

Rhododendron Leaves Support a Curious Organism

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Photos by author.

One of the things that makes plant hunting so enjoyable is that interesting plants tend to go hand-in-hand with interesting scenery. Another is that you just never know what else you might come across, such as observations that are completely unexpected and truly wonderful. This happened to me while hiking the Appalachian foothills of South Carolina in a place known as Eastatoe Creek Gorge. Twice in the past few years I had hiked down the long, steep switchback paths into the gorge with the intent of finding and photographing the rare and lovely filmy fern *Hymenophyllum tunbridgense* in its only North American haunt, and twice I had absolutely no luck in finding it. However, there was plenty else to occupy my attention along with the scenery, which was both spectacular and sublime at the same time. Before I tell you about the amazing thing that I found, a bit of background information would seem to be in order.

The gorge is part of the Eastatoe Creek Heritage Preserve which covers 374 acres (151 ha) in the northwestern

corner of South Carolina. This region attracted my attention not only as a temperate rain forest, being the wettest place in the eastern United States, but also for having been virtually untouched by the climatic extremes of the last Ice Age. Species which were eliminated from the rest of the continent found refuge here, including the “gorge-ous” early spring wildflower Oconee bells (*Shortia galacifolia*). The genus *Shortia* is found elsewhere only in East Asia, in sites also little affected by the worst of the climatic mayhem of the Pleistocene. That Asian region also sheltered such now familiar and previous native North American trees such as ginkgo (*Ginkgo biloba*) and dawn redwood (*Metasequoia glyptostroboides*).

Of course geology affects botany too. The woods on the way deep down into the gorge are dominated by several species of oaks and other hardwoods, as well as majestic white pines (*Pinus strobus*) and Canadian hemlock (*Tsuga canadensis*). All thrive on the acidic soils derived from the gneiss bedrock, a remnant of lofty ancient mountains. The undergrowth could best be described as a veritable plant menagerie, with everything from clumps of glossy mottled evergreen wild-gingers (*Asarum heterophyllum*) and palmetto-like evergreen irises (*Iris verna*) to pawpaws (*Asimina triloba*) and muscadine grapes (*Vitis rotundifolia*). Mountain-laurel



R. minus, Eastatoe Gorge.

(*Kalmia latifolia*) and two kinds of rhododendrons, rosebay rhododendron (*Rhododendron maximum*) and piedmont rhododendron (*R. minus*), thrive here in profusion. It was fascinating to see how very different the latter is in form and foliage from Carolina rhododendron (*R. minus carolinianum*), familiar to me from farther north at much greater elevations. It is hard to imagine that they are widely considered to be the same lepidote species.

Amidst these natural wonders I wandered, trying to take it all in. I brushed past lush thickets of rosebay rhododendron, a dominant species of the valley bottom near the rushing stream, enjoying the feel of their coriaceous leaves. From a distance I had casually observed what I took to be mildew infesting their foliage. It was



Eastatoe Creek Gorge, SC.



Eastatoe Creek, SC.



Lichen on *R. maximum*.



Lichen on *R. maximum*.



Lichen on *R. maximum*.



Lichen on *R. maximum*.

not until I got up close that the white splotches resolved to be not mildew at all, but something totally novel for me, a unique type of lichen. I had never seen this "species" of foliose (leafy) lichen before, neither on rhododendrons nor anywhere else. The reason that I put quotation marks around "species" is that despite appearances, lichens are not a single organism at all. Instead, they are comprised of at least two unrelated life forms, a fungus and an algae-of-some-sort living in a mutually beneficial relationship. Under a microscope, a section of lichen somewhat resembles college student dorm room fare: a bowl of ramen noodles with peas tossed in. The noodles correspond to the fungal threads or mycelium which supply the pea-like algal cells with water, nutrients, and protection. The photosynthetic algae in turn supply the fungus with what every living thing craves, namely sugar. Lichens do not necessarily appear green as this one attests, for accessory pigments ranging in color from blue to yellow to red offer some manner of protection and in the process, mask the chlorophyll.

All over the valley bottom I searched, determined to learn whether the lichen grew on other kinds of plants as well. To my satisfaction I proved that it was confined to the leaves of *Rhododendron*



Epiphytes and diseases on *Diospyros*, (sapote), Costa Rica.

maximum. Although lichens are not truly members of the Plant Kingdom, they somewhat look and act like plants and therefore we can lump them in with an exclusive group called foliar epiphytes or epiphylls. Lichens that partake in this unique lifestyle are also known as foliicolous lichens. These are adapted to growing upon the leaves of other plants and are typically found in moist climates. Although frequently growing on the same leaf as harmful fungal or bacterial foliar diseases or parasites, the epiphylls ("on leaves" in Greek) merely use their host as a perch. One would think this would always be



A green leaf covered in bryophytes in Costa Rica.



A palm frond's epiphytes in Costa Rica.

detrimental since excessive coverage can block sunlight and starve the leaf, but research has shown that in some cases the uncovered portions of some leaves hosting foliicolous lichens compensate by increasing photosynthesis.

My first encounter with these organisms was not in some exotic locale, but merely in my yard in the Northwoods of Wisconsin. There I noticed a particular "species" of gray foliose lichen smothering the long-lived foliage of boxwoods. I next encountered epiphylls in glorious abundance during a research trip that I undertook with my students to a montane rainforest in Costa Rica. Everywhere we looked, lichens, mosses, and liverworts were carpeting leaf surfaces. It held such a fascination for us that we ended up writing a research paper about it. What we found was that elevation correlated with the percent coverage of foliar epiphytes and diseases on the fronds of an understory palm species. Coverage increased as one descended towards the stream, likely due to an increase in humidity. So then how do tropical plants deal with this onslaught to their foliage? The answer is, they simply abscise their older leaves. It was an "Ah ha!" moment when I realized that this is an important reason why tropical plants

must lose their older leaves. If they held on to them for too long, the leaves would become a burden, consuming more calories than they produce.

Back at Eastatoe Gorge, the longer and closer I looked at the lichen, the more enamored I became of it. Where at first I had seen ugliness and disease, I now saw a thing of beauty evoking snowflakes scattered across the leaves, each in balance with its special environment. I wondered whether I could transplant this lichen by removing a leaf and tying it to a rhododendron twig back home, then thought the better of it. There is no telling what might happen if it were successfully introduced to a new environment with new kinds of rhododendrons. On the other hand, when looking at the broad picture, as with the relict *Shortia*, I might be performing a good deed by returning and rewilding a rare and highly specialized species, trapped in South Carolina since the Ice Age, back to its ancestral homeland. That, anyway, is one possible explanation for the lichen's presence in the sheltered gorge. The other is that it is not a northern species at the southernmost limit of its prehistoric range at all, but rather a nearly tropical species at the extreme northern extent of its tolerances. In this case the gorge

provides the mild even temperature and moisture conditions that allow it to persist this far north. After all, the record cold in the area only been around -5° F (-20° C), which is quite moderate for the Appalachian region. To put this into perspective, this is 4° F (3° C) warmer than Australia's coldest recorded temperature. So if this is the case, the rosebay rhododendron foliage may only be a convenient substitute for some unrelated tropical evergreen with similar physical and chemical properties to its foliage.

One cannot begin to address these questions until this exquisite lichen has been identified as to species. Once that happens, its natural range might be determined and that alone would tell us a great deal about its ecological needs. I have exhausted my amateur sleuthing skills in trying to track it down on the Internet. If you, dear reader, happen to know a lichenologist (or a mycologist, in case an algal symbiont is absent) who is up for a potential challenge, please have them contact me. My email is: mheim@Lco.edu.

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Continued from p. 71.

2. A hardy Schefflera, such as *Schefflera brevipedicellata* or *S. delavayi*. Their papery leaves are deep green, and the former has plum-coloured stems and leaf stalks. From late summer and into autumn, cream flowers are produced, similar to those of fatsia. The flowers are then followed by clusters of black berries; (Photo: <https://www.plantdelights.com>) or
3. Red bistort, *Persicaria amplexicaulis* 'Orange Field', also known as mountain fleece. This is a semi-evergreen, clump-forming perennial from which long, slender spikes clustered with tiny, fluffy,

orange-pink flowers appear from midsummer. Its flowers are popular with bees and other pollinators, and its foliage quickly makes dense groundcover. (<https://www.gardenersworld.com/plants/musa-basjoo/>).

In summary, I encourage people to try growing ornamental bananas and similar frost-hardy exotics in their garden. Bananas can be overwintered in pots in sheltered locations if necessary, and while their fruit are not tasty, banana leaves are beautiful, fun to use, and easy to cook with. They serve many purposes in Asian, Caribbean,

and Hispanic cuisines, from adding flavor to cooking foods inside them to simply being used as a colorful setting for serving plates and party platters at a dinner party!

Reference

Jamieson, G. 2021. Burning of Older Rhododendron Leaves under Excessive Heat. *J. American Rhodo. Soc* 75: 192-193.

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