

Table of Contents

Chapter 1—Evolution, the Themes of Biology, and Scientific Inquiry	2
Chapter 2—The Chemical Context of Life	14
Chapter 3—Water and Life	28
Chapter 4—Carbon and the Molecular Diversity of Life	42
Chapter 5—The Structure and Function of Large Biological Molecules	57
Chapter 6—A Tour of the Cell	73
Chapter 7—Membrane Structure and Function	87
Chapter 8—An Introduction to Metabolism	104
Chapter 9—Cellular Respiration and Fermentation	122
Chapter 10—Photosynthesis	138
Chapter 11—Cell Communication	156
Chapter 12—The Cell Cycle	171
Chapter 13—Meiosis and Sexual Life Cycles	186
Chapter 14—Mendel and the Gene Idea	201
Chapter 15—The Chromosomal Basis of Inheritance	216
Chapter 16—The Molecular Basis of Inheritance	231
Chapter 17—Gene Expression: From Gene to Protein	246
Chapter 18—Regulation of Gene Expression	262
Chapter 19—Viruses	276
Chapter 20—DNA Tools and Biotechnology	291
Chapter 21—Genomes and Their Evolution	305
Chapter 22—Descent with Modification: A Darwinian View of Life	315
Chapter 23—The Evolution of Populations	331
Chapter 24—The Origin of Species	349
Chapter 25—The History of Life on Earth	367
Chapter 26—Phylogeny and the Tree of Life	382
Chapter 27—Bacteria and Archaea	406
Chapter 28—Protists	427
Chapter 29—Plant Diversity I: How Plants Colonized Land	450
Chapter 30—Plant Diversity II: The Evolution of Seed Plants	469
Chapter 31—Fungi	489
Chapter 32—An Overview of Animal Diversity	513
Chapter 33—An Introduction to Invertebrates	532
Chapter 34—The Origin and Evolution of Vertebrates	556
Chapter 35—Vascular Plant Structure, Growth, and Development	575
Chapter 36—Resource Acquisition and Transport in Vascular Plants	589
Chapter 37—Soil and Plant Nutrition	604
Chapter 38—Angiosperm Reproduction and Biotechnology	615

Chapter 39—Plant Responses to Internal and External Signals	629
Chapter 40—Basic Principles of Animal Form and Function	643
Chapter 41—Animal Nutrition	659
Chapter 42—Circulation and Gas Exchange	674
Chapter 43—The Immune System	689
Chapter 44—Osmoregulation and Excretion	705
Chapter 45—Hormones and the Endocrine System	719
Chapter 46—Animal Reproduction	734
Chapter 47—Animal Development	750
Chapter 48—Neurons, Synapses, and Signaling	765
Chapter 49—Nervous Systems	780
Chapter 50—Sensory and Motor Mechanisms	794
Chapter 51—Animal Behavior	809
Chapter 52—An Introduction to Ecology and the Biosphere	827
Chapter 53—Population Ecology	845
Chapter 54—Community Ecology	869
Chapter 55—Ecosystems and Restoration Ecology	890
Chapter 56—Conservation Biology and Global Change	909

Chapter 1—Evolution, the Themes of Biology, and Scientific Inquiry

MULTIPLE CHOICE

- 1) Cells are_____.
- A) only found in pairs, because single cells cannot exist independently
 - B) limited in size to 200 and 500 micrometers in diameter
 - C) characteristic of eukaryotic but not prokaryotic organisms
 - D) characteristic of prokaryotic and eukaryotic organisms

ANS: D PTS: 1 TOP: Section 1.1
MSC: Knowledge/Comprehension

- 2) In comparison to eukaryotes, prokaryotes_____.
- A) are more structurally complex
 - B) are larger
 - C) are smaller
 - D) do not have membranes

ANS: C PTS: 1 TOP: Section 1.1
MSC: Knowledge/Comprehension

- 3) Which of the following types of cells utilize deoxyribonucleic acid (DNA) as their genetic material but do not have their DNA encased within a nuclear envelope?
- A) animal
 - B) plant
 - C) archaean
 - D) fungi

ANS: C PTS: 1 TOP: Section 1.1
MSC: Application/Analysis

- 4) To understand the chemical basis of inheritance, we must understand the molecular structure of DNA. This is an example of the application of which concept to the study of biology?
- A) evolution
 - B) emergent properties
 - C) reductionism
 - D) feedback regulation

ANS: C PTS: 1 TOP: Section 1.1
MSC: Application/Analysis

- 5) A localized group of organisms that belong to the same species is called a_____.
- A) community
 - B) population
 - C) ecosystem
 - D) family

ANS: B PTS: 1 TOP: Section 1.1
MSC: Knowledge/Comprehension

- 6) Which of the following statements is *true* regarding the complexity of biological systems?
- A) An understanding of the interactions between different components within a living system is an approach towards understanding reductionism.
 - B) Knowing the function of a component of a living system can provide insights into the structure and organization of the living system.
 - C) Understanding the chemical structure of DNA reveals how it directs the functioning of a living cell.
 - D) An ecosystem displays complex properties of the biotic component only.

ANS: B PTS: 1 TOP: Section 1.1
MSC: Application/Analysis

- 7) Which of the following order is correct in terms of the hierarchy of the organization?
- A) Ecosystem → Biosphere → Population → Community → Organism
 - B) Biosphere → Ecosystem → Population → Community → Organism
 - C) Ecosystem → Community → Biosphere → Population → Organism
 - D) Biosphere → Ecosystem → Community → Population → Organism

ANS: D PTS: 1 TOP: Section 1.1
MSC: Application/Analysis

- 8) When your body temperature rises on a hot day, the neural and hormonal mechanisms activate sweating. Evaporation of sweat leads to cooling of the body surface. This is an example of_____.
- A) positive feedback regulation
 - B) negative feedback regulation
 - C) chemical cycling
 - D) emergent properties

ANS: B PTS: 1 TOP: Section 1.1
MSC: Application/Analysis

- 9) Characters are transmitted from parents to offspring. _____are the units of inheritance.
- A) Genes
 - B) Proteins
 - C) RNA
 - D) DNA

ANS: A PTS: 1 TOP: Section 1.1
MSC: Knowledge/Comprehension

- 10) As letters are to English language, _____is/are to genetic information.
- A) proteins
 - B) nucleotides
 - C) DNA double helix
 - D) A and B

ANS: B PTS: 1 TOP: Section 1.1
MSC: Knowledge/Comprehension

- 11) The process by which the information in a gene directs the synthesis of a protein is called _____.
- A) gene expression
 - B) replication
 - C) post translation modification
 - D) cloning

ANS: A PTS: 1 TOP: Section 1.2
MSC: Application/Analysis

- 12) Which of the following statements is true?
- A) mRNA is the only type of RNA found in the living system
 - B) All forms of life employ the same genetic code
 - C) A typical human liver cell has one set of chromosomes
 - D) Organisms interact but do not affect their environment

ANS: B PTS: 1 TOP: Section 1.2
MSC: Knowledge/Comprehension

- 13) Plants convert _____.
- A) chemical energy to mechanical energy.
 - B) sunlight to mechanical energy.
 - C) sunlight to chemical energy.
 - D) mechanical energy to chemical energy.

ANS: C PTS: 1 TOP: Section 1.2
MSC: Knowledge/Comprehension

- 14) Which of these provides evidence of the common ancestry of all life?
- A) near universality of the genetic code
 - B) structure of the nucleus
 - C) structure of cilia
 - D) structure of chloroplasts

ANS: A PTS: 1 TOP: Section 1.2
MSC: Application/Analysis

- 15) Which branch of biology is concerned with the naming and classifying of organisms?
- A) informatics
 - B) taxonomy
 - C) genomics
 - D) evolution

ANS: B PTS: 1 TOP: Section 1.2
MSC: Knowledge/Comprehension

Use the following figure to answer the question.