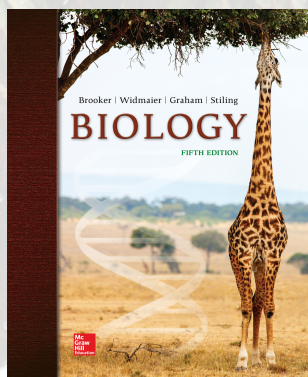


New Features You'll See in *Biology*, 5e



Title: Biology, 5e

Authors: Robert Brooker,
Eric Widmaier, Linda
Graham, and Peter Stiling

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New to This Edition —

- 1 Chapter 1. An Introduction to Biology.** Chapter 1 provides a description of the Core Concepts (see Figure 1.4) and the Core Skills (see Section 1.6) that are advocated by *Vision and Change*.

Chemistry Unit —

- 2 Chapter 2. The Chemical Basis of Life I: Atoms, Molecules, and Water.** The topics of pH and buffers have been placed in their own section (see Section 2.4).

Cell Unit —

- 3 Chapter 4. Evolutionary Origin of Cells and Their General Features.** This chapter now begins with a discussion of the evolutionary origin of cells (see Section 4.1). It also discusses a new topic, droplet organelles, which are organelles that are not surrounded by a membrane (see Section 4.3).

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4 Chapter 6. An Introduction to Energy, Enzymes, and Metabolism. For the topic of how cells use ATP as a source of energy, a revised subsection compares the Core Concept: Information to the Core Concept: Energy and Matter.

5 Chapter 7. Cellular Respiration and Fermentation. A Modeling Challenge asks students to predict the effects of a mutation on the function of ATP synthase (see Figure 7.12).

6 Chapter 10. Multicellularity. Four figures have been revised to better depict the relative locations of cell junctions between animal cells.

Genetics Unit —

7 Chapter 11. Nucleic Acid Structure, DNA Replication, and Chromosome Structure. Figure 11.8b has a Modeling Challenge that asks students to predict how the methylation of a base would affect the ability of that base to hydrogen bond with a base in the opposite strand.

8 Chapter 13. NEW! Gene Expression at the Molecular Level II: Non-coding RNAs. This new chapter begins with an overview of the general properties of non-coding RNAs and then describes specific examples in which non-coding RNAs are involved with chromatin structure, transcription, translation, protein sorting, and genome defense.

9 Chapter 16. The Eukaryotic Cell Cycle, Mitosis, and Meiosis. The Core Concept: Evolution is highlighted in a subsection that explains how mitosis in eukaryotes evolved from binary fission in prokaryotic cells (see Figure 16.10).

10 Chapter 17. Mendelian Patterns of Inheritance. The organization of this chapter has been revised to contain the patterns of inheritance that obey Mendel's laws.

11 Chapter 18. Epigenetics, Linkage, and Extranuclear Inheritance. This chapter now covers inheritance patterns that violate Mendel's laws. The topic of epigenetics has been expanded from one section in the previous edition to four sections in the 5th edition (see Sections 18.1 through 18.4).

12 Chapter 19. Genetics of Viruses and Bacteria. Discussion of the Zika virus has been added to this chapter.

13 Chapter 21. Genetic Technologies and Genomics. The use of CRISPR-Cas technology to alter genes is now discussed (see Figure 21.10).

Evolution Unit —

14 Chapter 22. An Introduction to Evolution. This chapter has been moved so that it is the first chapter in this unit on evolution.

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- 15 **Chapter 23. Population Genetics.** After learning about the Hardy-Weinberg equation, students are presented with a Modeling Challenge that asks them to propose a mathematical model that extends the Hardy-Weinberg equation to a gene that exists in three alleles (see Figure 23.2).
- 16 **Chapter 25. Taxonomy and Systematics.** The topic of taxonomy is related to the Core Concept: Evolution through an explanation of how taxonomy is based on the evolutionary relationships among different species.
- 17 **Chapter 26. History of Life on Earth and Human Evolution.** The topic of human evolution has been moved from the unit on diversity to this unit. The expanded version of this topic describes recent examples of human evolution and discusses the amount of genetic variation between different human populations (see Section 26.3).

Diversity Unit —

- 18 **Chapter 27. Archaea and Bacteria.** This chapter has been reorganized to provide essential background for new Chapter 30 (an exploration of microbiomes). The Core Skill: Connections is illustrated by linking electromagnetic sensing in bacteria with that in certain animals.
- 19 **Chapter 29. Fungi.** An overview of fungal phylogeny has been updated

to reflect new research discoveries. Coverage of plant root-fungal associations (mycorrhizae) and lichens has been moved to new Chapter 30.

- 20 **Chapter 30. NEW! Microbiomes: Microbial Systems On and Around Us.** This new chapter integrates information about microbial diversity (Chapters 27 through 29) with material on genetic technologies that is introduced in Chapter 21 to explain the evolutionary, medical, agricultural, and environmental importance of microbial associations.
- 21 **Chapter 31. Plants and the Conquest of Land.** The diagrammatic overview of plant phylogeny has been updated to reveal challenges in understanding the pattern of plant evolution.
- 22 **Chapter 33. An Introduction to Animal Diversity.** Figure 33.3, animal phylogeny, has been redrawn to reflect the idea that ctenophores, rather than sponges, are now considered to be the earliest diverging animals. Section 33.2 on animal classification has been largely revised.
- 23 **Chapter 34. The Invertebrates.** Following the new themes introduced in Chapter 33, this chapter has been reorganized to discuss ctenophores as the earlier evolving animals, followed by sponges, cnidria, jellyfish, and other radially symmetrical animals.

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Flowering Plants Unit —

- 24 **Chapter 36. An Introduction to Flowering Plant Form and Function.** A new chapter opener links the economic importance of plants, represented by cotton, to the significance of plant structure-function relationships.
- 25 **Chapter 37. Flowering Plants I: Behavior.** A Modeling Challenge links plant responses to conditions on Earth to those experienced in space.
- 26 **Chapter 38. Flowering Plants II: Nutrition.** In a Modeling Challenge related to plant-microbe interaction process, students infer how specific mutations might affect an important nutritional feature.
- 27 **Chapter 40. Flowering Plants IV: Reproduction.** This chapter explores intriguing parallels between the reproductive processes of animals and those of plants.

Animals Unit —

- 28 **Chapter 41. Animal Bodies and Homeostasis.** A section entitled “Homeostatic Control of Internal Fluids” (Section 41.4) now follows the section “General Principles of Homeostasis,” providing students with an understanding of body fluid compartments, osmolarity, and how animal bodies exchange ions and water with their environments. These concepts are important to students’ understanding of subsequent chapters.

- 29 **Chapter 42. Neuroscience I: Cells of the Nervous System.** The Core Skill: Science and Society is featured numerous times in the unit on animals, including in Figure 42.18 which describes the use of magnetic resonance imaging in modern medicine.
- 30 **Chapter 43. Neuroscience II: Evolution, Structure, and Function of the Nervous System.** The Core Skill: Connections is also featured throughout the unit on animals, including in Figure 43.1 in which students are asked to identify the defining features of animals by referring to Chapter 33.
- 31 **Chapter 44. Neuroscience III: Sensory Systems.** New research demonstrating a correlation between the types of locomotion of vertebrates and the relative sizes of their semicircular canals is described.
- 32 **Chapter 46. Nutrition and Animal Digestive Systems.** A Modeling Challenge was added in which students are tasked with creating models of hypothetical alimentary canals of two species with different diets, eating patterns, and teeth.
- 33 **Chapter 47. Control of Energy Balance, Metabolic Rate, and Body Temperature.** The meaning of body mass index and its usefulness and limitations are more fully elucidated, and data on obesity statistics in the United States have been updated to reflect current trends.

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- 34 Chapter 48. Circulatory and Respiratory Systems.** These topics were formerly addressed in two chapters but are now integrated into a single chapter that streamlines the presentation and emphasizes important connections between the two systems.
- 35 Chapter 49. Excretory Systems.** The chapter has been more narrowly focused on excretory systems by moving the material on osmoregulation and body fluids earlier in the unit, to Chapter 41.
- 36 Chapter 51. Animal Reproduction and Development.** Formerly two chapters, this material is now covered in one chapter, which eliminated redundancy in coverage. For example, the topic of fertilization (Section 51.2) is now covered in its entirety in the same section as the topic of gametogenesis, rather than being split between two chapters.
- 37 Chapter 52. Immune Systems.** Exciting new information has been added that describes the evolution of toll-like receptors and the presence of a TLR-domain in bacterial genes associated with immune defenses.
- 38 Chapter 53. NEW! Integrated Responses of Animal Organ Systems to a Challenge to Homeostasis.** This new chapter integrates material from virtually the entire unit on animals, using a classic challenge to homeostasis as an example. It includes a compelling case study of a young athlete that begins and concludes the chapter.

Ecology Unit —

- 39 Chapter 54. An Introduction to Ecology and Biomes.** The section on aquatic biomes as been expanded with a new figure and explanation of the annual cycle of temperate lakes, as well as new information on tide formation and waves.
- 40 Chapter 57. Species Interactions.** This chapter has been reduced in length by the deletion of four figures and streamlined for easier understanding.
- 41 Chapter 58. Communities and Ecosystems: Ecological Organization at Large Scales.** This chapter has been reorganized to include both community ecology and ecosystems ecology.
- 42 Chapter 59. NEW! The Age of Humans.** This new chapter synthesizes information concerning the effects of humans on the natural environment. It contains discussions of human population growth (previously covered in Chapter 56), the effect of global warming on climate change (previously covered in Chapter 54), and human effects on biogeochemical cycles and biomagnification (previously covered in Chapter 59), and new information on habitat destruction, overexploitation, and invasive species.
- 43 Chapter 60. Biodiversity and Conservation Biology.** The coverage of the value of biodiversity to human welfare, detailed in Section 60.3 has been updated and expanded.