

Preface

Throughout our lives, we are called upon to make important decisions based on our understanding of science, whatever that understanding may be. This book was designed and written specifically for students who do not intend to 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 a basic understanding of 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, too much detail overwhelms the introductory student. Thus, we authors are constantly trying to strike the perfect balance between level of detail and accessibility. We revised every page of this edition to pare detail to the minimum level we felt was necessary for the student to be able to make connections. We also know that English is a second language for many students, so we wrote in a clear and straightforward style.

This edition includes many analogies to 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.



A Wealth of Applications This book is packed with examples of applications that are relevant to a student's daily life (as marked by red squares in the index). At every opportunity, discussions of biological processes are enlivened by references to their effects on human health and the environment. Each chapter begins with an **IMPACTS/ISSUES** section that explores a current event or controversy directly related to the chapter's content. For example, in Chapter 2, a discussion of *trans* fats and their effects on health introduces the structure-function relationship of molecules. The introductory topic is integrated into the chapter material and the new **IMPACTS/ISSUES REVISITED** section that ends each chapter. This ending section uses chapter content to reinforce and expand the topic presented in the opening essay. In chapter 2, for example, we link the function of hydrolysis enzymes to the unhealthy effects of *trans* fats. We also pose an associated **HOW-WOULD-YOU-VOTE QUESTION** that gives students the opportunity to practice making an informed choice about a



science-related controversy. The student web site provides access to articles and other material that the student can use when considering the question.

Emphasis on the Process of Science 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 5 (Capturing and Releasing Energy) discusses the biofuels research of two young scientists at North Carolina State University (*right*). Research topics include 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.



To strengthen a student's analytical skills and offer further insight into contemporary research, each chapter now includes an exercise on **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. The student can use information in the text and graphic to answer a series of questions.

In-Text Learning Tools To facilitate learning, each chapter 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 Previous adopters of *Biology: Today and Tomorrow* will notice that this edition features a dramatically different design. Each chapter now opens with a stunning piece of art designed to encourage student interest in the chapter's topic. The art is also used to illustrate one of the concepts within the chapter. A one-column design gives this book a simple look, and it allows placement of the on-page glossary. The following list highlights some of the revisions to each

chapter. A page-by-page guide to revised content and figures is available upon request from your sales representative.

Introduction - Chapter 1 has a new Impacts/Issues section about the discovery of new species, and a new section on critical thinking. Expanded discussions of philosophy and process of science.

Unit I How Cells Work

- Chapter 2 has a new Impacts/Issues section about *trans* fats.
- Chapter 3 has a new Impacts/Issues section about foodborne *E. coli* O157:H7.
- Chapter 4 sections on energy and metabolism have been reorganized and rewritten. The new Impacts/Issues Revisited section covers alcohol metabolism and alcoholic liver disease.
- Chapter 5 now has integrated coverage of photosynthesis and energy-releasing pathways. A new Impacts/Issues about biofuels opens the chapter, and the Impacts/Issues Revisited section introduces the problem of rising atmospheric carbon dioxide.

Unit II Genetics - Material within this unit has been rearranged.

- Chapters 6 describes the structure of chromosomes, and discusses the structure and function of DNA.
- Chapter 7 covers gene expression. Gene control material reworked to focus on human examples such as breast cancer.
- Chapter 8 covers mitosis and meiosis. Revised mitosis spread juxtaposes photos of mitosis in animal and plant cells.
- Chapter 9 covers inheritance. Revised Impacts/Issues section shows a panel of young victims of cystic fibrosis. Tracking traits section has a new essay about human skin color.
- Chapter 10 covers genetic engineering. Content has been simplified and updated with current information and examples.

Unit III Evolution and Diversity - Material within this unit has been rearranged.

- Chapter 11 covers Darwin's theory and evidence of evolution. Transitional fossils and comparative embryology photo series added. New spread visually correlates sedimentary rock layers in the Grand Canyon with periods in the geologic time scale.
- Chapter 12 covers processes of evolution (microevolution, speciation, macroevolution) and classification systems. Revised and expanded coverage of reproductive isolation, cladistics.
- Chapter 13 covers prokaryotes, protists, and viruses. Impacts/Issues section now focuses on the causes of AIDS and malaria.
- Chapter 14 now covers plants and fungi. It opens with an Issues/Impacts section about Nobel Prize winner Wangari Maathai's efforts to replant trees and slow deforestation.
- Chapter 15 has a revised Impacts/Issues section that includes information about additional early bird fossils. New material added about placozoans. Birds are now discussed under the Reptile subhead. Human evolution has been updated to include a discussion of *H. floresiensis*.

- The chapter comparing plants and animals has been deleted.

Unit IV Ecology - The order of material within this unit has been altered and the chapter about animal behavior has been deleted.

- Chapter 16 covers population ecology and has a new Impacts/Issues about population explosions of Canada geese.
- Chapter 17 covers communities and ecosystems, previously covered in two separate chapters.
- Chapter 18 covers the biosphere and human effects. It opens with a new Impacts/Issues about threats to the Arctic and includes increased coverage of global climate change.

Unit V How Animals Work

- Chapter 19 has an updated Impacts/Issues section about stem cells. Homeostasis and thermoregulation now covered here.
- Chapter 20 has a new Impacts/Issues section about myostatin and muscle bulk. Improved coverage of joint, muscle disorders.
- Chapter 21 has more concise coverage of circulation and respiration.
- Chapter 22 has simplified coverage of immunology and a new Impacts/Issues section about the HPV vaccine.
- Chapter 23 has simplified coverage of urine formation.
- Chapter 24 discussion of the spinal cord now includes reflex pathways. Discussion of memory deleted.
- Chapter 25 includes information about role of thymus in AIDS, melatonin's cancer-suppressing effects, effects of phthalates.
- Chapter 26 has expanded and updated coverage of pregnancy, fertility, and sexually transmitted diseases.

Unit VI How Plants Work

- Chapter 27 has a new Impacts/Issues section about phytoremediation.
- Chapter 28 has a new Impacts/Issues section about colony collapse disorder. Expanded, revised asexual reproduction section.

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LISA STARR, CHRISTINE EVERS, AND CECIE STARR November, 2008