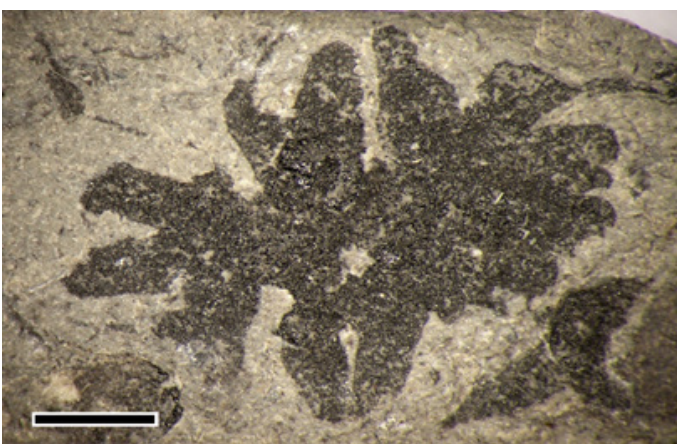


Liverworts



Liverworts belong to a group of plants known as the Bryophytes that include moss and hornworts. Green and small, they are amongst the simplest of land-dwelling plants. Liverwort fossils provide the earliest evidence of plants colonizing the land. They were discovered in Argentina in rocks dating to between 473 million and 471 million years ago. Liverworts have an even more simplified structure than moss and share a common ancestry with green algae.

(See previous handouts)



An example of a fossilised liverwort from the Devonian period – 50 million years ago

The name 'liverwort' derives from the Anglo-Saxon word 'lifer', meaning liver and 'wyr', the word for plant. The structure of the plant was thought to resemble the lobes of a human liver and thus, useful in the treatment for liver conditions – which they are not.

There are approximately 8,500 species of liverworts distributed across diverse environments. Due to their limited ability to transport and store water, they must be able to absorb it continuously. However, as long as the habitat is moist, liverworts can withstand very harsh climates and extreme temperatures. They live on rocks, tree trunks as well as directly on the soil.

Liverworts are ecologically important because they reduce erosion along stream banks, collect and retain water in tropical forests and are significant in the formation of soil crusts in deserts and polar regions.



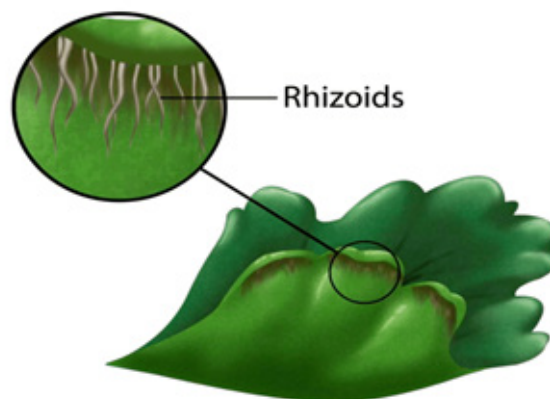
Liverwort growing on a tree trunk



Liverwort attached to a rock face

Liverworts lack some of the complex structures seen in other types of plants. They do not produce flowers or seeds, and have no internal means for transporting water or nutrients. Being non-vascular, (lacking the internal tubes of more complex plants,) they cannot grow upwards. Instead, they hug the surface of the support structure on which they live.

Like moss, liverworts do not have roots. Instead, they have rhizoids, small, hair-like fixtures on the bottom of the plant that attach themselves to rocks, trees, or soil. Liverworts use rhizoids to help collect water.



There are two types of liverwort, characterised by their general structure: **leafy liverworts** that resemble moss and grow on trees in damp woodland and the **thallose liverworts** that look like flat, green ribbons that grow on damp soil or on moist rocks.

Leafy liverworts usually consist of a stem with three rows of leaves. The leaves are very thin and transparent. Two of the rows of leaves are flattened and utilised for photosynthesizing. The third sits underneath the stem and is used to absorb water. The leaves are composed of a single layer of cells making it easy to transport water through to each part of the plant.



A close up of leafy liverworts

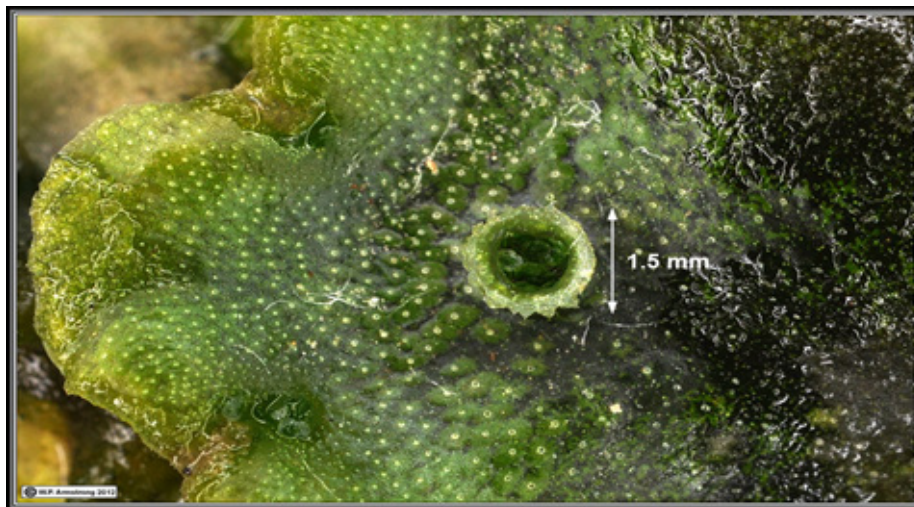
The thallose liverwort have neither leaves nor stems and resemble moist, green pancakes. Forming dense, prostrate mats that cover the soil, thallose liverworts can become a serious problem in container grown plants.

They compete with ornamental plants for water, nutrients and space. The liverwort mat can prevent the irrigation water reaching the root zone of the ornamental crop and can repel water when dry.



Liverworts reproduce both sexually and asexually producing spores, just as moss and fungi. Their predominant form of reproduction is asexual, where spores are produced, dispersed by wind or water and establish new growth.

Thallose liverworts (ones that have lobes) have goblet-like structures for asexual reproduction. Inside each tiny cup are green, egg-shaped discs of tissue, called gemmae. When raindrops knock gemmae out of the cups, another liverwort plant with the same genetic make-up as the parent will grow.



A gemma cup on a thallose liverwort, with spores in it

For sexual reproduction, liverworts develop miniature umbrella-shaped structures, both male and female. Sperm released from a male “umbrella” swim along the plant’s moist surface and fertilize the egg. An embryo grows and develops into a capsule, which releases spores that are carried to different locations by the wind.



Liverworts are very sensitive to shifts in environmental conditions and are an important marker in charting climate change.