

Preface

When I write *Biology* I always feel that I am speaking directly to you, the reader. This occurs, no doubt, because I taught biology before I began to write about it. During those years, I began to develop techniques for making science-shy students successful in their study of biology. The first edition of *Biology* had a learning system that has continued to improve through feedback from both students and instructors. The end result is the seventh edition you hold in your hands. The major topics in *Biology* are now numbered. This allows instructors to assign just certain portions of the chapter and permits study in terms of the concepts listed in the chapter outline. With the advent of the computer it became possible for me to page the text so that each illustration is on the same or facing page as the reference.

Most illustrations in this edition are new or revised to improve their student appeal and educational design. Each type of molecule (fat, protein, nucleic acids) is colored the same, not just in the chemistry chapters but throughout the book. Each type organelle is colored the same in the cell chapter and also in all chapters. The addition of icons relates the part to the whole and the addition of micrographs relates art to an actual structure. Icons occur in the cell, ecology, diversity, and systems chapters. A cell icon shows the usual location of organelles. A cellular respiration icon depicts the connections between various pathways. Phylogenetic tree icons remind students of the evolutionary relationship among groups of organisms.

The emphasis on the scientific process has been strengthened in this edition of *Biology*. The first chapter has an improved description of the scientific process using a more appealing experiment from literature. The end matter of each chapter now contains *Thinking Scientifically* questions and these give students an opportunity to participate in the scientific process and learn to think critically. The *Science Focus* readings are more varied this edition. Some of these are written by contemporary biologists who tell how they go about doing their research and how these findings can be applied to human beings.

A *Bioethical Issue* section has been added to the end of most chapters. These issues pertain to a wide range of topics that require thoughtful consideration by society at this

time. The issues end with appropriate questions to help students center their thoughts and arrive at an opinion. The myriad of topics considered include genetic disease testing, human cloning, AIDS vaccine trials, animal rights, responsibility for one's health, and fetal research.

New Chapters and Sections

Biology is an introductory text that covers the concepts and principles of biology from the structure and function of the cell to the organization of the biosphere. It draws upon the entire world of living things to bring out an evolutionary theme that is introduced from the start. The concept of evolution is necessary to understanding the unity and diversity of life and serves as a background for the study of ecological principles and modern ecological problems.

Every chapter of *Biology* has been revised and skillfully updated so that this edition has not grown in page length. These chapters are new:

Chapter 9, Cellular Reproduction and the Cell Cycle, has been reorganized and now ends with a discussion of the relationship between the cell cycle and cancer.

Chapter 27, Conservation Biology, is a new chapter which discusses the current biodiversity crisis including why we should care, the root causes, and how to preserve species and prevent extinctions.

Chapter 30, The Protists, was thoroughly updated to better reflect modern concepts regarding protist diversity.

Chapter 37, Nutrition and Transport in Plants, now begins with a section that includes a discussion of soil formation and its nutritional functions. In this chapter, new figures support an improved discussion of xylem and phloem transport.

Chapter 46, Neurons and Nervous Systems, has been reorganized and rewritten for better flow. The more thorough discussion of the central nervous system includes a new section on learning and memory.

Chapter 49, Hormones and Endocrine Systems, better emphasizes the role of hormones in homeostasis and the effects of imbalance on the human phenotype.

A more complete list of updates for the seventh edition is available on the *Biology* website.

Readings

The readings are organized into four types. The *Science Focus* readings are often written by contemporary scientists who tell us about their particular type of research and how they became interested in this field of biology. The *Health Focus* readings usually give practical information concerning some particular topic of interest, such as proper nutrition and how to prevent cancer. The *Ecology Focus* readings draw attention to some particular environmental problem such as the need to preserve tropical rain forests and the relationship between ozone holes and skin cancer. The *Closer Look* readings are designed to expand, in an interesting way, on the core information presented in each chapter.

Science Focus

- Microscopy of Today* p. 58
- Fragile X Syndrome* p. 206
- Aspects of DNA Replication* p. 228
- Barbara McClintock and the Discovery of Jumping Genes* p. 257
- Alfred Russel Wallace* p. 289
- The Pace of Evolution* p. 294
- Origin and Adaptive Radiation of the Hawaiian Silversword Alliance* p. 314
- Real Dinosaurs, Stand Up!* p. 332
- Origin of the Genus Homo* p. 350
- Biological Rhythms* p. 369
- The Winter Moth: A Case Study* p. 388
- Distribution of Hard Clams in the Great South Bay* p. 392
- Tree Rings Tell a Story* p. 651
- Competition for Resources and Biodiversity* p. 677
- Husband and Wife Team Explores Signal Transduction in Plants* p. 691
- Arabidopsis thaliana, the Valuable Weed* p. 716
- William Harvey and Circulation of the Blood* p. 746
- Susumu Tonegawa and Antibody Diversity* p. 767
- Control of Digestive Juices* p. 790
- Isolation of Insulin* p. 895
- Research with a Cellular Slime Mold Fruiting Body* p. 927

Ecology Focus

- Tropical Rain Forests: Can We Live Without Them?* p. 7
- The Harm Done by Acid Deposition* p. 29
- Ecosystems and the Second Law of Thermodynamics* p. 99
- Interactions and Coevolution* p. 411
- El Niño—Southern Oscillation* p. 461
- The First Forests* p. 563
- Paper Comes from Plants* p. 657
- Plants: Could We Do Without Them?* p. 660

Health Focus

- Nutrition Labels* p. 43
- Exercise: A Test of Homeostatic Control* p. 138
- Genetic Counseling* p. 212
- Organs for Transplant* p. 271
- Stratospheric Ozone Depletion Threatens the Biosphere* p. 436
- Treatment for Viral and Bacterial Infections* p. 521
- Deadly Fungi* p. 552
- Skin Cancer on the Rise* p. 733
- Prevention of Cardiovascular Disease* p. 750
- AIDS* p. 770
- Five Drugs of Abuse* p. 842
- Protecting Vision and Hearing* p. 855
- You Can Avoid Osteoporosis* p. 872
- Sexually Transmitted Diseases* p. 914

A Closer Look

- Life Cycles Among the Algae* p. 532
- Comparing Plant Life Cycles* p. 571
- Presence of a Coelom* p. 592
- Venomous Snakes Are Few* p. 631
- The Concept of Water Potential* p. 673
- Plants and Their Pollinators* p. 704