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***Erioderma pedicellatum* (Hue) P.M. Jørg, New to the United States and Western North America, Discovered in Denali National Park and Preserve and Denali State Park, Alaska.**

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Abstract. *Erioderma pedicellatum* (Hue) P.M. Jørg is a globally rare, foliose cyanolichen known from Scandinavia and southeastern Canada. In August 2007, several thalli of *E. pedicellatum* were collected in Denali National Park and Preserve on the south side of the Alaska Range, Alaska, USA. Subsequently, several additional thalli were observed in nearby Denali State Park. Together they represent the first report of *E. pedicellatum* within the United States and western North America and mark a major range extension for one of the most rare and endangered lichens in the world. The existence of a third global population center raises intriguing questions about the nature of the genetic relationships among eastern North American, western North American and Scandinavian populations.

Keywords. Rare lichen, lichen conservation, range, distribution

INTRODUCTION

The foliose cyanolichen *Erioderma pedicellatum* is known in North America from the Canadian Provinces of New Brunswick (Jørgensen 1972), Nova Scotia (Maass 1983, Cameron 2004) and Newfoundland (Ahti and Jørgensen 1971, Maass 1980) and in Europe from Sweden and Norway (Ahlner 1948, Tønsberg et al. 1996). In recent decades, however, most of the populations known in these regions have either substantially declined or disappeared altogether. In Scandinavia, *E. pedicellatum* is thought to be nearly extirpated (Goward et al. 1998, Holien et al. 1995). Recent surveys for *E. pedicellatum* in Canada have shown substantial reductions in the boreal populations in Newfoundland and dramatic declines over the last two decades in the Atlantic coastal populations of Nova Scotia (Environment Canada 2007). The

population in New Brunswick has now been gone for decades (C. Scheidegger pers. comm.)

Due to apparent rapid population declines across its range, *E. pedicellatum* is currently classified as Critically Endangered by the International Union for the Conservation of Nature (IUCN 2007), and is listed by the Canadian government as Endangered for coastal populations or as a species of Special Concern for boreal populations (COSEWIC 2003). Population decline throughout its range has been attributed to atmospheric pollution, habitat loss, and disturbance from forest management practices (Environment Canada 2007).

METHODS & RESULTS

Denali National Park and Preserve and Denali State Park are located in southcentral Alaska, USA, between the latitudes of 62°18' N and 64°04' N and longitudes of 152° 52' W and 148° 48' W. The region

is bisected by the Alaska Range and encompasses nearly 2.3 million hectares (Figure 1). The collections reported here were made in the Cook Inlet basin, which is subject to strong maritime influences from the Gulf of Alaska. The nearest long-term climate station is Skwentna, Alaska, which is between 57 and 116 km from the collection localities. Mean annual precipitation for this site is 67 cm and mean annual maximum daily temperature is 6.2 °C with a mean minimum daily temperature of -5.3° C. The area receives annual mean snowfall of 298 cm.

The first specimens of *E. pedicellatum* were collected from the bark of two different tree species in three localities along the base of the Alaska Range in Denali National Park and Preserve during a reconnaissance collecting trip in August 2007. The first two sites were 4 km apart on the east and west toeslopes of the Kahiltna Glacier (Figure 2), immediately adjacent to the headwaters of the Kahiltna River, between 229 m and 273 m elevation. Soil at the two sites is alluvium derived from unconsolidated glacial deposits. The vegetation of these sites was a mosaic of open to closed, mixed forests of *Picea glauca* (Moench) Voss, *Betula* sp. and *Populus trichocarpa* Torr. & Gray ex Hook. with large patches of seral *Alnus* sp. shrubs. The third site was 63.5 km from the nearest Kahiltna site, and was on the alluvial terrace of the Coffee River, situated at the bottom of a deep, shaded valley at 291 m elevation. Vegetation at the Coffee River site was an open, mixed forest of *Populus trichocarpa*, *Picea glauca* and *Betula* sp..

Approximately eighteen thalli were collected at the Kahiltna Glacier sites (collections PRN-07-800, PRN-07-801, JKW-10153, JKW-10158), all growing on *Picea glauca* twigs. Only one thallus (PRN-07-806) was found at the Coffee River site, growing on the bole of a *Betula* sp.. Specimens included a range of solitary larger thalli with abundant well-developed apothecia to a twig with ten small thalli. All collections are currently held in Denali National Park and Preserve by the Botany program for ongoing research. They will be deposited at University of Alaska Museum (ALA) at a future date.

In May 2008, we also observed several *E. pedicellatum* thalli at two sites within Denali State Park (Figure 1). All thalli were located on *Picea glauca* twigs and occurred in forest types similar to the Kahiltna sites. Specimens were not collected in

Denali State Park due to a pending collection permit application.

DISCUSSION

This is the first reported population of *E. pedicellatum* within the United States and western North America, confirming the supposition that there might be an Alaskan population of *E. pedicellatum*, a lichen of maritime-influenced habitats (Ahti and Jørgensen 1971). This discovery suggests the possibility that other locations of *E. pedicellatum* may also occur along the Pacific Coast, perhaps as far south as British Columbia (Ahti and Jørgensen 1971).

The lichen communities at our five *E. pedicellatum* locations are generally similar to those reported for other *E. pedicellatum* populations, in that *Lobaria pulmonaria* (L.) Hoffm. or *Lobaria scobriculata* (Scop.)DC., were present at all five sites. Other lichens indicative of humid environments were present, although not necessarily abundant, including *Pseudocyphellaria anomala* Brodo & Ahti, *Pseudocyphellaria crocata* (L.) Vain. and *Nephroma isidiosum* (Nyl.) Gyelnik. A more complete list of species by site is available from the first author.

The discovery of the Alaskan *E. pedicellatum* population raises questions about the genetic status of this species and about the relationships among the populations in eastern North America and western Europe. Genetic analysis of some of our material is being conducted by staff in the laboratory of Dr. Christoph Scheidegger. Whether or not the Alaskan population is distinct from other populations, it will be important to determine its size and stability. More fieldwork to study this population is scheduled for early July and early August 2008. A survey of likely habitats for this species in coastal southcentral and southeast Alaska and coastal British Columbia is also in order.

At this time, the populations within Denali National Park are suitably protected from direct threats because all three localities are difficult to access. No forestry activities are permitted within the area that could potentially alter *E. pedicellatum* habitat by removing or altering trees. There are currently no major air pollution sources upwind of this population, though climate change and increasing long distance transport of pollutants from Asia across the Pacific Ocean could be of future concern. Wild fires will likely occur eventually within the *E. pedicellatum* habitat areas, are not easily mitigated,

and may therefore pose the greatest short-term threat. The *E. pedicellatum* thalli we observed in Denali State Park were in close proximity to roadsides and could potentially be threatened by future road expansion or site development projects.

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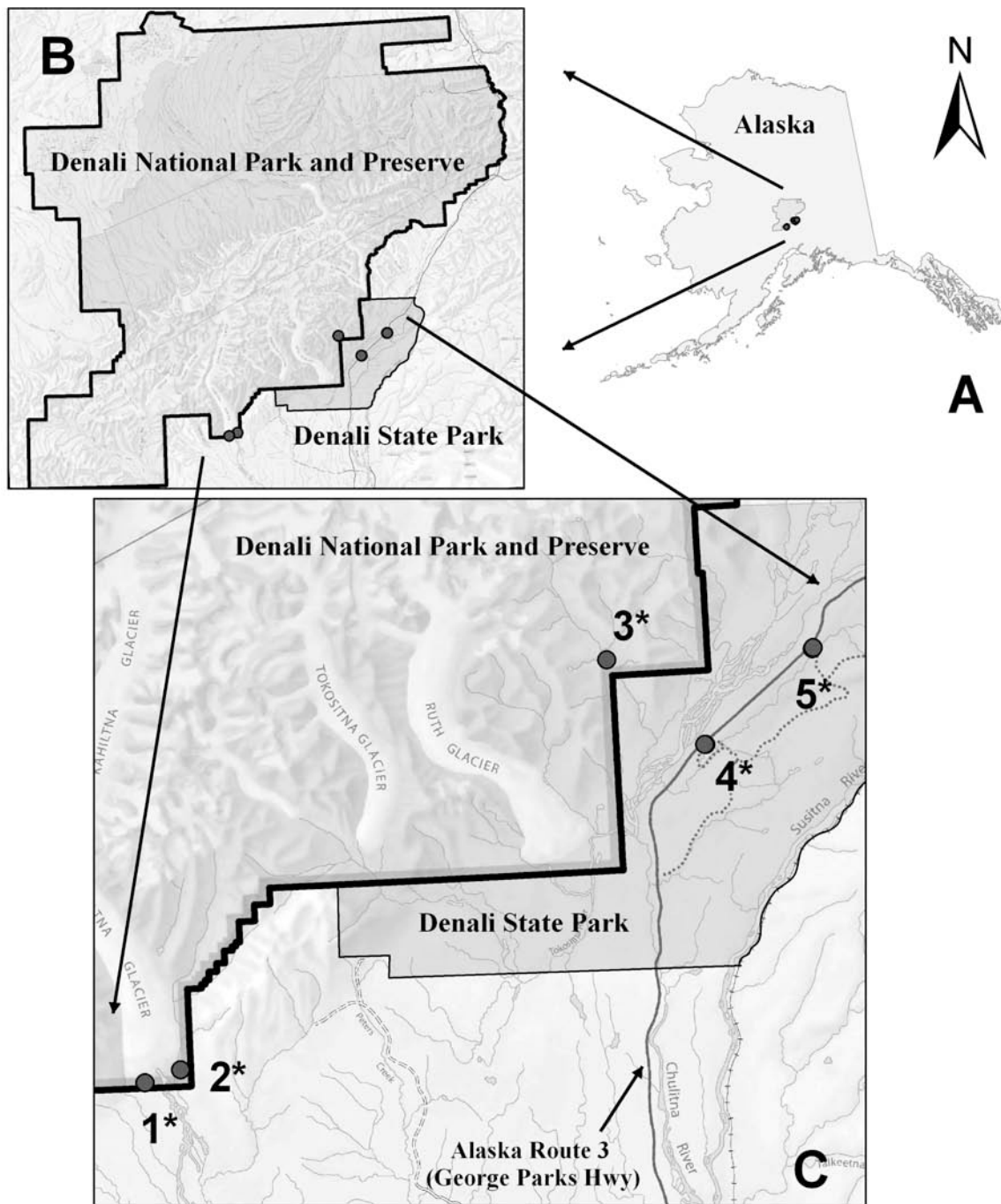


Figure 1. Map of *Erioderma pedicellatum* locations in Denali National Park and Preserve and Denali State Park, Alaska, USA. A) Map of Alaska with Denali N.P.P. and Denali State Park. B) Map of Denali N.P.P. and Denali State Park with 5 *E. pedicellatum* locations. C) Close up of *E. pedicellatum* locations in Denali N.P.P. and Denali State Park; 1* Kahiltna forest (west), 2* Kahiltna forest (east), 3* Coffee River, 4* Byer's Lake, 5* Ermine Hill Trailhead. NOTE: Specimens from locations in Denali State Park were not collected.

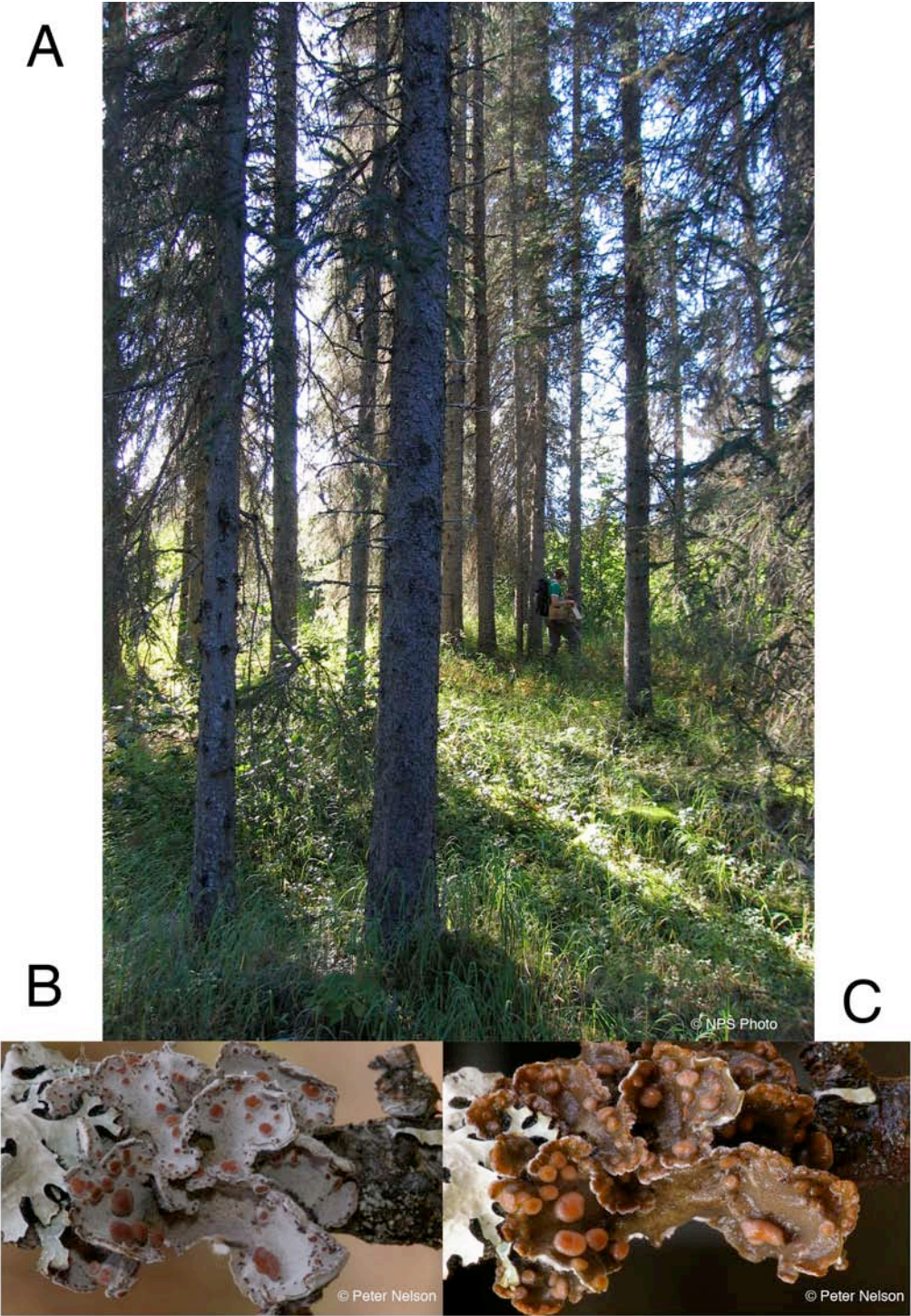


Figure 2. (A) Kahiltna Glacier west site where *E. pedicellatum* was found. (B) Dry specimen of *E. pedicellatum* (PRN-07-800) from Kahiltna Glacier west site. (C) Same specimen of *E. pedicellatum* (wet) from Kahiltna Glacier west site.