
Preface

For more than 150 years, since the publication of *On the Origin of Species*, biologists have focused on understanding the evolutionary chronicle of diversification and extinction, and the underlying evolutionary processes that have produced it. Although progress in evolutionary biology has been steady since Darwin's time, developments in the last 20 years have ushered in a golden era of evolutionary study in which biologists are on the brink of answering many of the fundamental questions in the field.

These advances have come from a confluence of technological and conceptual innovations. In the laboratory, the rapid and inexpensive sequencing of large amounts of DNA is producing a wealth of data on the genomes of many species; comparisons of these genomes are allowing scientists to pinpoint the specific genetic changes that have occurred over the course of evolution. In parallel, spectacular fossil discoveries have filled many of the most critical gaps in our documentation of the evolutionary pageant, detailing how whales evolved from land-living animals, snakes from their four-legged lizard forebears, and humans from our primate ancestors. In addition, providing the data that Darwin could only imagine, field biologists are now tracking populations, directly documenting natural selection as it occurs, and monitoring the resulting evolutionary changes that occur from one generation to the next.

At the same time, evolutionary biology is making an impact throughout human society. Many current issues—such as the rise of new diseases, the increased resistance of pests and microorganisms to efforts to control them, and the effect of changing environmental conditions on natural populations—revolve around aspects of natural selection and evolutionary change. Many disparate areas of modern life—medicine, the legal system, computing—increasingly employ evolutionary thinking and use methods developed in evolutionary biology. Paradoxically, even as our understanding of evolution and its importance to society has never been greater, substantial proportions of the population in a number of countries—most notably the United States and Turkey—dispute the scientific findings of evolutionary biologists and resist the teaching of evolution in schools.

This volume follows on the success of *The Princeton Guide to Ecology*, edited by Simon Levin. Published in 2009, the ecology guide has proven valuable to a wide

range of readers, from professional ecologists and graduate students to land planners, economists, and social scientists. With this model in mind, we set out to produce a guide that would be accessible and useful to students and scientists in evolutionary biology and related disciplines, as well as to anyone with a serious interest in evolution. What makes this volume stand out is the breadth and depth of our 107 chapters, each written by authorities in their respective field. In addition, the articles balance accessibility with depth of analysis, making the *Guide* a valuable reference for a broad audience. Certainly, some articles are more technical than others, but readers can easily select chapters appropriate for their interests and expertise.

The *Guide* is divided into eight sections. The introductory section includes four chapters covering the basics of evolution: what it is, the history of its study, the evidence for its occurrence, and a basic primer of genetic and phenotypic variation. The following seven sections cover the major areas of evolutionary biology, each beginning with a synoptic overview by the section editor. Section II: Phylogenetics and the History of Life, covers the history of life and how it is studied. It includes chapters on the evolution of each of the major forms of life, as well as on the study of life's history through the examination of the fossil record and the construction of phylogenetic trees that detail the relationships among species and higher taxa. Section III: Selection and Adaptation, moves to evolutionary processes, focusing on natural selection, the presumed primary driver of evolutionary change. Section IV: Evolutionary Processes, covers gene flow, genetic drift, and nonrandom mating. Section V: Genes, Genomes, Phenotypes, examines the link between genes and phenotypes and how they evolve, focusing on the rapid growth of knowledge and continuing research in genetics and developmental biology and the relationships of these fields to evolutionary biology. Section VI: Speciation and Macroevolution, moves the focus to the species level and above, emphasizing the origin of species—that is, speciation—and evolutionary change that drives large-scale changes in the history of life through time, such as the rise of particular taxa and the extinction of others. Section VII: Evolution of Behavior, Society, and Humans, focuses on behavioral and social interactions that occur within species, including competition for mating success (referred to

as sexual selection) and the evolution of traits such as parental care, communication, and altruism. Although chapters in this section are broad in taxonomic scope, many have particular relevance to human biology. Finally, Section VIII: Evolution and Modern Society, addresses how evolutionary biology directly affects the health and welfare of humans today.

This volume could not have been possible without the efforts of the editors and authors, whose work was instrumental to such a wide-ranging and authoritative work. Development of the guide also benefited immensely from the wisdom of our advisors, Michael Donoghue, Simon Levin,

Trudy Mackay, Loren Rieseberg, Joseph Travis, and Greg Wray. In addition, the editorial staff at Princeton University Press was indispensable. The entire project was skillfully overseen by executive editor Anne Savarese, and day-to-day management moved smoothly and efficiently under the watchful eyes of editorial assistants Diana Goovaerts and Sarah David, and production editor Karen Carter.

We mourn the loss and gratefully acknowledge the contribution of our distinguished colleague Farish Jenkins, who died on November 11, 2012.

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