Chapter 2—Evolution and the Diversity of Life

MULTIPLE CHOICE

1. As a transitional form, *Archaeopteryx* is important because it provides insight into
   a. the evolution of birds into reptiles.
   b. the relationship between dinosaurs and birds.
   c. adaptations for animals moving from an aquatic to a land environment.
   d. all of these

   ANS: B PTS: 1 DIF: Easy REF: Knowledge
   OBJ: Describe several characteristics of the *Archaeopteryx* that support this animal as a transitional form between reptiles (dinosaurs) and birds.
   TOP: 2.1 *Archaeopteryx* and the Evolution of Birds KEY: Evolution

2. All of the following are adaptations associated with *flight* that are first seen in *Archaeopteryx* EXCEPT
   a. feathers.
   b. a wishbone.
   c. backward facing claws for perching.
   d. a toothed beak.

   ANS: D PTS: 1 DIF: Easy REF: Knowledge
   OBJ: Describe several characteristics of the *Archaeopteryx* that support this animal as a transitional form between reptiles (dinosaurs) and birds.
   TOP: 2.1 *Archaeopteryx* and the Evolution of Birds KEY: Adaptations

3. Which of the following is an example of an organism's niche?
   a. a tortoise that lives on the African savannah eating grasses and living in deep burrows
   b. the thick mane of a male lion
   c. the camouflage coloration of zebras as they stand in the shade of acacia trees
   d. a flock of turkey vultures

   ANS: A PTS: 1 DIF: Moderate REF: Application
   OBJ: Describe several characteristics of the *Archaeopteryx* that support this animal as a transitional form between reptiles (dinosaurs) and birds.
   TOP: 2.1 *Archaeopteryx* and the Evolution of Birds
   KEY: Ecological interactions; Niche

4. Which group of organisms played an important role in shaping Earth's atmosphere?
   a. prokaryotes
   b. eukaryotes
   c. animals
   d. cyanobacteria

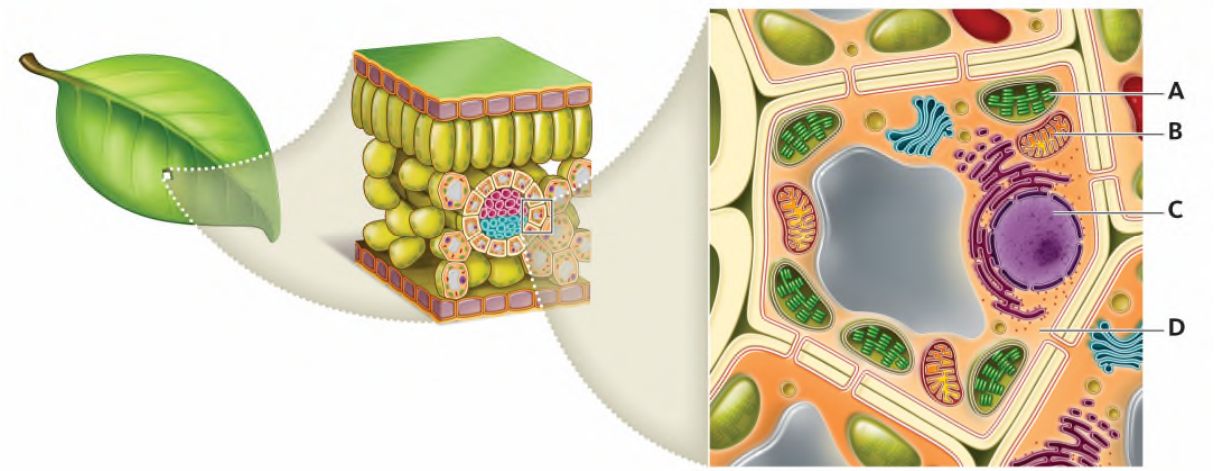
   ANS: D PTS: 1 DIF: Easy REF: Knowledge
   OBJ: Describe why and how the diversity of life is classified.
   TOP: 2.2 The Diversity of Life Is Cataloged and Classified by Evolutionary Relationships
   KEY: Ecological interactions

5. What role did cyanobacteria play in shaping Earth's environment?
   a. They are single-celled organisms that are detritivores.
   b. They produced oxygen, which led to changes in Earth's atmosphere.
   c. They evolved into the first plants that colonized land.
   d. They are the ancestral form of all life on Earth.

   ANS: B PTS: 1 DIF: Easy REF: Comprehension
   OBJ: Describe why and how the diversity of life is classified.
   TOP: 2.2 The Diversity of Life Is Cataloged and Classified by Evolutionary Relationships
   KEY: Ecological interactions

6. As prokaryotes, which structure is found in cyanobacteria?
   a. nucleoid
   b. mitochondrion
   c. nucleus
   d. all of these

   ANS: A PTS: 1 DIF: Easy REF: Analysis
   OBJ: Describe why and how the diversity of life is classified.
   TOP: 2.2 The Diversity of Life Is Cataloged and Classified by Evolutionary Relationships
   KEY: Cell types



7. Which structure originated from cyanobacteria?
   a. A
   b. B
   c. C
   d. D

   ANS: A PTS: 1 DIF: Moderate REF: Application
   OBJ: Describe why and how the diversity of life is classified.
   TOP: 2.2 The Diversity of Life Is Cataloged and Classified by Evolutionary Relationships
   KEY: Cell structure and function NOT: Figure 2.22a

8. Which of the following correctly lists the terms in hierarchical order from the most inclusive to the least inclusive?
   a. kingdom, domain, class, phylum
   b. species, kingdom, order, family
   c. class, order, family, genus
   d. order, phylum, family, species

   ANS: C PTS: 1 DIF: Easy REF: Comprehension
   OBJ: Describe why and how the diversity of life is classified.
   TOP: 2.2 The Diversity of Life Is Cataloged and Classified by Evolutionary Relationships
   KEY: Hierarchy

9. All living organisms
   a. belong to one of three domains.
   b. belong to the same kingdom.
   c. belong to the domain Eukarya.
   d. are composed of the same type of cell..

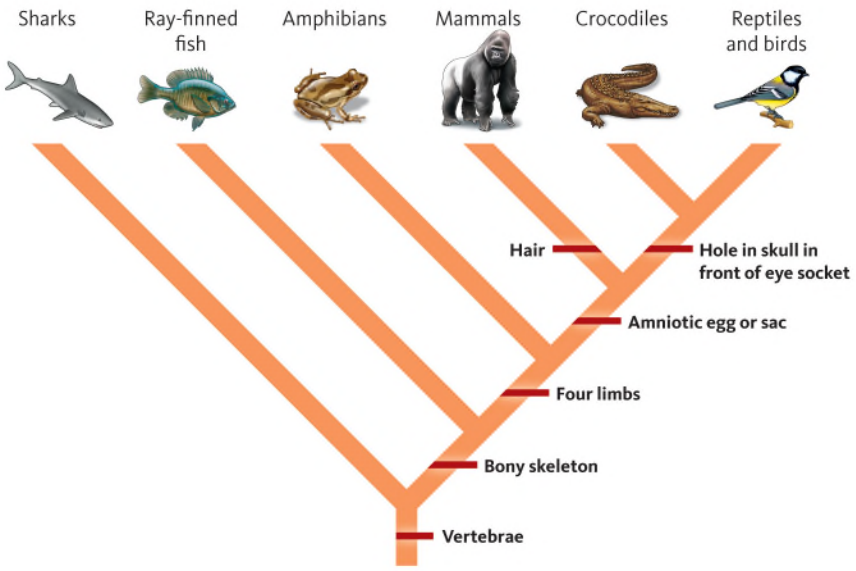
   ANS: A PTS: 1 DIF: Easy REF: Comprehension
   OBJ: Describe why and how the diversity of life is classified.
   TOP: 2.2 The Diversity of Life Is Cataloged and Classified by Evolutionary Relationships
   KEY: Hierarchy

10. Two organisms are very similar both in terms of molecular and physical characteristics. However, there is at least one characteristic that is not shared by these organisms—each organism has at least one evolutionary novelty that is not present in the other organism and thus these organisms do not interbreed. As a result, what is likely the lowest taxonomic classification that is shared by these organisms?
    a. species
    b. genus
    c. family
    d. order

    ANS: B PTS: 1 DIF: Moderate REF: Analysis
    OBJ: Describe why and how the diversity of life is classified.
    TOP: 2.2 The Diversity of Life Is Cataloged and Classified by Evolutionary Relationships
    KEY: Hierarchy

11. Which of the following domains contain prokaryotic cells?
    a. Archaea and Bacteria
    b. Eukarya and Archaea
    c. Bacteria and Eukarya
    d. Archaea, Bacteria, and Eukarya

    ANS: A PTS: 1 DIF: Easy REF: Knowledge
    OBJ: Describe why and how the diversity of life is classified.
    TOP: 2.2 The Diversity of Life Is Cataloged and Classified by Evolutionary Relationships
    KEY: Hierarchy

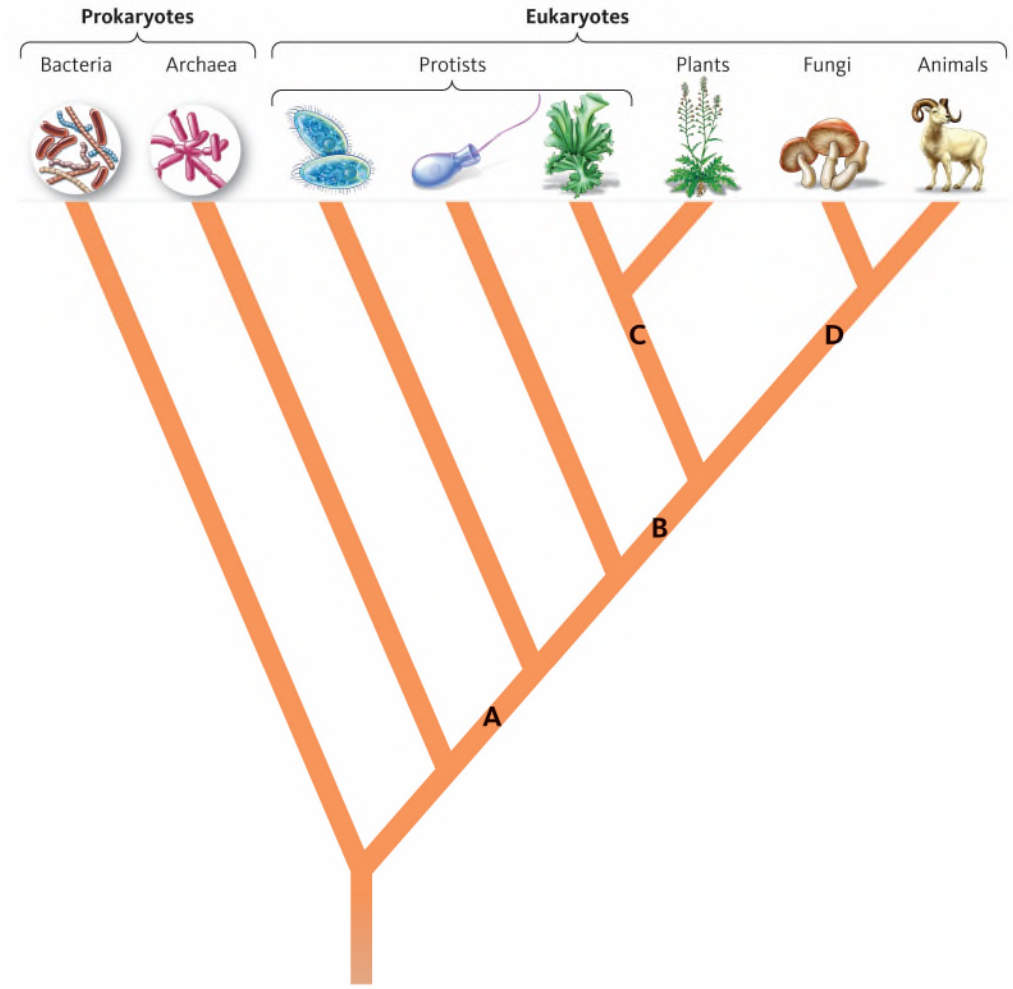


12. Which of the following groups share the characteristic of having an amniotic sac or egg?
    a. amphibians, mammals, and crocodiles
    b. sharks, amphibians, and ray-finned fishes
    c. mammals, crocodiles, and reptiles/birds
    d. reptiles/birds, crocodiles, and amphibians

    ANS: C PTS: 1 DIF: Easy REF: Comprehension
    OBJ: Describe why and how the diversity of life is classified.
    TOP: 2.2 The Diversity of Life Is Cataloged and Classified by Evolutionary Relationships
    KEY: Phylogeny NOT: Figure 2.12

13. Which characteristic is common to all groups represented on this evolutionary tree?
    a. vertebrae
    b. bony skeleton
    c. four limbs
    d. amniotic egg or sac

    ANS: A PTS: 1 DIF: Easy REF: Comprehension
    OBJ: Describe why and how the diversity of life is classified.
    TOP: 2.2 The Diversity of Life Is Cataloged and Classified by Evolutionary Relationships
    KEY: Phylogeny NOT: Figure 2.12



14. Based on the evolutionary tree, which domain is most closely related to animals?
    a. Prokaryotes
    b. Eukaryotes
    c. Archaea
    d. Bacteria

    ANS: C PTS: 1 DIF: Moderate REF: Analysis
    OBJ: Describe why and how the diversity of life is classified.
    TOP: 2.2 The Diversity of Life Is Cataloged and Classified by Evolutionary Relationships
    KEY: Phylogeny NOT: Figure 2.15

15. Based on the evolutionary tree, which letter represents the common ancestor of animals and fungi?
    a. A
    b. B
    c. C
    d. D

    ANS: D PTS: 1 DIF: Moderate REF: Analysis
    OBJ: Describe why and how the diversity of life is classified.
    TOP: 2.2 The Diversity of Life Is Cataloged and Classified by Evolutionary Relationships
    KEY: Phylogeny NOT: Figure 2.15

16. Based on the evolutionary tree, which letter represents the common ancestor of all eukaryotes?
    a. A
    b. B
    c. C
    d. D

    ANS: A PTS: 1 DIF: Moderate REF: Analysis
    OBJ: Describe why and how the diversity of life is classified.
    TOP: 2.2 The Diversity of Life Is Cataloged and Classified by Evolutionary Relationships
    KEY: Phylogeny NOT: Figure 2.15

17. Despite the variety of sizes, shapes, and colors, a male German Shepherd and a Great Dane (two breeds of dogs) can mate with one another and produce offspring. Do these dogs belong to the same species?
    a. yes, because they can interbreed
    b. no, because they each have evolutionary novelties not shared by the other breed
    c. no, because they are different dog breeds
    d. yes, because they share physical similarities

    ANS: A PTS: 1 DIF: Moderate REF: Application
    OBJ: Describe why and how the diversity of life is classified.
    TOP: 2.2 The Diversity of Life Is Cataloged and Classified by Evolutionary Relationships
    KEY: Hierarchy

18. All life can be divided into _____ domains and _____ kingdoms.
    a. three; three
    b. four; four
    c. three; four
    d. four; three

    ANS: C PTS: 1 DIF: Easy REF: Knowledge
    OBJ: Discuss the basic characteristics of animals, plants, fungi, and protists.
    TOP: 2.3 Animals, Plants, Fungi, and Protists Are Classified in the Domain Eukarya
    KEY: Hierarchy

19. A researcher is studying a parasitic bacterium that produces toxins that can harm its host. Thus, the researcher is studying a(n)
    a. heterotrophic eukaryote.
    b. autotrophic eukaryote.
    c. heterotrophic prokaryote.
    d. autotrophic prokaryote.

    ANS: C PTS: 1 DIF: Easy REF: Application
    OBJ: Discuss the basic characteristics of animals, plants, fungi, and protists.
    TOP: 2.3 Animals, Plants, Fungi, and Protists Are Classified in the Domain Eukarya
    KEY: Ecological interactions

20. Which of the following characteristics apply to animals?
    a. heterotroph only
    b. heterotroph, producer
    c. heterotroph, multicellular
    d. heterotroph, producer, multicellular, cell wall

ANS: C PTS: 1 DIF: Easy REF: Comprehension
OBJ: Discuss the basic characteristics of animals, plants, fungi, and protists.
TOP: 2.3 Animals, Plants, Fungi, and Protists Are Classified in the Domain Eukarya
KEY: Ecological interactions

21. Which of the following characteristics apply to plants?
    a. producer only
    b. heterotroph, producer
    c. producer, multicellular, cell wall
    d. heterotroph, producer, multicellular, cell wall

ANS: C PTS: 1 DIF: Easy REF: Comprehension
OBJ: Discuss the basic characteristics of animals, plants, fungi, and protists.
TOP: 2.3 Animals, Plants, Fungi, and Protists Are Classified in the Domain Eukarya
KEY: Ecological interactions

22. Which of the following characteristics apply to fungi?
    a. heterotroph only
    b. heterotroph, producer
    c. heterotroph, multicellular, cell wall
    d. heterotroph, producer, multicellular, cell wall

ANS: C PTS: 1 DIF: Easy REF: Comprehension
OBJ: Discuss the basic characteristics of animals, plants, fungi, and protists.
TOP: 2.3 Animals, Plants, Fungi, and Protists Are Classified in the Domain Eukarya
KEY: Ecological interactions

23. Which of the following are heterotrophic eukaryotes with a cell wall?
    a. ferns
    b. mosses
    c. mushrooms
    d. orchids

ANS: C PTS: 1 DIF: Easy REF: Application
OBJ: Discuss the basic characteristics of animals, plants, fungi, and protists.
TOP: 2.3 Animals, Plants, Fungi, and Protists Are Classified in the Domain Eukarya
KEY: Ecological interactions

24. All of the following statements are true about organisms that photosynthesize EXCEPT:
    a. They are called producers.
    b. They are able to convert the sun’s energy into a different form of energy.
    c. They release oxygen.
    d. They are all eukaryotes.

ANS: D PTS: 1 DIF: Easy REF: Comprehension
OBJ: Discuss the basic characteristics of animals, plants, fungi, and protists.
TOP: 2.3 Animals, Plants, Fungi, and Protists Are Classified in the Domain Eukarya
KEY: Photosynthesis

25. As producers, what inputs do plants require for the process of photosynthesis?
    a. oxygen and sunlight
    b. oxygen and carbon dioxide
    c. carbon dioxide and sunlight
    d. carbon dioxide, oxygen, and sunlight

ANS: C PTS: 1 DIF: Easy REF: Knowledge
OBJ: Discuss the basic characteristics of animals, plants, fungi, and protists.
TOP: 2.3 Animals, Plants, Fungi, and Protists Are Classified in the Domain Eukarya
KEY: Photosynthesis

26. Both plant and animal cells have all the following structures EXCEPT
    a. a cell membrane.
    b. a nucleus.
    c. mitochondria.
    d. chloroplasts.

ANS: D PTS: 1 DIF: Easy REF: Knowledge
OBJ: Discuss the basic characteristics of animals, plants, fungi, and protists.
TOP: 2.3 Animals, Plants, Fungi, and Protists Are Classified in the Domain Eukarya
KEY: Cell types

27. Which of the following characteristics are shared by cells found in both plants and fungi?
    a. cell wall
    b. chloroplast
    c. photosynthesis
    d. all of these

ANS: A PTS: 1 DIF: Easy REF: Knowledge
OBJ: Discuss the basic characteristics of animals, plants, fungi, and protists.
TOP: 2.3 Animals, Plants, Fungi, and Protists Are Classified in the Domain Eukarya
KEY: Cell types

28. The portion of a mushroom that you typically eat is
    a. the fruiting body.
    b. the reproductive structure.
    c. the chytrid sac.
    d. both the fruiting body and the reproductive structure.

ANS: D PTS: 1 DIF: Easy REF: Knowledge
OBJ: Discuss the basic characteristics of animals, plants, fungi, and protists.
TOP: 2.3 Animals, Plants, Fungi, and Protists Are Classified in the Domain Eukarya
KEY: Ecological interactions

29. All of the following are beneficial characteristics of fungi EXCEPT:
    a. They decompose and recycle dead matter.
    b. They are a source of medicines.
    c. They are producers that release oxygen.
    d. They are a food source.

ANS: C PTS: 1 DIF: Easy REF: Knowledge
OBJ: Discuss the basic characteristics of animals, plants, fungi, and protists.
TOP: 2.3 Animals, Plants, Fungi, and Protists Are Classified in the Domain Eukarya
KEY: Ecological interactions

30. Which of the following is not true of protists as a group?
    a. They are all single-celled.
    b. They are eukaryotes.
    c. They range in size from microscopic to large multicellular organisms.
    d. They likely belong to multiple kingdoms.

ANS: A PTS: 1 DIF: Easy REF: Knowledge
OBJ: Discuss the basic characteristics of animals, plants, fungi, and protists.
TOP: 2.3 Animals, Plants, Fungi, and Protists Are Classified in the Domain Eukarya
KEY: Cell types

31. Protists are currently divided into informal groups based on their similarity to other kingdoms. A protist that is a decomposer is categorized as a(n) _____ protist.
a. animal-like
b. plantlike
c. funguslike
d. autotrophic

ANS: C PTS: 1 DIF: Easy REF: Knowledge
OBJ: Discuss the basic characteristics of animals, plants, fungi, and protists.
TOP: 2.3 Animals, Plants, Fungi, and Protists Are Classified in the Domain Eukarya
KEY: Cell types

32. This organism lives in an aquatic environment and is a eukaryotic heterotroph without any cell walls. What kingdom does it likely belong to?
a. animals
b. fungi
c. plants
d. archaea

ANS: A PTS: 1 DIF: Easy REF: Analysis
OBJ: Discuss the basic characteristics of animals, plants, fungi, and protists.
TOP: 2.3 Animals, Plants, Fungi, and Protists Are Classified in the Domain Eukarya
KEY: Hierarchy

33. All of the following are true about prokaryotic cells EXCEPT:
a. Prokaryotic cells are smaller than eukaryotic cells.
b. They do not contain DNA.
c. They have no membrane-bound organelles.
d. They have ribosomes and a cell membrane.
e. They are found in two domains: Bacteria and Archaea.

ANS: B PTS: 1 DIF: Easy REF: Knowledge
OBJ: Discuss the basic characteristics of prokaryotic organisms.
TOP: 2.4 Bacteria and Archaea Are Prokaryotic Microorganisms
KEY: Cell types

34. Bacteria and Archaea
    a. belong to the same domain.
    b. have similar cellular structures.
    c. have cell walls that are structurally similar to plant cell walls.
    d. are more closely related to each other than to eukaryotes.

    ANS: B PTS: 1 DIF: Easy REF: Knowledge
    OBJ: Discuss the basic characteristics of prokaryotic organisms.
    TOP: 2.4 Bacteria and Archaea Are Prokaryotic Microorganisms
    KEY: Hierarchy

    Insects and bacteria appear to team up against a pesticide that is commonly sprayed on crops. The bean bug *Riptortus pedestris* is a common soybean pest and in a recent study was shown to acquire resistance to a common insecticide. This resistance is related to the presence of bacteria (*Burkholderia* sp.) living within its gut. In this mutually beneficial relationship, more than 100 million bacteria can live within the insect's gut. Evidence suggests that these bacteria are able to break down the pesticide into carbon dioxide, which is used by the bacteria, and harmless waste products are then secreted. In a recent study, researchers fed bacteria-infested bean bugs and bacteria-free bean bugs a diet of soybean seedlings that had been treated with the pesticide. Most of the bacteria-infested bean bugs survived after eating the treated soybeans, but 80 percent of the bacteria-free bean bugs died.

35. In the study using bean bugs, soybeans and *Burkholderia* bacteria, how many domains are represented?
    a. one
    b. two
    c. three
    d. four

    ANS: B PTS: 1 DIF: Easy REF: Application
    OBJ: Describe why and how the diversity of life is classified.
    TOP: 2.2 The Diversity of Life Is Cataloged and Classified by Evolutionary Relationships
    KEY: Hierarchy

36. Carbon dioxide, which is a breakdown product of the pesticide, is likely used by the bacteria for which of the following?
    a. an energy source
    b. cell structure
    c. to carry genetic information
    d. both an energy source and cell structure

    ANS: D PTS: 1 DIF: Moderate REF: Application
    OBJ: Describe why and how the diversity of life is classified.
    TOP: 2.2 The Diversity of Life Is Cataloged and Classified by Evolutionary Relationships
    KEY: Cell structure and function

37. Of the organisms mentioned in this study, which is an autotroph?
    a. soybeans
    b. bacteria
    c. bean bugs
    d. both bacteria and bean bugs

ANS: A PTS: 1 DIF: Easy REF: Comprehension
OBJ: Discuss the basic characteristics of animals, plants, fungi, and protists.
TOP: 2.3 Animals, Plants, Fungi, and Protists Are Classified in the Domain Eukarya
KEY: Ecological interactions

38. In the experiment, what would be considered the control group?
    a. the bacteria-free bean bugs
    b. the bacteria-infested bean bugs
    c. the use of pesticides on the soybean plants
    d. the number of deaths caused by eating the plants

ANS: A PTS: 1 DIF: Moderate REF: Application
OBJ: Describe the process of science, including how scientists use evidence to answer questions about life.
TOP: 1.5 Biologists Use Evidence to Answer Questions about the Living World
KEY: Scientific method

39. Together, the bean bugs and the bacteria living within their gut would be considered a(n)
    a. organism.
    b. population.
    c. community.
    d. ecosystem.

ANS: C PTS: 1 DIF: Easy REF: Application
OBJ: Describe why and how the diversity of life is classified.
TOP: 2.2 The Diversity of Life Is Cataloged and Classified by Evolutionary Relationships
KEY: Ecological interactions

40. Which of the following term(s) likely apply to the pesticide?
    a. macromolecule
    b. nucleic acid
    c. inorganic molecule
    d. nucleic acid and inorganic molecule

ANS: A PTS: 1 DIF: Moderate REF: Analysis
OBJ: Explain how organisms are systems of complex interactions at all levels of hierarchy.
TOP: 1.3 Organisms Are Complex Interactive Systems at All Levels of Organization
KEY: Macromolecules

41. In an agricultural field where pesticides are regularly sprayed, there are always some insects that survive due to some innate resistance based on their genetic makeup. These are the ones that then reproduce so that in future generations there are more insects/pests that are resistant to the pesticides. Over time, this may give rise to an entire population that is resistant to the pesticide. This is an example of
    a. homology.
    b. natural selection.
    c. experimentation.
    d. classification.

ANS: B PTS: 1 DIF: Moderate REF: Application
OBJ: Describe how the unity and diversity of life are explained by evolution.
TOP: 1.4 The Unity and Diversity of Life Are Explained By Evolution
KEY: Evolution; Natural selection

MATCHING

Match the following characteristic to the appropriate organism(s).

a. cell wall
b. chloroplast
c. nucleoid
d. ribosomes
e. heterotroph

1. bacteria and soybean
2. bacteria only
3. bacteria, soybean, and bean bug
4. bacteria and bean bug
5. soybean only

1. ANS: A PTS: 1 DIF: Moderate REF: Application
   OBJ: Describe why and how the diversity of life is classified.
   TOP: 2.2 The Diversity of Life Is Cataloged and Classified by Evolutionary Relationships
   KEY: Cell structure and function
2. ANS: C PTS: 1 DIF: Moderate REF: Application
   OBJ: Discuss the basic characteristics of prokaryotic organisms.
   TOP: 2.4 Bacteria and Archaea Are Prokaryotic Microorganisms
   KEY: Cell structure and function
3. ANS: D PTS: 1 DIF: Moderate REF: Application
   OBJ: Discuss the basic characteristics of prokaryotic organisms.
   TOP: 2.4 Bacteria and Archaea Are Prokaryotic Microorganisms
   KEY: Cell structure and function
4. ANS: E PTS: 1 DIF: Moderate REF: Application
   OBJ: Discuss the basic characteristics of animals, plants, fungi, and protists.
   TOP: 2.3 Animals, Plants, Fungi, and Protists Are Classified in the Domain Eukarya
   KEY: Cell structure and function
5. ANS: B PTS: 1 DIF: Moderate REF: Application
   OBJ: Describe why and how the diversity of life is classified.
   TOP: 2.2 The Diversity of Life Is Cataloged and Classified by Evolutionary Relationships
   KEY: Cell structure and function