Preface

Evolutionary biology and ecology share the goals of describing variation in natural systems and discovering its functional basis. Within this common framework, evolutionary biologists emphasize historical and lineage-dependent processes and hence often incorporate phylogenetic reconstructions and genetic models in their analyses. Ecologists, while cognizant of historical processes, tend to explain variation in terms of the contemporary effects of biotic and abiotic environmental factors. Evolutionary ecology spans these two disciplines and incorporates the full range of techniques and approaches from both. Evolutionary ecologists consider both historical and contemporary influences on patterns of variation and study variation at all levels, from within-individual variation (e.g., ontogenetic, behavioral) to variation among communities or major taxonomic groups. The overlap between evolutionary ecology and ecology is so broad that some previous treatments of the field (e.g., Pianka 1994) have little to distinguish them from standard ecology textbooks. However, recent advances in molecular genetics, quantitative genetics (e.g., multivariate models, analyses of quantitative trait loci), statistical methods for comparative analyses, and computer-intensive genetic modeling have enabled evolutionary ecologists to more explicitly incorporate lineage-dependent processes and constraints into their research programs. In modern evolutionary ecology, both the adaptive significance and the "evolvability" of traits are hypotheses to be tested, rather than a priori assumptions. As the chapters in this volume attest, contemporary evolutionary ecologists have assembled a very diverse and effective array of techniques and approaches to test these hypotheses.

Our primary objective in organizing this book was to provide a collection of readings, as an alternative to readings from the primary literature, that would serve as an introduction to contemporary research programs in evolutionary ecology. Having taught undergraduate and graduate courses in evolutionary ecology at our respective institutions, we recognized the need for such a volume and discovered that many of our colleagues, including some of the contributors to this volume, felt the same way. We hope that this book will fill this need and be suitable either as a textbook for evolutionary ecology courses offered at the graduate or advanced undergraduate level, or as a reader for graduate seminars on this same topic. We have asked authors to write their chapters for this audience. When writing the first part of the book, entitled "Recurring Themes," authors have assumed that students have the equivalent of at least one undergraduate course in ecology and one course in genetics, but they have not assumed any background in population or quantitative genetics, or in evolutionary theory. As indicated by the title, the concepts introduced in this section recur throughout the volume and are fundamental to most research in evolutionary ecology. For the suc-

ceeding chapters (parts II–V), we assume that students have a basic understanding of the evolutionary processes and concepts discussed in part I. Authors in all sections have also assumed that students have read the preceding chapters in the volume, allowing chapters to build on each other without repeatedly redefining terms or redeveloping basic concepts. However, we realize that some readers will select only a subset of chapters, and therefore when specific information from a previous chapter is necessary for understanding a concept or example, we have tried to ensure that a reference to the appropriate preceding chapter is included.

The chapters in this volume have each been written by a different author; all authors are leading researchers in their field. Chapters thus represent the current stage of evolutionary ecology better than any single-authored textbook could, and the diversity of authors introduces students to the diversity of ideas, approaches, and opinions that are the nature of science. However, a multiauthored textbook presents special challenges for students, just as team-taught lecture course presents challenges. Authors vary in the level at which they present their material and in the amount of background that they expect students to have when reading their chapter. Authors also vary in their writing styles and vary somewhat in the way that they organize their chapters. We have attempted to minimize the variation among chapters by providing guidelines to authors, by asking authors to communicate with each other while writing their chapters, and by aggressively editing and revising chapters as needed. We have also tried to minimize overlap among chapters and to ensure that chapters build on one another. Perhaps our major challenge as editors was to keep the volume to a reasonable length, given 28 independently written chapters. Each author was asked to contribute no more than 8000 words of text, using no more than six figures, plus tables, and 30 references. These restrictions precluded comprehensive reviews and forced each contributor to select only a few key references. Nevertheless, each chapter does serve as a good introduction to the research area by providing leading references to other reviews, books, and seminal papers. As editors, we take full responsibility for the resulting (and necessary) omission of many additional references, perhaps equally appropriate as examples or case studies. We hope that readers will be inspired to delve more fully into at least some of the research areas and will thus have the opportunity to discover the vast and detailed literature that we have been unable to include.

Although this volume is intended to be suitable as a text for advanced undergraduates or graduate students, we also had a second objective—to produce a volume that is valuable to all researchers in ecology, evolution, and genetics. It is largely for this reason that we opted for a multiauthored volume rather than a traditional textbook style. This volume is a collection of chapters that describe the modern state of evolutionary ecology, including informed and thoughtful insights into where this field is, or perhaps should be, going. Researchers should find the chapters dedicated to their areas of expertise interesting food for thought, while the chapters covering more disparate areas should provide effective updates and insights that will, we hope, encourage cross-fertilization.

Evolutionary ecology is a very broad and diverse field that includes much of modern ecology and evolutionary biology. Unfortunately, we have only one volume within which to cover the field. We have tried to include as many topics as possible in the space provided, but of necessity, some topics had to be covered only briefly or omitted altogether. Thus, we have made numerous editorial decisions concerning content; we hope that you, as readers, will agree with most of these. The most substantial decisions involved what topics should be left out of the book. Undoubtedly, our personal interests and biases have influenced some of these decisions, but most omissions are for practical reasons. For example, we have opted not to include chapters on speciation because numerous edited volumes have been dedicated to the topic and it is generally well covered in general evolution textbooks. We have also limited our coverage of statistical and analytical techniques to introductions and brief descriptions within individual chapters. Readers will not find specific chapters dedicated to methodology such as chapters on molecular methods, methods of phylogenetic analysis, or methods for measuring genetic variance components. These are important techniques for us all to understand but are best acquired from specialized volumes (e.g., Brooks and McLennan 1991; Harvey and Pagel 1991; Avise 1994; Roff 1997). Instead, we focus on conceptual problems and case studies that may illustrate why and when particular methods

and techniques are useful in evolutionary ecology, but we do not provide detailed recipes for application of the methods.

In closing, we express our gratitude to all of the authors contributing to this volume. Writing a book chapter is often a thankless task, and our stringent requirements have made the task especially difficult. We have been uniformly impressed not only by the very high quality of the contributions, but also by each author's cheerful willingness to respond to our requests for revision. Almost all of these requests were made to standardize the style of the chapters and increase the cohesiveness of the volume as a whole. To the extent that we have succeeded in this, and in our overall goal of providing a state-of-the-art introduction to evolutionary ecology, we must thank the individual chapter authors.

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