

## Glittering wood-moss

(*Hylocomium splendens*)

Glittering wood-moss, with its elegant feather-like fronds and unique branching structure, is the most abundant bryophyte in the Caledonian Forest.

### Worldwide distribution

Glittering wood-moss is very common and widespread in the boreal forests of Europe, Russia, Alaska and Canada, where it is the most abundant moss species, often carpeting large areas. It also grows in the Arctic tundra region, north of the treeline, and occurs further south, for example in northern California and western Sichuan in China, usually at increasing elevations. It is also found in Australia, New Zealand and the West Indies, and populations are known from Mt. Elgon and the Ruwenzori Mountains in East Africa.



*Glittering wood-moss typically grows in large clumps or mats, because of its vegetative method of reproduction.*

Throughout its range, it is known by a variety of names, including mountain fern-moss and stair-step moss in North America and common pagoda-moss in China. The scientific name is derived from Greek and Latin, with *splendens* meaning ‘shining’ in Latin, and *Hylocomium* coming from the Greek words ‘hyle’ meaning ‘wood’ and ‘mnum’ meaning moss.

### Distribution in Scotland

In Scotland, glittering wood-moss is a characteristic species of the Caledonian Forest pinewoods, where it is the commonest type of moss. Indeed, under the UK’s national vegetation classification system, the pinewood community, W18, is named as *Pinus sylvestris*–*Hylocomium splendens* woodland, thereby indicating the significance of this moss in identifying the Caledonian Forest ecosystem.

It also occurs in other woodland types, including birch-juniper woodland and birch-oak woodland, as well as in willow scrub. Outside of woodland communities, glittering wood-moss grows on heathlands, underneath the heather (*Calluna vulgaris*), and on dune pastures, thereby making it widespread, especially in the north of the country.

### Physical characteristics

Glittering wood moss is in the family *Hylocomiaceae*, and is a bryophyte, meaning that it is a plant which lacks vascular structures or liquid-conducting tissues, such as the xylem and phloem found in trees. Because of this key difference, mosses have more in common with green algae than they do with the more familiar vascular plants.

*Hylocomium splendens* is a relatively large moss which occurs in extensive patches, and often forms mats, with living parts growing on top of older, dead or dying sections. It is olive-green to yellowish green in colour and has reddish stems. Individual segments or stems are up to 20 cm. long, tapering frond-like to a point, and are featherlike or pinnate, with two or three sets of branching subdivisions. The stems are creeping and perennial, with each year’s new growth coming from near the centre of the previous year’s segment. This habit gives the moss a characteristic step-like growth form, which has led to its North American name of stair-step moss. This growth mechanism gives glittering wood-moss an ecological advantage, as it can ‘climb’ over other mosses and debris such as dead needles or twigs that fall on it.



*In wet locations, glittering wood-moss will even grow on tree trunks, such as this leaning rowan in Glen Affric.*

The stems are covered in green leaves which are oblong or oval and have pointed tips. On the main stems these are up to 2 mm long, but on the primary and secondary branches they are smaller, reaching only 0.4 mm in length on the smallest subdivisions.

Like all bryophytes, glittering wood-moss has no proper roots, but instead has root-like structures known as rhizoids. These are hairlike, filamentous groupings of cells which anchor the moss in place to the rock or tree bark that it is growing on.

Nutrients are absorbed from particles falling on to the leaves from the the air and from rain. Using the energy of the sun that is absorbed through photosynthesis, the moss combines these nutrients with water and air to produce sugars and carbohydrates that are used for growth. With a new segment or stem being produced each year, the moss can be aged quite simply by counting the sequence of segments - each one has an average lifespan of up to 8 years, before decaying into a mat of naturally-composted forest floor debris.

Glittering wood-moss is a shade-loving plant, and depends on the canopy of trees above, or the canopy of shrubs such as heather in non-woodland areas, to create ideal growing conditions, and to prevent it from drying out. When conditions do turn dry, the moss shrinks and shrivels, to retain as much moisture as it can. When rain returns, or the conditions become humid again, the moss will swell up, in response to the increased presence of moisture. Water moves over the moss surface by capillary action, and is absorbed by special water-storage cells.



*The darker green parts in the middle of this frond are the buds that will grow into next year's fronds, thereby giving the typical 'stair-step' pattern of spreading.*

Glittering wood-moss is susceptible to fire and burning will generally destroy entire patches. Afterwards, the moss will recolonise a burned area, although its progress will be limited by its annual growth rate, because of its vegetative method of reproduction.

In the Caledonian Forest, glittering wood-moss grows on a number of different substrates, including the forest floor, rocks, logs and even, in particularly damp sites, the trunks or branches of living trees. It also occurs on hummocks, the characteristic mounds of vegetation which grow, over time, on top of rocks or tree stumps.

Reproduction in mosses takes a different form to that in vascular plants, such as trees and shrubs, where female flowers are fertilised by pollen from male flowers and grow on to produce seeds, often encased in fruits. Mosses utilise a similar method to ferns, and this consists of alternating generations of two forms. The fertile gametophyte form of the moss is the one which is commonly encountered, and male and female sex organs on it produce sperm and eggs. The eggs are fertilised after the sperm swim to them, and they then grow into the sporophyte form of the moss. This grows out of the gametophyte and consists of a spore-bearing capsule on a stalk. After being released, the spores grow into gametophytes, and the life cycle then continues with the generations alternating.

In the case of glittering wood-moss, the sporophyte stalks are reddish-brown and up to 3 cm. long, while the capsules are brown and inclined, and 1.5 - 3 mm. in length. However, these sporophytes are uncommon, and although spores are produced, the growth of new plants from spores has not been documented. Glittering wood-moss relies instead primarily on vegetative reproduction, whereby the new segments which are produced each year can become separated from the 'parent' plant and grow on to develop their own rhizoids and an independent life. As a result, this species is frequently described as a clonal moss, because large areas or mats of it will often have grown from the same plant and are therefore genetically identical.

### **Ecological relationships of glittering wood-moss**

Although it is a small plant, glittering wood-moss is nonetheless a prominent feature of the Caledonian Forest ecosystem, because of its abundance. In areas where it is profuse, it helps to keep the soil moist, which benefits the growth of other plants. Organic matter which becomes trapped on the moss will decompose to become soil, partly through the action of invertebrates such as mites and nematodes.

While glittering wood-moss often predominates on the forest floor in large areas of the boreal forest, it does grow with other mosses as well. In the Caledonian Forest, common species found with it include red-stemmed feather moss (*Pleurozium schreberi*), big shaggy-moss (*Rhytidiadelphus triquetrus*) and common haircap moss (*Polytrichum commune*).



*Detail of a single frond, showing the red stem and the pinnate branching pattern.*

As a highly shade-tolerant species, it will gradually replace more light demanding organisms, such as some lichens, as a closed canopy forms overhead in the forest. As the moss grows and develops, it produces more organic material on the forest floor or other substrate where it is growing, and this in turn aids the establishment of soil-dependent vascular plants such as blaeberry (*Vaccinium myrtillus*) and cowberry (*Vaccinium vitis-idaea*).

Glittering wood-moss is utilised by a number of vertebrate species, and red deer (*Cervus elaphus*), for example, will occasionally eat it. It is used by various birds, including the crested tit (*Parus cristatus*), as a nesting material, but this is most likely due to its abundance in the forest, rather than a preference for it over other moss species.

It has also been used extensively by humans, for lining fruit and vegetable storage boxes and as a covering for dirt floors in former times. It is still used for filling the gaps between the logs in log cabins in Alaska and northern Canada and by florists for garden plant boxes and hanging baskets. Recently, it has been identified as one of a number of moss species which contain effective anti-tumour agents.