THE OHIO STATE UNIVERSITY EXTENSION

FACT SHEET

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Lichens

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Introduction

There is tremendous diversity in our natural world. As we live our lives, we begin to notice and recognize the most common "higher" plants and animals. We remember through experience the names of plants we have grown, their cultural requirements, and the insects and diseases naturally attracted to them. When it comes to recognizing organisms somewhat outside of the common experience, we may find ourselves a bit lost. This is especially true for the world of bacteria, protists, and other less well-known organisms. This fact sheet will examine some basic information about one unusual component of our natural world — lichens.

What are lichens?

It was once said by the great lichenologist Trevor Goward: "Lichens are a case of fungi that have discovered agriculture." Lichens are peculiar growths that develop when two unlike organisms come together in a mutualistic close association. The symbionts are a member of the Ascomycetes or "sac fungi" (from the Kingdom Fungi) and a green alga (in the Kingdom Protoctista) or a cyanobacterium, formally blue-green algae. The fungus provides a physical structure for the relationship and the cyanobacterium (which is slimey and has no structure) provides the food because it can photosynthesize. The carbohydrates in this food help produce new growth, which looks different than the two hosts. This new vegetative body that is produced is called the *thallus*. There are many variations of this relationship. For example, sometimes club fungi and brown algae are involved, rather than sac fungi and green algae.

What is NOT a lichen?

A lichen is not a true bryophyte (non-vascular land plant), such as a moss or a liverwort. Some of the common names of certain lichens, such as reindeer moss, fool people into confusing lichens with true mosses. The velvety green moss that often grows on the side of trees, in lawns, and on other surfaces is completely different biologically from the lichen symbiosis. The sphagnum mosses used for peat in horticulture are true mosses — and not lichens. Bryophytes are green and leafy and often live in the same places as lichens, but they are plants. They do not have the symbioses between fungi and algae that lichens have.

What do lichens look like?

The thallus body, which in structure is mostly composed of the fungal symbiont, is the most recognizable part of the lichen. There are four basic lichen body types:

1. Lichens that produce leaf-like, two dimensional, flattened, lobed thalli with upper and lower surfaces that grow in layers are known as **foliose lichens**.

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Figure 1. A fruiticose-type lichen attached to an azalea plant *(photo by David J. Goerig)*.

Figure 2. A crustose-type lichen growing on the bark of a tree *(photo by David J. Goerig)*.

2. **Fruiticose lichens** grow erect or pendulous in three dimensions and have no distinguishable upper and lower surfaces.
3. **Crustose lichens** look somewhat like the name implies. They form a crust over their substrates, like rocks and trees. The lower surface of crustose lichens attaches firmly to many surfaces and forms brightly colored patches of a thick, rough naturalized texture.
4. **Squamulose lichens** can be described as a mix between foliose and crustose growth forms. Their shape is scale-like and they attach at the lower surface like tiny shingles. There are other intermediate types that include one or more characteristics of the previously mentioned growth forms.

Where do lichens grow?

Lichens are located on every continent on Earth. They survive in all climates and altitudes. Lichens have specific cultural requirements, but in general they require three things to become established: (1) undisturbed surfaces, (2) time, and (3) clean air. Lichens grow on most any undisturbed surface commonly known as their substrate. Bark, wood, mosses, rock, soil, and peat are all natural substrates. Thalli will also establish itself on glass, metal, plastic, and cloth. Most lichens are restricted to certain types of substrate. Lichens normally found on tree bark, for instance, are rarely found on rock and vice versa. Lichens established on stone in the landscape give the garden a mature look. Discovering a lichen growing on your tree is not a bad thing. In fact, it should be celebrated by giving you peace of mind knowing that the environment in your neighborhood is clean enough to support the dual organism.

Do lichens damage plants?

Lichens do not cause plant damage. The lichen symbiosis is not damaging bark in any direct ways. It does not rob bark of moisture. The fungal symbionts of the lichen do not parasitize living plant cells and lichens do not appear to be associated with providing entranceways for pathogens into plant tissue. Why do so many people, including many horticulturists, think lichens damage plants? Perhaps it is because when branch decline occurs (due to other factors), lichen growth sometimes proliferates. This is due to increased sunlight that penetrates to the bark and favors the growth and development of the lichens. As with many things in nature, there are exceptions to the rules. For example, one indirect way in which lichens negatively impact plants is reported in *Lichens of North America* by Brodo, Sharnoff, and Sharnoff. It is stated that in Canada, hemlock looper (*Lambdina fiscellaria*) is a serious forest pest. This moth "lays its eggs almost exclusively on hair lichens such as *Bryoria trichodes*."

Lichens are important partners in nature's ecosystem and should be admired and studied when seen on landscape plant and hardscapes. They are

Figure 3. *Flavoparmelia sp*. Greenshield lichens growing on tupelo tree bark *(photo by David J. Goerig)*.

early colonizers that reestablish life on rock and undisturbed sites. Lichens play important roles in soil formation over much of the earth. As lichens colonize rocks, they trap dust. Because of their association with cyanobacteria, lichens can provide themselves with nitrogen compounds. Lichens contribute to the nitrogen cycle by converting the nitrogen in the air into nitrates that help in their growth and development. Their ability to fix atmospheric nitrogen is beneficial to other plant life as well. When it rains, nitrogen is leached from both living and dead lichens and is available to plant life in the immediate area. As lichens die, they contribute to decayed organic matter to the area they inhabit, which enables mosses and seeds from vascular plants to begin developing among the pockets of new soil.

Animals utilize lichens in many interdependent ways. It is well documented that numerous animals use lichens for food or shelter. Around fifty species of birds are known to regularly use fruiticose lichens as their preferred nesting material. Small animals commonly use lichens to hide from natural predators through camouflage and direct cover.

Links:

Lichens of North America, http://www.lichen.com, Brodo, Sharnoff, and Sharnoff.

Lovable Lichens, http://www.earthlife.net/lichens/intro.html

The New York Botanical Gardens, An Introduction to Lichens, http://www.nybg.org/bsci/lichens

Oregon State University, Lichenland, http://ocid.nacse.org/lichenland/

Ohio Moss and Lichen Association, http://www.ohiomosslichen.org/

USDA Forest Service, Lichen Biology, http://www.fs.fed.us/wildflowers/interesting/lichens/biology/index.shtml