



**Starting To
Learn About
Lichens**



**The foggy Deer Isle, Maine forests are
designated by the Maine Natural Areas Program**

Maritime Spruce/Fir Forests.

**Welcome to this virtual visit to a habitat
especially rich in lichens.**



What is a lichen?

The answer is not simple. As we have better ways of looking and analysing, the more we learn about these ancient organisms that seem to defy classification by mere humans.



You can think of a lichen as a team comprised of fungi and their photosynthetic algae and/or bacteria teammates.

Photobionts are the organisms living with (symbionts) the lichen **fungus** partner. The photobionts are able to synthesize sugars and other carbohydrates from sunlight and water. Cyanobacteria and green algae are the usual photobiont partners. Some say lichens have figured out farming.



After a while we learn to recognize a few different “teams” at a glance. Just how the team looks depends on the circumstances as well. On tree trunks? Tree tops? In lots of sunlight or very little, etc.



But, if you have microscope and can look deeper, the various teams will look different because their players and equipment are different.



Once you learn to recognize lichens on tree trunks you will see them everywhere as you walk forest trails or travel local roads...





...and even notice them festooning treetops.

Lichens live on dead branches as well as live ones. They do NOT kill the trees.

The power company after a storm is the lichen hunter's friend.





You can collect lichen-covered branches and bring them home to study. You will never run out of new discoveries.

There are more than 18,000 species of lichens in the world.

Surveys of lichens on nearby Mount Desert Island have identified some 400 species of lichens.

[https://mainenaturalhistory.org/
Biodiversity_Project/checklistsME/
Lichens/lichenchecklistMDI.htm](https://mainenaturalhistory.org/Biodiversity_Project/checklistsME/Lichens/lichenchecklistMDI.htm)

See also: Cleavitt, Natalie, Alison C. Dibble, and David Werier. 2009. Influence of tree composition upon epiphytic macrolichens and bryophytes in old forests of Acadia National Park, Maine. *The Bryologist* 112(3):467-487.

The first thing you may notice about lichens is their color. The shades of green, grey, or yellow are helpful in making an ID.



Mineral gray-green



Yellow-green



Lichenologist Dr Fred Olday carries a spray bottle so he can moisten dried out lichens. The lichens may show quite different colors when wet or dry.

There are also differences in shape:

Foliose = leaf-like, or flat like a lasagne noodle



Fruticose = thread-like, shrubby, often upright like a cherry tree, or hanging downward like a beard



Crustose = a very thin, tightly attached layer, like the burnt egg in your favorite frying pan



Small cup-like fruiting structures called apothecia may dot the surface of lichens.

(say a po thee sha.)

The spores they produce are for fungal reproduction only. After a spore is shed and lands, it must find the right algal partner to make a lichen.



Small asexual dust-like clumps of fungi, algae and cyanobacteria resemble little cotton balls on the surface of lichens...these are called soredia.



On a lichen on bark



Under the microscope

Small asexual finger-like outgrowths growing from the surface of lichens are called isidia.



On surface of a lichen



Under the microscope



Colorful and interesting as they are crustose lichens are often difficult to identify



Greenshield *Flavoparmelia*

Found on mature spruce and maples, this common lichen is easily identified. Call it the 40 mph lichen or the 80 mph lichen if you are driving along a superhighway so the joke goes.

Greenshield lichen: The name *Flavoparmelia* refers to the yellowish warm light green color of this flat shield-like lichen.



The species name *caperata* means wrinkled. It looks like a round tortilla with shredded cheese. Or the wide lobes if fairly separate look more like tortilla chips! Tiny **dust-like** soredia, **vegetative propagules** that look like plowed snow drifts, are often obvious.



The Tube lichens, *Hypogymnia physodes* and *H. krogiae* (pictured here), are quite tolerant of pollution so most people will find them common. The mineral gray, slightly convex thallus lobes look like skinny fluted straws with lobe ends varying from pudgy fingers to tiny barrels according to species. They are not bristly underneath but lacquered-looking with apothecia quite flared.

Fat fingers, little barrels

and the lacquer look



Hypogymnia physodes



Parmelia sulcata is another very common lichen to be the first colonizer.

Flat and strappy *Parmelia squarrosa* goes by the common name Bottlebrush. The rhizines underneath are bristly. It shares its mineral gray-green color with the previous species. It takes a bit of practice recognize distinguishing marks of each one. Since all are common this can be frustrating but don't forget to enjoy your new interest!



Parmelia sulcata, Hammered Shield, is also perhaps one of the most common mineral gray lichens in our forest.. Note the rather blunt, tan lobe ends and hammered look.

Usnea...the beard lichens. Species ID can be challenging but the genus is easy to spot!



Usnea hirta, Bristly or Shaggy beard lichen, is the shortest little bunch of *Usnea* that you are likely to find on our spruces and birches.

Usnea longissima = old Man's beard or Methuselah's beard is now very rare due to its sensitivity to air pollution.

Fishbone beard lichen, *Usnea filipendula*, draped over branches and hanging from rough spruce bark, is the longest *Usnea* you are likely to see here on the coast of Maine.

The *Usneas* have somewhat elastic white central cores. It's fun to tweak those beards and prove it.

Maritime sunburst lichen *Xanthoria* grows near the shore.



The very name *Xanthoria parietina* tells us that this lichen is yellow and can be found growing on walls. A close look reveals that it is a leafy foliose lichen.



Some of our lichens look as if they are made of black jelly.

Bitter Wart lichen *Pertusaria amara* with fine granular soredia



You do not need a chemistry set for this crustose lichen found on hardwoods.

Just taste it!

Fortunately it is not poisonous and a tiny taste gives a definite result.

Black dots on rock could be a non-lichenized fungus, true lichens or even dark minerals in granite!





The forest floor in our spruce/fir foggy forests near the shore is often carpeted with lichens.

The number of lichen species in Cladonia makes them a study all in themselves.

Cladonia - British Soldiers



Cladonia - Reindeer "Moss"



Edward Tuckerman named *Cladonia cristatella*, commonly called British Soldier lichen, which ironically is not found in Britain. There are several species of lichen which are commonly called Reindeer "moss" but are certainly NOT a moss.

Several species of conspicuous foliose rock tripe lichens can be found growing on the vertical faces of granite.



Unfortunately these conspicuous rock tripe lichens have disappeared from several places along our preserve trails. Perhaps collectors who planned to use them for making dyes did not realize that the lichens are slow growing and not likely to recover soon.

Lung lichen - clearly foliose - *Lobaria pulmonaria* is commonly found on red maples.

It is quite sensitive to air pollution.



Always try to take two photos - one to show tree, rock, or soil substrate and a close-up including apothecia and any other reproductive structures.



“Vegetative” refers to asexual reproduction in plants such as soredia, the powdery propagules of fungal hyphae wrapped around cyanobacteria or green alga. Heaps of these propagules may give the appearance of snow-plowed piles. Isidia are the tiny clubby, finger-like or somewhat coral-like containers, easily broken and dispersing the partner cells. The saucer-shaped apothecia are sexual reproduction structures, containing asci, spore cells.



Apothecium = saucer, in sexual reproduction

Soredium = heap, in asexual reproduction

Isidium = like the Gorgon monster at left

Thallus = undifferentiated plant-like organism...lacks true shoots, roots, leaves

All that vocabulary!

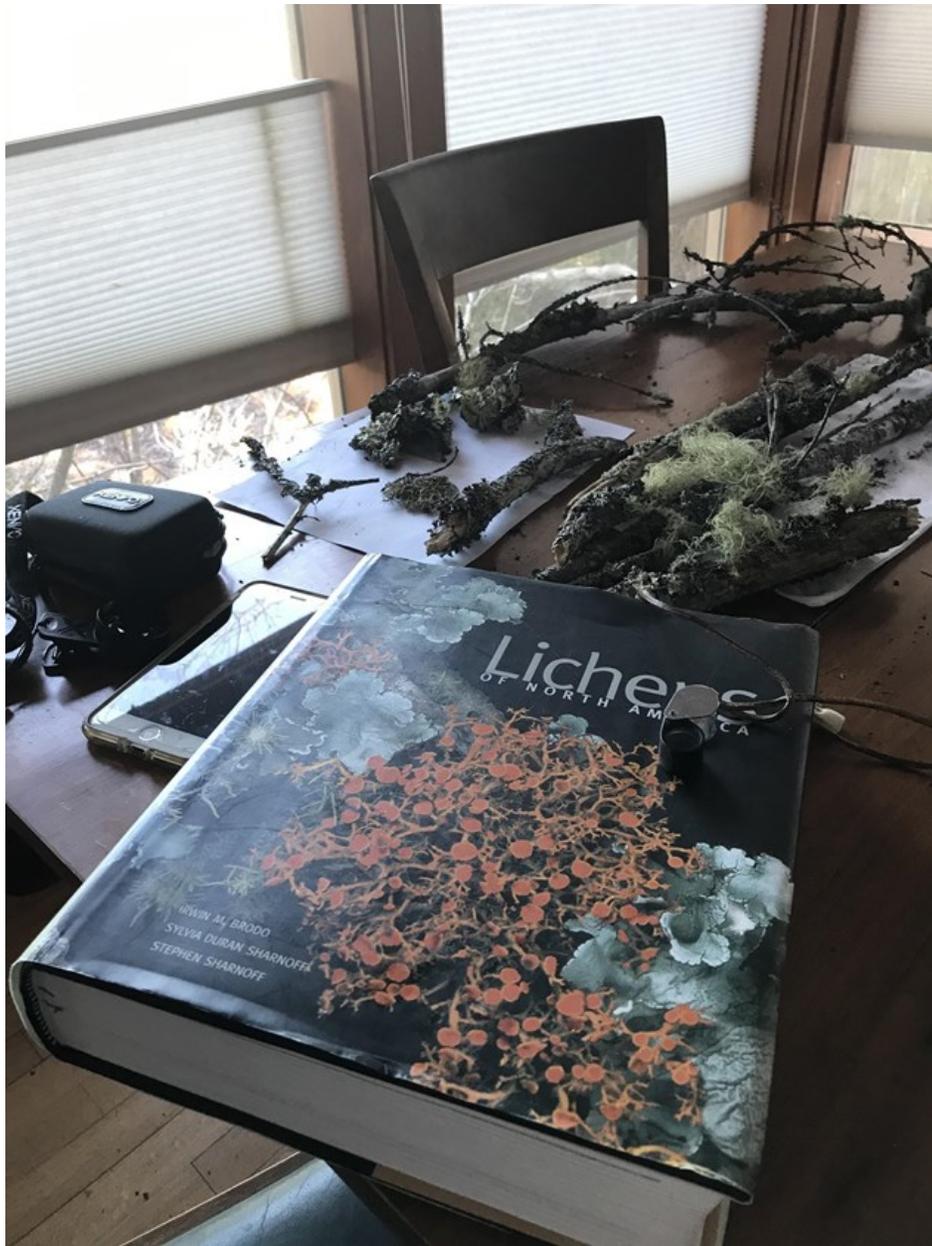
Wikipedia has excellent photos if you have the name to look up.
See also:

<http://www.britishlichens.co.uk/pictureindexcomplete.html>

<http://www.sharnoffphotos.com/index>

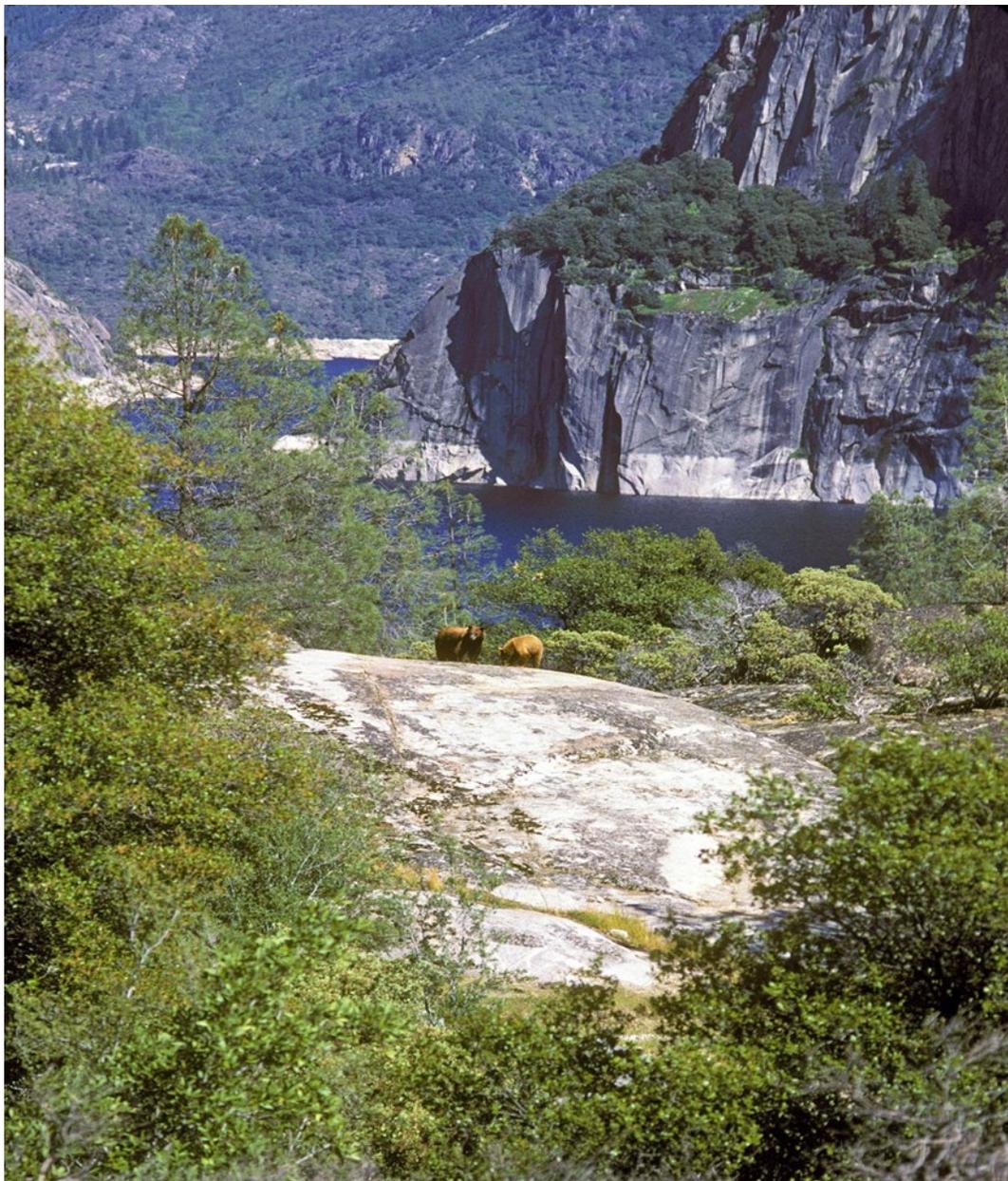
<https://lichenportal.org/>

Lichen enthusiast Thomas Walker has made an intermediate level slide show of common New England lichens



This great out-of-print book by Irwin M. Brodo weighs 8 1/2 pounds and has 795 pages. There are some 14,000 lichens in the world but only North American ones are pictured here. We have 3,600 species identified in North America so far.

Photos from your smartphone's camera have the GPS information embedded which is very convenient for posting on iNaturalist etc. Your photo identifications are checked by experts and become part of the California Academy of Science records available to scientists around the world for research.



This photo (used with permission) by Stephen Sharnoff was taken at Hetch Hetchy reservoir at Yosemite for Irwin Brodo's grand book. The text explains that the grey rocks on the opposite cliffs are covered with lichens while below the usual waterline the pale bare granite rocks have no lichens. Likewise the granite in the foreground has few enough lichens to look pale -- but, completely unmentioned, it does have two bears that wandered by. What restraint not mention the bears and what a stroke of comic genius!

Lichens rule !

Postscript



What is your style?

Your personal approach to learning to recognize some fantastically interesting lichens is yours and however you are pursuing it at the moment is just fine!

The show is over but not the studying.
Here is some online reading for you:

<https://www.plantscience4u.com/2014/07/difference-between-isidia-and-soredia.html#.YFdoYxD3ahA>

<https://www.yourarticlelibrary.com/reproduction/3-types-of-reproduction-that-are-found-in-lichens-biology/6945>

<https://www.cambridge.org/core/books/lichen-biology/sexual-reproduction-in-lichenforming-ascomycetes/65CBD9D7126DD36A2E6E0567B6935A50>

<https://www.anbg.gov.au/lichen/reproduction-dispersal.html>

<https://herbarium.usu.edu/fun-with-fungi/lichens>



Ready to move on to MOTHS? (By now you recognize the lichen it is sitting on, don't you? See # 19)

https://docs.google.com/presentation/d/12IcMDtZd4a4V2B10DO8TNzfbL4RJIWGQXwSg__UtPO0/edit?usp=sharing



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