

Several interesting lichens and bryophytes from Mount Washington, New Hampshire

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Abstract. The presence on Mount Washington of the rare species *Cladonia macrophylla* and *C. trassii* are validated. In addition, several other rare arctic-alpine lichens and bryophytes are reported and/or discussed.

Key words. Mount Washington, New Hampshire, lichens, bryophytes, *Cladonia macrophylla*, *Cladonia trassii*.

INTRODUCTION

The New England Geological Province represents the continuation of older Appalachian provinces to the south. It is divided into five sections, of these the White Mountain section is bounded by a generalized contour line of 1,500 feet (457 meters). Within this section there are three generalized mountain groups: White Mountains in northern New Hampshire; Katahdin group in Maine; and Caledonia range in Vermont (Fenneman 1938). Within the White Mountains, the Presidential Range has many mountains above 5,000 ft., and contains the highest peak in northeastern North America, Mount Washington, with a summit of 6,288 feet (1917 meters).

The first ascent of Mount Washington was in 1642 by Darby Field (Slack and Bell 2013). Edward Tuckerman, a distinguished Massachusetts lichenologist, did considerable field work in the White Mountains during the early 19th century (e.g. Tuckerman 1839, 1845). Mount Washington was botanically well-studied in the 19th and early 20th century, but there has been little published work by bryologists and lichenologists recently. An exception is a short paper by Alan Fryday (Fryday 2010) in which three crustose species of lichen new to North America were reported as well as *Cladonia luteoalba* Wheldon & A. Wilson, new to the eastern United States.

There are extensive areas both north and south of the summit of Mount Washington which are above treeline with many arctic-alpine plants; especially important for rare species are the snowbank communities to the east of the peaks. During the summer and fall of 2017, with the help of Rick Van de Poll and National Forest Botanist Keith Garrett, I obtained a collecting permit for an area just north of Mount Washington along the Gulfside Trail and the upper Headwall of the Great Gulf, which is considered a snowbank community.

RESULTS AND DISCUSSION

While exploring this area two very distinctive lichens were found: *Cladonia macrophylla* and *C. trassii*. Eventually five small populations of *C. macrophylla* were discovered in the study site. *Cladonia macrophylla* was first reported in New England from Mount Katahdin (Hinds and Hinds 2007). However, there appear to be unreported collections of the species made in 1976 and 1986 from Mount Washington, according to the Consortium of North American Lichen Herbaria (CNALH) website. *Cladonia trassii* was reported by Hinds and Hinds (2007) to have been collected on Mount Washington in the 19th century, and there is also an unreported collection of it in CNALH from Mount Washington in 1959, deposited in the Canadian Museum of Natural History (CANL). No collections of the species are known from New York, Vermont, Maine, or elsewhere in New Hampshire. In New England, this species appears to be restricted to Mount Washington.

Other interesting lichens found were mature plants of *Sphaerophorus fragilis* growing in very protected sites among boulders. The plants were tall and open-branching with white, globose

apothecia. These were very different from the stress form commonly found on bare rock. Another lichen of interest was a ground-dwelling *Bryoria* lacking atranorin.

Two unusual, arctic-alpine mosses included *Arctoa fulvella* and *Conostomum tetragonum*, both with abundant sporophytes, were found. These additional bryophytes were also found: *Andeaea rupestris* var. *papillosa*, *Calliergon stramineum* var. *patens*, *Racomitrium sudeticum*, *Barbilophozia sudetica*, *Gymnomitrium conncinatum*, *G. corallioides*, and *Tetralophozia setiformis*. Some of these taxa have been previously noted in early Mount Washington bryophyte checklists (Ammons 1934, Grout 1939), but modern specimens are lacking. Many appear to be southern disjunct extensions of arctic and sub-arctic species.

The italicized numbers in the list below refer to my personal collection numbers. Voucher specimens will be permanently housed in the Farlow Herbarium (FH) and the Missouri Botanic Garden Herbarium (MO).

Lichens

Bryoria nadvornikiana (Gyelnik) Brodo & Hawksworth

4050, growing over mosses beside Gulfside Trail. This lichen contains no atranorin, which is not typical of *Bryoria*. Irwin Brodo (CANL) examined the specimen, and considered it an odd form of *Bryoria nadvornikiana* that he often sees in the Arctic (pers. comm.). I have sent a duplicate of the specimen to Leena Myllys in Finland (H) for DNA sequencing. The results of that analysis confirmed that it was a Chemotype of *Bryoria nadvornikiana* (L. Myllys, pers. comm.); she referred me to her recent study of *Bryoria* in which it is demonstrated that certain chemotypes have distinct ecological and climatic preferences (Myllys et al. 2016)

Cladonia macrophylla (Schaerer) Stenh. (Fig. 1)

4068, on soil among boulders near Gulfside Trail. This species was found just north of the summit of Mount Washington. It is very distinctive because of its peltate squamules. This rare, arctic alpine lichen was first reported in New England on Mount Katahdin (Hinds and Hinds 2007), although according to the Consortium of North American Lichen Herbaria (CNALH) the species appears to have been collected in 1976 and 1986 on Mount Washington. It has also been found on Mount Marcy—the highest peak in the Adirondacks.



Figure 1. *Cladonia macrophylla*, Rahill 4068. Note the peltate squamules and brown apothecia. Scale = millimeters.

Cladonia trassii Ahti (Fig. 2)

4064, on soil among boulders near Gulfside Trail. This species was reported by Hinds and Hinds (2007) to have been collected on Mount Washington in the 19th century. In the CNALH, there is an unreported collection of the species from Mount Washington collected in 1959, deposited in the Canadian Museum (CANL). Otherwise, the species is unknown from New York, Vermont, Maine or elsewhere in New Hampshire. In New England this species seems to be restricted to Mount Washington.



Figure 2. *Cladonia trassii*, Rahill 4064. Scale = millimeters.

Sphaerophorus fragilis (L.) Pers.

4048, on soil among boulders. A mostly high-arctic species also known from alpine regions of New England (Brodo et. al. 2001). This species was found in very protected sites among boulders on Mount Washington. Its distinctive features include tall, open-branching plants with many white, globose apothecia. This is very different from the sterile stress-form commonly seen on bare rock. This collection was sent to Mats Wedin in Sweden (S) for verification (pers. comm.).

Bryophytes*Andreaea rupestris* var. *papillosa* (Lindb.) Podp.

5006, along Gulfside Trail.

Arctoa fulvella (Dicks.) Bruch. & Schimp.

5022, abundant at the upper Headwall.

Calliergon stramineum var. *patens* (Lindb.) G. Roth.

5010, among boulders near top of the Headwall.

Conostomum tetragonum (Hedw.) Lindb. (cover illustration)

5007, top of the headwall beside Gulfside Trail. Never abundant.

Gymnomitrium concinatum (Lightf.) Corda.
5008, common near the top of the headwall.

Gymnomitrium corallooides Nees
5002, at the top of the Headwall in dense cushions.

Lophozia sudetica (Nees) Grolle
5009, along Gulfside Trail.

Racomitrium sudeticum (Funk) Bruch & Schimp.
5017, along Gulfside Trail.

Tetralophozia setiformis (Ehrh.) Schljakov.
5000, among boulders at the top of the Headwall.

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