

Lichen – The Fungi that Developed Agriculture

How do Fungi Feed?

The Kingdom of Fungi is a vast and varied kingdom that is hugely successful. This is because the fungi have developed a wide range of different ways of getting energy. They can be parasitic and feed on a host plant without providing any benefit in return. They can be adapted to decomposing dead wood, thus recycling material back in to the soil. And they can work with other living plants to earn some of their energy. A common way they do this is by attaching themselves to the roots of plants to effectively extend the root network. This means that in exchange for providing the fungi with energy the plant gets access to more resources in the soil than it could reach on its own.

It could also be argued that fungi have developed agriculture in the form of Lichens. These are the bushy moss-like organisms that we see dripping off the trees in the Highlands, but also the more inconspicuous crusty and powdery forms that live on walls and fences everywhere. Many people do not associate them with fungi, but they could arguably be the most successful of them all.



Map lichen (*Rhizocarpon geographicum*)

What is a Lichen?

A lichen is a combination of fungi and free-living algae. The fungi engulf the algae surrounding it in a fungi 'sandwich' to gain the energy from its photosynthesising. In return the algae gain protection from the fungi and can survive in a range of habitats that they could not inhabit in a free-living form. This seems to have been an extremely beneficial relationship, so much so that the lichen forming fungi cannot survive without an algal partner. So, this is the only way that these species of fungi can survive. And they survive well. Lichen are some of the oldest recorded organisms on earth [1] and some of the hardiest on earth! In fact, the Map Lichen (*Rhizocarpon geographicum*) was transported to the international space station and held in the vacuum of space for 15 days before being returned to earth, where it continued to grow again quite happily [2]. Going in to detail about how lichen manage these incredible feats would take too long for a blog post. But if I've wetted your appetite you can find out more information at the British Lichen Society website [3].



Usnea and Evernia

Lichen in Scotland

Scotland has an impressive diversity of Lichens due to our humid climate, high levels of rainfall and diverse variety of habitats. There are estimated to be 1,500 species in Scotland [4] and some of these are of international importance, as they are not found anywhere else in the world. In the Highlands our abundance of clean air provides us with the fluffiest of lichens, the Usnea and Evernia, which are the ones you can't help but notice dripping off the trees.

ID Tips

With so many species to look out for and many being very simple structures it can be quite hard to identify Lichen to species level. However, it's not impossible and there are some common species that can be identified relatively easily. First look at the structure of the lichen, is it branched and bushy (Like Usnea), or does it have small leaf-like lobes (like Parmelia). What colour is it? Is it the same colour all the way round or does it have a different colour on the top and bottom? Lungwort (*Lobaria pulmonaria*) for example is a big leafy lichen which is green on top but cream underneath. It also has distinctive lung like veins running through it. Does it have any other distinguishing features, like hair like structures on the underside or white cracks on the surface? Is there 'jam tarts' on the surface. Which are the lichen fruiting bodies. What colour are they? They can be black, red, brown or a variety of other colours depending on the species. Further help can be gained from the wonderful FSC Guides on Lichen [5].



Lungwort (*Lobaria Pulmonaria*)

These are all things that you can keep in mind to get to know lichen better. Be warned that it does take some dedication to get in to this topic, but it will open a fascinating miniature world to you, which is worth the work. Happy hunting.

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References/Resources

1. https://en.wikipedia.org/wiki/Rhizocarpon_geographicum
2. <https://www.newscientist.com/article/dn8297-hardy-lichen-shown-to-survive-in-space/>
3. <https://www.britishlichensociety.org.uk/>
4. <https://www.nature.scot/plants-animals-and-fungi/lichens>
5. https://www.field-studies-council.org/product-category/publications/?fwp_keyword_search=lichen