Chapter 17

Communities

End of Chapter Questions

Simple Review Questions

16.1 Food Webs

1. What is the name for a diagram of who eats whom in a community?

2. Explain the difference between a producer and a consumer.

3. What is a decomposer? What organisms function as decomposers in most communities?

16.2 Competition

4. What is a niche?

5. Can two species have the exact same niche in a community? Why or why not?

16.3 Symbiosis

6. Define parasitism, and provide some examples.

7. Do species evolve in response to the symbiotic relationships they participate in?

16.4 Invasive Species

8. What is an invasive species?

9. Why are invasive species to harmful to native species?

(CLICK TO CHECK YOUR ANSWERS)

Challenging Review Questions

16.1 Food Webs

10. List three producers, three primary consumers, and three secondary consumers.

11. Think of an example of an organism that eats at multiple levels of a food chain. Is your organism a producer? A consumer? What are the advantages of eating at multiple levels of a food chain?

12. What is the difference between a food chain and a food web?

13. In a habitat, mice eat plant seeds, and owls and lynxes prey on the mice. Draw the simple food chain or food web that shows these relationships. Label the producer(s), primary consumer(s), and secondary consumer(s).

16.2 Competition

14. In a habitat, mice eat plant seeds, and owls and lynxes prey on the mice. What term describes the relationship that exists between two species that eat the same prey, as owls and lynxes do in this example?

15. Explain how two different populations of plants can compete for resources. For what kinds of resources might they compete?

16. What is a niche? Explain the significance of Robert MacArthur's observations of warblers and their niches.

17. How can interspecific competition result in evolution through natural selection? Use examples in your answer.

16.3 Symbiosis

18. What is an example of a parasite and its host? Explain how the relationship in your example benefits the parasite while harming the host.

19. What is an example of mutualism? Explain how the relationship in your example benefits the two species involved.

20. Some flowering plants rely on insects to carry pollen from male flowers to female flowers. For example, the bee in the photo below is covered with specks of yellow dandelion pollen. Bees are dusted with pollen as they feed on nectar produced by the flowers. Is this an example of parasitism, commensalism, or mutualism?

16.4 Invasive Species

21. Do all species that colonize a new area become invasive species?

22. Why do some species become invasive species in a new habitat?

(CLICK TO CHECK YOUR ANSWERS)

Apply & Discuss Questions

23. A habitat's carrying capacity for a population can change over time. For example, a forest may be able to support a certain number of bears, but when the trees are cut down and the land is paved over, the carrying capacity drops (probably to zero). What other factors could cause the carrying capacity of a habitat to change? How has Earth's carrying capacity for humans changed over time? Does technology influence how many people Earth can support?

24. What type of survivorship curve characterizes humans? What other characteristics are associated with this type of survivorship curve? Do humans show many of these other characteristics?

25. Two species of salamanders, *Plethodon cinereus* and *Plethodon hoffmani*, overlap in parts of their range in the eastern United States. The two species are very similar in size *except* in places where both species are found. In places where both species are found, *Plethodon cinereus* is smaller than it usually is, and *Plethodon hoffmani* is larger than it usually is. This size difference is related to what the salamanders eat: *Plethodon cinereus* eats smaller prey than it eats in other parts of its range, and *Plethodon hoffmani* eats larger prey than it eats in other parts of its range. How can natural selection due to interspecific competition explain the evolution of size and diet in these salamanders?

26. Some acacia trees have evolved a special relationship with certain species of ants. The trees provide food and nesting sites (in the form of hollow thorns, as shown in the photo) for the ants. The ants attack insects and other species that try to eat the acacia, and they may also kill plants that grow in the immediate vicinity. Discuss the species interactions (food chain, competition, symbiosis, etc.) among the species in this community.

(CLICK TO CHECK YOUR ANSWERS)

End of Chapter Solutions

Simple Review Solutions

1. Food chain or food web.

3. A decomposer obtains food by eating dead organic matter. Fungi and bacteria are important decomposers in many communities.

5. No two species in a community can have exactly the same niche. Otherwise, the species that is better at acquiring and using resources outcompetes the other species and eventually drives it to extinction.

7. A species that lives in close association with another species evolves in response to that partner. Many parasites, for example, have evolved special adaptations for attaching to their hosts. Of course, hosts also evolve in response to parasites. As we saw, eels have evolved an amazing relationship with cleaner shrimp in order to get rid of their parasites.

9. Many invasive species do a lot of damage to native species by competing with them for resources or by preying on them directly.

Challenging Review Solutions

11. An omnivore such as a bear eats both plants and animals. It's both a primary consumer and a secondary consumer. The advantage of eating at multiple levels in a food chain is that there are more potential sources of food.

13. Plants are the producers, mice are the primary consumers, and owls and lynxes are the secondary consumers.

15. Two different populations compete for resources any time they use the same resource and it is in limited supply. Plants might compete for soil nutrients, water, or sunlight.

17. Interspecific competition could result in evolution if either (or both) species evolved to be better competitors. For example, if plants were competing for water, they might evolve more extensive root systems. If two plant populations were competing for sunlight, they might evolve larger leaves, or they might evolve to grow very tall so that they could gain a better share of the available light.

19. Many examples are possible. As just one example, humans and dogs have a mutualistic relationship. Dogs get food and protection from humans, and humans gain companionship and love. Depending on the dog, humans may also receive help with herding or hunting or other activities.

21. No. When an organism is moved to a new place, it might not even survive there. Even if a species can survive in a new area, most species will not become invasive species. Only a few become so successful in their new habitat that they harm native species.

Apply & Discuss Solutions

23. Many answers are possible. Climate is one obvious variable that can affect carrying capacity. Years with good rainfall may increase carrying capacity for producer populations as well as for populations of species higher up the food chain. Drought may result in a reduced carrying capacity for many populations in the habitat. The introduction of new species into a community can also affect the carrying capacity, if this new species competes with or preys on the population of interest. Earth's carrying capacity for humans has increased over time as a result of technological advances such as the origin of agriculture and the green revolution. However, as human activities cause global warming, Earth's carrying capacity for humans may decrease.

25. In areas where both species are found, the salamanders experienced interspecific competition for food. Individuals of each species that happened to differ more in size were more successful because they experienced less competition for food. That is, larger *Plethodon hoffmani* were more successful at surviving and reproducing because they competed less with *Plethodon cinereus*. Similarly, smaller *Plethodon cinereus* were more successful at surviving and reproducing because those individuals competed less with *Plethodon hoffmani* salamanders. Over time, this led to size evolution in both species.