vito Volterra (who was also a Member of the Academy and its President from 1923 to 1926) might be con sidered a further reason to have the meeting in Rome at the Accademia dei Lincei; thus the meeting is dedicated to his memory. Biology, in its manifold aspects proved to Se ~ difficult object for an exhaustive approach; thus it became necessary for practical reasons to make a choice of problems. Therefore not all branches of biology have been represented. The proceedings of the symposium, as a whole, assume a knowledge of mathematics on the part of the reader; however the problem of teaching mathematics to biologists was the subject of a round table discussion, not recorded in these proceedings. On this were brought up some basic points to be recommended to teachers on an international basis, and a statement was prepared for circulation. The Organizing Committee TABLE OF CONTENTS TOPIC I MODELS OF NATUPAL SELECTION . . . . . • . . . .

West-Eberhard is widely recognized as one of the most incisive thinkers in evolutionary

biology. This book assesses all the evidence for our current understanding of the role of changes in body plan and development for the process of speciation. The process of evolution is systematically reassessed to integrate the insights coming from developmental genetics. Every serious student of evolution, and a substantial share of developmental biologists and geneticists, will need to take note of this contribution. The timing is clearly ripe for the synthesis that this work will help bring about.

Genetic constraints on adaptive evolution can be understood as those genetic aspects that prevent or reduce the potential for natural selection to result in the most direct ascent of the mean phenotype to an optimum. The contributions to this volume emphasize how genetic aspects in the transmission of traits constrain adaptive evolution. Approaches span from quantitative, population, ecological to molecular genetics. Much attention is devoted to genetic correlations, to the maintenance of quantitative genetic variation, and to the intimate relation between genetics, ecology, and evolution. This volume addresses all evolutionary biologists and explains why they should be wary of evolutionary concepts that base arguments purely on phenotypic characteristics.

This volume surveys advances in the study of adaptive radiation showing how molecular characters can be used to analyze the origin and pattern of diversification within a lineage in a non-circular fashion.

Tropical climates, which occur between 23°30'N and S latitude (Jacob 1988), encompass a wide variety of plant communities (Hartshorn 1983, 1988), many of which are diverse in their woody floras. Within this geographic region, temperature and the amount and seasonality of rainfall define habitat types (UNESCO 1978). The F AO has estimated that there 1 are about 19 million km of potentially forested area in the global tropics, of which 58% were estimated to still be in closed forest in the mid-1970s (Sommers 1976; UNESCO 1978). Of this potentially forested region, 42% is categorized as dry forest lifezone, 33% is tropical moist forest, and 25% is wet or rain forest (Lugo 1988). The species diversity of these tropical habitats is very high. Raven (1976, in Mooney 1988) estimated that 65% of the 250,000 or more plant species of the earth are found in tropical regions. Of this floristic assemblage, a large fraction are woody species. In the well-collected tropical moist forest of Barro Colorado Island, Panama, 39. 7% (481 of 1212 species) of the native phanerogams are woody, arborescent species (Croat 1978). Another 21. 9% are woody vines and lianas. Southeast Asian Dipterocarp forests may contain 120-200 species of trees per hectare (Whitmore 1984), and recent surveys in upper Amazonia re corded from 89 to 283 woody species ~ 10 cm dbh per hectare (Gentry 1988). Tropical communities thus represent a global woody flora of significant scope.

Human activities influence the chemical and physical properties of the atmosphere; examples are increases in troposphere concentrations of ozone, carbon dioxide, oxides of nitrogen and sulfur, heavy metals and UV-B radiation. Many of these changes can alter the physiological status of terrestrial vegetation through either inhibition or enhancement of growth and reproduction, thereby influencing the ability of sensitive plants to compete for limited resources. As a result, air pollution stress may be changing the genetic structure of plant populations. In this book, leading researchers with a broad, interdisciplinary

range of expertise discuss the known and measurable effects of pollution on terrestrial vegetation within the framework of ecological genetics, as well as suitable experimental methodologies to analyze the often novel or unusual effects of such environmental stresses. For environmental researchers and managers, Ecological Genetics and Air Pollution will be a welcomed introduction to this field of growing importance for long-term ecological studies.

This volume presents some of the most recent dramatic results of molecular, genomic, and organismal evolutionary processes. It represents analyses, experiments, observations, reviews, discussions and forecasts of evolutionary theory comprising both novel methods and results, reanalyzed and reviewed data sets based on comparative, experimental, and theoretical studies utilizing model organisms across phylogeny, including bacteria, fungi, plants, animals and humans. It elucidates the revolution in molecular biology that ushered in our understanding of the evolutionary process over time and space. The topics discussed include major problems of evolutionary theory concerning origins, phylogeny, relative importance of evolutionary forces, structure and function, adaptation and speciation in space and time in changing and stressful environments. A major emerging generalization is the nonrandomness of genome structure highlighting the importance of natural selection as a major organizing evolutionaryforce not only at the phenotypic level, but most importantly at the interlinked genotypic molecular level. The integration between the molecular

Plant resistance to pathogens is one of the most important strategies of disease control. Knowledge of resistance mechanisms, and of how to exploit them, has made a significant contribution to agricultural productivity. However, the continuous evolution of new variants of pathogen, ana additional control problems posed by new crops and agricultural methods, creates a need for a corresponding increase in our understanding of resistance and ability to utilize it. The study of resistance mechanisms also has attractions from a purely academic point of view. First there is the breadth of the problem, which can be approached at the genetical, molecular, cellular, whole plant or population lev~ls. Often there is the possibility of productive exchange of ideas between different disciplines. Then there is the fact that despite recent advances, many of the mechanisms involved have still to be fully elucidated. Finally, and compared with workers in other areas of biology, the student of resistance is twice blessed in having as his subject the interaction of two or more organisms, with the intriguing problems of recognition, specificity and co-evolution which this raises.

Dr King presents an up-to-date synthesis of research on speciation.

Ecological Genetics: the InterfaceProceedings of the Symposium Genetics and Ecology: the Interface; Ithaca - N.Y., June 12-15, 1977Ecological GeneticsThe Interface : Proceedings of the Society for the Study of Evolution's Symposium, Genetics and Ecology, the Interface, Held at Ithaca College, Ithaca, NeW York, June 12-15, 1977Ecological GeneticsThe InterfaceSpringer Science & Business

Media

This is a pioneering work on the emerging field of artificial immune systems-highly distributed systems based on the principles of the natural system. Like artificial neural networks, artificial immune systems can learn new information and recall previously learned information. This book provides an overview of artificial immune systems, explaining its applications in areas such as immunological memory, anomaly detection algorithms, and modeling the effects of prior infection on vaccine efficacy.

Bringing together the viewpoints of leading experts in taxonomy, ecology and biogeography of different taxa, this book synthesises discussion surrounding the so-called 'everything is everywhere' hypothesis. It addresses the processes that generate spatial patterns of diversity and biogeography in organisms that can potentially be cosmopolitan. The contributors discuss questions such as: are microorganisms (e.g. prokaryotes, protists, algae, yeast and microscopic fungi, plants and animals) really cosmopolitan in their distribution? What are the biological properties that allow such potential distribution? Are there processes that would limit their distribution? Are microorganisms intrinsically different from macroscopic ones? What can microorganisms tell us about the generalities of biogeography? Can they be used for experimental biogeography? Written for graduate students and academic researchers, the book promotes a more complete understanding of the spatial patterns and the general processes in biogeography.

Based on observational and experimental data, in natural populations of plants and animals studied in the field and in the laboratory, this perspective unravels the hidden and often poorly founded assumptions underlying some of the more troublesome controversies in evolutionary biology today

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.

The 2nd Interface Between Ecology and Land Development Conference was held in association with Earth Day 1997, five years after the first Interface Conference. Rapid population growth in California has intensified the inevitable conflict between land development and preservation of natural ecosystems. Sustainable development requires wise use of diminishing natural resources and, where possible, restoration of damaged landscapes. These Earth Week Celebrations brought together resource managers, scientists, politicians, environmental consultants, and concerned citizens in an effort to improve the communication necessary to maintain our natural biodiversity, ecosystem processes and general quality of life.

As discussed by our keynote speaker, Michael Soulé, the best predictor of habitat loss is population growth and nowhere is this better illustrated than in California. As urban perimeters expand, the interface between wildlands and urban areas increases. Few problems are more vexing than how to manage the fire prone ecosystems indigenous to California at this urban interface. Today resource managers face increasing challenges of dealing with this problem and the lead-off section of the proceedings considers both the theoretical basis for making decisions related to prescribed burning and the practical application. Habitat fragmentation is an inevitable consequence of development patterns with significant impacts on animal and plant populations. Managers must be increasingly resourceful in dealing with problems of fragmentation and the often inevitable consequences, including susceptibility to invasive oganisms. One approach to dealing with fragmentation problems is through careful landplanning. California is the national leader in the integration of conservation and economics. On Earth Day 1991, Governor Pete Wilson presented an environmental agenda that promised to create between land owners and environmentalists, agreements that would guarantee the protection of -endangered species and out of this grew the pioneering initiative, known as the Natural Communities Conservation Planning (NCCP) program. California's vast expanse of seemingly endless resources has traditionally been viewed as justification for abusive land use practices. The modem day recognition that resources are finite has led to greater concern, not only for conserving what is left, but for restoring abused landscapes. Ecological restoration is a new science devoted to returning disturbed environments to a semblance of their "pristine" state. Based on principles of "revegetation," restoration goes far beyond simple replanting, rather the ambition of ecological restoration is to return landscapes to functioning ecosystems and is the focus of the last section.