Section 3

Biogeography

Reading Preview

Key Concepts

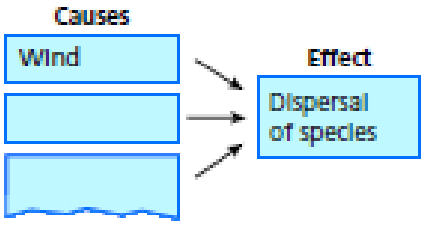
- How has the movement of the continents affected the distribution of species?
- What are three ways that dispersal of organisms occurs?
- What factors can limit the dispersal of a species?

Key Terms

- biogeography
- continental drift
- dispersal
- exotic species
- climate

Target Reading Skill

Relating Cause and Effect As you read, identify three causes of dispersal. Write the information in a graphic organizer like the one below.



Lab zone Discover Activity

How Can You Move a Seed?

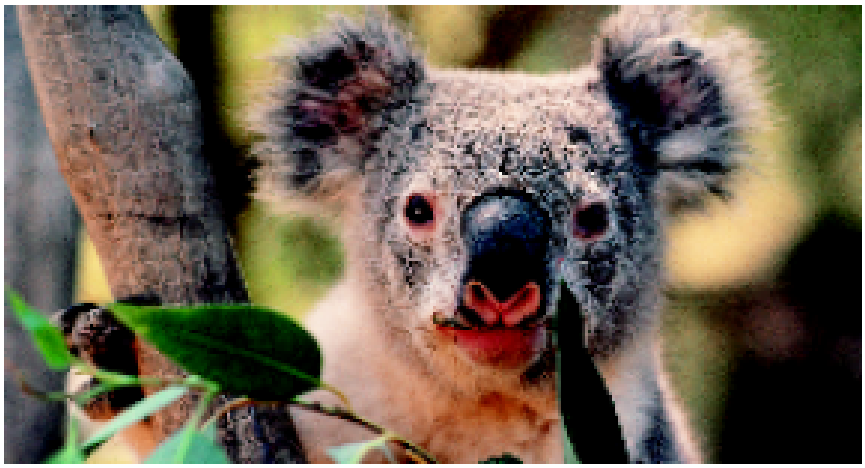
1. Place a few corn kernels at one end of a shallow pan.
2. Make a list of ways you could move the kernels to the other side of the pan. You may use any of the simple materials your teacher has provided.
3. Now try each method. Record whether each was successful in moving the kernels across the pan.

Think It Over

Predicting How might seeds be moved from place to place?

Imagine how European explorers must have felt when they saw Australia for the first time. Instead of familiar grazing animals such as horses and deer, they saw animals that looked like giant rabbits with long tails. Peering into eucalyptus trees, the explorers saw bearlike koalas. And who could have dreamed up an egg-laying animal with a beaver's tail, a duck's bill, and thick fur? You can see why people who heard the first descriptions of the platypus accused the explorers of lying!

As the explorers had learned, different species live in different parts of the world. The study of where organisms live is called **biogeography.** The word *biogeography* is made up of three Greek word roots: *bio*, meaning "life"; *geo*, meaning "Earth"; and *graphy*, meaning "description of." Together, these root words tell what biogeographers do—they describe where living things are found on Earth.



Koala in a eucalyptus tree in Australia ▶

FIGURE 10
Continental Drift
The movement of the continents is one factor affecting the distribution of organisms. **Interpreting Maps** *How has Australia's location changed?*

225 Million Years Ago

180–200 Million Years Ago

135 Million Years Ago

Earth Today

Continental Drift

In addition to studying where species live, biogeographers also try to understand what led to the worldwide distribution of species that exists today. **One factor that has affected how species are distributed is the motion of Earth's continents.** The continents are parts of huge blocks of solid rock, called plates, that make up Earth's surface. Scientists have found that the plates have been moving very slowly for millions of years. As the plates move, the continents move with them in a process called **continental drift.**

Figure 10 shows how much the continents have moved over time. About 225 million years ago, all of today's continents were part of one large landmass now called Pangaea. But after millions of years of slow drifting, they have moved to their present locations.

Continental drift has had a great impact on the distribution of species. Consider Australia, for example. Millions of years ago Australia drifted away from the other landmasses. Organisms from other parts of the world could not reach the isolated island. Kangaroos, koalas, and other unique species developed in this isolation.

Reading Checkpoint **What was Pangaea?**

Means of Dispersal

The movement of organisms from one place to another is called **dispersal.** Organisms may be dispersed in several different ways. **Dispersal can be caused by wind, water, or living things, including humans.**

Wind and Water Many animals move into new areas on their own. But plants and small organisms need assistance to move from place to place. Wind can disperse seeds, the spores of fungi, tiny spiders, and other small, light organisms. Similarly, water transports objects that float, such as coconuts and leaves. Small animals may get a free ride to a new home on top of these floating rafts.

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FIGURE 11
Means of Dispersal
Berry seeds can be dispersed by animals, such as cedar waxwings (top left), that eat berries and leave seeds in their wastes. The spores of puffball mushrooms (top center) and the seeds of milkweed plants (top right) are usually dispersed by wind.
Inferring *What are two ways that seeds disperse?*

Other Living Things Organisms may also be dispersed by other living things. For example, a bird may eat berries in one area and deposit the seeds elsewhere in its wastes. And if your dog or cat has ever come home covered with sticky plant burs, you know another way seeds can get around.

Humans are also important to the dispersal of organisms. As people move around the world, they take organisms with them. Sometimes this dispersal is intentional, as when Europeans who explored Central and South America in the 1500s took corn and tomato plants back to Europe. Sometimes it is unintentional, as when insects are carried from one location to another by an airplane passenger. An organism that is carried into a new location by people is referred to as an **exotic species.**

Reading Checkpoint **What are two ways that an animal can disperse a species?**

Limits to Dispersal

With all these means of dispersal, you might expect to find the same species everywhere in the world. Of course, that's not so. **Three factors that limit dispersal of a species are physical barriers, competition, and climate.**

Physical Barriers Barriers such as water, mountains, and deserts are hard to cross. These features can limit the movement of organisms. For example, once Australia became separated from the other continents, the ocean acted as a barrier to dispersal. Organisms could not easily move to or from Australia.

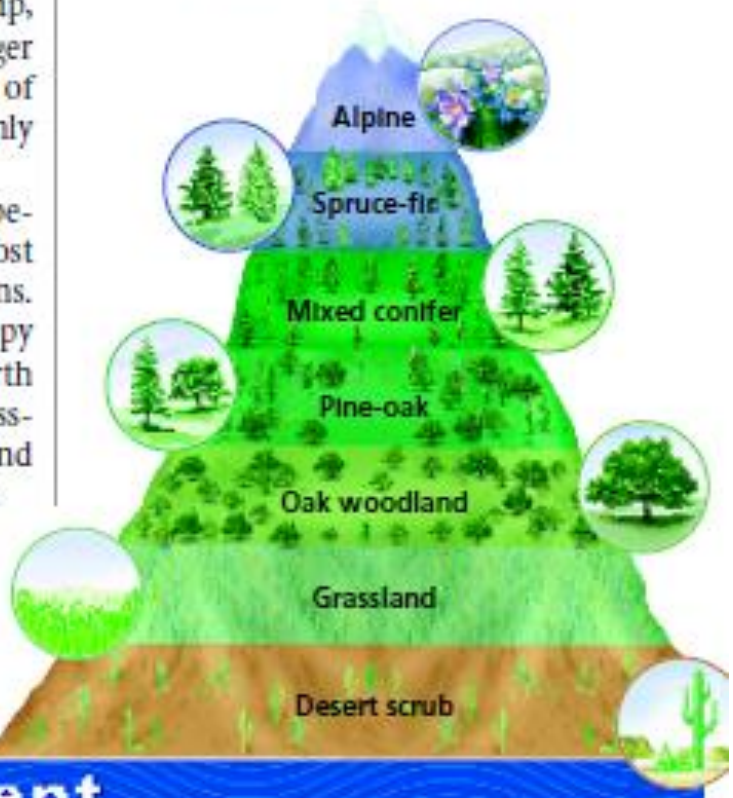
Competition When an organism enters a new area, it must compete for resources with the species already there. To survive, the organism must find a unique niche. Existing species may outcompete the new species. In this case, competition is a barrier to dispersal. Sometimes, however, new species outcompete the existing species. The existing species may be displaced.

Climate The typical weather pattern in an area over a long period of time is the area's **climate.** Climate differences can limit dispersal. For example, conditions at the top of the mountain shown in Figure 12 are very different from those at the base. The base of the mountain is warm and dry. Low shrubs and cactuses grow there. Higher up, the climate becomes cooler and wetter, and larger trees such as oaks and firs grow. Near the top of the mountain, it is very cold and windy. Only short plants can grow in this area.

Places with similar climates tend to have species that occupy similar niches. For example, most continents have a large area of flat, grassy plains. So these continents have organisms that occupy the niche of "large, grazing mammal." In North America, the large, grazing mammals of the grasslands are bison. In Africa, they are wildebeests and antelopes. And in Australia, they are kangaroos.

Reading Checkpoint **How does the climate at the base of a mountain differ from the climate at the top?**

FIGURE 12
Climate Differences and Dispersal
The climate changes dramatically as you move up a tall mountain. Climate determines the distribution of species on different parts of the mountain.



Section 3 Assessment

Target Reading Skill

Relating Cause and Effect Refer to your graphic organizer about means of dispersal to help you answer Question 2 below.

Reviewing Key Concepts

1. a. **Defining** What is continental drift?
   b. **Explaining** How has continental drift affected the dispersal of organisms?
   c. **Relating Cause and Effect** How can continental drift explain why unique species are often found on islands?
2. a. **Listing** What are three ways in which organisms can be dispersed?
   b. **Explaining** What role do humans play in the dispersal of species?
   c. **Predicting** Do you think the role of humans in the dispersal of species will increase or decrease in the next 50 years? Defend your answer.
3. a. **Identifying** What are three factors that can limit the dispersal of a species?
   b. **Applying Concepts** Suppose that a new species of insect were introduced to your area. How might competition limit its dispersal?

Lab zone **At Home Activity**

Sock Walk Take an adult family member on a "sock walk" to learn about seed dispersal. Each person should wear a thick white sock over one shoe. Take a short walk through woods, a field, or a park. Back home, observe how many seeds you collected. Then plant the socks in pans of soil. Place the pans in a sunny spot and water them regularly. How many species did you successfully disperse?