

Figure 12.4.1**Vascular and Nonvascular Plants**

The leaf below demonstrates vascular tissue. Those lines are called veins, and they function just like the veins in you! Veins carry nutrients and water throughout the plant. The picture on the right is a moss, which is nonvascular, so it doesn't have plumbing to carry water and nutrients throughout the plant. Vascular tissue is a highly efficient way to move things through a plant, so nonvascular plants are always quite small because it's hard to transport substances through a plant without plumbing.

**12.5 NONVASCULAR PLANTS: MOSSES, LIVERWORTS, AND HORNWORTS**

Mosses (Division Bryophyta), liverworts (Division Marchantiophyta), and hornworts (Division Anthocerotophyta) are some of the common names of the nonvascular plants. Even though they don't have vascular tissues, they still need to transport materials throughout the plant, which they do using osmosis and diffusion. Osmosis moves water through the plant from cell to cell, while diffusion moves nutrients and minerals. As you might imagine, these are slow processes. Osmosis and diffusion are generally highly dependent on water to move things, and this is why nonvascular plants grow in areas that are moist most of the time. Also, nonvascular plants do not grow large. Most are no more than a few inches tall.

Figure 12.5.1**Nonvascular Plants**

Liverworts (left), hornworts and mosses (right) are common nonvascular plants. These pictures demonstrate their characteristic of not growing very tall because of the inefficiencies associated with osmosis and diffusion as transport mechanisms. Most nonvascular plants tend to grow in moist areas for an adequate water supply. Since they do not have roots to sink into the earth and soak up water, they need a moist environment.



Like all plants, nonvascular plants can reproduce sexually and asexually. Asexual reproduction is by spores, which are like the spores we learned about that Fungi make. They are essentially just a single cell that can grow into a new plant. Spores are produced by **meiosis**, and there are male and female spores. Male spores grow into male plants, and female spores grow into female plants. During sexual reproduction, male plants produce the male gamete, sperm, which fertilizes the female gamete, the egg.