

Moss

Mosses are small, soft plants that are typically 1-10 cm tall, though some species are much larger. They commonly grow close together in clumps or mats in damp or shady locations. They do not have flowers or seeds, and their simple leaves cover the thin wiry stems. At certain times mosses produce spore capsules which may appear as beak-like capsules borne aloft on thin stalks.

Overview

Botanically, mosses are bryophytes, or non-vascular plants. They can be distinguished from the apparently similar liverworts (Marchantiophyta or Hepaticae) by their multi-cellular rhizoids. Other differences are not universal for all mosses and all liverworts, but the presence of clearly

differentiated "stem" and "leaves", the lack of deeply lobed or segmented leaves, and the absence of leaves arranged in three ranks, all point to the plant being a moss.

There are approximately 10,000 species of moss classified in the Bryophyta.

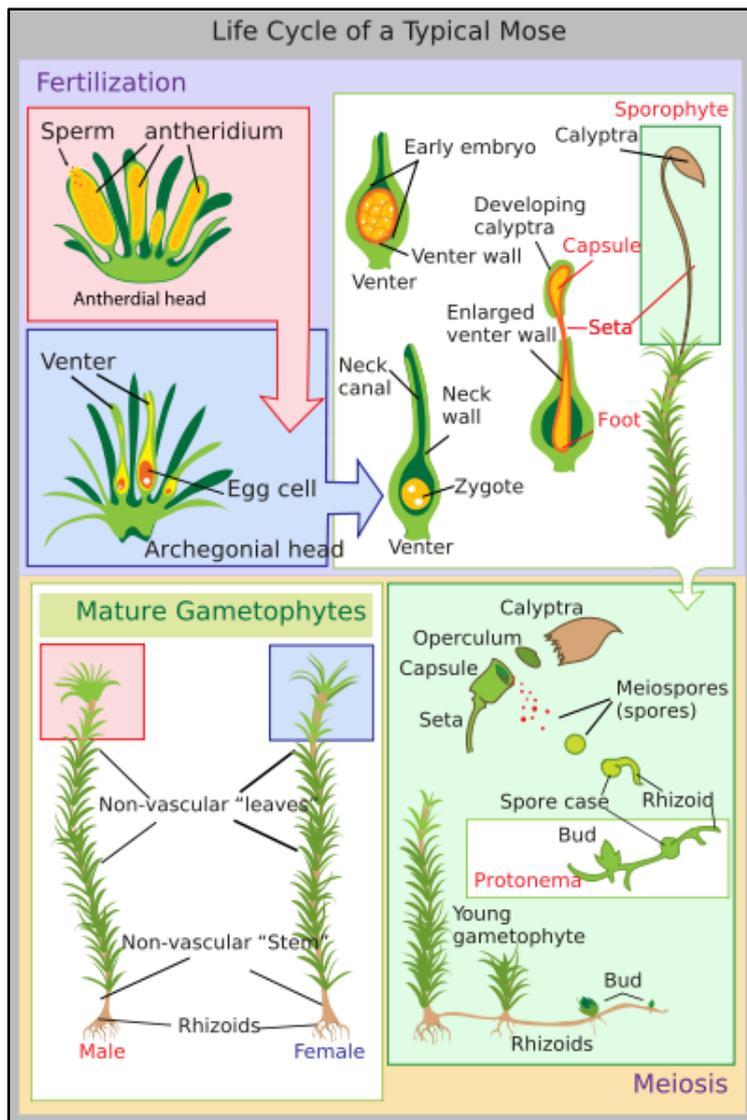
In addition to lacking a vascular system, mosses have a gametophyte-dominant life cycle, that is, the plant's cells are haploid for most of its life cycle. Sporophytes (i.e. the diploid body) are short-lived and dependent on the gametophyte. This is in contrast to the pattern exhibited by most "higher" plants and by most animals. In vascular plants, for example, the haploid generation is represented by the pollen and the ovule, whilst the diploid

generation is the familiar flowering plant.



Life Cycle

Most kinds of plants have a double portion of chromosomes in their cells (diploid, i.e. each chromosome exists with a partner that contains the same genetic information) whilst mosses (and other bryophytes) have only a single set of chromosomes (haploid, i.e. each chromosome exists in a unique copy within the cell). There are periods in the moss lifecycle when they do have a full, paired set of chromosomes but this is only during the sporophyte stage.



The life of a moss starts from a haploid spore, which germinates to produce a protonema, which is either a mass of filaments or thalloid (flat and thallus-like). This is a transitory stage in the life of a moss. From the protonema grows the gametophore ("gamete-bearer") that is differentiated into stems and leaves ('microphylls'). From the tips of stems or branches develop the sex organs of the mosses. The female organs are known as archegonia (sing. archegonium) and are protected by a group of modified leaves known as the perichaetum (plural, perichaeta). The archegonia have necks called venters which the male sperm swim down. The male organs are known as antheridia (singular antheridium) and are

enclosed by modified leaves called the perigonium (plural, perigonia).

Mosses can be either dioicous (compare dioecious in seed plants) or monoicous (compare monoecious).

In dioicous mosses, both male and female sex organs are borne on different gametophyte plants.

In monoicous (also called autoicous) mosses, they are borne on the same plant. In the presence of water, sperm from the antheridia swim to the archegonia and fertilisation occurs,

leading to the production of a diploid sporophyte. The sperm of mosses is biflagellate, i.e. they have two flagella that aid in propulsion.

Without water, fertilisation cannot occur. After fertilisation, the immature sporophyte pushes its way out of the archegonial venter. It takes about

a quarter to half a year for the sporophyte to mature.



The sporophyte body comprises a long stalk, called a seta, and a capsule capped by a cap called the operculum. The capsule and operculum are in turn sheathed by a haploid calyptra which is the remains of the archegonial venter. The calyptra usually falls off when the capsule is mature. Within the capsule, spore-producing cells undergo meiosis to form haploid spores, upon which the cycle can start again. The mouth of the capsule is usually ringed by a set of teeth called peristome. This may be absent in some mosses.

In some mosses, green vegetative structures called gemmae are

produced on leaves or branches, which can break off and form new plants without the need to go through the cycle of fertilization. This is a means of asexual reproduction.

Habitat

Mosses are found chiefly in areas of low light and dampness. Mosses are common in wooded areas and at the edges of streams. Mosses are also found in cracks between paving stones in damp city streets. Some types have adapted to urban conditions and are found only in cities. A few species are wholly aquatic, such as *Fontinalis antipyretica*, and others such as *Sphagnum* inhabit bogs, marshes and very slow-moving waterways. Such aquatic or semi-aquatic mosses can greatly exceed the normal range of lengths seen in

terrestrial mosses. Individual plants 20-30 cm or more long are common in *Sphagnum* species for example.

Wherever they occur, mosses require moisture to survive because of the small size and thinness of tissues, lack of cuticle (waxy covering to prevent water loss), and the need for liquid water to complete fertilisation. Some mosses can survive desiccation, returning to life within a few hours of rehydration.

In northern latitudes, the north side of trees and rocks will generally have more moss on average than other sides (though south-side outcroppings are not unknown).



This is assumed to be because of the lack of sufficient water for reproduction on the sun-facing side of trees. South of the equator the reverse is true. In deep forests where sunlight does not penetrate, mosses grow equally well on all sides of the tree trunk.



Inhibiting Moss Growth

Moss growth can be inhibited by a number of methods:

- Decreasing availability of water through drainage or direct application changes.
- Increasing direct sunlight.
- Increasing number and resources available for competitive plants like grasses.
- Increasing the soil pH with the application of lime.

Heavy traffic or manually disturbing the moss bed with a rake will also inhibit moss growth.

The application of products containing ferrous sulfate or ferrous ammonium sulfate will kill moss; these ingredients are typically in commercial moss control products and fertilizers. Sulfur and Iron are essential nutrients for some competing plants like grasses. Killing moss will not prevent regrowth unless conditions favourable to their growth are changed.