

Preface

If you want to know about the science of evolution, how life began, what Charles Darwin really said about evolution, why a fungus is more closely related to a human being than to a plant, how experiments in evolution are carried out, why birds are flying dinosaurs, how we manipulate the evolution of other species, and if you want a clear treatment of the processes that result in evolution, then this is the book for you. It is written for those who want to learn about evolution but have minimal background in sciences such as chemistry or mathematics. The approach and level of treatment makes the book suitable for biology majors in an introductory class in evolution, non-biology majors seeking an evolution class, students in Arts, Liberal Arts, Social Science or Health professions in which a science class is required, business schools or departments of economics in which students need to understand the importance of natural selection, and community colleges offering a one-term or full-year class in evolution for students or for the public.

Evolution is both a science and the science of life. Cultures, societies, populations, organisms, cell and tissue types, genes and other molecules, can be compared because similarities and differences can be explained on the basis of common inheritance from earlier forms. The processes that explain evolution can be examined in nature. Evolutionary processes can be tested experimentally in the field or in the laboratory. Evolution is both real and ongoing.

Theories that life evolved have been proposed since the early 18th century. Not until 1859, however, when Charles Darwin's book *On the Origin of Species* appeared in print, was the evidence for evolution gathered together on such a massive scale in support of a particular mechanism of evolution: evolution by natural selection. Darwin's theory revolutionized human existence and caused enormous changes in how we view the world, understand our place in it, and explain life and living things.

The central aim of evolutionary biology, which is to explain the origins and diversity of life, treats such issues as:

- How whales evolved from ancestors that walked on land
- How birds acquired flight as they evolved from dinosaurs
- Why genes that cause human diseases have not disappeared as humans evolved
- Whether human cultural evolution has overtaken biological evolution
- Whether the Universal Tree of Life (UToL) has multiple trunks

These and many other questions are asked and answered by the study of evolution.

The aim of this book is twofold: (1) To bring together the major **principles** and **processes** that explain evolutionary change; (2) To discuss the **patterns** of life that

have resulted from the operation of evolution over the past 3.5 billion years. To achieve these aims, the first third of the book discusses evolution in relation to:

- the scientific method and evolution as a science in Chapter 1;
- the origins of matter, of the universe, and of Earth in Chapter 2;
- the origin of molecules, cells and the first organisms, and the nature of life in Chapter 3 and 4;
- the role played by Charles Darwin and Alfred Wallace in independently proposing a theory of evolution by natural selection in Chapters 5 through 7.

The next four chapters, Chapters 8 through 11, outline the transformation of single-celled organisms into multicellular organisms — animals, plants and fungi — that can be grouped into kingdoms in a universal tree of life. Chapters 12 to 15 discuss:

- the presence and importance of variation at the level of genes, gene regulation and in populations; and
- how populations as reproductively isolated units provide the raw material upon which natural selection can act.

In Chapters 16 through 18, you will see that organisms are members of species, which arise and usually become extinct. Chapters 19 to 21 examine the principles, processes and patterns of evolution as seen in the origination and evolution of humans, in the evolution of culture and society, and in the evolution of belief systems and of religion.

Although the 7 parts and 21 chapters are logically arranged, the structure of the book allows you to begin with any part — for example, Part VII, which contains chapters 19–21 on Human Origins and Evolution — or to read individual parts as units independent of the others. Neither your reading nor the curriculum need follow the order of topics.

The book is extensively illustrated with four-color images and includes the following pedagogical tools:

Key concepts are listed at the beginning of each chapter. Checking these both before and after you read a chapter will alert you to the content and enable you to be sure you have mastered it. Key concepts in the text and in boxes are highlighted. Boxes are used to draw attention to particular topics, often ones that relate to more than one chapter.

Marginal notes are used to provide comments on or to expand upon the text. A list of **recommended reading** for each chapter allows you to explore particular topics in more depth by looking to primary literature and other relevant resources.

A **glossary of definitions** is provided at the end of the book, along with a separate **cross-listing (lexicon)** of key concepts, principles, processes, and groups of organisms. This cross-tool allows you to access related (or opposite) terms and concepts. For example, “Abiotic” links to “Biotic” and to “Life.” “Adaptive radiation” links to “Biogeography,” “Speciation,” and “Zoogeography.” This cross-listing, which may alert you to relationships you otherwise might not have thought of, will be especially useful for those readers who want to examine or study related topics and for those who need to assign projects or related topics in examination formats.

Ancillary Materials

To assist the instructor with teaching the course and to provide students with the best in learning aids, Jones and Bartlett has prepared an ancillary package.

For the Instructor

The *Instructor's Media CD-ROM* provides instructors who have adopted the text with the following traditional ancillaries:

The **PowerPoint® Image Bank** provides a library of all of the illustrations, photographs and tables, to which Jones and Bartlett Publishers holds the copyright or has permission to reprint digitally, inserted into PowerPoint slides. Instructors can easily copy individual images into existing PowerPoint slides or add more images to the PowerPoint Lecture Outline Slides.

The **PowerPoint Lecture Outline Slides**, prepared by Jeff Meldrum of Idaho State University, combine text and images into a presentation that is both educational and engaging. Using the Microsoft® PowerPoint program, instructors can easily modify and edit the slide show to fit individual presentation needs.

An online **Test Bank**, prepared by Dalton Gossett of Louisiana State University–Shreveport, features questions in plain text files that can be easily integrated with your existing course management software.

For the Student

Jones and Bartlett has established a **Student Companion Web Site**, at <http://biology.jbpub.com/hall/evolutionprinciples>, to host a wide array of additional resources and activities for independent study, review and research.

An **Interactive Glossary**, on-screen **Flashcards** and electronic **Crosswords** offer fun and easy ways for you to review key terms, concepts and processes.

To help with reading comprehension and exam preparation, **Study Quizzes** for each chapter, prepared by James K. Dooley of Adelphi University, provide you with short Web-based tests to assess your knowledge of the content.

Web Links recommend external Web sites that provide further information about topics covered in the text. James K. Dooley compiled this list of helpful outside resources.

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