

Seedless Plants

Key Concept Seedless plants do not produce seeds but are well adapted for reproduction and survival.

What You Will Learn

- Nonvascular plants do not have specialized vascular tissues.
- Seedless vascular plants have specialized vascular tissues.
- Seedless plants reproduce sexually and asexually, but they need water to reproduce.
- Seedless plants have two stages in their life cycle.

Why It Matters

Seedless plants play many roles in the environment, including helping to form soil and preventing erosion.

Vocabulary

- rhizoid
- rhizome

READING STRATEGY

Graphic Organizer In your **Science Journal**, create a Venn Diagram that compares vascular plants and nonvascular plants.

rhizoid (RIE ZOYD) a rootlike structure in nonvascular plants that holds the plants in place and helps plants get water and nutrients

▶ When you think of plants, you probably think of plants, such as trees and flowers, that make seeds. But two groups of plants don't make seeds. The two groups of seedless plants are nonvascular plants and seedless vascular plants.

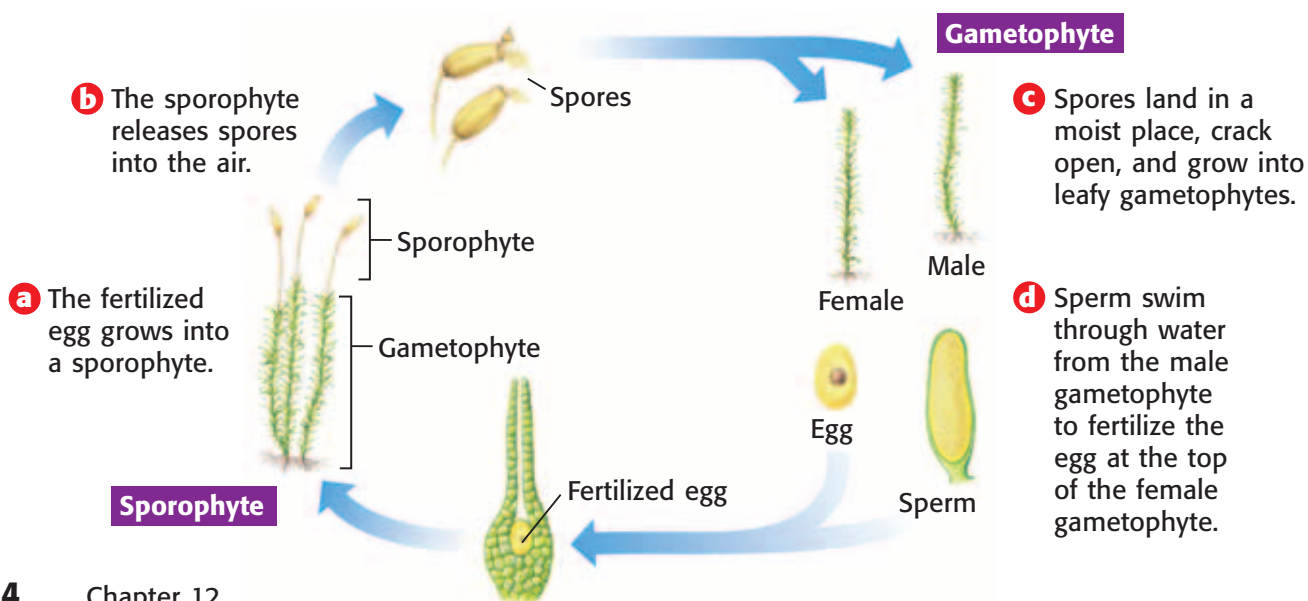
Nonvascular Plants

Mosses, liverworts, and hornworts do not have vascular tissue to transport water and nutrients. Each cell of the plant must get water from the environment or from a nearby cell. So, nonvascular plants usually live in places that are damp. Also, nonvascular plants are small. They grow on soil, the bark of trees, and rocks. Mosses, liverworts, and hornworts don't have true stems, roots, or leaves. They do, however, have structures that carry out the activities of stems, roots, and leaves.

Mosses

Large groups of mosses cover soil or rocks with a mat of tiny green plants. Mosses have leafy stalks and rhizoids. A **rhizoid** is a rootlike structure that holds nonvascular plants in place. Rhizoids help the plants get water and nutrients. As you can see in **Figure 1**, mosses have two stages in their life cycle. During the gametophyte stage, a sperm must travel through a thin film of water to fertilize an egg. This is sexual reproduction. Mosses can also reproduce asexually.

Figure 1 Moss Life Cycle



Liverworts and Hornworts

Like mosses, liverworts and hornworts are small, nonvascular plants that usually live in damp places. The life cycles of liverworts and hornworts are similar to the life cycle of mosses. The gametophytes of liverworts can be leafy and mosslike or broad and flattened. Hornworts also have broad, flattened gametophytes. Both liverworts and hornworts have rhizoids.

The Importance of Nonvascular Plants

Nonvascular plants have an important role in the environment. They are usually the first plants to live in a new environment, such as newly exposed rock. When these nonvascular plants die, they decompose to help form a thin layer of soil. New plants can grow in this soil. More nonvascular plants may grow and hold the soil in place. This reduces soil erosion. Some animals eat nonvascular plants. Other animals use these plants for nesting material.

Peat mosses are important to humans. Peat mosses grow in bogs and other wet places. This peat can be dried and burned as a fuel. Peat mosses are also used in potting soil.

Seedless Vascular Plants

Seedless vascular plants include, ferns, horsetails, and club mosses. Ancient seedless vascular plants grew very tall. For example, club mosses grew to 40 m tall in ancient forests! Today, ferns, horsetails, and club mosses are usually much smaller. **Figure 2** shows modern club mosses.

Because they have vascular tissue, seedless vascular plants are often larger than nonvascular plants. Vascular tissue is specialized to transport water to all of the cells in a plant.

Standards Check How does vascular tissue help plants?  7.5.a



7.2.a Students know the differences between the life cycles and reproduction methods of sexual and asexual organisms.

7.5.a Students know plants and animals have levels of organization for structure and function, including cells, tissues, organs, organ systems, and the whole organism.

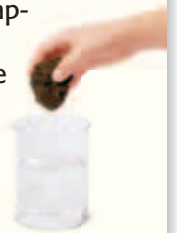
Quick Lab



Moss Mass

7.2.a
7.7.c

1. Determine the mass of a small sample of **dry sphagnum moss**.
2. Observe what happens when you put a small piece of the moss in **water**. Predict what will happen if you put the entire sample in water.
3. Place the moss sample in a **large beaker of water** for 10 to 15 minutes.
4. Remove the wet moss from the beaker, and determine the mass of the moss.
5. How much mass did the moss gain? Compare your result with your prediction.
6. How is water important to the reproduction of moss?



 20 min

Figure 2 Club mosses are seedless vascular plants.

Ferns

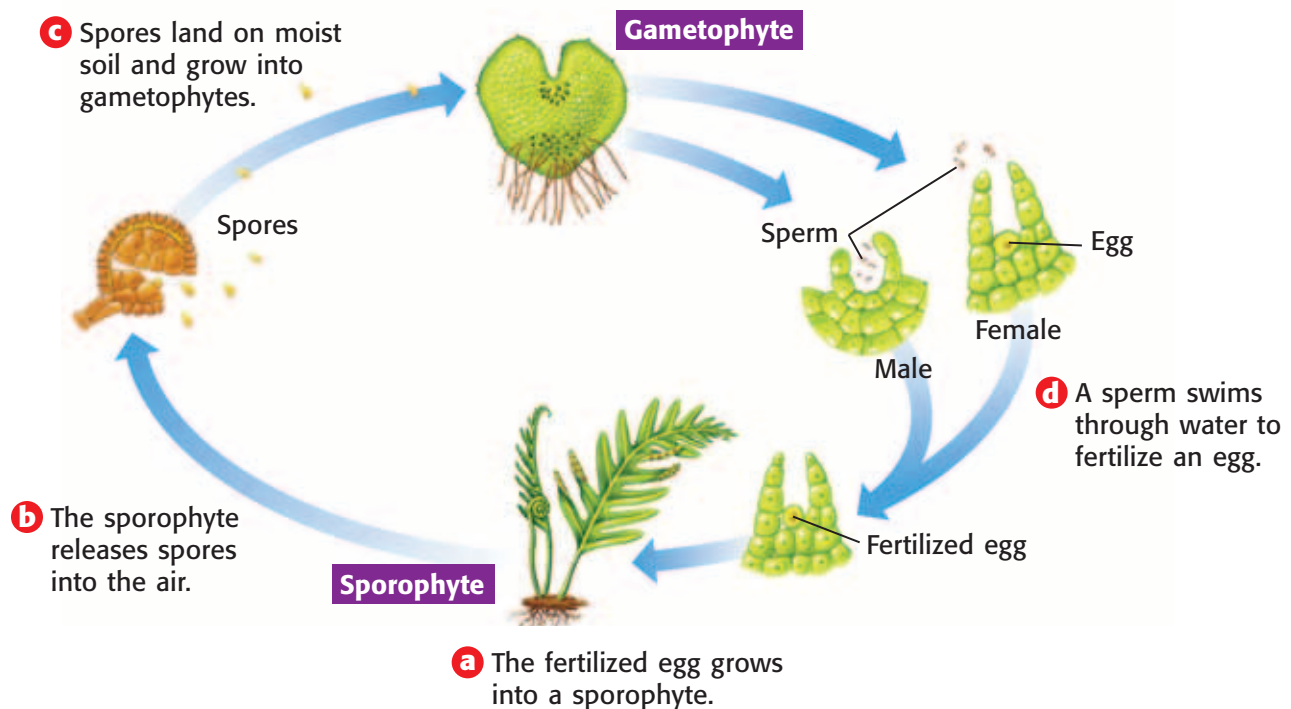
Ferns grow in many places, from the cold Arctic to warm, humid tropical forests. Many ferns are small plants. But some tropical tree ferns grow as tall as 24 m. Most ferns have a rhizome. A **rhizome** is an underground stem from which new leaves and roots grow. At first, fern leaves, or fronds, are tightly coiled. These fronds look like the end of a violin, or fiddle. So, they are called *fiddleheads*. You are probably most familiar with the leafy fern sporophyte. The fern gametophyte is a tiny plant about half the size of one of your fingernails. The fern gametophyte is green and flat. It is usually shaped like a tiny heart. The life cycle of ferns is shown in **Figure 3**. Ferns and other seedless vascular plants have two stages in their life cycle. Like mosses, ferns rely on water for sexual reproduction. Also, like mosses, ferns are also able to reproduce asexually.

rhizome (RIE ZOHM) a horizontal, underground stem that produces new leaves, shoots, and roots

Horsetails and Club Mosses

Modern horsetails can be as tall as 8 m. But many horsetails are smaller. They usually grow in wet, marshy places. Their stems are hollow and contain silica. The silica gives horsetails a gritty texture. In fact, early American pioneers used horsetails to scrub pots and pans. Club mosses grow in woodlands. Unlike mosses, club mosses have vascular tissue. Horsetails, club mosses, and ferns have similar life cycles.

Figure 3 Fern Life Cycle



The Importance of Seedless Vascular Plants

Seedless vascular plants play important roles in the environment. Ferns, horsetails, and club mosses help form soil. They also help prevent soil erosion. In rocky areas, ferns can play a role in the formation of communities. After lichens and mosses create a layer of soil, ferns may take over. Ferns add to soil depth, which allows other plants to grow.

Ferns and some club mosses are popular houseplants. The fiddleheads of some ferns can be cooked and eaten. Young horsetail shoots and their roots are also edible. Horsetails are used in some dietary supplements, shampoos, and skin-care products.

Seedless vascular plants that lived and died about 300 million years ago are among the most important to humans living today. The remains of these ancient ferns, horsetails, and club mosses formed coal and oil. Coal and oil are fossil fuels that humans mine from Earth's crust. Coal and oil are called fossil fuels because they formed from plants that lived long ago. Humans rely on coal and oil for energy.

INTERNET ACTIVITY

Weird and Wonderful Plants

What is your favorite plant? What do you like about it most? Tell your classmates all about it. Go to go.hrw.com, and type in the keyword HY7PL1W.

SECTION Review



7.2.a, 7.5.a

Summary

- Nonvascular plants include mosses, liverworts, and hornworts.
- Seedless vascular plants include ferns, horsetails, and club mosses.
- Most plants have a two-stage life cycle and reproduce both sexually and asexually.
- The rhizoids and rhizomes of seedless plants prevent erosion by holding soil in place. The remains of seedless vascular plants that lived and died about 300 million years ago formed coal.

Understanding Concepts

- 1 **Listing** What are four important roles of seedless plants in the environment?
- 2 **Identifying** Describe six kinds of seedless plants.
- 3 **Analyzing** What is the relationship between coal and seedless vascular plants?

Critical Thinking

- 4 **Making Inferences** Imagine a very damp area. Mosses cover the rocks and trees in this area. Liverworts and hornworts are also very abundant. What might happen if the area dries out? Explain your answer.
- 5 **Applying Concepts** Modern ferns, horsetails, and club mosses are smaller than they were millions of years ago. Why might these plants be smaller?

6 Making Comparisons

Compare the life cycle of mosses with the life cycle of ferns.

INTERPRETING GRAPHICS Use the image below to answer the next question.



7 Identifying Relationships

Identify the structure shown above. What role does this structure play in reproduction?

Internet Resources

For a variety of links related to this chapter, go to www.scilinks.org
Topic: **Seedless Plants**
SciLinks code: **HY71368**