

2. How would you describe the symbiotic relationship between the milkweed plant and aphids?

ANS: The aphids are parasites.

DIF: A OBJ: 3-4

3. What is the niche of the harvestmen?

ANS: The harvestmen act as scavengers.

DIF: B OBJ: 3-3

4. Based on the scientist's observations, what is one food chain that begins with a milkweed plant?

ANS: Answers may vary. Milkweed-mosquito-crab spider-harvestman.

DIF: A OBJ: 3-5

5. How would you characterize the interactions between the milkweed and the organisms that visit or live on the plant?

ANS: The milkweed and its visitors form a community.

DIF: B OBJ: 3-2

6. Did this scientist perform quantitative or descriptive research?

ANS: descriptive research

DIF: A OBJ: 3-4

CHAPTER 4—COMMUNITY DISTRIBUTION

COMPLETION

1. The greatest numbers of organisms are found within the _____ range of environmental conditions for a particular population.

ANS: optimum DIF: B OBJ: 4-1

2. _____ are the characteristic climax plants in a desert biome that receives more than the average amount of precipitation for that biome.

ANS: Shrubs DIF: B OBJ: 4-2

3. The absence of permafrost and the presence of coniferous trees as the dominant climax plants characterize the _____.

ANS: taiga DIF: B OBJ: 4-4

4. The tides affect the _____ of water in an estuary.

ANS: salinity DIF: B OBJ: 4-3

5. Water temperature and light are two _____ factors that affect the tolerance range of organisms in a lake.

ANS: abiotic DIF: B OBJ: 4-1

6. _____ are characterized by complex food webs, many different species of organisms, and little or no succession.

ANS: Climax communities DIF: B OBJ: 4-2

7. Tropical rain forest and _____ biomes are both characterized by a thin layer of nutrient-poor topsoil that can support only shallow-rooted plants.

ANS: tundra DIF: B OBJ: 4-4

8. Fires, natural disasters, and human intervention are possible causes of _____.

ANS: secondary succession DIF: B OBJ: 4-2

9. Concentric bands of different plant species are characteristic of _____ biomes.

ANS: freshwater DIF: B OBJ: 4-2

10. In a _____ biome, decomposition occurs too quickly for humus to form.

ANS: tropical rain forest DIF: B OBJ: 4-5

11. Saltmarsh ecosystems are usually associated with _____.

ANS: estuaries DIF: B OBJ: 4-3

12. The first organisms to appear in an area undergoing succession are known as _____.

ANS: pioneer species DIF: B OBJ: 4-2

13. _____ is the ability of an organism to withstand changes in abiotic and biotic factors in an ecosystem.

ANS: Tolerance DIF: B OBJ: 4-1

SHORT ANSWER

1. Name two biomes and list at least three common plants and three common animals of each.

ANS: Answers will vary. Students may relate that desert biomes have a few shrubs and grasses and many cacti, as well as snakes, lizards, and cactus wrens. Forest biomes have many mosses, ferns, and deciduous trees such as oaks and hickories. Animals that live in forests include squirrels, deer, and skunks, along with many species of birds.

DIF: A OBJ: 4-5

2. List the three terrestrial biomes that make up the United States and discuss the factors that determine their distribution.

ANS: Temperate grasslands make up the middle of the country, and temperate forests are found in the eastern half and small sections of the Northwest and Southwest. A desert biome is found in the western third of the United States. Rainfall and temperatures are two major factors that determine the locations of these biomes.

DIF: A OBJ: 4-4

3. Describe how light affects life in the oceans.

ANS: The factor that differentiates the euphotic and aphotic zones is light. In the euphotic zone, phytoplankton produce food by photosynthesis. Zooplankton eat the phytoplankton, which are eaten by fishes. Because of the presence of light, there are many organisms. In the aphotic zone, the few organisms depend on food that filters down from the aphotic zone.

DIF: A OBJ: 4-3

4. Under what environmental conditions do the largest number of individuals in a population occur? Relate your answer to limiting factors and range of tolerance.

ANS: Largest numbers occur when environmental factors are within the optimal ranges of the limits of tolerance. Numbers decline when environmental factors become limiting at the extremes of the range of tolerance.

DIF: A OBJ: 4-1

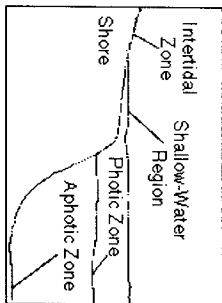


Figure 4-1

5. In which region of Figure 4-1 are most of the producers in this marine biome found?

ANS: the photic zone

DIF: B OBJ: 4-3

6. What organisms form the base of all food chains in the biome shown in Figure 4-1?

ANS: plankton

DIF: B OBJ: 4-3

7. Using Figure 4-1, why are few producers found in the intertidal zone?

ANS: Answers may vary. Crashing waves and tidal variations make it difficult for producers to float or take hold in one place.

DIF: A OBJ: 4-3

8. Which region in Figure 4-1 is characterized by high levels of sunlight, nutrients, and oxygen, but low productivity?

ANS: the intertidal zone

DIF: B OBJ: 4-3

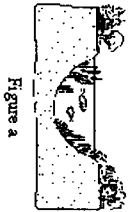


Figure a

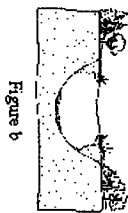


Figure b

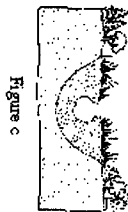


Figure c



Figure d

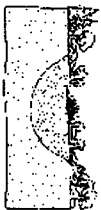


Figure e

Figure 4-2

9. What type of succession is illustrated in the ponds in Figure 4-2? How do you know?

ANS: Primary succession; the pond area is a natural site that underwent change from its original condition. This could also be secondary succession if the pond was created by humans or beavers.

DIF: A OBJ: 4-2

10. What changes are illustrated in figure d of Figure 4-2?

ANS: Answers may vary. The pond continues to fill in. In the filled-in areas, grasses begin to replace the cattails and reeds.

DIF: A OBJ: 4-2

11. How would you classify the community in figure c of Figure 4-2?

ANS: marsh or swamp

DIF: A OBJ: 4-5

12. What might account for the differences in pond a and pond b of Figure 4-2?

ANS: Answers may vary. Soil washes into the pond; fallen leaves and other dead matter gradually build up on the bottom, increasing the nutrients in the pond. The increase in nutrients results in an increase in plant growth around the margins.

DIF: A OBJ: 4-4

13. How is the pond in figure b different from the original pond shown in figure a of Figure 4-2?

ANS: Answers may vary. The pond in figure b is slightly shallower than the original pond. The land along the margins of the pond in figure b extends farther out into the pond, making it narrower than the original pond.

DIF: A OBJ: 4-2

Epiphytes are plants that grow on other plants. In the rain forest, they sprout from seeds or spores carried by the wind or animals and take root on the trunks and branches of the canopy trees. Epiphytes are not parasitic; they gain nothing from the trees except support and access to sunlight. However, under favorable conditions, they may form dense, water-logged, tangled mats of roots and stems, weighing up to several thousand kilograms. This weight is often enough to break the limbs of the more fragile trees. Some tree species have developed adaptations to protect against the growth of epiphytes. Two known mechanisms are (1) the frequent shedding of bark layers that periodically removes young epiphytes, and (2) the presence of certain plant-manufactured chemicals that inhibit the growth of other plants.

In his explorations of the Costa Rican rain forest, Donald Perry developed an apparatus consisting of a platform base built on one tree and connected to two other trees by means of ropes. From this base, a system of ropes and pulleys attached to a harness would allow an investigator to access previously unexplored areas of the canopy and to move relatively unrestricted with minimal contact or interference with rain forest organisms.

During his studies, Perry noticed that some trees were completely free of epiphytes, although the species were known not to shed bark or to manufacture plant-inhibiting chemicals. Other scientists had speculated that the *Azteca* ants, which live mutualistically with certain species of rain forest trees,

were responsible. These aggressive ants were known to swarm and attack other insects and mammals that might damage their trees. To test the effect of epiphytes on these trees, Perry tied some moss and other small epiphytes to the limbs of one such tree. Perry found that the ants did destroy epiphytes.

14. Why was the development and use of Perry's rope-and-pulley apparatus necessary in the testing of this hypothesis?

ANS: Answers may vary. The ants were known to attack mammals that threatened their trees, so they might attack an investigator who climbed the tree to perform tests and make observations. The use of Perry's equipment would allow easy access with minimal risk to the investigator.

DIF: A OBJ: 4-1

15. What problem was suggested to Perry upon observing the epiphyte-free trees?

ANS: Answers may vary. What caused these trees to be resistant to the growth of epiphytes?

DIF: A OBJ: 4-1

16. What observation(s) would help support Perry's hypothesis that ants prevent the growth of epiphytes?

ANS: Answers may vary. Direct observation of the ants swarming over the epiphytes and tearing them off would be supportive evidence.

DIF: A OBJ: 4-1

17. Why might ants want to destroy epiphytes?

ANS: Answers may vary. Epiphytes might make it difficult for the ants to move around a tree.

DIF: A OBJ: 4-1

18. How might Perry's invention help scientists discover new species?

ANS: With the aid of the apparatus, scientists can now explore an area of the rain forest seldom seen by humans.

DIF: A OBJ: 4-1

OTHER

If the underscored word or phrase makes the sentence true, write "true" in the space provided. If the underscored word or phrase makes the sentence false, write the correct term or phrase in the space provided.

1. Herd animals are usually concentrated in the forest biome. _____

ANS: grassland biome DIF: B OBJ: 4-5

2. The great northern coniferous forests are part of the tundra biome.
 ANS: taiga biome DIF: B OBJ: 4-5
3. Light intensity is a major limiting factor of the tundra biome.
 ANS: Temperature DIF: B OBJ: 4-4
4. Phytoplankton are usually found concentrated in the euphotic zone of the ocean.
 ANS: true DIF: B OBJ: 4-3
5. A pioneer community is usually the stable result of succession.
 ANS: climax community DIF: B OBJ: 4-2
6. Limiting conditions usually fall midway between an organism's limits of tolerance.
 ANS: Optimal DIF: B OBJ: 4-1
7. Age, physical condition, and stage in its life cycle may all influence an organism's limits of tolerance.
 ANS: true DIF: B OBJ: 4-1
8. The range of factors under which an organism functions and survives are its limiting factors.
 ANS: limits of tolerance DIF: B OBJ: 4-1
9. The tundra is a region dominated by deciduous trees.
 ANS: temperate forest DIF: B OBJ: 4-5
10. A large group of ecosystems characterized by the same type of climax community is called a taiga.
 ANS: biome DIF: B OBJ: 4-5
11. The colonization of new sites by communities of organisms is secondary succession.
 ANS: primary DIF: B OBJ: 4-2
12. A pioneer community is a stable, mature community that undergoes little or no succession.
 ANS: climax community DIF: B OBJ: 4-2

13. Conditions that restrict the existence, population size, reproductive success, or distribution of organisms are called ranges of tolerance.
 ANS: limiting factors DIF: B OBJ: 4-4
14. The portion of the shoreline that is affected by the changing tides is the aphotic zone.
 ANS: intertidal DIF: B OBJ: 4-3
15. The region of the ocean shallow enough for sunlight to penetrate is the photic zone.
 ANS: true DIF: B OBJ: 4-3
16. Succession is the replacement of one community by another as environmental conditions change.
 ANS: true DIF: B OBJ: 4-2
17. A body of water near the coast that is partly surrounded by land and contains both fresh and salt water is known as the intertidal zone.
 ANS: estuary DIF: B OBJ: 4-3
18. Humus is a layer of soil that remains frozen throughout the year.
 ANS: Permafrost DIF: B OBJ: 4-4
19. Microscopic organisms that float in the sunlit regions of the ocean are pioneer species.
 ANS: plankton DIF: B OBJ: 4-3
20. The tundra is an arid region characterized by little or no plant life.
 ANS: desert DIF: B OBJ: 4-5