

The Lungwort Lichens

By Terry Taylor

Lungworts are large lichens with a surface covered by ridges and bowlshaped depressions. They grow on trees and are only numerous in areas with clean air. Along the coast in sites with old trees they can be quite numerous and branches fallen from the canopy look as if they are covered with strange pitted leaves. As their large thalli are only loosely attached to the branches, windstorms can bring them down quite regularly.

In such locations these lichens are more than curiosities. They are the fertilizer factories of the forest. The substance Lungworts give to the soil is nitrogen. Nitrogen is often the limiting nutrient in land ecosystems. It is an essential component in the proteins of all organisms, and is the element that makes up most of the air we breathe. However, nitrogen molecules are very stable, and almost inert. It takes a great deal of energy to pry them apart so that they can be combined with other elements and used by living organisms. The only life forms that have developed the biochemistry to do this are a few groups of bacteria. All the larger organisms owe their existence to these bacteria. The reason why we grow legumes to enrich soil is due to the fact that legume roots contain nitrogen fixing bacteria that extract nitrogen from the atmosphere. When their plant hosts die these nitrogenous compounds are released into the soil.

Lichens differ from most of the other organisms with which we are familiar as they are actually two or three separate organisms so closely intermeshed that they form a composite life form that functions as a single organism. Most lichens are a cooperative venture by two kingdoms – a fungus and a plant. The plant is usually a green alga that produces sugars to feed the fungus. The Lungworts are composed of three kingdoms - fungi, plants, and bacteria. The bacteria are blue-green bacteria, one of the groups that fixes nitrogen. Nitrogen-fixation is the process of splitting nitrogen molecules apart and combining the two atoms within each molecule with hydrogen, to make fertilizer. This fixed nitrogen builds the proteins of the lichen while the lichen is alive, but some of the nitrogen leaches out of it, and the rest of it goes into the soil once the lichen falls from the tree. The common Lungwort (*L. pulmonaria*) most often grows in the canopies of old Broadleaf Maple trees. It is most common on the maples of the east coast of Vancouver Island. If you are walking in such a site after a winter storm you may be fortunate enough to find great piles of their leaf-like thalli covering the forest floor. A disaster for the fallen Lungwort, but a banquet for the plants growing here.

Another Lungwort is the Oregon Lungwort (*L. oregana*). Its preferred habitat is the canopies of old-growth Douglas firs. It is very similar to the previous species, but has a slightly different colour, and the edge of the lichen is minutely frilly. In its coniferous forest habitat its fertilizer contributions are probably even more important than those of the previously described Lungwort. Coniferous forest soils are more acidic and nutrient-poor than those of deciduous forest stands. Veteran Douglas firs can live for a thousand years and in some old forests such as in the Elaho Valley the ground is covered with Oregon Lungwort fragments. The lichens in such areas have been raining down onto the ground for century after century, and are probably the main nitrogen reservoir for these old trees and their associated ecosystem.

