

# 6.1

## The Dynamics of Nature: Succession



**Figure 1** This parking lot has become overgrown with vegetation.

**succession:** a series of gradual changes that result in the replacement of one community of plants and animals by another

**primary succession:** succession that develops a community of plants and animals in an area where no living things existed before

### LINKING TO LITERACY

#### Marking the Text

You can use sticky notes to help you stay focused and reflect on your reading. As you read the following three pages, make note of key ideas, words you need to check for meaning, or questions you have about the topic. Write your thoughts on sticky notes. Place the sticky notes on each page alongside the text.

When you have finished reading, follow up on your notes. Is there information that you have to learn more about?

When you mark up your text and follow up on your notes, you develop a deeper, more complete understanding of a topic.

Have you ever noticed grasses or other plants growing in a vacant lot (Figure 1)? Eventually, bushes and trees will begin to grow, and animals will make their homes in the lot. Over time, ecosystems change.

Ecological **succession** is the predictable and orderly change over time in the types of organisms in an ecosystem. In succession, the dominant plant and animal species living in an ecosystem are gradually replaced by new species. This occurs in stages over many years. Plants play a key role in succession because they provide food and shelter for animals. The new, changed environment creates conditions that are ideal for new species. Over time, the community becomes more stable and succession slows down. Eventually, the community remains as is and simply renews itself.

### Primary Succession

**Primary succession** happens in areas where there has never been any life. Imagine that a volcano, landslide, or earthquake has created a large area of newly exposed bare rock. Lichens are the first organisms to “colonize” the bare rock (Figure 2). They begin the process of building soil. Lichens use photosynthesis to make food and to grow, and they produce acids that help them to absorb nutrients from the rock and the air. These acids break down the rock into soil. Lichens pick up some of the newly formed soil particles and other bits of debris as the wind blows over them. Once lichens are thick enough, mosses can live in the area. The death and decay of lichens and mosses also help build new soil. When enough soil gathers, small plants begin to grow. Plant roots continue to break up the rock and keep the existing soil in place. Eventually, the area develops enough soil for grasses and weeds to grow.

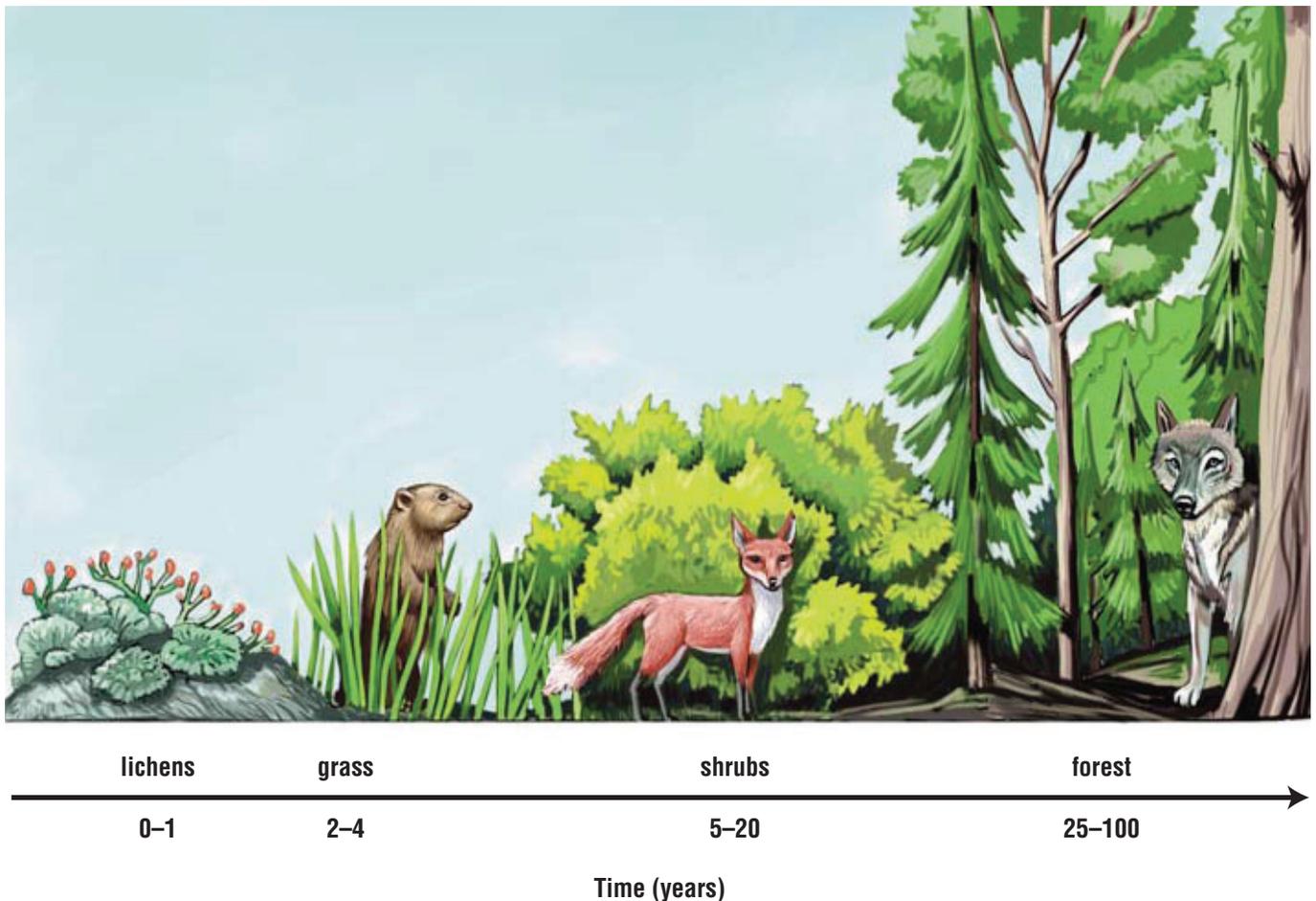


**Figure 2** Lichens form because of the interaction of an alga and a fungus. Lichens are the first organisms to appear in primary succession.

As each generation of plant grows and dies, more soil is created. This allows plants to grow even taller, and shrubs and other bushes begin to grow. As more shrubs grow, they out-compete the shorter plants, such as grasses, for resources. Shorter plants die out because they no longer receive enough sunlight to grow. The shrubs provide shade and more stable, moist soil for tree seedlings to develop. As the tree population expands, the trees out-compete the shrub species, and only shade-loving plants remain. The area eventually develops into a forest.

As each new plant species begins to grow, consumers that feed on that species move into the community (Figure 3). Grasshoppers and groundhogs feed on the grasses in the early stages of succession, but are replaced as more dominant species, such as shrubs and trees, cover the area and grasses die out. Caterpillars and squirrels move in to feed on the trees. Foxes, which feed on grassland animals, are replaced by wolves, which feed on forest animals. Grass-nesting birds such as sparrows are replaced by tree-nesting birds such as orioles.

In succession, early communities are quite simple, with few species interacting. As succession progresses, communities become more complex and contain many interactions.



**Figure 3** Succession is gradual; as plants change, so do the animals. Succession can take more than a hundred years.

**secondary succession:** succession that develops a community in an area after it has been disturbed

## Secondary Succession

**Secondary succession** is the slow change in species in an established community after the community has been disturbed. Examples of natural disturbances include forest fires and strong winds. Examples of human-made disturbances include cutting down forests for agriculture or urban development.

In secondary succession, soil already exists and needs to be revitalized. First, seeds from grasses and wildflowers blow in from neighbouring communities. The seeds grow on the exposed soil, enriching it over time. This enriched soil promotes the growth of bigger plants, such as blackberry bushes and birches (Figure 4). These plants provide food and shelter for animals such as deer mice, nesting birds, and garter snakes, which begin to move into the community. Eventually, larger trees begin to grow and out-compete the bushes and birches, pushing them out. Animals that prefer tall trees move in. Succession continues until the community re-establishes itself.

However, humans often interfere with succession. For example, clear-cutting a forest eliminates the entire forest ecosystem. Left alone, this area can recover through succession, eventually returning to a complex forest ecosystem. However, humans often replace complex ecosystems with simple ones designed for their own needs. These ecosystems tend not to be sustainable. For example, reforestation companies may plant only one tree species in an area that has been clear-cut (Figure 5). One tree species results in a less complex food web. Fewer organisms can be supported in the ecosystem, and it is more likely that problems will occur. Planting only one tree species instead of allowing succession to occur naturally also increases the risk of the forest being wiped out by disease or insect invasion.



**Figure 4** This area has been abandoned for some time. It is at the stage of succession where shrubs are starting to grow.



**Figure 5** Christmas trees often come from fir tree farms, such as this one. However, relatively few other organisms can live here.

### ✓ CHECK YOUR LEARNING

1. (a) What is primary succession?  
(b) Why are lichens so vital for primary succession?
2. What is the difference between primary and secondary succession?
3. A forest is clear-cut and left to regrow naturally. Describe the pattern of succession for the area.
4. Explain how humans interfere with succession. How does this negatively affect ecosystems?