



COMMON LICHENS OF OHIO **field guide**

DIVISION OF WILDLIFE



INTRODUCTION

This booklet represents the 15th publication in the Division of Wildlife's ongoing series of informative works about Ohio's natural history. Previous booklets cover birds, mammals, dragonflies, fish, butterflies, moths, amphibians, reptiles, and spiders. Collectively, over one million copies have been distributed to Ohioans. Recipients include schools, nature centers, natural history organizations, and scores of interested citizens. While lichens may seem an obscure topic, these organisms play an important role in contributing to Ohio's rich biodiversity. Lichens support numerous interesting animals, and play an important role in ecology.

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HOW TO USE THIS GUIDE



Lichens are found in many shapes and sizes, but they can be generally categorized into three growth forms: crustose, foliose and fruticose. The lichens in this field guide are grouped according to growth form and the different forms are described in detail at the beginning of each section.

COMMON LICHENS OF OHIO

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WHAT ARE LICHENS?

What are lichens? Lichens are one of the most interesting, yet least understood groups of organisms. They are present almost everywhere and are one of the most widely-distributed entities in nature. People walk past them every day without noticing them or the animals frequently associated with them. Lichens are found in many colors such as gray, brown, yellow-green, yellow and orange. A few lichens turn green when wet, but usually if something is green it is not a lichen.

Lichens are a good example of symbiosis – two different organisms living together in close proximity, with both partners benefiting from this association. In the case of a lichen, the two partners (also called symbionts) are a fungus and an alga (or sometimes a cyanobacterium, formerly called a blue-green alga). Each lichen species has a different species of fungus, but the same species of algae could be present in scores of different lichens.

There are many examples of symbiosis in the natural world -trees and mycorrhizal fungi, ants and aphids, cows and cellulose-digesting bacteria in their stomachs to name a few, but in all these other symbioses the partners retain their own identity. With lichens, those identities are lost and a new, composite organism with a new identity is formed. A lichen looks different from either partner, can live where neither partner can live alone, and can produce chemicals that neither partner can produce.

*RIGHT: The author of this booklet, Ray Showman, stands by an oak in Adams County, Ohio festooned with his namesake lichen, *Hypotrachyna showmanii*. Showman discovered this species in Vinton County, Ohio in the early 1970's, and it was described to science in 1976. It has since been found in a total of nine southern Ohio counties, and is considered rare in the eastern U.S.*



DISTRIBUTION

Lichens are one of the most widely distributed of all organisms, second only to bacteria. They are estimated to be the dominant life form on around 8% of the world's land surface. This includes the Arctic and Antarctic and high mountain areas where nothing else can grow. Because lichen reproduction is by microscopic propagules, many lichens are widely dispersed. Some are circumpolar, the same species may be present all around the northern hemisphere – northern North America, Europe and Asia. Other species could have populations centered in the Appalachian Mountains but due to the windblown propagules might have scattered individuals far away.



Lichens are common in tundra habitats like St. Paul Island, Alaska

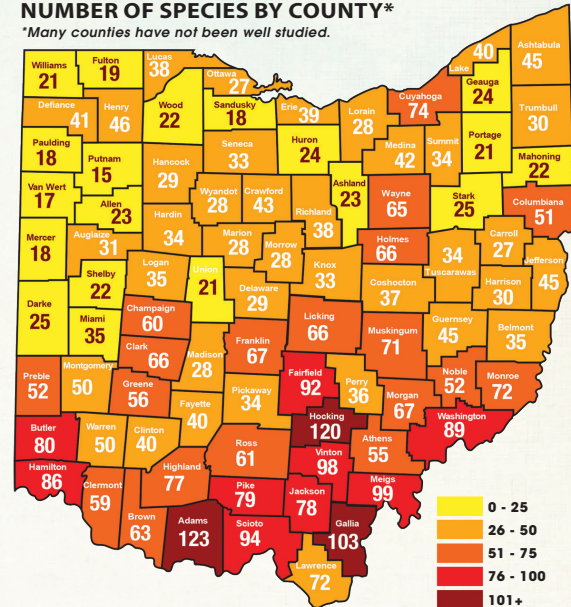
Worldwide there are around 15,000 lichen species. North America hosts around 3,600 different lichens while Ohio has records of 249 crustose lichens and 235 macrolichens (foliose and fruticose taken together). As you might imagine, lichens are not evenly distributed across Ohio.

The accompanying map shows the number of macrolichen species per county. Crustose lichens have been rarely studied so their distributions in Ohio are almost unknown. The variety of habitat is much greater in the hilly and more wooded area of southern Ohio, so more lichen species are present there.

Good places to see lichens are the Shawnee State Forest and most of the state parks in southern Ohio. Try a sunny roadside bank with scattered trees or a picnic area with scattered trees. Remember, lichens need plenty of sunlight. Look for fallen limbs, these usually have several different lichens.

NUMBER OF SPECIES BY COUNTY*

*Many counties have not been well studied.



STRUCTURE OF LICHENS

Lichens have been called “fungi that invented agriculture.” Fungi, of which other, non-lichenized, examples include molds, mushrooms, and morels, are more closely related to animals than they are to plants. Thus, instead of producing their own food by photosynthesis as plants do, fungi need to “eat” something. The body of most fungi consists of pale, hair-like filaments called “hyphae.” Hyphae are the organs fungi use to acquire food, either by secreting extracellular digestive enzymes and then directly absorbing the digested food (mushrooms do this), or, as in some parasitic and symbiotic fungi (including lichens), by using special absorptive hyphae to adhere closely to, surround, or even directly enter the cells of other organisms. In both molds and the underground portions of mushrooms, the hyphal strands are loose and sparsely arranged (recall what happens when strawberries sit too long; the white strands you see are mold hyphae). Often, however, hyphae are packed tightly together, forming

a firm, macroscopic (visible to the unaided eye) complex structure such as a toadstool, a bracket fungus, or a lichen.

A drawing of a thin cross-section of a typical foliose lichen thallus (as the body of a lichen is called) seen through a microscope shows its distinct internal organization, with a clear stratification into functional zones. The skin-like outer surfaces, composed of firmly compressed cells, are the upper and lower cortex. Most of the area between the upper and lower cortex is occupied by a loose, cottony tangle of hyphae termed the medulla. Sandwiched between the medulla and the upper cortex, where sunlight and moisture can penetrate, is the thin but crucial algal layer. This is a colony of single-celled photosynthesizing organisms, typically green algae, which are “farmed” by the fungus. Rhizines are frequently found on the lower surface. These are tiny hold-fasts that resemble roots and anchor the lichen to the substrate. They can be simple (unbranched) or branched in several different ways.

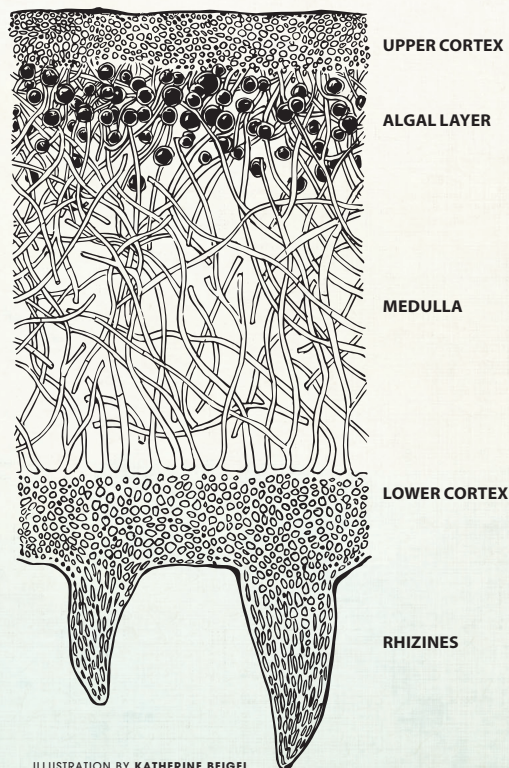
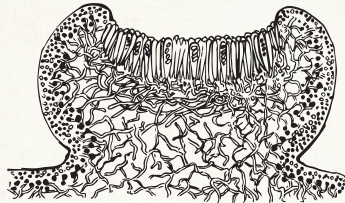


ILLUSTRATION BY KATHERINE BEIGEL

HOW DO LICHENS REPRODUCE?

Lichen reproduction and colonization can occur in two ways: the production of sexual spores, and through some sort of asexual fragmentation. Spores are microscopic, single cells that can develop into entire new multicellular organisms. The fungus group to which the great majority of lichens belong, the class Ascomycetes, are sometimes called “cup fungi,” because the specialized spore-producing hyphae (the asci) are packed together in a neat little button-shaped cup, the “apothecium.” Spores released into the air can be blown to a new place where they germinate and start a new fungus. This new fungus must immediately find the correct species of alga to form a new lichen, or it dies. Some lichen algae can live independently but no lichen fungi can. This may seem haphazard, but some lichens are successful with this method of reproduction.



APOTHECIUM

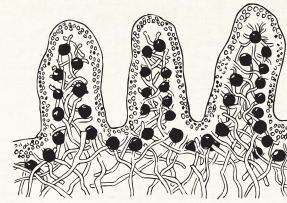
When lichens reproduce by fragmentation, a small portion of the thallus containing both partners breaks off and is transported to a new location where it grows to a new thallus. Many lichens have specialized structures that enhance fragmentation. The most common asexual propagule (small particle that can be transported and form a new organism) is a soredium. Soredia are very tiny (barely visible to the unaided eye) dust-like or granular balls of hyphae along with a few intertwined algal cells. They are borne through breaks in the upper cortex that are usually aggregated into easily-seen rough patches called “soralia.” The size of soredia ranges from dust-like to coarsely granular, and they may be located on the flat surface of the lichen, or along its margin. These are distinguishing features that can help in telling lichens apart.



SOREDIA

A somewhat less common, but by no means rare, asexual propagule is formed from isidia. Isidia are small buds that form on the upper surface of lichens that contain both the upper cortex (fungus) and algal layer. These generally tubular or stump-shaped projections eventually break off from the lichen’s surface, leaving a microscopic scar. Using a hand lens, a lichen with isidia can usually be distinguished from one with soredia by having a bumpy yet shiny surface, (shiny because the cortex is intact).

Most lichens that reproduce through asexual fragmentation will be either sorediate or isidiate, not a mixture of the two. They may, however, also have apothecia and produce spores. Some lichen species are neither sorediate nor isidiate; these types are most likely to have abundant apothecia.



ISIDIATE

ILLUSTRATIONS BY KATHERINE BEIGEL

LICHENS & AIR POLLUTION

Around 150 years ago naturalists noted that lichens were dying out in city centers. Smoke was thought to be the reason and since then experiments have proven that many lichens are very sensitive to sulfur dioxide, the main pollutant in coal smoke. Lichens can be surveyed around cities and industrial areas and used to map the ground-level effects of air pollution.

In Ohio, lichens have been used to study air quality around coal-fired power plants and in some of the state forests. Most areas in Ohio were found to have relatively good air quality. However, one exception was the upper Ohio River valley where there was a large area affected by pollution. This was reputed to be one of the most polluted areas in the US. One sensitive lichen, the Common Greenshield (described in detail later), was absent from hundreds of square miles and was reduced in numbers in a much larger area. In the most affected part of the valley many places had no lichens at all, even though suitable habitat was present.

Several things combined to reduce air pollution in this region. The Federal Clean Air Act was passed in 1972. This regulated the pollution that was allowed and subsequent regulations

have greatly reduced the amount of sulfur dioxide pollution. In the mid-1970's a recession caused many old, inefficient coal-burning industries to close. Around this same time older houses with coal furnaces were converted to gas or oil furnaces. Now, not only sulfur dioxide, but also nitrogen oxides and particulate pollution have been almost eliminated.

By about the mid-1980's lichens had started to recolonize formerly impacted sites. Continuing studies showed that at present the effect on lichens has almost completely healed. Air quality is now good enough that other factors (sunlight, etc.) far outweigh pollution in determining where lichens can grow.



Power plant at Avon Lake, Ohio

HUMANS & LICHENS

Humans have found a number of fairly minor uses for lichens. These include emergency survival food (try a tiny bit of a lichen and see what you think), use in perfumes and skin lotions, and use in model sets and artistic projects such as wreaths. Perhaps the best known use is as a natural dyeing agent. The examples usually given are Scottish tweeds and Navajo weavings. Lichen chemistry is now well known and lichen species can be chosen (according to the chemicals they contain) to give different colors.



Wool dyed with three Ohio lichens

ABOUT THE AUTHOR & PHOTOGRAPHER



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RAY SHOWMAN

Ray E. Showman is a biologist who spent his career with American Electric Power. He was the first lichenologist hired to specifically study the effects of power plant emissions on lichens. He is coauthor of *The Macrolichens of Ohio* (2004). Ray lives in lichen-rich woods in Vinton County, Ohio.

WANT TO LEARN MORE?

If you would like to learn more about lichens there are several books that we recommend. *Lichens of North America* by Irwin M. Brodo, Sylvia Duran Sharnoff and Stephen Sharnoff (2001, Yale University Press) is a must. This is a large (795 pages) book covering all aspects of lichenology in the comprehensive introduction. It describes most North American lichens with keys to the species and wonderful color photographs. For details on Ohio lichens try *The Macrolichens of Ohio* by Ray E. Showman and Don G. Flenniken (2004, Ohio Biological Survey). This contains keys to the genera and species, descriptions of species and Ohio distribution maps (unfortunately no photographs).

For additional information, visit the website of the Ohio Moss and Lichen Association at www.ohiomosslichen.org. This group has two forays per year, concentrating on under-collected counties. So far the group has added to the knowledge of the distribution of lichens and bryophytes in Ohio with many new county records and several new state records.

COMMON LICHENS OF OHIO

LICHEN AND ANIMAL INTERACTIONS

Lichens are an abundant and widespread group of organisms, occurring throughout Ohio and much of the world. Long term evolutionary relationships have been forged between lichens and numerous groups of animals. In some animal species, their connection to lichens is essential, and they would probably perish if their lichen hosts were to vanish. Such interdependency could be termed an obligate relationship. Other animals use lichens when convenient, but do not depend on them for survival. These sorts of associations can be

considered facultative relationships. Lichens spawn a diverse and robust fauna, especially among insects. Some experts believe that species in at least half of all insect orders (there are 32 orders worldwide) have relationships with lichens.

Lichen/animal relationships include insects that mimic the appearance of lichens for purposes of camouflage. Lichens can also serve as food for a variety of animals, from caterpillars to white-tailed deer. Dense clus-

ters of lichens provide shelter for numerous small animals such as barklice, springtails, and mites. Lichen-foraging predators include lacewing larvae and spiders that hunt for victims in and around lichen colonies. Finally, several species of birds make use of lichens as nest material, which serve as disguise and make the nest appear to be a lichen-encrusted knot on a branch.

Examples of lichens' relationships with animals are scattered throughout the booklet.



White-breasted nuthatches often forage in lichens.

PHOTOS BY JIM McCORMAC



Fishing spiders stalk prey among lichens.

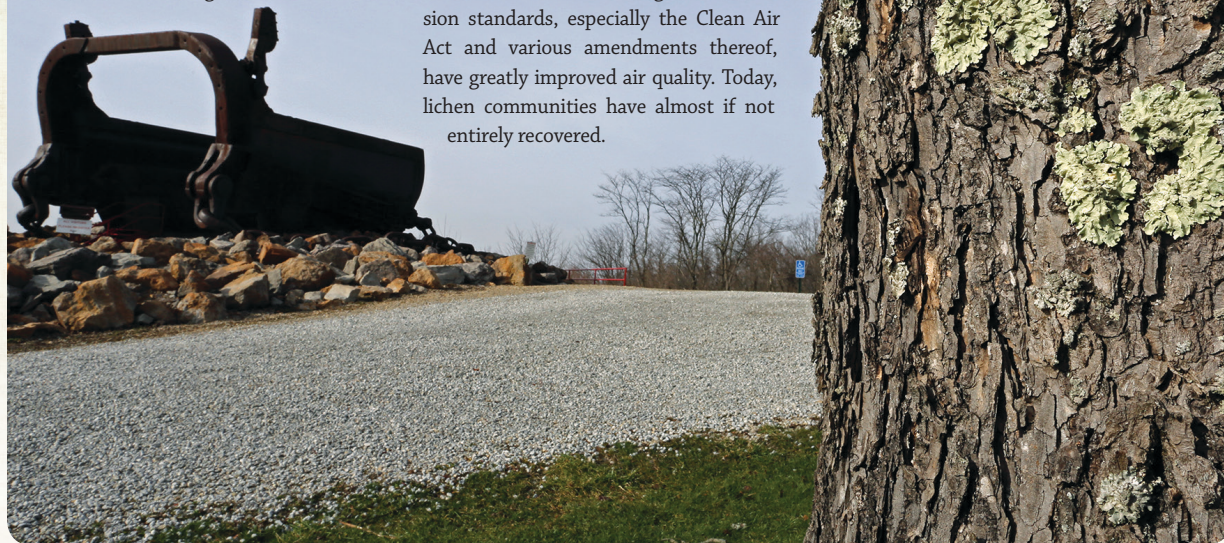


Blue-gray Gnatcatchers shingle their nests with lichens.

The bucket of the Big Muskie provides the backdrop for a lichen-encrusted tree trunk at Miners' Memorial Park in Morgan County, Ohio. The Big Muskie, which operated from 1969 to 1991, was one of the largest draglines ever built. This bucket could hold 295 tons of overburden, and over the course of its service, the Big Muskie excavated in

excess of 608 million cubic yards of earth to expose the underlying coal seams. At one time, power plants fired by coal emitted high levels of sulfur dioxide, which caused significant air pollution. One ill effect was the destruction of sensitive lichens for miles around coal-burning power plants. Enactment of laws that tightened emission standards, especially the Clean Air Act and various amendments thereof, have greatly improved air quality. Today, lichen communities have almost if not entirely recovered.

PHOTO BY JIM MCCORMAC



lichen groups in this book

CRUSTOSE (13 - 21)

Crustose lichens are thin and very tightly attached on the substrate on which they grow. They frequently grow in a circular pattern and can be no thicker than a coat of paint. Most crustose lichens are stratified (layered) with a fairly hard upper cortex in top, consisting of dense fungal cells or hyphae. Next is a thin algal layer where all of the algae are located, followed by the medulla, a looser tissue of fungal cells. The medulla is directly on the substrate and frequently penetrates the rock or bark. One group of crustose lichens (called the dust lichens) is not stratified and the fungal hyphae and algal cells are jumbled together. Crustose lichens do not have a lower surface and it is nearly impossible to separate one intact from the substrate.

Foliose (24 - 56)

Foliose lichens are flat and leaf-like. Growth occurs at the outer margin and is usually in a circular pattern. Areas of faster growth produce lobes which may be large or small depending on the species. Some species of foliose lichens may grow together, coalescing into large indistinct patches. Some foliose lichens lie very flat on the substrate while others may have edges that curl above the substrate.

Most foliose lichens are stratified into four layers: the upper cortex, algal layer, medulla and lower cortex. This is similar to the stratification described for crustose lichens except the lower cortex which is a distinct bottom to the foliose lichen, not found in crustose species. Rhizines are frequently found on the lower surface. These are tiny hold-fasts that resemble roots and anchor the lichen to the substrate. They can be simple (unbranched) or branched in several different ways.

FRUTICOSE (58 - 73)

The third form is called fruticose. These lichens are upright like tiny trees or bushes, or they can hang down like a miniature vine. Fruticose lichens are long and skinny with a round or flattened cross section. They have an outer cortex, algal layer and medulla, but not a definite top and bottom like their foliose cousins. The center is sometimes hollow or can have a denser central strand. There is a large family of fruticose lichens that are called cladoniform. These consist of two parts, a primary thallus which is the first thing to grow and is usually crustose or formed by numerous small plates called squamules. The second part is an upright, fruticose structure called a podetium (plural – potetia). This is the most common type of fruticose lichen in Ohio.

While many lichens are common and widespread, Ohio also has its share of rare lichens. Some of these are common elsewhere but at the edge of their range in Ohio and some are rare throughout their known range. One factor that adds to the number of rare lichens is the way that they are disseminated. A microscopic propagule can be windblown for hundreds of miles then grow into a lichen far away from its normal range. Some of Ohio's lichens follow this pattern and are known from only a single specimen, with no known extant populations.

CRUSTOSE

Common Button Lichen

Buellia stillingiana

The thallus of this crustose species is pale gray. The numerous apothecia, always present, are black.

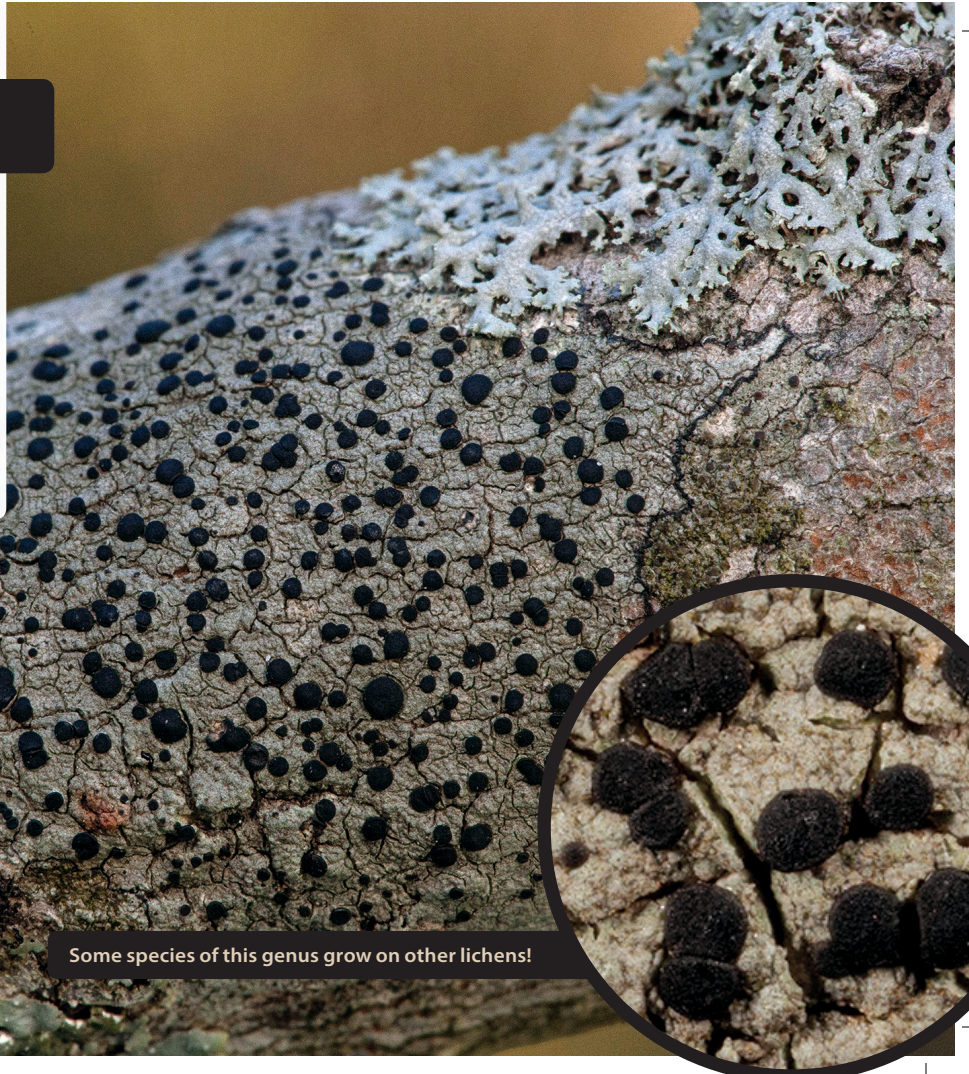
HABITAT: This species grows on a variety of tree species in light shade.

DISTRIBUTION: As the common name implies, this species is common in eastern North America. It should be present anywhere in Ohio where suitable habitat exists.

SIMILAR SPECIES: Seven species of *Buellia* have been found in Ohio and all are somewhat similar.

PHOTOS BY ROBERT KLIPS

Some species of this genus grow on other lichens!



CRUSTOSE

Sidewalk Firedot Lichen

Caloplaca feracissima

This is a tiny lichen (hands and knees and lens to see it). The thallus soon disappears leaving abundant dull orange apothecia with lighter margins.

HABITAT: This species grows on mortar, cement and limestone in full sun.

DISTRIBUTION: This northern US lichen is common in Ohio, probably present on almost all urban and suburban sidewalks.

SIMILAR SPECIES: *Caloplaca* is a large genus with 133 North American species, 19 so far found in Ohio. This is the only species commonly found on sidewalks.

PHOTOS BY ROBERT KLIPS

As the name implies, this species is common on sidewalks. It is so abundant that sidewalks may turn a greenish-yellow color when wet due to this lichen.



CRUSTOSE

Common Script Lichen

Graphis scripta

This crustose lichen forms whitish to greenish gray patches with linear apothecia. These are black, usually prominent, and frequently curved and branched.

HABITAT: This lichen grows on the bark of a number of species, but prefers smooth, hard bark such as maple or hickory to the rough, softer bark of ash and walnut.

DISTRIBUTION: This eastern US lichen is common in Ohio. It could be present anywhere that suitable habitat exists.

SIMILAR SPECIES: This is the only crustose lichen with linear apothecia found in Ohio.

PHOTOS BY ROBERT KLIPS

15

Named for the linear dark apothecia which resemble scribbles or perhaps chicken tracks. It has also been called the 'cryptic writing lichen'.



CRUSTOSE

Bumpy-rim Lichen

Lecanora hybocarpa

This species has a pale gray thallus with prominent apothecia. The apothecia have a brown to reddish-brown center with a light colored, bumpy margin.

HABITAT: This lichen grows on a variety of tree species, frequently on twigs and branches.

DISTRIBUTION: An eastern US lichen that has been found in 8, mainly southern Ohio counties.

SIMILAR SPECIES: Many *Lecanoras* look similar and in fact, a lot of other crustose lichens also look alike. This is why the crustose group is so difficult and is tackled by only a few dedicated individuals.

PHOTOS BY ROBERT KLIPS

Lecanora one of the largest crustose genera with 171 species in North America. So far, 18 species have been found in Ohio.



CRUSTOSE

Fluffy Dust Lichen

Lepraria lobificans

This crustose lichen has a fairly thick, fluffy thallus consisting almost entirely of soredia, thus leading to the common name 'Dust Lichen.' The color of the thallus is a pale yellow-green to greenish gray. The thallus can have rounded edges but is often an indistinct mass.

HABITAT: This lichen grows on rocks and trees in shade. It is one of the most shade tolerant lichens and can sometimes be found where no other lichens grow.

DISTRIBUTION: This eastern US species is common in Ohio and should be in most counties.

SIMILAR SPECIES: There are 7 species of Dust Lichen in Ohio and all share the same general appearance.

PHOTO BY ROBERT KLIPS

This species is one of the sources of soredia that camouflage lacewing larvae.

Zoned Dust Lichen

Lepraria neglecta

Our dust lichens (genus *Lepraria*) may be separated into 2 groups, based upon morphological characteristics. One group is those that appear granular, have a thin thallus, and lack a medulla. The other group (see fluffy dust lichen, page 17) consists of species that are essentially fluffy, with a relatively thick thallus and an apparent medulla. Zoned dust lichen is a member of the granular group. It forms coaster-sized, distinctively blue-gray patches on rock, often displaying target-like concentric growth rings, appearing zoned with light and dark bands..

DISTRIBUTION: Wide-ranging in the northeastern U.S., this species is reported to be very common on partly shaded or exposed granitic rocks. In Ohio, it is known from areas in the northeast and southern portions of the State, where sandstone outcrops are prominent. The photo was taken at Conkle's Hollow State Nature Preserve, one of our premier locations for observing lichens.

SIMILAR SPECIES: When in this "zoned" form it is rather easily identified. However, it may be found as patches of granules without any appearance of zonation. In circumstances such as this, chemical spot tests are necessary to distinguish it from other granular dust lichens.



CRUSTOSE

Wart Lichen

Pertussaria multipunctoides

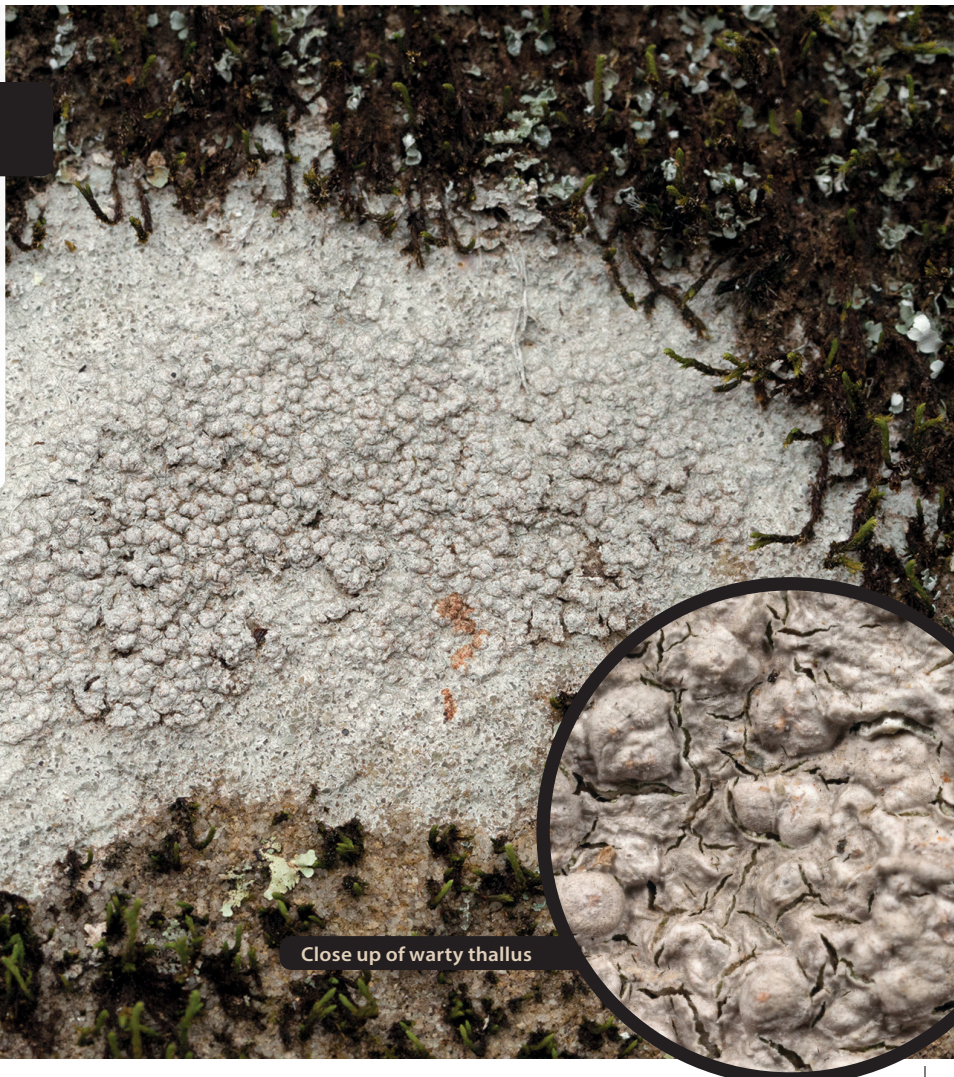
This lichen has a gray thallus with numerous warts which erode and become whitish spots.

HABITAT: This species grows on bark in sunny locations.

DISTRIBUTION: This eastern US species is the most common Wart Lichen in Ohio. It should be present in many counties.

SIMILAR SPECIES: There are 11 *Pertussaria* species in Ohio and all have a gray, warty thallus.

PHOTOS BY ROBERT KLIPS



CRUSTOSE

Smokey-eye Boulder Lichen

Porpidia albocaerulescens

This crustose lichen has a light gray thallus with numerous, fairly large apothecia. The apothecia are darker gray to blue-gray with a black margin. Thalli are frequently hand-sized or larger.

HABITAT: This species prefers shaded sandstone boulders and slump blocks. Frequently found competing with mosses.

DISTRIBUTION: This eastern US species is mainly southern and eastern in Ohio where suitable habitat exists.

SIMILAR SPECIES: No other species has this combination of characteristics and ecology.

PHOTOS BY ROBERT KLIPS



CRUSTOSE

Bordered Scale Lichen

Psora pseudorussellii

This is a distinctive, even striking species that does not fit well in either the crustose or foliose group. It consists of rounded squamules, reddish brown when dry and green when wet, with a white margin. The numerous apothecia are rounded and rusty brown.

HABITAT: This species grows on limestone, dolomite and coarse, limy soil in full sun.

DISTRIBUTION: This northeastern and central US species is limited in Ohio to counties with exposed alkaline bedrock. It is fairly common in Adams County.

SIMILAR SPECIES: No other Ohio lichen resembles this species.

PHOTO BY MARK ZLOBA



COMMON LICHENS OF OHIO

lichen AND ANIMAL INTERACTIONS



Green Leuconycta
Leuconycta diptheroides



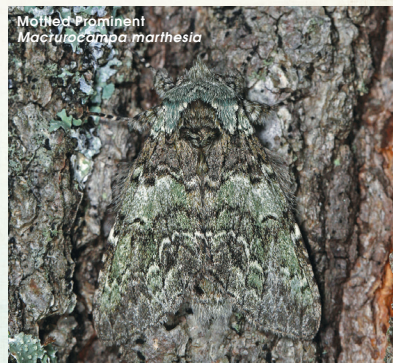
Spotted Phosphila
Phosphila miselloides

Moth Lichen Mimics

The massive order Lepidoptera includes conspicuous butterflies, and their more poorly known darker side, the moths. In Ohio, there is an estimated 3,000 species of moths – about 22 times the number of butterfly species! See the Ohio Division of Wildlife publication “Common Moths of Ohio” for a taste of our moth diversity. Most moths are nocturnal, and they must conceal themselves during the day. Some species hide in plain sight, by evolving a close resemblance to objects such as tree bark. Among the more interesting of these moth mimics are those species that resemble lichens. These moths rest among lichens on tree trunks during the day, and thus become one with the tree, sometimes to a remarkable degree. The adjacent photos depict moths that, when resting among lichens, are rendered nearly invisible.



The Joker
Feralia jocosa



Mottled Prominent
Macrurocampa marthesia

Caterpillar Lichen Mimics



Illa Underwing moth caterpillar
Calocalla illa

Just as moths can blend extraordinarily well with lichen-encrusted tree bark, so can their larval stages, the caterpillars. Moth caterpillars that are specialized lichen feeders are often very small and match their host lichens to a remarkable degree. Others, such as the two species shown here, do not feed on lichens but spend much time on tree trunks or branches. Their lichenlike patterning and coloration helps them to avoid detection by predators.



Inchworm
Geometrid Family

Little White Lichen Moth

The caterpillars of this small moth feed exclusively on lichens, and probably primarily eat the algal component of the food lichen. Little White Lichen Moth caterpillars are tiny and blotched with mosslike patterns of dappled green. They blend extraordinarily well with the lichens upon which they feed. This species is one of a relatively small suite of moths whose caterpillars utilize lichens as a food source. This group of caterpillars is mostly poorly understood, in part due to the difficulty of finding them.



Little White Lichen Moth
Clemensia albata

PHOTOS BY JIM McCORMAC

FOLIOSE

Lemon Lichen

Candelaria concolor

This lichen is small, usually no larger than a fingernail, with very minute lobes (you will need a hand lens to see them). Thalli sometimes coalesce to form larger patches. Color of the upper surface is greenish yellow to lemon yellow, with a whitish undersurface. This species produces numerous soredia, sometimes almost covering the thallus. Apothecia are very rare.

HABITAT: This species grows on bark in full sun. It prefers the softer bark of ash, walnut and maple to the harder, acidic bark of oaks.

DISTRIBUTION: Found in all of the contiguous US and in much of Canada. Common in Ohio, almost certainly found in every county.

SIMILAR SPECIES: The sister species, *Candelaria fibrosa*, does not have soredia and nearly always has apothecia.

PHOTO BY ROBERT KLIPS



There are only two species of *Candelaria* in North America and both are found in Ohio. This species is thought to be an indicator of eutrophication (accumulation of nutrients).

FOLIOSE

Ridged Shield Lichen

Canoparmelia crozalsiana

This fairly large (up to three inches in diameter) foliose lichen has broad, rounded lobes. Color of the upper surface is light gray with a black lower surface. The upper surface has prominent reticulately patterned ridges with soredia along the ridges.

HABITAT: This species grows exclusively on bark in full sun to light shade.

DISTRIBUTION: A southeastern US species that is scattered in Ohio. It is fairly common in southern Ohio, rarer in the northern counties.

SIMILAR SPECIES: No other Ohio lichens has the patterned ridging.

PHOTOS BY ROBERT KUPS





FOLIOSE

Tree Jelly Lichen

Collema subflaccidum

This foliose lichen grows up to 2-3 inches in diameter and has broad, rounded lobes, usually wrinkled and contorted. The color is dark green-brown to almost black, with little difference in color between the upper and lower surfaces. The upper surface contains rounded isidia.

HABITAT: Shaded and moist tree bases and rocks. Sometimes seen on streamside trees.

DISTRIBUTION: This eastern North American species is scattered in Ohio with records from 20 counties.

SIMILAR SPECIES: The jelly lichens (*Collema* plus the genus *Leptogium*) number 20 in Ohio and are a difficult group to separate. The Tree Jelly Lichen is the largest and most easily recognized.

PHOTO BY ROBERT KLIPS

This genus contains cyanobacteria as the photosynthesizing partner. These are mixed throughout the thallus without the stratified layers of most foliose lichens. Due to the gelatinous covering of the cyanobacterium this lichen is very rubbery when moist. Thus it is commonly called a jelly lichen.

Common Stippleback

Dermatocarpon muhlenbergii

This lichen has a roundish, leathery thallus, generally one inch more or less which is attached to the substrate by a single point. The color of the upper surface is light to dark grayish brown, becoming dull green-brown when wet. The undersurface is brown. The upper surface is usually covered with slightly raised darker brown dots.

HABITAT: The Common Stippleback grows on dry alkaline rock in full sun to light shade.

DISTRIBUTION: Found over almost all of the continental US. Scattered in Ohio where suitable habitat is present

SIMILAR SPECIES: A sister species the Brook Lichen, *Dermatocarpon luridum*, is gray-brown turning bright green when wet. It is usually found on sandstone that is periodically wetted.

PHOTO BY ROBERT KLIPS



The brown dots are the mouths of embedded fungal fruiting structures called perithecia. These produce spores which sprout and must immediately partner with the right alga to form a new Stippleback lichen.

FOLIOSE

Common Greenshield Lichen

Flavoparmelia caperata

This foliose lichen has broad, rounded lobes and frequently grows as a nearly round thallus up to 4 inches in diameter. The upper surface is a rather dull, light yellow-green color which is distinctive to this species. This lichen produces soredia scattered over the surface, and the central, older portion of the thallus can be wrinkled. The undersurface is black, shading to brown at the lobe tips.

HABITAT: The Common Greenshield grows on a wide variety of tree species, but never on rock. It prefers open locations with plenty of sunlight. It is found on both tree boles and upper limbs and in dense forest it is present only on the upper branches. It is also sometimes found on weathered wood like fence rails and posts.

DISTRIBUTION: This lichen is widely distributed in the eastern US and is one of the most common species in Ohio, present in every county.

SIMILAR SPECIES: A sister species, Rock Greenshield Lichen, *Flavoparmelia baltimorensis*, is similar in color and appearance but grows only on exposed sandstone. It also differs by having coarse isidia.

PHOTOS BY ROBERT KLIPS



The Common Greenshield is sensitive to sulfur dioxide air pollution and had been affected in the upper Ohio River region including portions of northeastern Ohio. It is also one of the lichens used by hummingbirds to camouflage their nests.



FOLIOSE

Speckled Greenshield Lichen

Flavopunctelia flaventior

This lichen has broad, rounded lobes and can grow up to several inches in diameter. The upper surface is shiny yellow-green and has prominent white dots (pseudocyphellae) on the lobes. The lower surface is black, shading to brown at the lobe margins. Soredia are present on the lobe margins and upper surface.

HABITAT: The Speckled Greenshield grows on bark in sunny locations.

DISTRIBUTION: Found in the northeastern US and Rocky Mountain states. This lichen is widely distributed in Ohio but is not abundant at any location.

SIMILAR SPECIES: A sister species, the Powder-edged Speckled Greenshield, *Flavopunctelia soredica*, is smaller and has distinct crescent-shaped soralia bearing soredia. The Common Greenshield is a lighter yellow-green without pseudocyphellae and is much more common.

PHOTO BY ROBERT KLIPS

FOLIOSE

Powdered Fringe Lichen

Heterodermia speciosa

This is a small (around an inch in diameter), gray lichen with narrow, crowded lobes with crescent-shaped soralia at the tips. The undersurface is white with numerous rhizines.

HABITAT: The Powdered Fringe Lichen grows on bark or sometimes rock in light shade. It favors white oak trees but can also be found on other soft bark trees like ash or walnut.

DISTRIBUTION: This eastern US species is widespread in Ohio except in the northwestern counties.

SIMILAR SPECIES: The Orange-tinted Fringe Lichen (*Heterodermia obscurata*) is similar but has a yellow to orange, cottony lower surface. It grows in similar habitats and is sometimes found with the Powdered Fringe Lichen.

PHOTOS BY ROBERT KLIPS



FOLIOSE

Wrinkled Loop Lichen

Hypotrachyna livida

This foliose lichen can grow up to 3 inches in diameter with branched, linear lobes. The upper surface is light gray with a black undersurface. The surface is usually somewhat shiny with neither isidia nor soredia, but apothecia are common and usually present. As the name implies, the upper surface is frequently wrinkled.

HABITAT: The Wrinkled Loop Lichen is usually found on hard-barked trees (oak and hickory) in full sun to light shade.

DISTRIBUTION: This eastern US species is fairly common in southern Ohio but rarer in the northern counties.

SIMILAR SPECIES: An unrelated species, the Smooth Axil-bristle Lichen (*Myelochroa galbina*) resembles the Wrinkled Loop Lichen but usually grows on the branches and twigs of soft-barked trees like ash, maple and walnut.

PHOTOS BY ROBERT KLIPS

The Loop Lichens are so named because after branching, new lobes grow back toward each other, forming a loop.



FOLIOSE

Salted Starburst Lichen

Imshaugia aleurites

This foliose lichen is typically around one inch in diameter, but can coalesce into larger areas. It has narrow lobes and the upper surface is light gray to almost white, with a pale brown lower surface. The upper surface is usually almost covered with fine isidia, thus the common name 'salted.'

HABITAT: Usually found on pine bark or more rarely oak bark or weathered wood.

DISTRIBUTION: This eastern US and boreal species is mainly southern and eastern in Ohio. It is absent from the northwestern counties.

SIMILAR SPECIES: The Hairless-spined Shield Lichen is similar but is darker gray with a black undersurface.

PHOTO BY ROBERT KLIPS

There are only two species of *Imshaugia* worldwide and Ohio has both!

FOLIOSE

Common Toadskin

Lasallia papulosa

This foliose lichen is attached by a single, central holdfast and grows to several inches in diameter. The upper surface is blistered or warty, brown when dry turning green when wet. The lower surface is tan to light brown with pits (reverse blisters). Small, round black apothecia are usually present.

HABITAT: The Common Toadskin grows on sandstone cliffs and boulders in light shade.

DISTRIBUTION: This Appalachian species is found in the southern portion of Ohio where suitable habitat exists.

SIMILAR SPECIES: The Blackened Toadskin is similar but has a coal-black undersurface. There is a single, old record of this species in Ohio but the location is uncertain. A modern location for this species would be a great find!

PHOTOS BY ROBERT KLIPS

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This is one of the most easily recognized lichens. If you see it on sandstone and it is warty like a toad, it's a Common Toadskin.



FOLIOSE

Lea's Shadow Lichen

Phaeophyscia leana

This is a small (less than an inch) foliose lichen with narrow, linear lobes, usually forked. Color of the upper surface is gray with a pale brown undersurface. Isidia and soredia are absent but apothecia are nearly always present.

HABITAT: This species grows along the Ohio River, below the high water mark on floodplain trees periodically inundated by flood water. It is usually found with moss but other lichens are usually absent.

DISTRIBUTION: Near the Ohio River at scattered sites in Illinois, Indiana, Kentucky and Adams County, Ohio.

SIMILAR SPECIES: Other Shadow Lichens may resemble this species but no other lichen has this ecology.

PHOTO BY MARK ZLOBA

Originally this species was known only from the type specimen and duplicates from Hamilton County, Ohio (1839 collection). This site was later destroyed and for well over a century the Lea's Shadow Lichen was thought to be extinct. It was rediscovered in southern Illinois in 1984 and subsequent intensive searching led to records in other Ohio River locations. There are two extant (and flourishing) populations in Adams county.

FOLIOSE

Abraded Camouflage Lichen

Melanelia subaurifera

This is a fairly small lichen (up to one inch) with a shiny brown (sometimes with a greenish or bronze tint) upper surface and a black lower surface. Tiny isidia on the upper surface break off and become soredate or leave the white medulla exposed. Usually tightly attached to the substrate.

HABITAT: Grows on the twigs and branches of soft-barked trees like ash, tulip tree, walnut and willow. Often found on willow trees near streams or wetlands.

DISTRIBUTION: Northeastern US, southern Canada and the US west coast. Scattered across Ohio with more records from the southeastern counties.

SIMILAR SPECIES: A rare sister species, *Melanelia exasperata*, has a warty rather than isidiate surface. There is only one recent record for Ohio, from Athens county.

PHOTO BY ROBERT KLIPS



This lichen is often overlooked due to its small size and brown color. It is probably more common in Ohio than the records indicate.

COMMON LICHENS OF OHIO LICHEN AND ANIMAL INTERACTIONS

Lichen-nesting Birds

Northern Parula
Parula americana



PHOTO BY STEVE BYLAND

Ohio's first statewide Breeding Bird Atlas was conducted from 1982 thru 1987. The second Atlas took place from 2006 thru 2011, and provided valuable data regarding changes in the state's birdlife. Of the 200+ species documented as nesting during the second Atlas, none experienced as dramatic an increase between atlases as did the Northern Parula warbler. This population spike was probably fueled in large part by a long-term increase in lichens, which parulas rely on for nest material. Following implementation of the Clean Air Act in the 1970's, emissions from coal-burning power plants became increasingly cleaner, which allowed pollution-intolerant lichens to flourish and recolonize areas in which they had long been absent. The little warbler's decades-long rebound is likely the result of cleaner air and an abundance of lichens.

Ruby-throated Hummingbird
Archilochus colubris



PHOTO BY STEVE BYLAND

Ruby-throated Hummingbirds and Lichens



The only breeding hummingbird in Ohio and east of the Mississippi River is the Ruby-throated Hummingbird. This species, and many other hummingbirds, rely heavily on lichens for nesting material. A hummingbird nest is an engineering marvel. Built solely by the female, the nest is a tiny cup comprised of plant down and other soft material bonded together with spider webbing. When new, the nest diameter is about that of a quarter. The cobwebs allow for elasticity, and permit the cup to expand to accommodate rapidly growing nestlings. A dense coat of lichens shingle the nest's exterior, and help it to blend with the branch that it is saddled to. Thus, a Ruby-throated Hummingbirds' nest resembles a lichen-covered bump and is virtually invisible to potential predators.

LEFT: This branch is crusted with Common Greenshield Lichen, *Flavoparmelia caperata* (page 28) and Hammered Shield Lichen, *Parmelia sulcata* (page 40). These are the two most common lichens used in Ruby-throated Hummingbird nests - seen on the right.



PHOTOS BY JIM MCCORMAC

Powdery Axil-bristle Lichen

Myelochroa aurulenta

This is a medium sized (up to 2 inches) lichen with a gray upper surface and a black lower surface. Powdery soredia are present on the upper surface and can be easily dislodged with a fingertip. The medulla is sometimes a pale yellow.

HABITAT: Grows on the twigs and boles of a variety of tree species but seems to prefer soft-barked trees. This species is shade tolerant and can be found on forest trees where few other lichens grow.

DISTRIBUTION: This eastern US species is one of the most common lichens in Ohio, present in every county.

SIMILAR SPECIES: The Ridged Shield Lichen and Hammered Shield Lichen both superficially resemble this species.

PHOTO BY ROBERT KLIPS



This group is called the Axil-bristle Lichens because they have short, black cilia in the lobe axils. This species seems to be a hard one for beginners to ID because it is a typical 'little gray lichen' without any very distinctive features.

FOLIOSE

Smooth Axil-bristle Lichen

Myelochroa galbina

This medium sized (up to 2 inches) lichen has a gray upper surface and a black lower surface. The surface is without isidia or soredia but usually has numerous apothecia. The medulla is sometimes light yellow in color.

HABITAT: This lichen grows on a variety of tree species, frequently on the upper branches.

DISTRIBUTION: This eastern US lichen is common in Ohio and is probably present in every county.

SIMILAR SPECIES: The Wrinkled Loop Lichen (p.31) is similar but is a little larger and grows in a different habitat.

PHOTOS BY ROBERT KLIPS



FOLIOSE

Hammered Shield Lichen

Parmelia sulcata

This foliose lichen has fairly narrow, linear lobes, often forked. It forms somewhat circular thalli sometimes up to 2 inches in diameter but usually smaller. The upper surface is a dull, medium gray with patterned whitish ridges. The undersurface is black.

HABITAT: The Hammered Shield Lichen grows primarily on tree bark and old wood but is occasionally also found on rock. It is a pioneer species and is more prevalent on twigs and small branches than on tree boles. It seems to prefer the softer bark of ash, walnut and maple to the harder bark of oak and hickory. Pick up a fallen walnut branch and you will likely find it.

DISTRIBUTION: This species is common throughout northern North America and extends southward down the Rocky and Appalachian mountains. Ohio is near the southern extent of its range but it is still very common here, present in every county.

SIMILAR SPECIES: The less common Bottle-brush Shield Lichen, *Parmelia squarrosa*, is very similar but has coarse isidia instead of soredia. It is found on oak trees in eastern and southern Ohio.

PHOTOS BY ROBERT KLIPS



Areas on the lobes between the ridges are concave, as if beaten with a miniature ball-peen hammer. Thus, the common name. This species (among several others) is used by the Ruby-throated Hummingbird to camouflage its tiny nest.



FOLIOSE

Hairless-spined Shield Lichen

Parmelinopsis minarum

This medium sized foliose lichen grows to around 2 inches in diameter. The upper surface is gray with a black undersurface. The upper surface is covered with fine isidia.

HABITAT: This species prefers hard-barked trees in full sun to light shade. It is more rarely found on sandstone. Look on oak trees in dry, sunny woods to find it.

DISTRIBUTION: Common in the southeastern US and found mainly in southeastern Ohio counties.

SIMILAR SPECIES: The Bottlebrush Shield Lichen is superficially similar but has patterned ridges on the surface.

PHOTO BY ROBERT KLIPS

FOLIOSE

Powdered Ruffle Lichen

Parmotrema hypotropum

This large (up to several inches across) lichen has broad, rounded lobes that stand up from the substrate (like a ruffled curtain). Color of the upper surface is light gray with an undersurface that is black near the center with broad, white bands under the lobe tips. Margins of the lobes have cilia, black hairs that stand out almost like an eyelash. The lobe margins also contain powdery soredia.

HABITAT: Grows on a variety of tree species in full sun to light shade. Also common on the upper branches of forest trees.

DISTRIBUTION: The Powdered Ruffle Lichen is a southeastern US species that is common in Ohio's eastern and southern counties. Probably the most commonly encountered Ruffle Lichen in Ohio.

SIMILAR SPECIES: There are 16 species of ruffle lichens in Ohio and many look alike. The Powdered Ruffle Lichen is the only one with a white zone on the underside of the lobes.

PHOTOS BY ROBERT KUIPS



This gray lichen can be used to dye wool a rich brown color.



FOLIOSE

Powder-edged Ruffle Lichen

Parmotrema stuppeum

This Ruffle Lichen has a gray upper surface and a black lower surface with a shiny brown zone beneath the lobe margins. Soredia are present along the lobe edges and cilia are usually present.

HABITAT: Grows on hard-barked trees in full sun to light shade.

DISTRIBUTION: This Appalachian species is scattered in Ohio but more common in the southern counties.

SIMILAR SPECIES: This species looks like many of the other Ohio Ruffle Lichens, but can be separated by the unique set of chemicals that it produces.

PHOTO BY ROBERT KLIPS

The Ruffle Lichens are easy to identify as a group – large rounded lobes with cilia, lobes usually ascending and appearing ruffled. However, separating the species is more difficult and frequently depends on chemical tests.

FOLIOSE

Dog Lichen

Peltigera canina

The Dog Lichen is large, up to 4 inches across, but frequently fragmented and not a discrete circular thallus. The upper surface is brown or gray-brown when dry, turning green when wet. The upper surface is usually pruinose (has a whitish dusting on the lobe tips). The lower surface is white to light brown, webby and veined without a hard, lower cortex. Brown apothecia, rolled and standing up are usually present.

HABITAT: This species grows on soil or over moss in sunny to shady locations.

DISTRIBUTION: The Dog Lichen is boreal, extending south in the Appalachian and Rocky mountains. It is scattered over most of Ohio and could be found in any county.

SIMILAR SPECIES: There are 9 species of *Peltigera* in Ohio. All have a similar look but the Dog Lichen is by far the most common.

PHOTO BY ROBERT KLIPS

This lichen has a cyanobacterium as the photosynthesizing partner, giving it the dark color. The erect, curled apothecia are said to resemble dog teeth.



FOLIOSE

Lung Lichen

Lobaria pulmonaria

This large foliose lichen can attain the diameter of a dinner plate. The lobes are broad, loosely attached and deeply pitted with prominent ridges above the pits. The upper surface is olive brown when dry and bright green when wet. The undersurface is pale brown with white spots.

HABITAT: Found on a variety of tree species in moist and fairly shaded forests. It might also be found on fallen logs or mossy rocks.

DISTRIBUTION: Northeastern North America south into the Smoky Mountains, northwestern coastal states into Alaska. Ohio has old records from 14 scattered counties but no recent records or extant populations are known.

SIMILAR SPECIES: There are no other large, pitted lichens, brown turning green when wet, that could be mistaken for the Lung Lichen.

PHOTO BY RALPH POPE

This lichen is thought to be an indicator of old growth forests. It should be present somewhere in Ohio and rediscovery would be a great find.

FOLIOSE

Orange-cored Shadow Lichen

Phaeophyscia rubropulchra

This is a small lichen, not more than one inch across, with narrow, branched lobes. The upper surface is gray-green to brown when dry turning green when wet. The lower surface is black. Unique to this species, the medulla (exposed by scraping with a knife blade) is a bright orange-red. Soredia are present on the lobe margins.

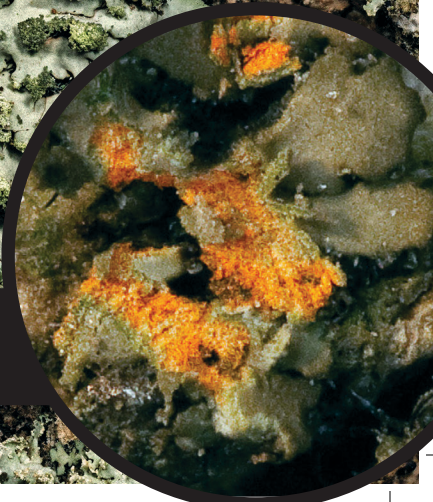
HABITAT: Grows on tree bark and rocks in light to deep shade. This species is shade tolerant and may be present in dense forests.

DISTRIBUTION: This eastern US species is very common in Ohio, probably present in every county.

SIMILAR SPECIES: There are 11 species of shadow lichens in Ohio but this is the most common and the only one with a colored medulla.

PHOTOS BY ROBERT KLIPS

The specific name *rubropulchra* means 'beautiful red,' referring to the color of the medulla. Slugs sometimes graze on this lichen, exposing the colored medulla.



FOLIOSE

Hooded Rosette Lichen

Physcia adscendens

This is a small lichen, not more than an inch in diameter, with narrow lobes. The color of the upper surface is light gray to almost white, with a white lower surface. Long, white cilia extend from the lobe margins and many lobe tips form a helmet or fist shaped structure with soredia inside.

HABITAT: The Hooded Rosette Lichen is most commonly found on old marble cemetery headstones. It also grows on soft-barked trees, primarily ash.

DISTRIBUTION: Present over much of North America, this lichen is common in Ohio, probably present in every county.

SIMILAR SPECIES: This is the only Ohio lichen with fist shaped lobe tips.

PHOTOS BY ROBERT KLIPS



The Rosette Lichens are a large group with 36 species in North America and 9 in Ohio.



FOLIOSE

Powdery Rosette Lichen

Physcia americana

This medium sized lichen can grow to 2 inches across, with narrow lobes. Color of the upper surface is light gray with a tan to white undersurface. Powdery soredia are present in circular, nearly white soralia on the central part of the thallus.

HABITAT: Usually found on white oak or ash trees in full sun to partial shade. Sometimes it is also found on cemetery headstones.

DISTRIBUTION: This eastern US species is fairly common in Ohio with records from most counties.

SIMILAR SPECIES: The round, white soralia separate the Powdery Rosette Lichen from related species.

PHOTO BY ROBERT KLIPS

FOLIOSE

Mealy Rosette Lichen

Physcia millegrana

This small lichen, up to one inch for a single thallus, often coalesces into a large mass following bark fissures. Color of the upper surface is gray with a white lower surface. The lobe margins are finely dissected and covered with soredia. This lichen often appears as a fuzzy gray mass on the substrate.

HABITAT: The Mealy Rosette Lichen grows on many species of trees as well as rock and cemetery headstones. It is a pioneer species, among the first to colonize the stem and branches of woody plants. Tolerant of air pollution as well as a variety of microclimatic conditions it is often one of the few lichens found in a city center.

DISTRIBUTION: Found throughout the eastern US, this is undoubtedly the commonest foliose lichen in Ohio, present at numerous locations in every county.

SIMILAR SPECIES: None of the other Rosette Lichens have finely dissected lobes. *Cladonia* primary thallus (see the Fruticose Lichen section) can sometimes be confused with this species.

PHOTOS BY ROBERT KLIPS

This lichen is also naturalized in part of California where it hitchhiked on nursery stock.



FOLIOSE

Star Rosette Lichen

Physcia stellaris

This is a small (usually not more than an inch across) lichen with narrow, crowded lobes. It usually forms a more or less circular rosette. Color of the upper surface is gray with a white undersurface. It has neither isidia nor soredia but the central part of the thallus is often warty. Apothecia are common.

HABITAT: The Star Rosette Lichen grows on trees in full sun to light shade. It is a pioneer species usually found on twigs and limbs.

DISTRIBUTION: Found over the entire US this species is common in Ohio, probably present in every county.

SIMILAR SPECIES: The Hoary Rosette Lichen, *Physcia aipolia*, is similar but has white markings on the lobe tips.

PHOTOS BY ROBERT KLIPS

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A cross section of the thallus shows typical stratification.

FOLIOSE

Bottlebrush Frost Lichen

Physconia detersa

This medium sized lichen (up to a couple inches) is gray-brown to brown with a brown to black undersurface. The lobes have marginal soredia with frosted (pruinose) tips.

HABITAT: This species grows on bark in full sun to light shade. It is also commonly found on cemetery headstones.

DISTRIBUTION: This eastern US species is found in most Ohio counties.

SIMILAR SPECIES: There are 3 other Frost Lichens in Ohio but the Bottlebrush Frost Lichen is by far the most common.

PHOTO: BY ROBERT KLIPS

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Named for the frosted appearance of the lobes. The frosting (pruina) consists primarily of calcium oxalate crystals.



FOLIOSE

Rough Speckled Shield Lichen

Punctelia rudecta

A large (up to 3 inches across) foliose lichen with broad, rounded lobes. Color of the upper surface is gray with a pale brown undersurface. The lobe tips have tiny white spots (pseudocyphellae) and the center of the thallus is densely isidiate.

HABITAT: This lichen grows on a variety of trees in full sun to light shade. It is sometimes also found on rocks.

DISTRIBUTION: An eastern US species that is very common in Ohio, present in every county.

SIMILAR SPECIES: The Powdered Speckled Shield Lichen, *Punctelia caseana*, is similar but has soredia instead of isidia.

PHOTO BY ROBERT KLIPS

This lichen can be used to dye wool a rich magenta color.

FOLIOSE

Mustard Lichen

Pyxine sorediata

This is a fairly small lichen (less than 2 inches), with narrow lobes, upturned at the tips and somewhat concave. The lobe tips are usually pruinose (dusted with a whitish substance). Color of the upper surface gray to blue-gray with a black lower surface. The medulla (exposed with a knife blade) is light orange or peach colored. Soredia present on the upper surface.

HABITAT: This species is found on trees in full sun to light shade.

DISTRIBUTION: This eastern US species is common in Ohio, present in most counties.

SIMILAR SPECIES: The Jack-o-lantern Lichen *Pyxine subcinerea* has flat lobe tips with discrete patches of pruina. It is common in southern Ohio but uncommon in the northern counties.

PHOTOS BY ROBERT KLIPS

A sister species *Pyxine subcinerea*, will fluoresce orange under UV light. This is perhaps the only Ohio lichen that can be identified in the field on a dark night!



FOLIOSE

Smooth Rock Tripe

Umbilicaria mammulata

This large lichen can be the size of an outstretched hand. It is umbilicate – attached to the substrate by a single point. The upper surface is brown and the lower surface is black with a velvety nap of short black rhizines.

HABITAT: The Smooth Rock Tripe grows on sandstone outcrops and boulders in light shade.

DISTRIBUTION: This Appalachian-Boreal species is found in southeastern Ohio where suitable habitat exists.

SIMILAR SPECIES: There are two other Rock Tripes reported from Ohio, both from single specimens in old collections.

PHOTO BY ROBERT KLIPS

According to *Lichens of North America*, this species is among the largest lichens in the world in terms of mass and diameter. A specimen from the Smoky Mountains measured over two feet across!

FOLIOSE

Plitt's Rock Shield

Xanthoparmelia plittii

This rock shield is medium sized lichen it can grow to several inches, but frequently forms larger coalesced patches. The lobes are narrow, with a shiny, yellow-green upper surface and tan to light brown lower surface. Isidia are present on the upper surface and apothecia are common.

HABITAT: This lichen grows on sandstone and other acidic rocks, never on limestone. It prefers horizontal or sloping surfaces in full sun, but not vertical rock faces.

DISTRIBUTION: Widespread in the US, this lichen is found scattered in eastern Ohio counties where suitable habitat exists.

SIMILAR SPECIES: The Peppered Rock Shield, *Xanthoparmelia conspersa*, is very similar but has a black lower surface.

PHOTO BY ROBERT KLIPS

The Rock Shields are a fairly large group with 51 species in North America and 8 found in Ohio.



FOLIOSE

Hooded Sunburst Lichen

Xanthomendoza fallax

A small lichen (less than one inch across) that frequently coalesces into larger masses. The lobes are very narrow and crowded with soredia bursting from crescent shaped slits at the tips. These resemble tiny bird nests filled with soredia. Color of the upper surface is orange to golden yellow, with a whitish to light yellow lower surface.

HABITAT: This lichen grows on non-acidic bark, alkaline rock and cemetery headstones in full sun.

DISTRIBUTION: Present over much of the US, the Hooded Sunburst is common in the western two thirds of Ohio, less frequent in the eastern counties.

SIMILAR SPECIES: The Powdery Sunburst, *Xanthomendoza ulophyllodes* is similar but has soredia produced from the underside of the lobes rather than from a basket-like structure.

PHOTO BY ROBERT KLIPS

COMMON LICHENS OF OHIO

LICHEN AND ANIMAL INTERACTIONS

Lichens, Moths, and Bats

A Brief Essay by Dr. David Wagner

Author of *Caterpillars of Eastern North America*

Painted Lichen Moth caterpillar
Hypoprepia fucosa



PHOTO BY DAVID WAGNER

Painted Lichen Moth
Hypoprepia fucosa



PHOTO BY JIM McCORMAC

An extraordinary group of lichen associates are the Footman (Lichen) Moths, a globally distributed lineage of mostly small, brightly colored tiger moths. So far as known, Footman larvae feed exclusively on lichens, and especially lichen tissues rich in green algae. Because the caterpillars tend to be small and well camouflaged, their feeding behaviors and chemical ecology are virtually unstudied. Both caterpillars and moths are believed to sequester lichen compounds that assure chemical protection. All ten species of Ohio's Footmen Moths are boldly colored, presumably advertising their toxicity. The adults have a small tymbal organ just under their hindwing that they use to signal to echolocating (feeding) bats that they are distasteful. Once a bat has targeted a moth, and begins to zero in for the kill, lithosiine compounds in the moth produce an ultrasonic click that warns of its potential danger. There is growing evidence that some moths can even produce enough ultrasonic noise to jam the bat's echolocation system, thus thwarting the bat's ability to reliably track the moth and make an effective attack.

Tricolored Bat
Perimyotis subflavus



PHOTO BY JIM McCORMAC

FRUTICOSE

Stalkless Cladonia

Cladonia apodocarpa

This lichen is an oddball – a fruticose, cladoniform lichen that has no upright podetia. It consists only of the primary squamules which, compared with other *Cladonias* are large and long-lasting. The squamules are narrow and linear, up to ½ inch long, frequently with a forked tip. Color of the upper surface is gray-green, frequently with a bluish cast. The undersurface is a brilliant, chalky white. The massed squamules grow in clumps up to several inches across, usually somewhat upright with the undersurface visible.

HABITAT: This lichen grows on soil in full sun to light shade.

DISTRIBUTION: The Stalkless Cladonia is an eastern US species, common in southeastern Ohio and found elsewhere in the state where suitable habitat exists.

SIMILAR SPECIES: Other *Cladonias* usually have podetia and apothecia and their squamules are smaller.

PHOTOS BY ROBERT KLIPS



You can identify this from a distance by the long, narrow squamules and shining white undersurface.

FRUTICOSE

Ladder Lichen

Cladonia cervicornis

This fruticose lichen is distinctive with several tiers of cups, each arising from the center of the one below. Individual podetia can be up to 2 inches tall.

HABITAT: The Ladder Lichen grows on soil in full sun to very light shade. An old field species of sunny banks and bare soil areas.

DISTRIBUTION: This species is widely distributed in eastern North America and northwestern North America through Alaska. Common in Ohio except for the agricultural northwest where suitable habitat is rare.

SIMILAR SPECIES: Small examples of the Ladder Lichen may look like other cup-forming *Cladonias* but will have a point in the center where the next cup is starting.

PHOTO BY ROBERT KLIPS



With its several tiers of cups, each arising from the center of the one beneath, this is one of the most beautiful and easily recognized *Cladonias*.

FRUTICOSE

Common Powderhorn

Cladonia coniocraea

The primary squamules are fairly large and persistent, gray-green to brown-green in color. The podetia are pointed and sterile, up to an inch tall, arising from the center of the squamules.

HABITAT: This lichen grows on bark and old wood, rarely directly on soil. It is fairly shade tolerant and is often found on tree bases in open woods.

DISTRIBUTION: Widely distributed in the eastern US, Rocky Mountains and the west coast. Common in Ohio, in most counties.

SIMILAR SPECIES: No other Ohio cladoniform lichen has podetia arising from the center of a squamule.

PHOTOS BY ROBERT KLIPS

This species is named for its resemblance to a horn.



British Soldiers

Cladonia cristatella

This cladoniiform lichen has persistent small primary squamules with upright podetia up to an inch tall. The podetia are gray-green to yellow-green and usually have small squamules. The podetia are sometimes branched and always tipped with bright red apothecia spilling over the podetial tips.

HABITAT: British Soldiers are sometimes found on bare soil but usually prefer some organic substrate such as rotting or weathered wood. A tree base, fallen log, old stump, fencepost or weathered board in sun to part shade is ideal habitat for this species.

DISTRIBUTION: This species is widely distributed and common in eastern North America. It is probably present in every Ohio county.

SIMILAR SPECIES: The Lipstick Lichen, *Cladonia macilentata*, also has a red-fruited podetia usually not spilling over the podetial tips. Another difference is that the podetia are sorediate while not so with British Soldiers.

PHOTOS BY ROBERT KLIPS



This is probably one of the best known and most easily recognized lichens. Its common name refers to the red tops which are reminiscent of the red hats worn by the royal British troops during the Revolutionary War.

FRUTICOSE

Many-forked Cladonia

Cladonia furcata

The primary squamules soon disappear and we see only the podetia which form tangled mats 2-3 inches thick. Individual podetia may be slender to stout and sometimes become irregularly twisted in cross section. The color is green-gray to green-brown. Podetia have a few to many squamules. Pick up a mat and turn it upside down. The squamules are white below and easily seen this way. Podetia may rarely be tipped with brown apothecia.

HABITAT: This species grows on soil, usually in open woods with light shade. Frequently seen with mosses.

DISTRIBUTION: The Many-forked Cladonia is an eastern US species, present over much of Ohio except the intensively farmed northwest-ern counties.

SIMILAR SPECIES: Squamules on the podetia, color, and to a lesser extent habitat, separate this species from the other Ohio 'reindeer lichens'.

PHOTOS BY ROBERT KLIPS

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There are 5 'reindeer lichen' species in Ohio but the Many-forked Cladonia is the only one with squamules on the podetia.



FRUTICOSE

Turban Lichen

Cladonia peziziformis

This cladoniform lichen has small but persistent primary squamules. The podetia are slender, frequently twisted and contorted, up to an inch tall. Podetia are tipped with tan to light brown apothecia, noticeably wider than the podetia and spilling over the podetial tips like turbans.

HABITAT: This lichen usually grows on soil in sunny locations. Old fields and roadside banks are good places to look for the Turban Lichen.

DISTRIBUTION: This eastern US species is common in Ohio, found in most counties except the heavily farmed northwestern part of the state.

SIMILAR SPECIES: There are several brown-fruited *Cladonias* in Ohio but the Turban Lichen is distinctive with its pale brown apothecia spilling over the apothecial tip.

PHOTOS BY ROBERT KLIPS

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Cladonia is the largest fruticose genus with 128 species in North America. There have been 32 species identified from Ohio.



FRUTICOSE

Peg Lichen

Cladonia polycarpoides

The primary squamules of this cladoniiform lichen are rather large and persistent, often reflexed (standing up), with an olive green color. The podetia are usually up to one inch tall with brown to blackening apothecia, not spilling over the podetial tip.

HABITAT: The Peg Lichen is found on soil in sunny locations. Old fields, roadside banks and sparsely wooded south-facing slopes are good places to find this lichen.

DISTRIBUTION: This species is widespread in the eastern half of the US and common in Ohio, in most counties except the heavily farmed northwest.

SIMILAR SPECIES: There are two other similar, brown-fruited *Cladonias* in Ohio. These are less common and separated by chemistry which is beyond the scope of this field guide.

PHOTOS BY ROBERT KLIPS



Pebbled Pixie-cup

Cladonia pyxidata

The primary squamules of this cladoniform lichen are small, gray-green and persistent. Podetia are goblet-shaped, up to one inch tall. Apothecia are uncommon but when present are brown, along the rim of the cup. The Pebbled Pixie-cup can be identified by the flat, circular squamules on the inside of the cup.

HABITAT: Pixie-cups can grow on bare soil, old wood or tree bases in full sun to light shade.

DISTRIBUTION: Pixie-cups are widespread in North America but less common in the southern states. They are scattered in Ohio, wherever suitable habitat exists, but absent from the corn and soybean fields of the northwest.

SIMILAR SPECIES: There are four other species which closely resemble *C. pyxidata* and together are sometimes called the 'Cladonia pyxidata complex.' The Pebbled Pixie-cup is the only one having the flattened plates in the cup and the others must be separated by chemistry.

PHOTO BY ROBERT KLIPS

Pixie-cups are one of the most recognized lichens in Ohio. They are so named because they look like tiny goblets which might be used by diminutive faerie creatures.

FRUTICOSE

Gray Reindeer Lichen

Cladonia rangiferina

The primary squamules of this cladoniform lichen soon disappear and are usually not seen. The branched podetia form deep, tangled cushions. Each branch is tipped with three or four short branchlets, usually pointing in the same direction, almost like an upraised hand with fingers curled. The color of this Reindeer Lichen is a cold, gray-white.


HABITAT: This species grows on soil, sometimes among mosses, in full sun to light shade.

DISTRIBUTION: Widespread in North America, generally boreal and eastern US. Fairly common in southern Ohio but not found in northwestern Ohio. It is often seen on the thin, dry soil on top of sandstone cliffs.

SIMILAR SPECIES: There are five species of *Cladonia* in Ohio which can be considered 'reindeer lichens.' These all differ slightly and the Gray Reindeer Lichen is the only one with an ashy-gray to nearly white color.

PHOTOS BY ROBERT KLIPS

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This circumpolar lichen, along with related species, is a major winter food of caribou in North America and reindeer in Europe. It has also been eaten by native peoples during famine times.

FRUTICOSE

Dragon Cladonia

Cladonia squamosa

The primary squamules of this lichen are fairly small, persistent, and reflexed so that the white undersurface is distinct. The podetia are up to an inch tall and densely covered with small squamules, standing out perpendicularly. The podetial tips can have small branchlets and are sometimes almost cup-forming. Apothecia are fairly common, small on the podetial tips, dark brown.

HABITAT: This lichen is shade-tolerant and is usually not seen in full sun. The Dragon Cladonia grows on soil, decaying wood and among mosses. It is frequently seen with moss on shaded sandstone outcrops and boulders.

DISTRIBUTION: Widely distributed in the eastern US and boreal North America. It is fairly common in eastern and southern Ohio but absent from the northwestern counties.

SIMILAR SPECIES: There are no other densely squamulose fruticose lichens in Ohio.

PHOTOS BY ROBERT KLIPS

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The Dragon Cladonia is so named because it is densely covered with scales (squamules).



FRUTICOSE

Dixie Reindeer Lichen

Cladonia subtenuis

The primary squamules of this cladoniform species soon disappear, leaving the abundantly branched, cushion forming podetia. The cushions are generally several inches deep, rounded, and gray-green to yellow-green. Individual podetia are slender, mostly Y-branched and tipped with usually two branchlets. Apothecia are usually not present.

HABITAT: The Dixie Reindeer Lichen grows on soil in full sun to light shade.

DISTRIBUTION: Found in the southeastern US from Florida to southern Michigan and New York. Fairly common in the southern and eastern counties of Ohio but unknown from northwestern Ohio. This is the most often seen of the Ohio reindeer lichens.

SIMILAR SPECIES: The other Ohio Reindeer Lichens are coarser and have slightly different colors.

PHOTOS BY ROBERT KLIPS

Reindeer lichens are soft and pliable when wet but hard and brittle when dry. An animal stepping on a dry thallus could break off pieces and transport them to another location where a new thallus might form.



Pink Earth Lichen

Dibaeis baeomyces

This cladoniiform fruticose lichen has a crustose primary thallus which is whitish-gray and somewhat warty or granular. The podetia are short, usually 3/4 inch or less, and topped by pink, spherical apothecia.

HABITAT: The Pink Earth lichen grows on soil, typically clay banks in full to light shade.

DISTRIBUTION: This eastern North America species is uncommon in southeastern and southern Ohio.

SIMILAR SPECIES: A rare sister species, the Pink Dot Lichen, *Dibaeis absoluta*, is recorded from a few counties in southeastern Ohio. It grows on moist sandstone with a primary thallus that is light green. Although classed as fruticose, the podetia are so short that the apothecia sit directly on the primary thallus, much like a crustose lichen.

PHOTO BY ROBERT KLIPS



There are only two species in this genus in North America and Ohio has both!

FRUTICOSE

Sinewed Ramalina

Ramalina americana

This fruticose lichen arises from a single holdfast and has strongly flattened, upright branches. The thallus can grow up to an inch tall but is frequently smaller. The color is yellow-green and the surface is dull and usually pitted and veined. Apothecia are sometimes present and are lighter yellow-green to almost white on the ends of the branches.

HABITAT: The Sinewed Ramalina grows on bark, frequently on twigs and branches in full sun.

DISTRIBUTION: This eastern US species has been found scattered in Ohio with most modern records in the southern counties.

SIMILAR SPECIES: There are three other Ramalinas recorded from bark in Ohio but these differ in morphological features.

PHOTO BY ROBERT KLIPS



This lichen, along with several sister species, is a common hitchhiker on nursery trees and bushes. It can sometimes be found flourishing on small landscape trees in cities. Thus, care must be taken in recording new Ohio county records.

FRUTICOSE

Rock Ramalina

Ramalina intermedia

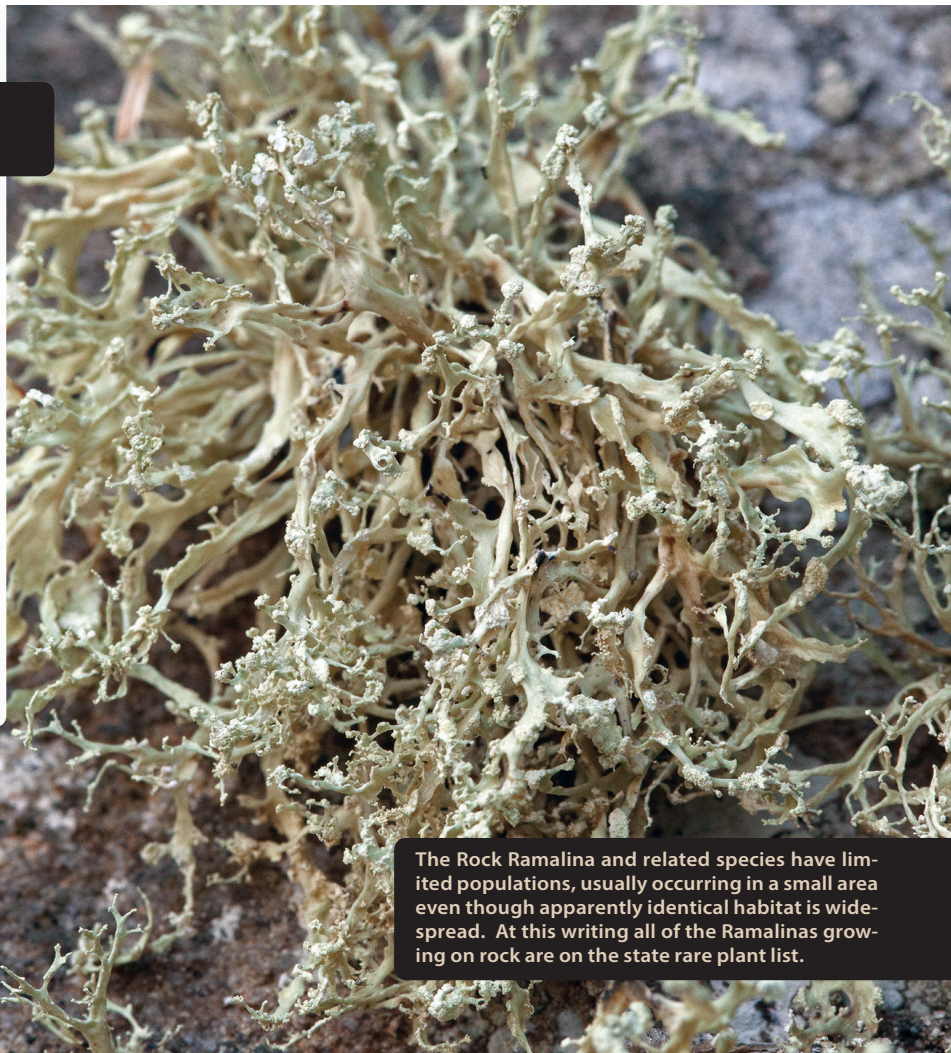
This light yellow-green lichen grows up to one inch tall but is more often in the ½ inch range. Attached by a single point this fruticose lichen is upright, flattened and abundantly branched. The branch tips are fine with soredia usually present near the tips.

HABITAT: The Rock Ramalina grows on sandstone cliffs and boulders, usually in light shade.

DISTRIBUTION: The North American distribution is generally Appalachian and Boreal. Rather rare in southeastern Ohio counties where suitable habitat exists.

SIMILAR SPECIES: Two other species, *Ramalina petrina* and *R. pollinaria* also grow on rock and may be confused with the Rock Ramalina. Occasionally all three are found growing together.

PHOTO BY ROBERT KLIPS



The Rock Ramalina and related species have limited populations, usually occurring in a small area even though apparently identical habitat is widespread. At this writing all of the Ramalinas growing on rock are on the state rare plant list.

FRUTICOSE

Bushy Beard Lichen

Usnea strigosa

This yellow-green fruticose lichen is round in cross section and is attached by a single point. It is abundantly branched with dense perpendicular tiny side branches. It can grow up to several inches long and small thalli are upright while larger thalli can be somewhat pendulous. Apothecia are fairly common on larger individuals and are tan and born in the ends of branches.

HABITAT: This species grows on bark or old wood, in full sun to light shade. Frequently found on canopy branches rather than tree boles.

DISTRIBUTION: The Bushy Beard Lichen is an eastern US species and is found scattered in eastern and southern Ohio.

SIMILAR SPECIES: Many of the *Usnea* species are superficially similar and separated by microscopic characters.

PHOTOS BY ROBERT KLIPS



The genus *Usnea* contains 79 species in North America and 11 have been found in Ohio. Most *Usneas* are sensitive to air pollution and have been very scarce in Ohio. However, improving air quality has led to a rebound of many species.

FRUTICOSE

Gold-eye Lichen

Teloschistes chrysophthalmus

This is a small (up to one inch tall), abundantly branched, tufted, fruticose lichen. The branches are narrow, flattened and unlike most fruticose species, the upper and lower surfaces are different. The upper surface is bright orange, sometimes mottled with gray and the lower surface is whitish. Margins of the lobes are densely ciliate. This lichen does not have isidia or soredia but large, orange apothecia are nearly always present.

HABITAT: The Gold-eye Lichen grows on the branches of trees and shrubs in full sun.

DISTRIBUTION: This is a Great Plains species, inhabiting the woody plants of the tall grass prairie. In Ohio there are two old collections, from Erie and Hamilton counties, and one recent collection from Union County.

SIMILAR SPECIES: Nothing else looks like this unique little lichen.

PHOTO BY BRIAN RILEY



This is one of the most colorful and attractive of the lichens. Look for it on sunny trees and shrubs.

COMMON LICHENS OF OHIO

lichen AND ANIMAL INTERACTIONS

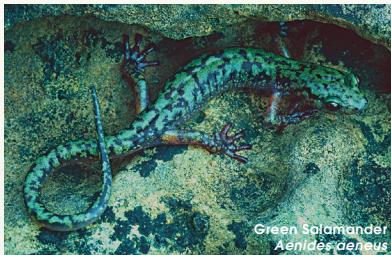
Gray Treefrog
Hyla versicolor



PHOTOS BY JIM McCORMAC

Lichenlike Animals

There are numerous species of animals that live in sites that are rich in lichens. Some of these creatures have evolved an appearance that allows them to match the look of lichen-dappled rocks or tree bark. Camouflage such as this is called crypsis.



Green Salamander
Ambystoma opacum



Eyed Click Beetle
Alysiina



Fence Lizard
Sceloporus undulatus

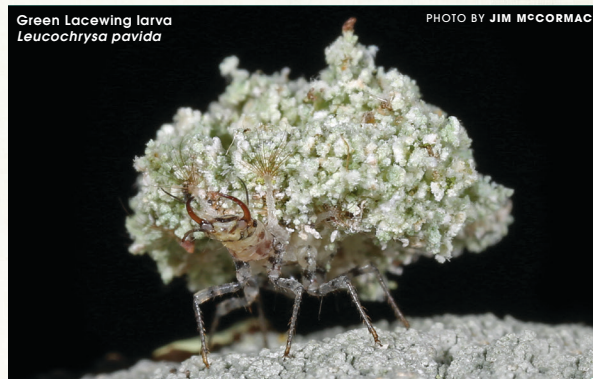
Avian Lichen Hunters

At least five species of songbirds specialize in foraging on tree bark, as do all seven of Ohio's woodpecker species. Lichens create biological hotspots on tree trunks and limbs, and bark-foraging birds often probe lichens looking for insect prey. In addition to the bark specialist birds, many other songbirds will occasionally pick through lichens looking for food.



A Lichen that Walks

The natural world is awash with animals that mimic the look of things other than themselves. Few do it better than the Green Lacewing, *Leucochrysa pavida*. The larvae resemble tiny dragons with long, ferocious mandibles. But the casual observer would never know, as the larva adorns its body with lichen bits to the point that it is unrecognizable. What people do sometimes notice is a small clump of lichen that “walks” across the bark. The lacewing larva’s lichen ghillie suit is an effective disguise. It allows the predator to infiltrate aphid colonies that are guarded by ants. Ants are protective of aphids, as they receive nutrient-rich honeydew that is secreted by their wards. However, a lichen-clad lacewing larva slips by the guard ants, and is free to capture and eat the aphids.



LICHEN IDENTIFICATION

The scientists who categorize things consider lichens to be fungi. The scientific name of the lichen is also the name of the fungal symbiont. The algal symbiont has a separate name. The characteristics of the fungal spores and reproductive structures are very important in naming crustose lichens. In the macrolichens, other factors such as color of the undersurface, presence of isidia or soredia, and type of rhizines are critical in determining species.

Lichens produce chemicals that are found nowhere else in nature. Around 600 have been characterized so far and many have acidic properties. They have been given acid names such as 'usnic acid,' but they are not strong acids like sulfuric acid and are not harmful to touch. Often a lichen will produce more than one chemical and different species will frequently have unique combinations of compounds. Thus, chemistry has been incorporated into lichen taxonomy and some species are very difficult to separate without using chemistry. However, most common species can be identified without chemistry and these are featured in this field guide.

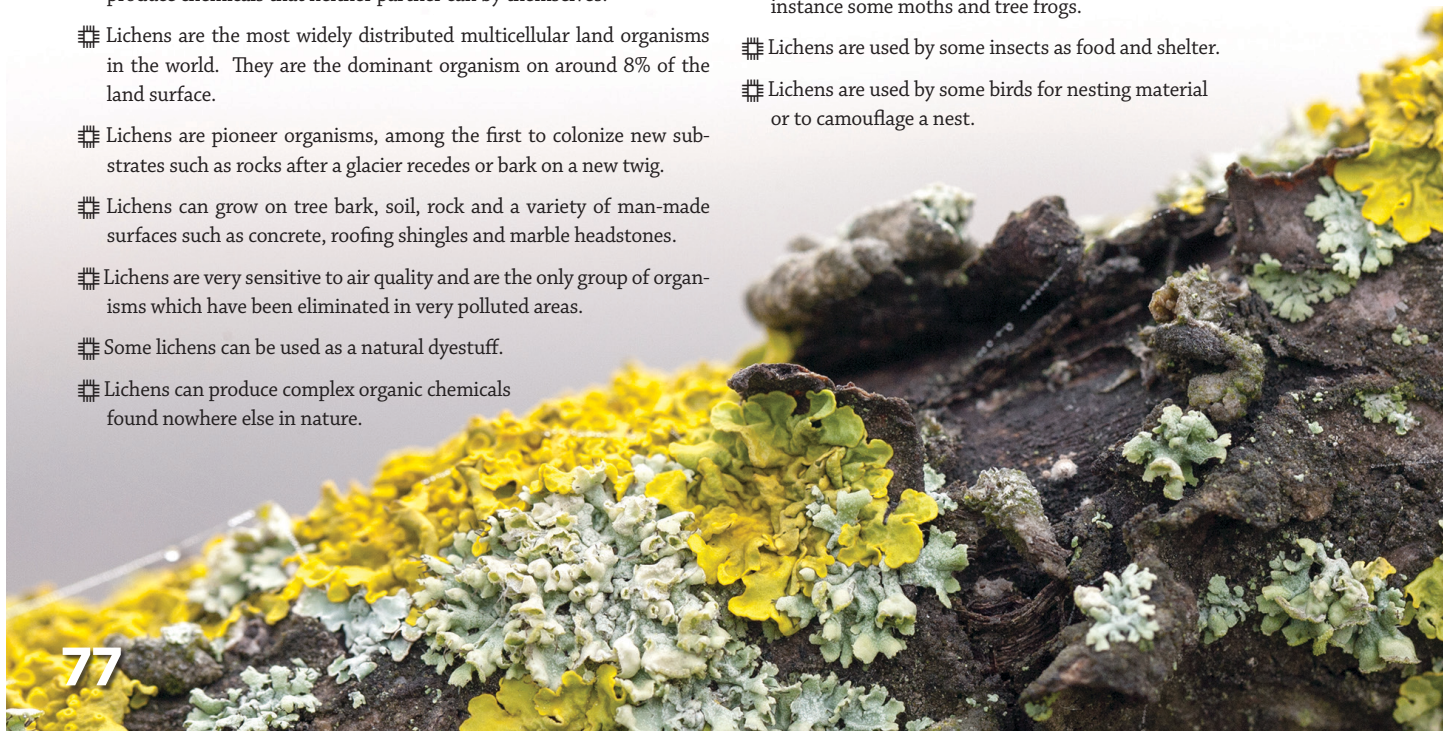
For a long time many lichens did not have common names. When *Lichens of North America* was published in 2001, the author, Dr. Irwin Brodo, attached common names to almost all of the species. Many lichens are not very different from one another, separated primarily by microscopic or chemical differences. So Dr. Brodo approached this systematically with a genus common name and a species common name. Some of the resulting names are a little unwieldy, for instance 'Rough Speckled Shield Lichen' for *Punctelia rudecta*, but we support this effort and have used common names in this field guide.



Lichenologist inspects lichen-cloaked tree trunk

LICHEN FAST FACTS

- ⌘ A lichen is a dual organism composed of a fungus and a photosynthesizing partner, either a green alga or a blue-green cyanobacterium. It looks like neither partner, can live where neither partner can, and can produce chemicals that neither partner can by themselves.
- ⌘ Lichens are the most widely distributed multicellular land organisms in the world. They are the dominant organism on around 8% of the land surface.
- ⌘ Lichens are pioneer organisms, among the first to colonize new substrates such as rocks after a glacier recedes or bark on a new twig.
- ⌘ Lichens can grow on tree bark, soil, rock and a variety of man-made surfaces such as concrete, roofing shingles and marble headstones.
- ⌘ Lichens are very sensitive to air quality and are the only group of organisms which have been eliminated in very polluted areas.
- ⌘ Some lichens can be used as a natural dyestuff.
- ⌘ Lichens can produce complex organic chemicals found nowhere else in nature.
- ⌘ Lichens are an important winter food for arctic animals such as reindeer and musk ox.
- ⌘ Some animals have evolved camouflage patterns resembling lichens, for instance some moths and tree frogs.
- ⌘ Lichens are used by some insects as food and shelter.
- ⌘ Lichens are used by some birds for nesting material or to camouflage a nest.



GLOSSARY

Algal layer – In a stratified lichen, a layer of algal cells and interwoven, thin-walled hyphae, usually just below the upper cortex.

Apothecium (pl. apothecia) – The spore producing body of the fungal partner. A disc-like, or saucer-shaped structure on the surface of the lichen. Each apothecium may produce hundreds of microscopic spores.

Cilia – Hair-like growths from the margin of a lichen thallus. A characteristic of the ruffle lichens.

Ciliate – Lichens having cilia.

Cladoniform – Fruticose lichens which have two parts: a primary thallus, either crustose or squamulose which grows first, and a fruticose secondary thallus, arising from the primary thallus.

Cortex – The outer layer of a lichen; either a top layer (upper cortex) or bottom layer (lower cortex).

Crustose – Lichens having a thin thallus adhering inseparably to the substrate of rock, bark, soil, etc. Crustose lichens lack a lower cortex and rhizines.

Foliose – Lichens with a leafy form and having definite upper and lower surfaces.

Fruticose – Lichens which are bushy and shrub-like or vine-like, usually with a round cross section. May be unbranched or variously branched. Fruticose lichens rarely have distinctly different upper and lower surfaces.

Hyphae – The microscopic, thread-like elements of the fungal partner. Composed of long, thin cells.

Isidium (pl. isidia) – A specific type of asexual propagule born on the surface of a lichen. Isidia are tiny buds which contain both fungal and algal tissue.

Isidiate – Lichen which have isidia on their surface.

Lobe – The active, growing portion of a lichen thallus margin. Usually rounded and may be broad to very narrow.

Medulla – A layer of loosely packed fungal hyphae, without algae. In a stratified lichen this is the layer below the algal layer. Usually white but colored yellow, orange or red in some species.

Podetium (pl. podetia) – The fruticose portion of a cladoniform lichen. This may be unbranched or variously branched. Frequently topped with an apothecium.

Pruinose – Having a whitish, powdery bloom or 'frosting' on the surface of the lichen.

Rhizine – A root-like holdfast on the lower surface of a foliose lichen. These can be simple, or variously branched.

Soredium (pl. soredia) – Specialized asexual propagule erupting from the lichen surface. Soredia are microscopic bodies consisting of a few algal cells enclosed by fungal hyphae. These originate from the algal layer from a crack or pore in the upper cortex. Soredia may be fine and powdery or larger and granular.

Sorediate – A lichen which has soredia.

Spore – The reproductive body of the fungal partner. Some lichens routinely produce spores while others do not.

Squamule – A small lobe or scale of lichen tissue consisting of an upper cortex, algal layer and medulla, but without a lower cortex or rhizines.

Substrate – The material to which the lichen is attached. Typically bark, soil, rock or some man-made material.

Symbiont – One of the symbiotic partners of the lichen. The fungal partner is more specifically called the mycobiont and the photosynthesizing partner is called the photobiont.

Thallus – The body of the lichen.

Umbilicate – A form of foliose lichen that is roughly circular and attached to the substrate by a single, central point.

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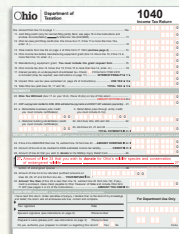
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