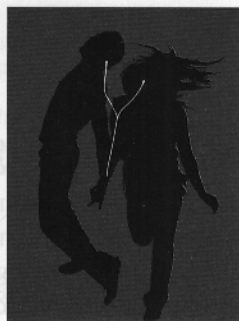


Preface

It's an exciting time to be a biologist, with a wealth of new discoveries every day, and biology-related issues such as climate change and stem cell research often making headlines. However, this avalanche of information can intimidate non-scientists. This book was designed and written specifically for students who most likely will not become biologists and may never again take another science course. It is an accessible and engaging introduction to biology that provides future decision-makers with an understanding of basic biology and the process of science.

Accessible Text Understanding stems mainly from making connections between concepts and details, so a text with too little detail reads as a series of facts that beg to be memorized. However, excessive detail can overwhelm the introductory student. Thus, we constantly strive to strike the perfect balance between level of detail and accessibility. We once again revised the text to eliminate details that do not contribute to a basic understanding of essential concepts. We also know that English is a second language for many students, so we avoid idioms and aim for a clear, straightforward style.

This edition includes many analogies of familiar objects and phenomena that will help students understand abstract concepts. For example, in the discussion of covalent bonding in Chapter 2 (Molecules of Life), we explain that sharing electrons links two atoms, just as sharing earphones links two friends. A graphic of linked listeners (*right*) reinforces the explanation in the text.



Wealth of Timely Applications This book is packed with everyday applications of biological processes. At every opportunity, we enliven discussions of biological processes with references to their effects on human health and the environment. (In the index, you'll find health-related applications denoted by red squares and environmental applications by green squares.) Each chapter begins with a section that explores a current event or controversy directly related to the chapter's content. For example, a discussion of binge drinking on college campuses introduces the concept of metabolism in Chapter 4. The introductory topic is integrated into the chapter material and the final **REVISITED** section of the chapter. This final section uses chapter content to reinforce and expand the topic presented in the opening essay. In chapter 4, for example, this section presents a metabolic pathway that breaks



down alcohol, linking the function of enzymes in this pathway to hangovers, the alcohol flushing reaction, alcoholism, and cirrhosis. The section is illustrated with a photo of a cirrhotic human liver and a very ill Gary Reinbach, who died at age 22 of alcoholic liver disease.

Emphasis on the Process of Science

To strengthen a student's analytical skills and offer insight into contemporary research, each chapter includes an exercise called **DIGGING INTO DATA**. The exercise consists of a short text passage—usually about a published scientific experiment—and a table, chart, or other graphic that presents experimental data. A student can use information in the text and graphic to answer a series of questions. For example, the exercise in Chapter 2 asks students to interpret results of a study that examined the effect of dietary fat intake on “good” and “bad” cholesterol levels.

Throughout the book, descriptions of current research and photos of the scientists who do it drive home the message that science is an ongoing endeavor carried out by a diverse community of people.

For example, Chapter 14 (Plants and Fungi) describes an international team of plant scientists (*right*) now seeking ways to protect the world's wheat supply from a newly evolved strain of fungal disease. We discuss not



only what researchers have already discovered, but also how discoveries were made, how our understanding has changed over time, and what remains under investigation.

In-Text Learning Tools To emphasize connections between biological topics, each chapter begins with **WHERE YOU HAVE BEEN**, a brief list of concepts that were introduced earlier and will reappear in the chapter. A similar **WHERE YOU ARE GOING** at the close of the chapter text points toward later discussions that will be based on the current chapter's material.

The chapter itself consists of several numbered sections that contain a manageable chunk of information. Every section ends with a boxed **TAKE-HOME MESSAGE** in which we pose a question that reflects the critical content of the section, and then answer the question in bulleted list format. Every chapter has at least one **FIGURE IT OUT QUESTION** with an answer immediately following. These questions allow students to quickly check their understanding as they read. Mastering scientific vocabulary challenges many students, so we have included an **ON-PAGE GLOSSARY** of key terms introduced in each two-page spread, in addition to a complete glossary at

the book's end. The end-of-chapter material features a **VISUAL SUMMARY** that reinforces each chapter's key concepts. A **SELF-QUIZ** poses multiple choice and other short answer questions for self-assessment (answers are in Appendix I). A set of more challenging **CRITICAL THINKING QUESTIONS** provides thought-provoking exercises for the motivated student.

Design and Content Revisions The following list highlights some of the revisions to each chapter. A section-by-section guide to revised content and figures is available upon request from your sales representative.

Introduction - Chapter 1 has an expanded discussion of science and many new photos. Material on taxonomy was moved to this chapter for an early introduction.

Unit I How Cells Work

- Chapter 2 has an expanded discussion of hydrogen bonding and its importance in liquid water. Molecular models were updated. A new photo of PET scans illustrates the use of tracers.
- Chapter 3 includes a section that considers how we define life.
- Chapter 4 has new photos illustrating energy. Enzyme discussion has updated graphics that include a model of an active site.
- Chapter 5 introduction now includes material on anthropogenic carbon dioxide emissions. A new overview diagram illustrates aerobic respiration in a mitochondrion.

Unit II Genetics

- Chapter 6 has a new introductory essay about cloned 9/11 rescue dog Trackr.
- Chapter 7 now includes epigenetics and related discoveries.
- Chapter 8 reorganized; expanded discussion of sexual vs. asexual reproduction now includes the Red Queen hypothesis.
- Chapter 9 has many new photos and includes a discussion of Tay-Sachs. Genetic screening section has been heavily revised.
- Chapter 10 opens and concludes with sections about SNP testing and the implications of information it provides. DNA profiling updates the material on DNA fingerprinting.

Unit III Evolution and Diversity

- Chapter 11 fossil section is expanded with many new photos.
- Chapter 12 has much expanded coverage of cladistics, including examples of practical applications. Behavioral isolation now illustrated with peacock spiders; adaptive radiation, with honeycreepers; coevolution, with large blue butterflies and ants.
- Chapter 13 now opens with a section about how understanding the evolutionary history of pathogens such as HIV can help us fight disease. New art depicts viral reassortment.
- Chapter 14 now opens with a section about how wheat stem rust fungus threatens the global food supply.
- Chapter 15 has heavily revised coverage of primate and human evolution, and coverage of Neanderthals has expanded.

Unit IV Ecology

- Chapter 16 has a new Revisited section discussing geese that caused a plane crash. Ecological footprints added.
- Chapter 17 includes a new subsection about plant-herbivore interactions.
- Chapter 18 has a reorganized discussion of biomes.

Acknowledgments

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LISA STARR, CHRISTINE EVERS, AND CECIE STARR March, 2012