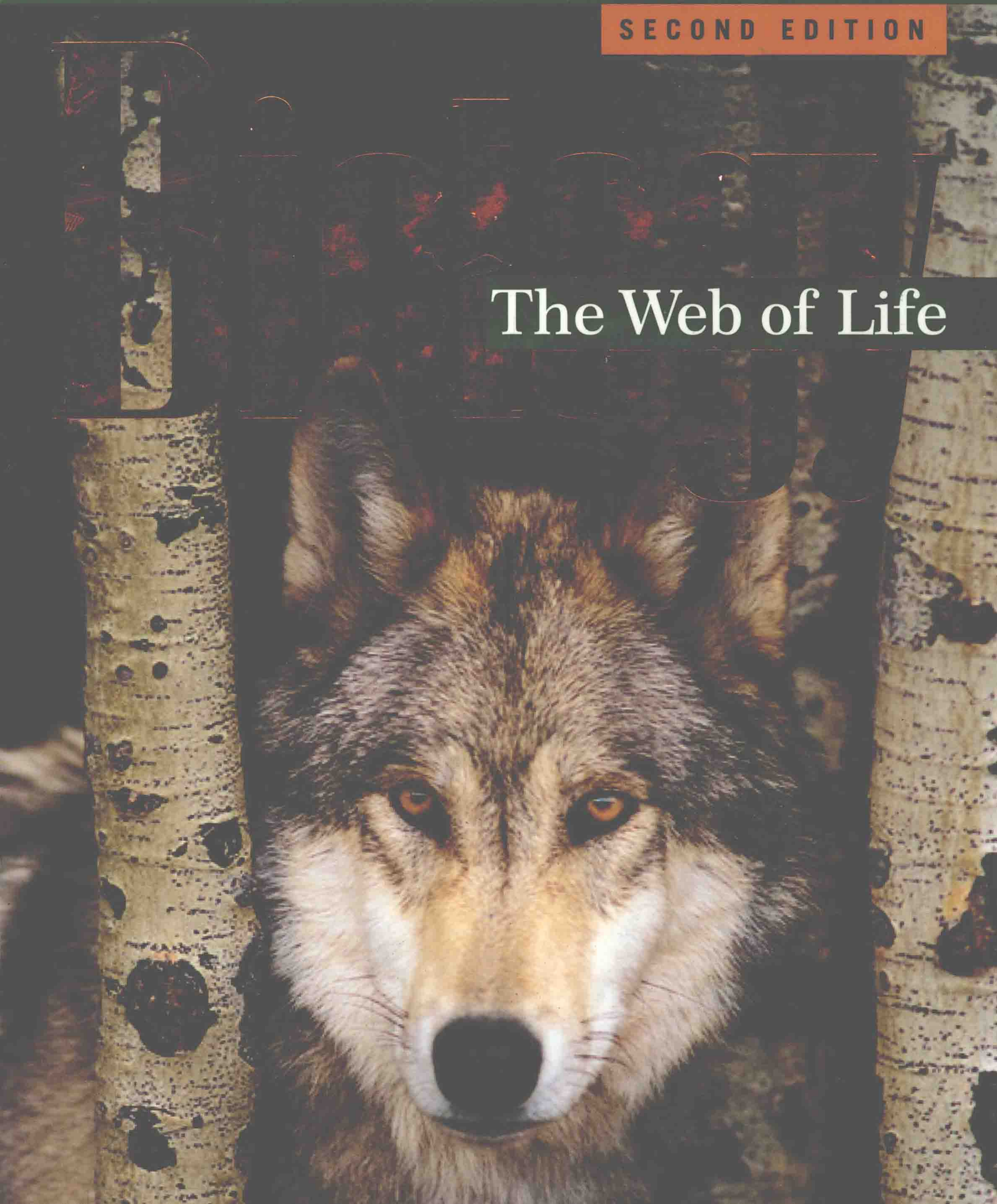
SCOTT FORESMAN - ADDISON WESLEY

SECOND EDITION

Biology
The Web of Life



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*"We did not weave the web of life,
we are merely a strand in it.
Whatever we do to the web, we do
to ourselves."* –CHIEF SEATTLE

Biology
The Web of Life
Second Edition

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Biology
The Web of Life

Program Components

STUDENT EDITION

TEACHER'S EDITION

TEACHER'S RESOURCE PACKAGE

- Laboratory Manual (Teacher's Edition)
- Unit Review Modules
- Consumer Applications
- Issues and Decision Making
- Biotechnology Manual
- Overhead Transparency Preview
- Teacher's Curriculum Guide
- Super Read! Strategies for Effective Reading in Biology
- Interpreting and Developing Graphics
- Guide to Block Scheduling
- Spanish Reviews

LABORATORY MANUAL

- Student Edition

OVERHEAD TRANSPARENCY PACKAGE

TECHNOLOGY

- Biology Alive! Video Series
- Rewind: *The Web of Life* Reteach Videos
- Animated Biological Concepts Videodiscs and Worksheets
- TestWorks CD-ROM
- Interactive Biological Simulations CD-ROM and Worksheets
- Teacher's Resource Planner CD-ROM
- *Biología: la telaraña de la vida* CD-ROM (Spanish Student Edition)
- bioSURF Internet Site
- The Biology Place Internet Site
  Published by Peregrine Publishers, Inc.

Second Edition

Cover photograph: Tim Davis/Davis-Lynn Images

About the cover: Wolves and aspen trees are just two of the millions of species that comprise the web of life. The effects of the wolf's removal from and reintroduction to ecosystems demonstrate the delicate and complex connections among living things.

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Big Ideas

There is much to learn in every chapter of this textbook. The Big Ideas! will help you organize and understand the essential knowledge and skills that comprise biology. Build a framework of biology by learning and connecting these Big Ideas.

Unit 1 The Basis of Life

- *Living things share many characteristics, including organization and adaptation. 1.1–1.2*
- *Scientists use careful observation and controlled experiments to study the natural world. 1.3*
- *Living things are made of chemicals with characteristic structures and functions. 2.1–2.2*
- *Life processes depend on breaking and forming chemical bonds in chemical reactions. 2.3–2.4*
- *Life processes depend on the properties of water and the characteristics of solutions. 2.5*
- *Cell structures of living organisms perform life functions. 3.1–3.3*
- *Cells of major groups of organisms can be distinguished by their structural differences. 3.4*
- *Cells exchange materials with their environment by chemical and physical processes. 3.5*
- *All organisms get energy by breaking down the chemical compounds in food and making ATP and other molecules. 4.1–4.3*
- *Energy from sunlight passes through a series of living organisms. 4.4*
- *Cell division is the basis of reproduction and development 5.1–5.2*
- *Chromosome number is reduced in meiosis. 5.3–5.4*

Unit 2 Genetics

- *Traits are inherited in a consistent pattern. 6.1–6.2*
- *There are patterns of inheritance that make some traits predictable. 6.3–6.5*
- *The structure of DNA, the molecule of heredity, enables the molecule to copy itself. 7.1–7.2*
- *Genes, sections of DNA that code for a specific trait, are linked together on chromosomes. 7.3–7.5*
- *Genes are sequences of DNA bases that can be translated into proteins or parts of proteins when they are activated. 8.1–8.2*
- *Changes in DNA can cause changes in phenotype. 8.3–8.4*
- *Genotypes can be changed through selective breeding and genetic engineering. 9.1–9.2*
- *Technology enables us to find out about genotype and use this knowledge to affect phenotype. 9.3–9.4*

Unit 3 Change and Diversity

- *Populations change over time through natural selection. 10.1–10.2*
- *Scientific analysis of fossils and modern organisms supports the theory of evolution. 10.3*
- *New species can originate through natural selection and other changes in a population's gene pool. 10.4–10.5*
- *Evidence indicates that organic molecules and cells may have formed spontaneously on ancient Earth. 11.1*
- *Our planet and the organisms that inhabit it have changed greatly over time. 11.2–11.3*
- *Primates are mammals with binocular vision and dexterous hands and arms. 12.1*
- *There have been many different hominid species over time, each species with its own unique characteristics. 12.2–12.3*
- *Scientists classify organisms into a hierarchy of groups based on evolutionary relationships. 13.1–13.2*
- *Classification has numerous applications, including identifying species. 13.3*

Unit 4 Monerans, Protists, and Fungi

- *Viruses are particles that depend on living things to replicate. 14.1–14.3*
- *Monerans are microscopic organisms that lack a membrane-bound nucleus and membrane-bound organelles. 14.4–14.6*
- *Protists are a diverse group of eukaryotes that include unicellular and multicellular organisms. 15.1*
- *Protists can be classified into three groups—protozoans, algae, and molds. 15.2–15.4*
- *Protists have a major ecological impact as food sources, decomposers, and infectious agents. 15.5*
- *Fungi are stationary organisms that live as heterotrophs. 16.1–16.2*
- *Fungi act as decomposers and symbiotic partners of humans and many other organisms. 16.3*

Unit 5 Plants

- *Most plants have structures that enable them to survive on land and produce food. 17.1–17.3*
- *Key features can be used to classify plants. 17.4*
- *Plants perform life processes using specialized structures. 18.1–18.2*
- *The parts of most plants grow from specialized tissues. 18.3*

- Plants respond to and affect the environment. 19.1–19.2
- Plants reproduce both asexually and sexually. 19.3–19.5
- Plants are multicellular organisms with adaptations for life on land. 20.1–20.2
- Ferns have vascular systems and reproduce by means of spores. 20.3
- Seed plants do not require water for fertilization and have therefore colonized extensive areas of land. 20.4–20.5

Unit 6 Invertebrate Animals

- Animals have evolved a number of adaptations enabling them to perform essential functions of life. 21.1
- Sponges are sessile animals without specialized tissues and organs. 21.2–21.3
- Cnidarians are radially symmetrical animals with specialized tissues and stinging tentacles. 21.4–21.5
- Sponges and cnidarians provide food and protection for a large number of organisms. 21.6
- Flatworms and roundworms have bilateral symmetry and specialized tissues. 22.1
- Mollusks share a common body plan that includes a muscular foot, a visceral mass, and a mantle. 22.2
- Annelids are wormlike animals with a segmented body. 22.3
- Arthropods are segmented invertebrates with jointed appendages and an exoskeleton. 23.1
- In general, arthropods are classified by the number of body segments they have and the structure of their appendages. 23.2–23.4
- Arthropods, as members of the largest phylum, have many important roles in the biosphere. 23.5
- Echinoderms are marine animals with spiny skin, an endoskeleton, and a water vascular system. 24.1
- Invertebrate chordates represent possible evolutionary links between invertebrates and vertebrates. 24.2

Unit 7 Vertebrate Animals

- Vertebrates are animals with backbones. 25.1
- Fishes are a diverse group of vertebrates that are adapted for life in the water. 25.2–25.4
- Although amphibians share some fish traits, they are adapted to life on land. 25.5–25.7
- Reptiles represent the first vertebrates with adaptations that enable them to live their entire lives out of water. 26.1–26.3
- With the development of feathers, birds were the first vertebrates able to maintain a constant body temperature. 26.4–26.6
- Although different species have unique adaptations, all mammals are endothermic vertebrates with hair and mammary glands. 27.1–27.2
- Mammals live almost everywhere on Earth and play important roles in ecosystems. 27.3
- Animal behaviors are adaptations that maximize survival and reproductive fitness. 28.1–28.3
- Animal behavior involves interactions between individuals, between groups, and with the environment. 28.4

Unit 8 Human Biology

- The human body consists of twelve systems. 29.1
- The body's skeleton provides support and protection. 29.2–29.3
- Muscles contract to move the body. 29.4–29.5
- The skin covers and protects the body's internal organs. 29.6
- The digestive system breaks down food into usable compounds. 30.1–30.3
- The excretory system eliminates nitrogen-containing wastes and helps maintain homeostasis. 30.4–30.5
- The vital exchange of oxygen and carbon dioxide occurs in the respiratory systems of animals. 31.1–31.3
- Circulatory systems transport materials necessary for life. 31.4–31.6
- The immune system protects the body from harmful organisms and substances. 32.1
- The immune system consists of specialized cells, organs, and organ systems that respond to the presence of a pathogen. 32.2–32.3
- A healthy immune system requires a healthy lifestyle. 32.4
- The endocrine system controls long-lasting internal changes. 33.1–33.3
- Reproductive systems make possible the continuation of life. 33.4–33.6
- Nervous systems control our detection of and response to the environment. 34.1
- The human nervous system consists of the brain, spinal cord, nerves, and sensory organs. 34.2–34.4
- The health of the nervous system can be affected by injury, disease, and substance abuse. 34.5

Unit 9 Organisms and the Environment

- Life depends on the relationships between living and nonliving parts of the environment. 35.1–35.2
- Regions of the biosphere have distinguishing characteristics. 35.3–35.4
- The size of a population is affected by living and nonliving factors. 36.1–36.2
- How populations interact determines the structure and characteristics of a community. 36.3
- Biotic and abiotic changes in a community alter the community structure. 36.4
- In an ecosystem, the flow of energy moves in one direction. 37.1–37.2
- Nutrients are recycled in ecosystems. 37.3
- Human use of essential natural resources can affect the web of life. 38.1
- Land, water, and air are invaluable natural resources. 38.2–38.4
- Humans can affect the future of the biosphere in a positive way. 38.5

Labs and Activities

LAB ZONE Investigate It!

LAB ZONE Do It!

LAB ZONE Discover It!

LAB ZONE Think About It!

Features

EVERYDAY BIOLOGY

IN THE COMMUNITY

SCIENCE, TECHNOLOGY, AND SOCIETY

Environmental Awareness

Issues in Biology

Frontiers in Biology

CRITIC'S CORNER

SPOTLIGHT ON CAREERS

bioSURF

Internet references are included in Chapter Openers, in some Do It! and Think About It! activities, in the Community features, and Spotlight on Careers features.

Discover The Web of Life

You are about to explore the amazing and wondrous web of life. Your textbook will serve as a valuable tool for your journey through the world of living things. Use the next few pages to become familiar with the organization and features of this textbook. Then begin your travels and enjoy biology!

Hit or Myth?

The amazing stories of **Hit or Myth**—sometimes fact and sometimes fiction—reflect the relevance of biology to today's world.

bioSURF

Connect the *Web of Life* to the World Wide Web using the **bioSURF** internet site.

Chapter Opener

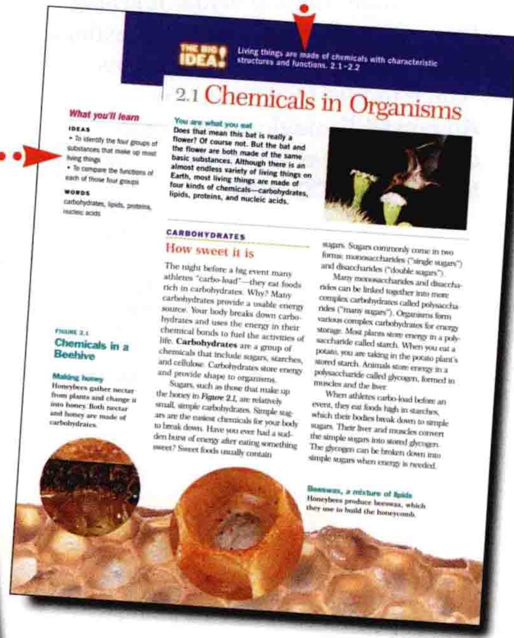
We introduce you to the chapter with a story that puts the content in context. Use the **LAB ZONE Discover It!** activity to begin your exploration of the chapter material. Practice expressing your knowledge, ideas, and experiences as you **WRITE ABOUT IT!**

Super Read This logo refers to additional **Super Read** activities that can be used to practice reading skills.

Identify and Connect

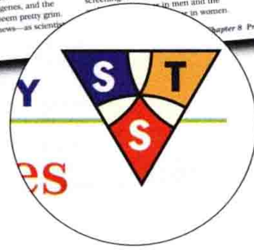
The Big Idea

There is much to learn in every chapter of this textbook. **THE BIG IDEA!** will help you identify and connect major biology concepts.



What you'll learn

The **objectives** describe what you should be able to do after you have read the section. New **key terms** are listed at the beginning and shown in bold type so that you can recognize them easily. Each key term is accompanied by a definition.



Everyday Biology and In the Community

Recognize that biology is everywhere by doing an activity in **In the Community** and by reading the often surprising and always interesting information in **Everyday Biology**.

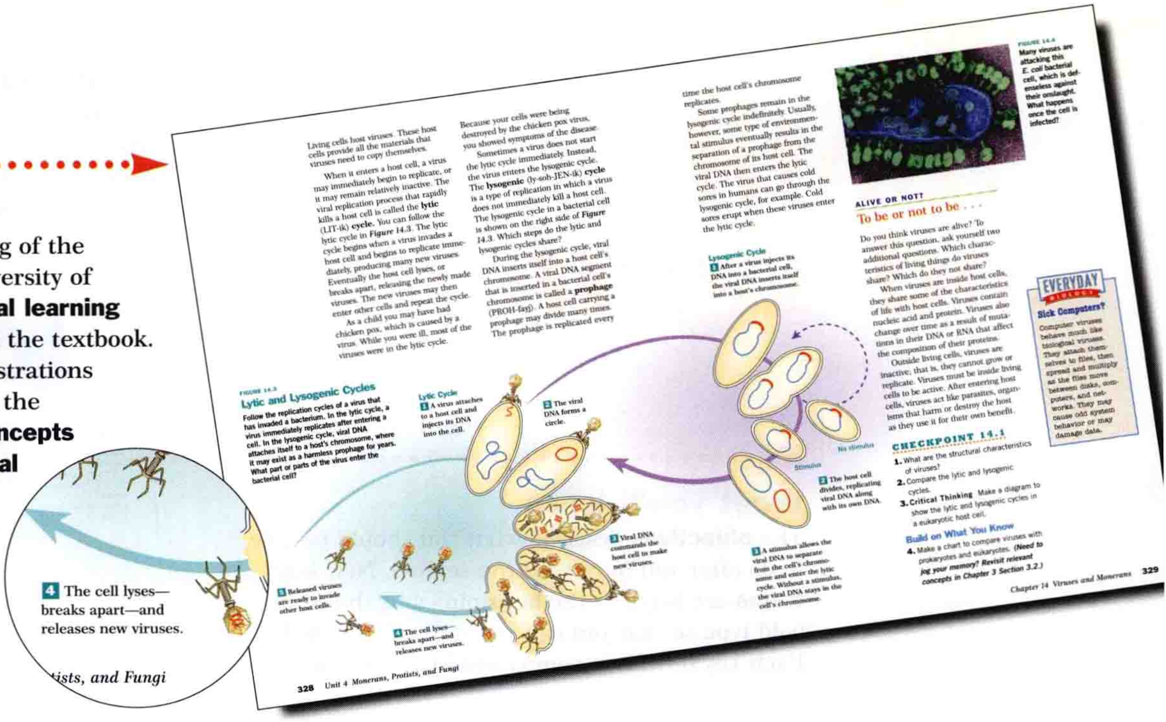
Science, Technology, and Society

Information about the role of biology in your life and the lives of others is identified and categorized as **Environmental Awareness**, **Issues in Biology**, and **Frontiers in Biology**.

Interact and Explore

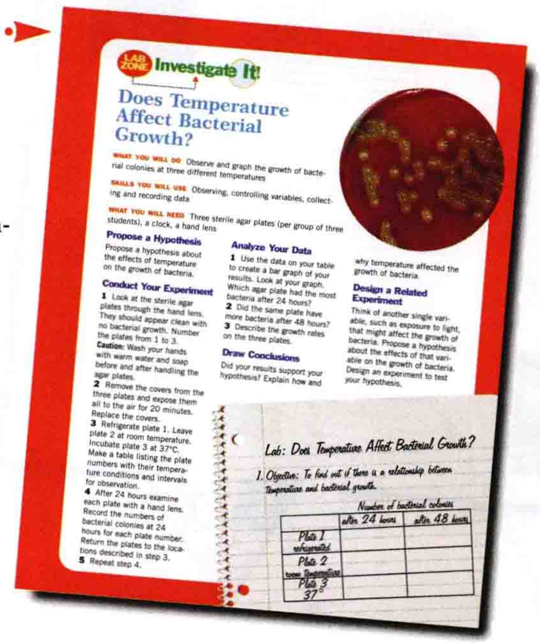
Visual Learning

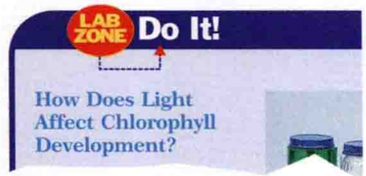
Develop an understanding of the processes, cycles, and diversity of life by analyzing the **visual learning** figures found throughout the textbook. You can even see the illustrations "come to life" by viewing the **Animated Biological Concepts** and **Interactive Biological Simulations CD-ROM.**



Lab Zone Activities

LAB ZONE Investigate It! activities give you an opportunity to experiment in much the same way a biologist does: You will use a variety of skills to hypothesize, experiment, observe, analyze, conclude, and apply your conclusions to other situations.

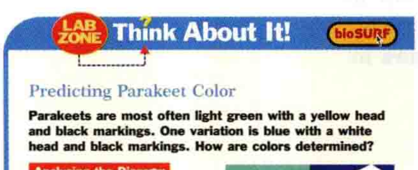




LAB ZONE Do It! activities provide quick and effective hands-on applications of science concepts and skills.

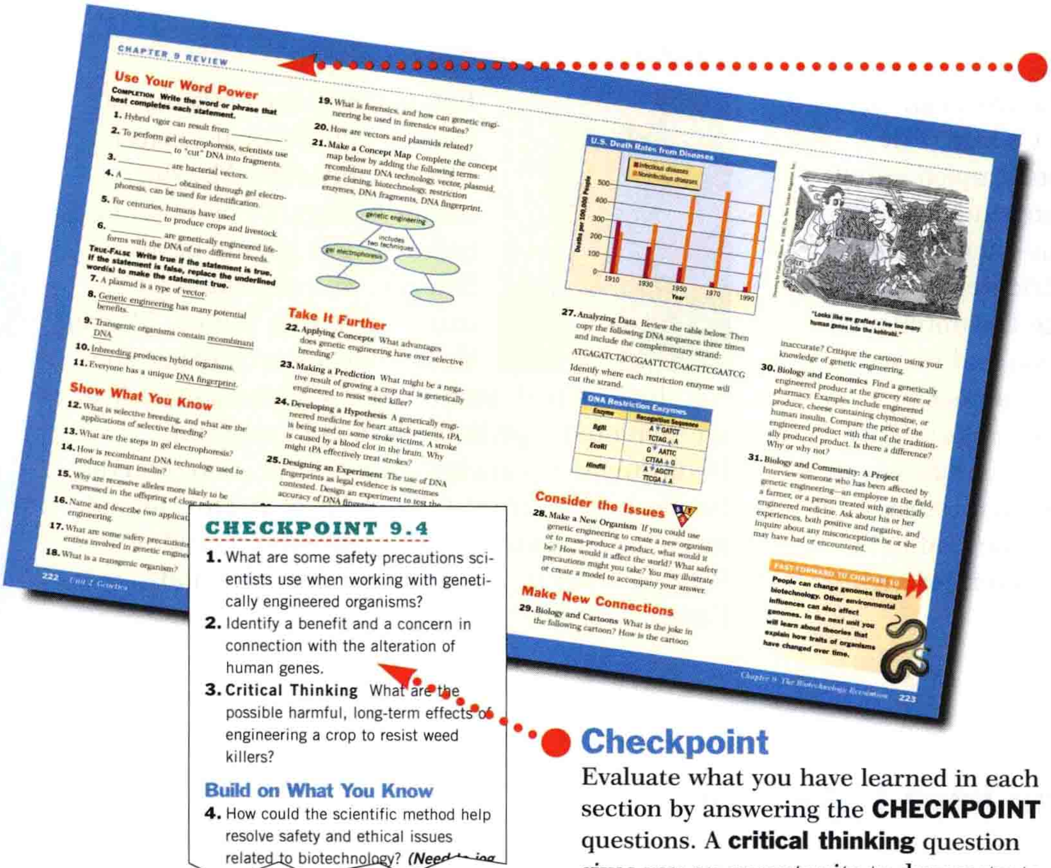
LAB ZONE Discover It! activities provide opportunities to explore ideas and discover characteristics of life—before you read about them.

bioSURF In each chapter, there are references for bioSURF in the **Think About It!** and **Do It!** activities. When you see this logo, go to the **bioSURF** internet site to find additional related activities.



LAB ZONE Think About It! activities provide practice in analyzing and applying concepts.

Review and Extend



Chapter Review

Test your knowledge of the **words** and **ideas** presented in the chapter by answering questions. Challenge your understanding by answering the **critical thinking** questions in **Take It Further.** Use the questions in **Consider the Issues** and **Make New Connections** to extend the Chapter content.

Checkpoint

Evaluate what you have learned in each section by answering the **CHECKPOINT** questions. A **critical thinking** question gives you an opportunity to demonstrate your understanding. And the **Build on What You Know** question connects concepts in different chapters.

Unit Review

Integrate all the concepts you have learned throughout each unit by answering the questions and doing the activities in the **Unit Review**. Read a student's review of a book, film, or CD-ROM in **The Critic's Corner**. And through **Spotlight on Careers**, meet people whose lives exemplify biology in action.

The Authors . . .

Eric Strauss

In the years he has been teaching at Boston College, Eric Strauss has quadrupled enrollment in an introductory biology course for non-science majors. In addition, Eric helped start the Boston College Environmental Studies program and serves as the program director. His dynamic approach to teaching biology extends beyond the college classroom. High school students, college undergraduates, and graduate students conduct original research on animal behavior and ecology at a Cape Cod field research station run by Eric and his former high school teacher.

Marylin Lisowski

Before becoming professor of science education at Eastern Illinois University, Marylin taught Biology, Environmental Science, and Middle Level Science. She also directed a marine research station. Marylin shares her research experience with high-school teachers and students as she leads international expeditions and field programs. Dedicated to improving science education, Marylin has been the recipient of dozens of awards, including Ohio Science Teacher of the Year, Florida Honor Science Teacher, and Illinois Environmental Educator of the Year.

and others who have helped us

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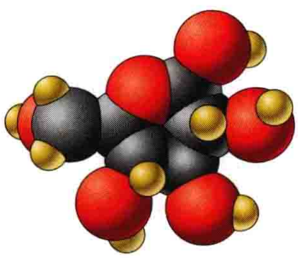

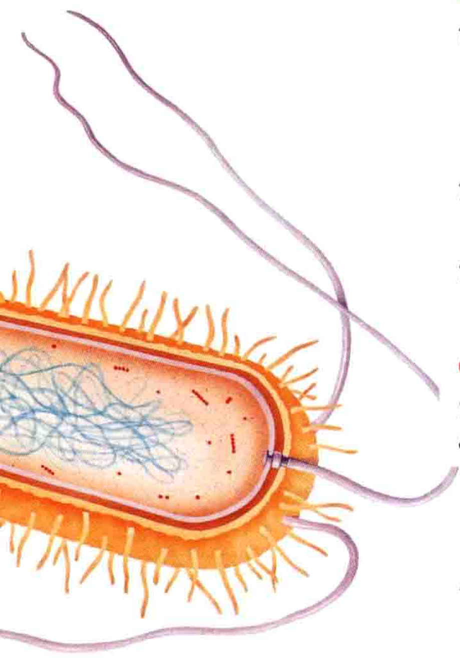

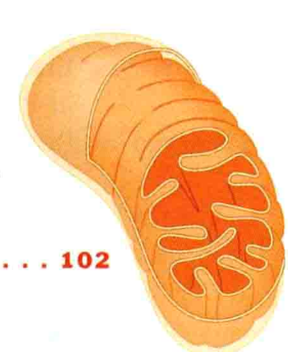

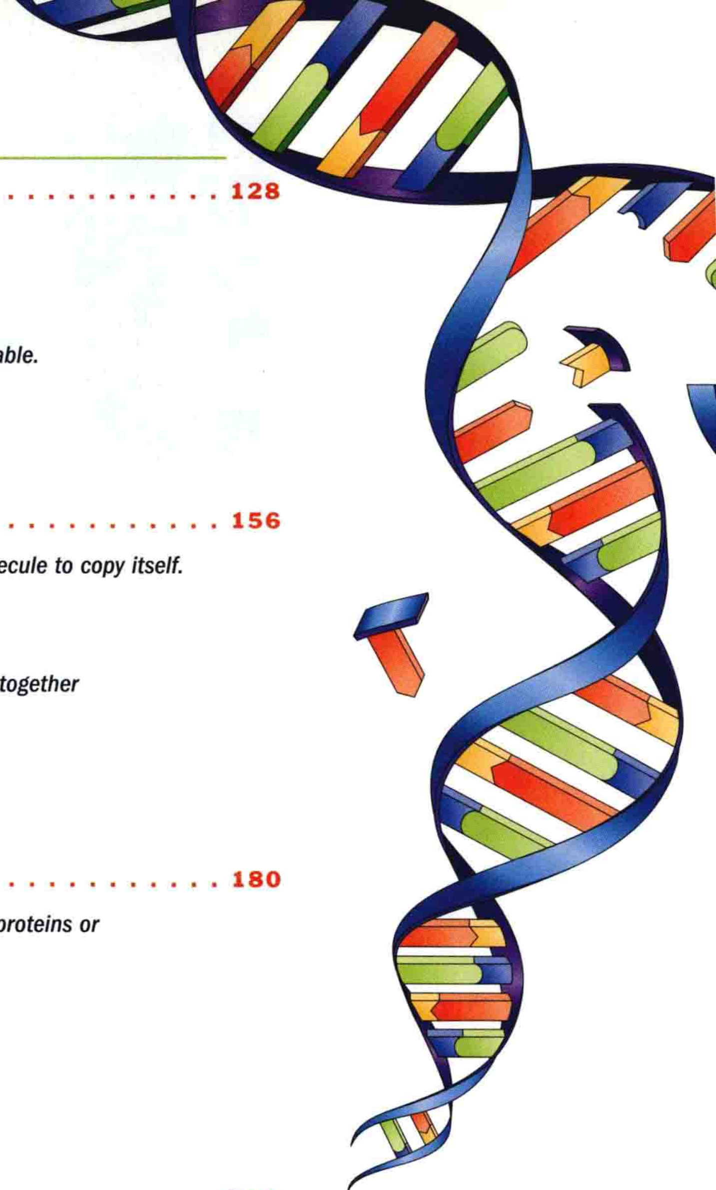

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