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Nathan G. Swenson is professor of biology and director of the Behavior, Ecology, Evolution, and Systematics (BEES) Graduate Concentration Area at the University of Maryland. He is the

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However, the increase in the functional volume is less than expected suggesting that the overall functional space is constrained. We then show that

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Functional and Phylogenetic Ecology in R is designed to teach readers to use R for phylogenetic and functional trait analyses. Over the past decade, a

dizzying array of tools and methods were generated to incorporate phylogenetic and functional information into traditional ecological analyses. Increasingly these tools are implemented in R, thus greatly expanding their impact. Researchers getting started in R

can use this volume as a step-by-step entryway into phylogenetic and functional analyses for ecology in R. More advanced users will be able to use this volume as a quick reference to understand particular analyses. The volume begins with an introduction to the R

environment and handling relevant data in R. Chapters then cover phylogenetic and functional metrics of biodiversity; null modeling and randomizations for phylogenetic and functional trait analyses; integrating phylogenetic and functional trait information; and

interfacing the R environment with a popular C-based program. This book presents a unique approach through its focus on ecological analyses and not macroevolutionary analyses. The author provides his own code, so that the reader is guided through the

computational steps to calculate the desired metrics. This guided approach simplifies the work of determining which package to use for any given analysis. Example datasets are shared to help readers practice, and readers can then quickly turn to their own datasets.

Over the past decade, ecologists have increasingly embraced phylogenetics, the study of evolutionary relationships among species. As a result, they have come to discover the field's power to illuminate present ecological patterns and

processes. Ecologists are now investigating whether phylogenetic diversity is a better measure of ecosystem health than more traditional metrics like species diversity, whether it can predict the future structure and function of communities and ecosystems, and whether

conservationists might prioritize it when formulating conservation plans. In Phylogenetic Ecology, Nathan G. Swenson synthesizes this nascent field's major conceptual, methodological, and empirical developments to provide students and practicing ecologists

with a foundational overview. Along the way, he highlights those realms of phylogenetic ecology that will likely increase in relevance--such as the burgeoning subfield of phylogenomics--and shows how ecologists might lean on these new perspectives to inform their research

programs.

This handbook focuses on the enormous literature applying statistical methodology and modelling to environmental and ecological processes. The 21st century statistics community has become increasingly

interdisciplinary, bringing a large collection of modern tools to all areas of application in environmental processes. In addition, the environmental community has substantially increased its scope of data collection including

observational data, satellite-derived data, and computer model output. The resultant impact in this latter community has been substantial; no longer are simple regression and analysis of variance methods adequate. The contribution of this handbook is to assemble a state-of-

the-art view of this interface. Features: An internationally regarded editorial team. A distinguished collection of contributors. A thoroughly contemporary treatment of a substantial interdisciplinary interface. Written to engage both

statisticians as well as quantitative environmental researchers. 34 chapters covering methodology, ecological processes, environmental exposure, and statistical methods in climate science.

“Biodiversity” refers to the variety of life. It

is now agreed that there is a “biodiversity crisis”, corresponding to extinction rates of species that may be 1000 times what is thought to be “normal”. Biodiversity science has a higher profile than ever, with the new Intergovernmental Science-Policy Platform on

Biodiversity and Ecosystem Services involving more than 120 countries and 1000s of scientists. At the same time, the discipline is re-evaluating its foundations – including its philosophy and even core definitions. The value of biodiversity is being debated. In this

context, the tree of life ("phylogeny") is emerging as an important way to look at biodiversity, with relevance cutting across current areas of concern – from the question of resilience within ecosystems, to conservation priorities for globally threatened species – while capturing the values

of biodiversity that have been hard to quantify, including resilience and maintaining options for future generations. This increased appreciation of the importance of conserving “phylogenetic diversity”, from microbial communities in the human gut to

global threatened species, has inevitably resulted in an explosion of new indices, methods, and case studies. This book recognizes and responds to the timely opportunity for synthesis and sharing experiences in practical applications. The book recognizes that the challenge of

finding a synthesis, and building shared concepts and a shared toolbox, requires both an appreciation of the past and a look into the future. Thus, the book is organized as a flow from history, concepts and philosophy, through to methods and tools, and followed by

selected case studies. A positive vision and plan of action emerges from these chapters, that includes coping with inevitable uncertainties, effectively communicating the importance of this “evolutionary heritage” to the public and to policy-makers,

and ultimately contributing to biodiversity conservation policy from local to global scales.

Ice is melting around the world and glaciers are disappearing. Water, which has been solid for thousands and even millions of years, is

being released into streams, rivers, lakes and oceans. Embedded in this new fluid water, and now being released, are ancient microbes whose effects on today's organisms and ecosystems is unknown and unpredictable. These long sleeping microbes are

becoming physiologically active and may accelerate global climate change. This book explores the emergence of these microbes. The implications for terrestrial life and the life that might exist elsewhere in the universe are explored. Key Selling Points:

Explores the role of long frozen ancient microbes will have when released due to global warming Describes how ice preserves microbes and microbial genomes for thousands or millions of years Reviews work done on permafrost microbiology Identifies

potential health hazards and environmental risks Examines implications for the search for extraterrestrial life.

Phylogenies in Ecology is the first book to critically review the application of phylogenetic methods in ecology, and it serves as a

primer to working ecologists and students of ecology wishing to understand these methods. This book demonstrates how phylogenetic information is transforming ecology by offering fresh ways to estimate the similarities and differences among species, and by

providing deeper, evolutionary-based insights on species distributions, coexistence, and niche partitioning. Marc Cadotte and Jonathan Davies examine this emerging area's explosive growth, allowing for this new body of hypotheses testing. Cadotte and

Davies systematically look at all the main areas of current ecophylogenetic methodology, testing, and inference. Each chapter of their book covers a unique topic, emphasizes key assumptions, and introduces the appropriate statistical methods and null models required for

testing phylogenetically informed hypotheses. The applications presented throughout are supported and connected by examples relying on real-world data that have been analyzed using the open-source programming language, R. Showing how phylogenetic

methods are shedding light on fundamental ecological questions related to species coexistence, conservation, and global change, Phylogenies in Ecology will interest anyone who thinks that evolution might be important in their data.

“It is not only the species that change evolutionarily through interactions . . . the interactions themselves also change.” Thus states John N. Thompson in the foreword to Interaction and Coevolution, the first title in his series of books exploring the relentless nature of

evolution and the processes that shape the web of life. Originally published in 1982 more as an idea piece—an early attempt to synthesize then academically distinct but logically linked strands of ecological thought and to suggest avenues for further research—than as a

data-driven monograph, Interaction and Coevolution would go on to be considered a landmark study that pointed to the beginning of a new discipline. Through chapters on antagonism, mutualism, and the effects of these interactions on

populations, speciation, and community structure, Thompson seeks to explain not only how interactions differ in the selection pressures they exert on species, but also when interactions are most likely to lead to coevolution. In this era of climate change and swiftly

transforming environments, the ideas Thompson puts forward in Interaction and Coevolution are more relevant than ever before.

Biological diversity, the variety of living organisms on Earth, is traditionally viewed as the diversity of taxa, and species in

particular. However, other facets of diversity also need to be considered for a comprehensive understanding of evolutionary and ecological processes. This novel book demonstrates the advantages of adopting a functional approach to diversity in order to improve

our understanding of the functioning of ecological systems and their components. The focus is on plants, which are major components of these systems, and for which the functional approach has led to major scientific advances over the last 20 years. Plant Functional

Diversity presents the rationale for a trait-based approach to functional diversity in the context of comparative plant ecology and agroecology. It demonstrates how this approach can be used to address a number of highly debated questions in plant ecology

pertaining to plant responses to their environment, controls on plant community structure, ecosystem properties, and the services these deliver to human societies. This research level text will be of particular relevance and use to graduate students and professional

researchers in plant ecology, agricultural sciences and conservation biology.

Questions why species are becoming extinct, and how we can protect the natural world on which we all depend.

As anthropogenic environmental

changes spread and intensify across the planet, conservation biologists have to analyze dynamics at large spatial and temporal scales. Ecological and evolutionary processes are then closely intertwined. In particular, evolutionary responses to

anthropogenic environmental change can be so fast and pronounced that conservation biology can no longer afford to ignore them. To tackle this challenge, areas of conservation biology that are disparate ought to be integrated into a unified framework. Bringing together

conservation genetics, demography, and ecology, this book introduces evolutionary conservation biology as an integrative approach to managing species in conjunction with ecological interactions and evolutionary processes. Which

characteristics of species and which features of environmental change foster or hinder evolutionary responses in ecological systems? How do such responses affect population viability, community dynamics, and ecosystem functioning? Under

which conditions will evolutionary responses ameliorate, rather than worsen, the impact of environmental change?