

An introduction to mosses and liverworts

Rosemary Etheridge

Mosses and liverworts are bryophytes, which were one of the very first land plants and form a vital link in the migration of plants to land. They absorb nutrients from rainwater and need moisture to reproduce; they can grow on almost anything. They are difficult to identify and a hand lens or even a microscope is often needed to do so. Their leaves are only a single cell thick and some have rhizomes that act as holdfasts. They had very few common names but in 1981, the Wildlife Trust determined that common names had to be used so they were invented.

Mosses and liverworts



Mosses are small non-flowering plants, which grow in damp and shady places and produce spores in capsules. There are about 12,000 species worldwide with 763 species in Britain. Pear Wood has over 40 different species and Stanmore Common about 50. There are probably about 20 common species. They do not have conductive tissue, which limits their size and are typically 2mm to 10cm tall; the tallest moss *Dawsonia superba*, a native of Australia and New Zealand, is up to 60cm tall.

In structure, they are either acrocarp – growing upright with fruit capsules on top – or pleurocarp – growing horizontally with fruit capsules at the side. Acrocarps tend to grow in disturbed places and are short-lived, while pleurocarps are longer-lived and grow in less disturbed places. The leaves spiral around the stem and are only one cell thick. They have no flowers but produce spores in capsules.



In structure, liverworts are much flatter than mosses. They can either have a thallose flat body or be leafy but with flat-lying leaves. Thallose liverworts have no distinct leaves with broad flattened bodies and grow in cracks in paving etc. Examples include Common (umbrella) liverwort (*Marchontia polymorpha*), Crescent cap liverwort (*Lunularia cruciate*) and Forked veilwort (*Metzgeria furcate*), which is not quite so robust as others.

Leafy liverworts include the Bifid crestwort (*Laphocolea bidentata*) and Greater whipwort (*Bozzonia trilobata*). Leaves are in flat rows, are round or divided into lobes with no thickened midrib, border or other features. This contrasts with mosses that have leaves spirally arranged, usually leaf-shaped or narrow, may have teeth on the edges and may have a thickened midrib or border. Liverworts have round or oval capsules on a translucent stalk and the capsules break into 4 flaps to release spores. Mosses in contrast have coloured capsules on a coloured stalk and spores release through the opening when the cap falls off. Pocket moss (*Fissidens*) is an anomaly as it looks superficially like a liverwort.

Reproduction is generally sexual, with male and female shoots on the same plant in some cases but not all. Male shoots produce 2-tailed sperm and must swim to the female shoot – hence the need for moisture – into the archegonium with its egg to produce a capsule. An ordinary moss plant has just one copy of each chromosome (ie they are haploid) but when the egg and sperm merge they have 2 copies of each chromosome (ie they are diploid). When the cells divide, the resulting cells have only one copy but there is some interchange. There are thus alternating haploid and diploid generations. Some species keep their antheridia in so-called splash cups, bowl-like structures on the shoot tips that propel the sperm several decimetres when hit by water droplets, increasing the fertilisation distance. Examples include Swan's neck thyme-moss (*Mnium hornum*) and Juniper haircap (*Polytrichum juniperinum*).

The capsules have a little hood on top (the calyptra), derived from the archegonium, which protects them, but at maturity it drops off to reveal the cap, the appearance of which is important in identification. When ripe, the cap drops off revealing the peristome with 2 rows of teeth, which control escape of the spores to dry conditions to facilitate wind transport. Screw mosses have teeth that project from the end and screw up when wet but open up when dry so spores can fall out.

Some mosses have asexual vegetative reproduction with gemmae, balls of moss tissue which break away and form new plants. One moss, the Drumsticks (*Aulacomnium androgynum*) has gemmae on sticks.

Because of the styles of reproduction, either asexual or, in many cases with male and female shoots on the same plant, mosses evolve very slowly.

Identification of mosses is very difficult and it is better when they are wet. A x10 hand lens is essential and the features to look for are leaf shape and colour, nerve (midrib), hair-point and teeth. Many mosses can survive desiccation, sometimes for months, returning to life within a few hours of rehydration.

Some examples of more common mosses

Bonfire moss (*Funaria hygrometrica*) grows in large patches on old bonfire sites, typically bare nutrient-rich soils and often on flowerpots. Less than 1cm tall, it has translucent leaves with large cells and the capsule stalks curl round and get tangled.

Wall mosses include:

- Grey-cushioned grimmia (*Grimmia pulvinator*), which forms hairy cushions. It has long hair-points and lots of capsules but the stalks curl round and lie on top of the plant.
- Capillary thread moss (*Bryum capillare*) has separate male and female plants. The capsules are large for the size of the plant, which is only 1-3cm tall. It is common and widespread throughout Britain, growing on walls, trees and rocks.
- Wall screw-moss (*Tortula muralis*) is very common but tiny (<1cm tall with leaves 2.0-2.5mm long and capsules 1-2cm long. It is the commonest moss on mortared or base-rich walls.

Woodland mosses grow on the ground, on stumps, branches, trunks and exposed roots. They include:

- Bank haircap (*Polytrichastrum formosum*) grows up to 5-7cm with leaves 1cm long and capsules 2.5-6.0cm long. Species of this genus have spiky leaves and is much more opaque than other mosses due to plates of green tissue on the midrib. Larger than other mosses, they have an erect, thickened central stem, which is solitary or with a few branches, arising from rhizomes underground. They form cushions up to 40cm high and are some of the earliest colonisers of disturbed sites such as landslides, exposed banks and road and trail cuts.
- Common smooth cap/Catherine's moss (*Atrichum undulatum*) is very common in lowland woods. It has quite broad leaves, which shrivel up when dry and grows up to 7cm tall. The capsules (2.5-5.0cm long) have beaks 3-4mm long on caps the same length.
- Swan's neck thyme-moss (*Mnium hornum*) is very common on the ground around trees on acidic soils and on logs, rocks and tree bases. It produces lighter green shoots in spring and grows up to 2-4cm with 4-8mm long leaves and a 5mm cap on 2.5-5.0cm capsules. It has separate male and female plants.
- Common feather moss (*Kindbergia praelonga*) has stem and branch leaves, which differ in shape and size with stem leaves wider and bigger. One of the commonest mosses in lowland Britain, it grows to 1-3cm, with 1.0-1.5mm long leaves and a 2mm long beaked capsule lid.

- Cypress-leaved plait-moss (*Hypnum cupressiforme*) has little noses on the capsule lid. Widespread and abundant, it is very common on acidic bark and siliceous rock.
- Rough-stalked feather moss (*Brachythecium rutabulum*) has rough bumps on the stalk and cone-shaped caps on capsules. It is very common, quite variable in appearance and grows in a wide range of habitats.
- Wood bristle-moss (*Orthotrichum affine*) is 0.8-3.5cm tall with 3mm long leaves and forms little balls on twigs on trees and has short-stalked capsules with a pointed lid.

Heath star moss (*Campylopus introflexus*) is an alien moss that was first found in England in 1941 and is now widespread. Up to 5cm tall, it has 2.5-6.5mm long leaves. It is common on the Grimdyke in Pear Wood.

White moss (*Leucobryum glaucum/L. juniperoideum*) is a pale moss that forms little spheres. It grows on the ground in Pear Wood.

Bog mosses (*Sphagnum spp*) include at least 20 different species but they are very difficult to tell apart. These large mosses rot very slowly to form extensive acidic bogs in peat swamps. Some can absorb up to 20x their own weight in water. They have large empty cells with pores between the green cells. Their water-absorption and retention capacity meant they were often used as bandages during the First World War (they were also claimed to have some antibacterial properties) as babies' nappies (especially by native Americans) or as sanitary towels. They are locally recorded in Oxhey Woods (October 2009), Harrow Weald Common (April 2011) and Stanmore Common (April 2013). While peat moss can be harvested on a sustainable basis and managed to allow regrowth, the harvesting of moss peat (for fuel and as a soil additive) is considered to cause significant environmental damage as the peat is stripped with little or no chance of recovery.

Mosses are important because they colonise disturbed sites, stabilise soil and reduce erosion and the evaporation of water as well as providing nesting material for birds and mammals. They are also the home for tiny creatures such as springtails, mites and tardigrades.