

Toy Soldiers and Tundra Spaghetti

The life of lichen

BY MICHAEL ENGELHARD

YOU COULD CALL LICHENS THE POORER COUSINS of plants, though combining hardy fungi and algae, they partake of other kingdoms, forming miniature ecosystems. The fungus provides a solid structure and cultivates a green alga or cyanobacterium to photosynthesize nutrients for both “symbionts” involved. Slow growing and long-lived, lichens thrive where no plants can survive: in extreme climates and at extreme elevations or latitudes. As rootless pioneer species, they attach to bare rock, dead wood, bone, humus or moss mounds, buildings, or rusty metal, lying dormant metabolically for long periods when conditions turn too inhospitable for them. Unlike vascular plants, the brittle survivors remain active under snow even in a frozen state. They contribute to rock weathering, which releases inorganic nutrients, and they prepare the field for plant succession by catching soil particles on which mosses germinate. Over 500 biochemical compounds they produce mitigate UV-light exposure and deter microbes, browsers, and plant competitors. In Arctic Alaska or on high mountain peaks, they often are the only living things visible. Their biomass and diversity surpass the vegetation’s in such places—300 species were recorded at Anaktuvuk Pass.

They look exactly like naturalists’ descriptive terms suggest: crustose, leprose umbillicate, fan-shaped, filamentous, gelatinous. Or, more specifically, like red-capped, straight Toy Soldiers; mint-green Fairy Barf with fleshy, mushroomy bits; Pixie Cups; Sunbursts; Devil’s Matchsticks; or Dead Man’s Fingers poking palely from the ground. Some names allude to internal organs, to lung, kidney, belly, the gut, or the heart. Many species have found their own niche. Crinkled Snow Lichen prefers melting snow banks. Goldtwist or Limestone



Sunshine Lichen brightens calcium-rich soils. Wind-driven, branched Arctic Tumbleweed balls into thickets of tiny caribou antlers that pile into depressions on the tundra.

Benefits from lichens are as diverse as their shapes, preferences, and colors. Arctic species yield brilliant purple or ruddy dyes and, in a pinch, have been alchemized into beer, vodka, or molasses. Boiled in consecutive batches of water to leach out its bitterness, Rock Tripe served explorers and Native peoples as emergency rations. The flavor is earthy, “not entirely unappetizing.” Witch’s Hair made great tinder on the soggy North Slope and Snow Lichen’s lacy strips, fish and duck soup condiment. Eskimo hunters used Jewel Lichen’s stunning rosettes to locate prey; it encrusts outcrops fertilized with nitrogen from perching raptors’ and ground squirrels’ urine. “Caribou Moss,” the ungulate’s partially digested stomach content, is still sometimes removed for a version of “Eskimo ice cream” in which the fermented lichens are mixed with raw, mashed fish eggs and then frozen as a treat.

Hundreds of thousands of equally dedicated eaters subsist exclusively on the carbohydrate-rich growth. Caribous’ winter intake, about 10 pounds per head per day, is up to 90 percent reindeer lichens—a few closely related species—and half of their summer

Elegant
Sunburst Lichen
(*Xanthoria
elegans*).



diet as well. (The “cauliflower-headed” kind is sculpted into wreaths and toy railroad-trees, and the genus, in Europe, yields an acid ingredient for antibacterial ointments.) Special enzymes in the ruminants’ guts break down the fibrous fare. Considering herd sizes and lichen growth rates, corridors scoured down to the land’s bones are unsurprising. Their recovery can take 200 years. Caribou avoid lichen turfs younger than 50 years, which in part might explain shifting migration routes, or why they linger where they do. Moose, muskox, and mountain goats substitute ground-level lichens for favorite foods, while tree varieties stock northern flying squirrels’ winter larder. Golden plovers nest in patches of White Worm Lichen, further camouflaging their speckled eggs.

Because lichens don’t have an outer, epidermal layer, they can’t differentiate nutrients from pollutants, and absorb both. The 1986 Chernobyl disaster’s fallout poisoned Norwegian landscapes on which Sami herders’ reindeer forage. Thousands of animals had to be killed and their meat destroyed. As recently as 2014, hundreds marked for consumption were released from corrals, too sick from cancer caused by radioactive residue. As indicators of environmental health, lichens

help monitor dust-borne heavy metals near Northwest Alaska’s Red Dog Mine, and their diversity has decreased along the unpaved Haul Road. Equally handy in scientific research, black-fringed, yellow Map Lichen dates rockslides and glacial retreats—it expands 0.02 inches per year, the first life claiming a foothold on moraines as ice recedes. Samples endured 10 days in outer space without damage. Colonies of this stone rash exceed 8,000 years in age, which makes them the veteran living organisms on Alaska’s North Slope, older by far than Sierra Nevada bristlecone pines. At Atigun Pass, lichen-circle diameters show that the most recent cirque glaciers disappeared there four to five millennia ago.

Outpacing glaciers, even quickly shrinking ones, humans miss much. On your next Arctic adventure, bust out a loupe or a camera and on your belly explore the wild microcosm underfoot. Just beware of the undead reaching for you from the permafrost. 🗺

Changing his residence frequently, Michael Engelhard lives the life of a rolling stone. He wonders if those also do not gather lichens.

**Map Lichen
(*Rhizocarpon
geographicum*).**