YOSEMITE CONSERVANCY

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Big & Small
YOSEMITE

It's the LITTLE Things

Yosemite naturalists bring small life into big focus

BY LAUREN HAUPTMAN

It's easy to think everything in Yosemite is about the big: the world's largest granite monolith, some of the world's largest trees, and one of North America's largest waterfalls. But what excites many naturalists about the park are the little things of Yosemite. Like countless visitors, these naturalists came for the big, but what keeps them here is the little.

WE LICHEN THEM A LOT

Yosemite Conservancy's Outdoor Programs Manager and Senior Naturalist Cory Goehring loves lichen. Goehring's wife loves lichen. Goehring's son's middle name is Lichen. His wife suggested the name, explaining their child represents the symbiotic relationship between them, just as lichen represents the symbiotic relationship between fungi and algae. In fact, the word *symbiosis* was created in the 1800s to describe lichen.

With more than 500 different species of lichen in Yosemite, you'll see them everywhere — once you start looking.

"Lichen are one of those little things people overlook," says Goehring, a self-described lichen evangelist. "But as famous Yosemite naturalist Carl Sharsmith said, 'The more you know, the more you see.' Once you know, you'll notice them everywhere, and they're so beautiful. They come in the darker blacks on the cliffs of Yosemite, but if you

SENIOR NATURALIST Cory Goehring admires lichen growing on a rock in Yosemite Valley. PHOTO: © LUKE SCHAFTARY.


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LEFT: Mushrooms from the genus Galerina sprout in moist Yosemite soil. **RIGHT:** Snow plant grows in Yosemite Valley. This plant is unable to photosynthesize, and thus derives nutrition from underground fungi. PHOTOS: (ABOVE & OPPOSITE PAGE) © LUKE SCHAFTARY.

look closely, you'll also see these vibrant greens and almost psychedelic-looking oranges on the rocks that are all lichen."

Lichen often look like a simple patch of crust, fuzz, or leafy growth on a rock or tree, but they're actually a remarkable team effort between two very different organisms: a fungus and a photosynthesizing partner such as algae. The fungus provides a sturdy structure where the algae can live, shielded from harsh weather. In return for living inside the fungi's structure, the algae use sunlight to make food for the fungus that the fungus can't produce on its own. This partnership benefits both organisms and allows lichen to survive in places few other life-forms can live.

Lichen are excellent indicators of air quality. They are sensitive to air pollution, because everything they need to exist comes from air and sunlight, which photosynthesizes with water. If you see lichen in the area, it's a good bet the air quality is good, so take a deep breath.

Lichen are also considered a pioneer species. A fresh rockfall won't have lichen, but one that has been there for several decades or much longer will likely have a patina of lichen that grows over it. Once that patina covers rocks or cliffs, it can serve as an anchor for other things to live on the surface — dust and pollen particles, spiders and other small creatures, and so on.

Adventurers, too, like to explore where the lichen live. It's easy to look at a popular route — say, Half Dome from the Yosemite Conservancy spotting scope at Olmsted Point — and see where climbers and cables have worn away a path in the lichen patina. It's yet another reason to adhere to Leave No Trace principles in alpine areas. By being mindful of where we tread, we give lichen and other sensitive alpine species a greater chance of survival.

THE FUNGI ARE FASCINATING

Way before dinosaurs, way before sequoias, way before the earliest mammals, there were fungi — one of the two parts of lichen. Fungi play vital roles in our lives, as well as the life of the park. They aid decomposition, breaking down everything from bananas to big-leaf maple leaves.

"One of the things people don't know about fungus is that it's not a plant," says Dan Webster, a naturalist who leads a fungi-focused Yosemite Conservancy Field School program each year. "And when you see the bright red, beautiful mushroom growing out of the ground, it's only a small part of the fungal body — just the fruiting part. The rest of the fungal body is deep inside a dead and decaying tree, or way, way underground. It just pops up a fruiting body so it can release spores to reproduce."

There are many dozens of species of fungi in Yosemite — from those underground to those on trees to those in microhabitats on the Valley cliffs.

"As fungi spreads their mycelium — a root-like structure through which a fungus absorbs nutrients from its environment — out underground, they're in search of food," Webster explains. "Fungus grows into its food, then enzymatically breaks it down and absorbs it, often by creating a symbiotic relationship with tree roots and plant roots."

Some 90% of the world's plants have a mutually beneficial relationship with fungi. Tree roots and root hairs are covered with mycelium, which is composed of thread-like filaments that greatly extend the reach of roots, allowing the tree to gain more water and nutrients than it would by itself, all the while feeding the fungi.

LEARNING LITTLE BY LITTLE

The list of Yosemite's little organisms is seemingly endless: alpine butterflies, tiny wildflowers, elusive salamanders, countless species of bees, lichen, fungi, moss … all these petite parts are essential members of the park's ecosystems.

Single drops of water froze to form the glaciers that sculpted this area, Goehring adds.

"Even those pesky mosquitoes we curse throughout the summer are feeding bats and helping pollinate some of the flowers," he says. "The lichen that are breaking down the rocks are feeding 1,600 different vascular plants that are here in the park. It's all interconnected, and if you take away one small little thing, it can mess up the entire ecosystem."

Yosemite Conservancy donors appreciate the importance of every single species and are passionate about funding projects ranging from big wall bats to studying monkeyflowers on the side of a cliff to teaching visitors about the importance of tiny pollinators. Donors, too, are part of the interconnectedness of the park.

"People can look at Half Dome or El Capitan or giant sequoia trees, and it's so easy to feel that sense of awe and wonder," Webster says. "But the opportunity for awe and wonder is not limited. These smaller things can be found in many, many, many places, and once we develop wonder about them, we get that sense of that awe everywhere." ■

"Yosemite is a living puzzle, and our donors ensure no piece ever goes missing. Their support helps protect the big picture by safeguarding every little piece."

Cory Goehring
SENIOR NATURALIST
YOSEMITE CONSERVANCY

To learn a little bit more about the big picture of Yosemite, join a Yosemite Field School program. Our expert-led courses piece together the story of the park — from the grand landscapes to the smallest details.

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