

Explore the Watershed: Getting to Know Lichens

Article by Jackie Van Der Hout

Lichens are an abundant and widely misunderstood and overlooked part of the Sausal Creek Watershed. Lichens (pronounced “likens”) can be found on every continent on earth. Look closely at the trees, mailboxes, and rocks around you, and you will see lichen growing anywhere it can get a good foothold. Last week, I went on a hike with some old family friends. As we walked through their neighborhood, they told me that they were worried that the trees were getting sick because they were covered in small dangling “plants” that they had not noticed before. We stopped to examine these “plants” at closer range and instead found lichens. Lichens are not like parasitic organisms that grow in tree branches, such as mistletoe, and root into a tree’s branches and take its nutrients without giving anything return. Lichens perch on trees, live off of the air, and take nothing from the host trees. They pose no threat to the trees or rocks that they live on, and in fact provide many benefits for the ecosystems.



Lichens and mosses grow on a tree trunk in Oakland. Photo by Ken-ichi Ueda.

Lichens are not plants, though they do photosynthesize. Lichens are composed of two or more symbiotic organisms that bind together as one: a fungus and an alga (or in some cases cyanobacteria). Oftentimes lichens are also composed of a yeast component. The symbiotic nature of the relationship is open to some debate in the scientific community. In a lichen, the fungal partner tends the algae as a kind of “crop”, creating a relationship with more nuance than the term

symbiosis can encompass. In this set up, the fungal component provides the photobiont (a catch-all term for either algae or cyanobacteria in the context of lichen) a safe habitat, and in return the photobiont provides the fungus with nutrients. The taxonomy of lichens is mapped through lineages of fungi species. In lab settings, scientists have been able to identify the individual fungus and photobiont species individually. There are many mysteries about lichens that scientists have not been able to solve. Lichenization – the process of the photobiont and fungus binding together into a lichen – is one such mystery which has never successfully been replicated in a lab.

Lichens are broadly categorized into three types based on their phenotype: foliose, fruticose, and crustose. A crustose lichen can often be found on branches and rocks and appears thick, bumpy

and crust-like. Foliose lichens tend to appear leafier and have a distinct underside. Fruticose lichens have a coral-like branching pattern. Lichens come in an astounding variety of colors and change throughout their lifecycle. The pigments they produce protect them from UV radiation.

Lichens are a crucial part of ecosystems, providing habitat for invertebrates and playing a key role in ecosystem nutrient cycling (notably in the nitrogen and sulfur cycles). Additionally, many lichens are foraged by deer for food and by hummingbirds to create nests that blend invisibly into a forested setting.



A hummingbird's nest woven out of lichens. Photo by Beth Keer.

Lichens also provide water cycle benefits to their ecosystems by slowly releasing water after a rain event and preventing erosion by slowing the flow of water into soils. Some lichens are extremely sensitive to air quality and can be used as indicators of good air quality.

No article about lichens would be complete without mentioning the role of lichens in ecosystem evolution. Lichens growing on rocks during early evolutionary history paved the way for life as we know it today.

Lichen-created acids,

such as carbonic acid, are released onto their rocky substrates and are thought to have contributed to the breakdown of rock and the formation of soil, allowing for other plants and fungi to evolve and thrive. Mosses and other primitive plants become established in the newly forming soil and lead the way for more advanced plants and small animals. This pattern of lichens making the way for more complex ecosystems is seen not only in the long history of evolution but also in disturbed areas, such as after floods, earthquakes or fires.

There are over 14,000 species of lichens around the world, and more are being chronicled every year. California is a known biodiversity hotspot, and lichen is no outlier to that trend – more than 1,200 identified lichen species can be found across the state. In a 2009 survey, members of the California Lichen Society identified 81 lichen species in Oakland's Claremont Canyon.

Today, many naturalists document and share lichen information with the public on iNaturalist. Western science is rapidly learning more about lichens. Species names have changed over the last decade as genomes have been sequenced by scientists using DNA analysis techniques. The state of California has even adopted an official state lichen, *Ramalina menziesii*. However, indigenous knowledge about lichens has existed for millennia across the world, and people and lichens have long intertwined histories. Lichens have been used for dyes, foods, medicines, and even fibers by cultures across the globe.

Those interested in lichen conservation may find that many of the same strategies promoted to protect other wild species are also key for lichens. The best measures that can be taken to protect lichens are to create habitat connectivity, protect substrate availability (trees) and good air quality, and enact strong climate protections.



Ramalina menziesii, California's state lichen.
Wikimedia commons.



Lichen dyed yarn by Tessie Nicholson

Next time you are out for a walk in the watershed, consider taking a few moments to observe the lichens around you. If you want to be extra prepared, bring a hand lens and a guidebook with you. You may find that zooming in on a lichen allows you to see a new world that has been quietly growing around you.

More Resources:

- [A Field Guide to California Lichens](#) by Stephen Sharnoff
- [The California Lichen Society](#)
- iNaturalist Project: <https://www.inaturalist.org/guides/8390> Lichens of the SF Bay Area