



# New Features You'll See in *Biology*, 12e



Title: Biology, 12e

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ISBN: 1260169618/ 9781260169614 Part I: The Molecular Basis of Life —

- **Chapter 1**—New section added that elaborates on the core concepts and prepares the student for the use of the Connecting the Concepts feature.
- 2 Chapter 2—Edited for clarity, especially regarding atomic structure and the periodic table.
- 3 Chapter 3—Edited for clarity, especially regarding the structure of nucleotides, the role of ATP in cells, and secondary structure in proteins.

#### Part II: Biology of the Cell -

4 Chapter 4—The section on the endomembrane system has been completely rewritten. This includes new material on lipid droplets. Material on adhesive junctions has been rewritten to give a more evolutionary perspective.



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Chapter 5—New material on proteins that can alter membrane structure has been added. This provides information on how the different cellular membranes can have different structures. Figure on Na+/ K+ pump was redone to address errors in mechanism. Material on diffusion and facilitated diffusion was rewritten.

**Chapter 6**—The material on free energy and chemical reactions was completely rewritten, including redoing the figures. These changes significantly improve clarity and accuracy. Material on the role of ATP in cells was rewritten for clarity. Discussions of energy throughout the chapter were rewritten to improve clarity and accuracy of chemical concepts.

**Chapter 7**—The nature and action of cofactors in redox reactions and the role of ATP in cells were improved.

**Chapter 8**—The nature and structure of photosystems was rewritten for clarity and accuracy.

**Chapter 10**—The section on chromosome structure was completely rewritten to reflect new data and views of this important topic. The material on cancer was expanded and updated, producing a new section "Genetics of Cancer". This contains significant new information and pulls together material on cancer from this chapter and others. Part III: Genetic and Molecular Biology —

10 Chapter 11—Edited for clarity and readability for the student, especially regarding the events of meiosis I.

11 Chapter 12—The material on extensions to Mendel was rewritten for clarity and accuracy.

12 Chapter 13—The material on analyzing and mapping genetic variation in humans was updated and rewritten. The section on Human genetic disorders was completely rewritten to reflect new information, and to make more accessible for the student. A new figure on imprinting in mice was added to clarify this important and difficult concept.

> **Chapter 14**—The material on eukaryotic DNA replication was rewritten and updated. Particular emphasis was placed on the evolution of DNA replication. The section on DNA repair was rewritten and updated and information on mismatch repair was added.

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**Chapter 15**—Content on process of transcription was rewritten to reflect new data on elongation machinery. New data on alternative splicing was included, along with information on the integration of RNA modification during transcription. The section on the nature of mutations was rewritten and includes latest data on human mutation rates.



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**Chapter 16**—Overview of control of eukaryotic transcription was rewritten to reflect modern views. Continued updating of the material on chromatin structure and the control of gene expression. Material on control of gene expression at the level of transcription was updated.

**Chapter 18**—New section added on the 1000 Genomes project to illustrate how fast information on genetic diversity is accumulating. The material on the wheat genome was updated, which provides both new information and approaches to complex genomes.

**Chapter 19**—Added a new section on the evolution of pattern formation using new material and material from chapter 25. This consolidates material on this subject, and provides a clear vision for the student.

#### Part IV: Evolution —

Chapter 20—The topic of sexual selection was moved into this chapter from the Behavioral Biology chapter. Some material on Lamarck was eliminated, natural selection was explicitly defined, information on snp variation in humans and other animals was added. New examples of pleiotropy were added, and new data on how the speed of racehorses has not changed through time was added along with a revised figure. A new section was added on the role of sensory exploitation as a mechanism for traits to evolve under sexual selection.

19 Chapter 21—A number of points were updated and an example of vestigial traits involving the toenails of manatees was added.

- 20 Chapter 23—The figure on the evolution of feathers in dinosaurs was updated to incorporate new paleontological findings. Discussion of HIV evolution and other points were also revised in light of new science.
- 21 Chapter 24—Updated material on comparative genomics of vertebrates. New data on Neanderthal and Denisovan genomes have been added. Presentation of genes unique to humans has been updated and edited for clarity.
  - Chapter 25—Evolution of Development
    was eliminated and material moved
    to other chapters, placing the topic
    of evolution of development into the
    appropriate context. This reflects the view
    that evolution and development are now
    so clearly intertwined with all of biology
    that setting off the material in a separate
    chapter no longer made sense.

#### Part V: Diversity of Life on Earth —

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**Chapter 26**—This chapter has been largely rewritten and now includes material on viral diversity, classification, metagenomics, and taxonomy. The latter



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part of the chapter now focuses on viruses of medical importance to promote student engagement and interest.

**Chapter 27**—This chapter has been largely rewritten. In addition to the traditional discussion of prokaryotic structure and function, and taxonomy, there is new emphasis placed on microbial ecology and medical microbiology with relevant examples.

Chapter 31—The chapter has been rewritten for clarity. The chapter has also been reordered to bring material most relevant to society to the front of the chapter. The reorganization includes expanding and moving the fungal ecology up earlier in the chapter, as well as expanding and moving the fungal parasites and pathogens up earlier in the chapter. The chapter now ends with the coverage of fungal classification.

**Chapter 32**—Aspects of taxonomy and natural history were updated in line with new findings.

**Chapter 33**—The presentation of taxonomic relationships was revised as a result of new findings based primarily on molecular phylogenetic studies, specifically with regards to Platyhelminthes, lophotrochozoans (formerly Spiralia) and a few others. New natural history information was included. 28

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**Chapter 34**—The discussion of the evolutionary history of vertebrates was substantially revised, especially the sections on lobe-finned fishes/early tetrapods/early amniotes (emphasizing now those terms, rather than referring to all of the early diverging lineages as amphibians or reptiles). Also, the terminology about human evolution was revised to acknowledge the new meaning of "hominin" and "hominid." A new paragraph on *Homo naledi* was added to discuss recent discoveries.

#### Part VI: Plant Form and Function —

There have been no major changes in the plant form and function chapters. There has been overall editing for readability and responding to recommendations by reviewers and users of the 11th edition.

#### Part VII: Animal Form and Function —

- Charles Welsh of Duquesne University, brought his expertise in animal anatomy and physiology as a Contributor to the Animal Form and Function Part in the 12th edition, placing greater emphasis on evolutionary aspects of animal biology.
- **Chapter 41**—The discussion of the evolution of tissues in invertebrates and vertebrates was expanded, including the addition of a phylogeny and an image of cnidarian tissues.



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Chapter 42—The graph of an action potential was revised and improved. Discussions and images of glial cells and cranial nerves were added.

**Chapter 43**—The chapter was revised and reorganized with regards to the general senses. The evolution of eyes material found in chapter 25 in the 11th edition was moved to this chapter with a revised phylogeny added. The illustration depicting the evolution of the inner ear has been revised to make it more clear, concise, and informative.

**Chapter 44**—Section 44.2 was formerly organized as action of lipophilic vs. hydrophilic hormones. This has now been reorganized to be a complete overview of how hormones work. This organization should improve clarity for students.

**Chapter 45**—The chapter was extensively revised. This included the addition of images for the human skeleton, ossification, osteoporosis, invertebrate muscle, comparative anatomy of flying vertebrates, and a new phylogeny that reveals the evolution of various vertebrate skeletal characters.

**Chapter 46**—The structure of the latter half this chapter was completely reorganized for better conceptual flow.

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**Chapter 47**—The images for the bicarbonate buffering system and the mechanics of breathing have been

revised. The discussion of lung volumes and capacities was expanded with the addition of an accompanying figure. A phylogeny of hemoglobin evolution was added.

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Chapter 48—The chapter was
reorganized and extensively revised.
Invertebrate circulatory systems is now
the first section in the chapter. The
sections on Cardiac Cycle, ECG, Electrical
Conduction, and Cardiac Output have
been reorganized and revised. The
discussions of blood vessels and blood
pressure are now in the same section. The
phylogeny of the evolution of vertebrate
hearts has been revised.

- **39** Chapter 50—Material on innate immunity was updated and rewritten for clarity. The coverage on effects of AIDS was also update to reflect new information.
- 40 **Chapter 51**—A discussion of some select invertebrate reproductive strategies has been added, with accompanying images.
  - **Chapter 52**—A section detailing the classic experiments regarding pattern formation in chick limb buds has been added. This includes a discussion of AER, ZPA, FGF, *Hox* genes, and Shh. The material on gene regulation from chapter 25 in the 11th edition has also been added.



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#### Part VIII: Ecology and Behavior —

- **Chapter 53**—Stronger emphasis on phylogenetic and evolutionary perspectives was added throughout the chapter, including a new section on evolution and behavior.
- **Chapter 54**—Human population trends and other timely data were updated to stay current. An evolutionary perspective on population adaptation was added to the beginning of the chapter.

**Chapter 55**—An evolutionary perspective was added in several places.

**Chapter 56**—New material on the impact of anthropogenic changes on nutrient cycling was added. An evolutionary perspective to discussion of the speciesarea relationship was incorporated.

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- 46 Chapter 57—Evolution was discussed more thoroughly in the section on microclimate adaptation during adaptive radiation. All of the data on biosphere impacts of humans were updated to stay current.
- 47 Chapter 58—The chapter was substantially revised, including much new discussion of the relevance of evolution to conservation biology, including the role of natural selection, the importance of phylogenetic perspectives, and how speciation can lead to biodiversity hotspots.