Name _____ Class _____ Date _____

CHAPTER 2 Cycles in Nature

SECTION 2

Ecological Succession

BEFORE YOU READ

After you read this section, you should be able to answer these questions:

- How do communities of living things form?
- Why do the type of organisms in a community change over time?

National Science Education Standards

LS 1a, 4d

What Is Succession?

In the spring of 1988, much of Yellowstone National Park was a forest. The trees grew close together. Large areas were in shade, and few plants grew under the trees.

That summer, fires burned much of the forest and left a blanket of gray ash on the forest floor. Most of the trees were dead, though some of them were still standing.

The following spring, the forest floor was green. Some of the dead trees had fallen over, and many small, green plants, such as grasses, were growing.

Why were grasses the first things to grow? After the fire, the forest floor was sunny and empty. Nonliving parts of ecosystems, such as water, light, and space, are called *abiotic factors*. When the trees were dead, grasses had the abiotic factors they needed, and their populations grew quickly.

In a few years, larger plants began growing in some areas, and the grasses could not grow without sunlight. Within 10 years, the trees were starting to grow back. The trees began to shade out those plants.

When one type of community replaces another type of community, this is called **succession**. The grasses and other species that are the first to live or grow in an area are called **pioneer species**. ☑

STUDY TIP

Organize As you read, make a table comparing primary succession and secondary succession.

Math Focus

1. Calculate Percentages The fires in Yellowstone National Park in 1988 burned 739,000 acres. The park has 2.2 million acres total. What percentage of the park burned?

_____

READING CHECK

2. Define What is a pioneer species?

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Critical Thinking

3. Analyze What makes lichens good pioneer species?

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PRIMARY SUCCESSION

Sometimes, a small community starts to grow in an area where living things have never grown before. The area is only bare rock and there is no soil. Over a very long time, a community can develop. The change from bare rock to a community of organisms is called *primary succession*.

Lichens are pioneer species on bare rock. A lichen's structure allows it to function on bare rock. Lichens don't have roots, and they get their water from the air. This means they do not need soil. Most other organisms, however, cannot move into the area without soil.

Lichens produce acid that breaks down the rock they are living on. The rock particles, mixed with the remains of dead lichens, become the first soil.

After many years, there is enough soil for mosses to grow. The mosses eventually replace the lichens. Tiny organisms and insects begin to live there. When they die, their remains add to the soil.

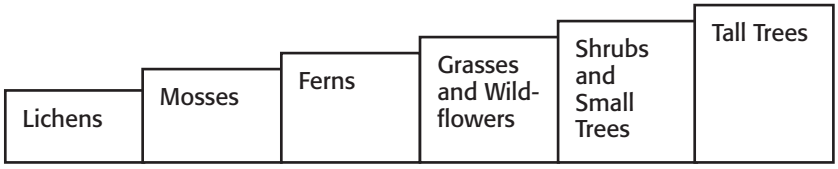
Over time, the soil gets deeper, and ferns replace mosses. The ferns may be replaced later by grasses and wildflowers. If there is enough soil, shrubs and small trees may grow. After hundreds of years, the soil may be deep enough and rich enough to support a forest community.

TAKE A LOOK

4. Identify Which kind of plants are generally the last to appear in an area going through primary succession?

_____

Succession of Lichen and Plant Species in a Forest



Remember that a community is made up of all the living things in an area. It includes the plants that can live with the abiotic factors there at the time. It also includes the animals that can use the resources there at the time.

When the abiotic factors and resources change, so does the community. For example, a population of cottontail rabbits will get bigger as more small plants grow in the soil over the rock. Later, there will be fewer small plants, when more trees grow and block the sun. Then, there will be fewer rabbits. However, the populations of animals that need trees, such as squirrels, will increase.

SECONDARY SUCCESSION

Sometimes, a community is destroyed by a natural disaster, such as a flood or fire. Sometimes, humans or animals alter an environment. For example, a farmer may stop growing crops in a field. In either case, if there is soil and the area is left alone, the natural community can grow back. The plant species change in a series of stages called *secondary succession*. Secondary succession happens in areas where living things already exist. ☑

The figure below shows secondary succession in a farm field that used to be a forest.

First Year Weeds start to grow.

Second Year New weeds appear. Their seeds may have been blown to the field by the wind, or insects may have carried them.

In 5 to 15 Years Small conifer trees, such as pines and firs, grow among the weeds. After about 100 years, the weeds are gone and a forest has formed.

After 100 Years or More As older conifer trees die, they may be replaced by hardwood trees. Oak and maple will grow if the temperature and precipitation are right.

READING CHECK

5. Describe Where does secondary succession happen?

_____

_____

_____

TAKE A LOOK

6. Identify In this example, what are the first kind of plants to grow in secondary succession?

_____

7. Identify What are the first kind of trees that may grow in an area?

_____

MATURE COMMUNITIES AND BIODIVERSITY

As succession goes on, a community can end up having one well-adapted plant species. This is called a *climax species*. However, in many places, a community is more likely to include many species. The variety of species that live in an area is called its *biodiversity*.

Name _____ Class _____ Date _____

Section 2 Review

NSES LS 1a, 4d

SECTION VOCABULARY

pioneer species a species that colonizes an uninhabited area and that starts a process of succession	**succession** the replacement of one type of community by another at a single location over a period of time

1. **Define** What are abiotic factors? Give three examples.

2. **Compare** What is the difference between primary and secondary succession?

3. **Apply Concepts** Secondary succession generally happens faster than primary succession. Why do you think this happens?

4. **Apply Ideas** Consider a species of animal that eats grass and a species of animal that eats nuts. Which species do you think would have a larger population in a mature forest? Explain your answer.

5. **Analyze** Why, in general, can't tall trees be pioneer species?

6. **Define** What is biodiversity?

7. **Describe** When soil first forms over bare rock, what is it made of?