Erioderma mollissimum (Pannariaceae) found with certainty in Newfoundland, Canada

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ABSTRACT. Well-developed thalli of *Erioderma mollissimum* have been found on the island of Newfoundland. Previously reported collections from other areas of Atlantic Canada, and from high elevations in the southern Appalachians, were small and poorly developed. It had been suggested that these might represent a distinct, undescribed species. However, the morphology and chemistry of the collections reported here confirm the identity of the Newfoundland population as *E. mollissimum*.

KEYWORDS. *Erioderma mollissimum*, wrighti, Newfoundland, Atlantic Canada, disjunct, oceanic, wet balsam fir forest, *Abies balsamea*.

Species of the lichen genus *Erioderma* occur predominantly in the Southern Hemisphere (Jørgensen 2000) and are found mostly in South America (Jørgensen & Arvidsson 2002). However, three species are known to occur rarely in North America (Jørgensen 2000; Maass 1983): *E. sorediatum* P. M. Jørg. & D. J. Galloway in hypermaritime parts

of the Pacific coast; and *E. mollissimum* (Sampaio) Du Rietz and *E. pedicellatum* (Hue) P. M. Jørg., both in the East, though belonging in quite different ecogeographic elements. *Erioderma mollissimum*, which is the sorediate counterpart of the strictly South American *E. wrightii* Tuck., was previously known with certainty only as far north as Sevier Co.,

Tennessee, with some atypical specimens collected at rather high altitudes in the Great Smoky Mountains (Degelius 1941) and as far north as New Brunswick and Nova Scotia (Jørgensen 1972, 2000; Maass 1983). It is otherwise known mainly from the subtropics (Jørgensen & Arvidsson 2001). A published report of this species from Alaska (Geiser et al. 1998) and various reports on the internet of specimens of *E. mollissimum* from Thailand are based on incorrect identifications (Jørgensen & Wolseley 2009). We can now report the discovery of *E. mollissimum* from the island of Newfoundland (Province of Newfoundland and Labrador) in Canada.

THE NEW RECORD

More typical material (Fig. 1) of *Erioderma mollissimum* was discovered by Claudia Hanel and colleagues (E. Conway, R. P. Cameron, T. Neily, W. M. Clarke and I. Goudie) on the Avalon Peninsula in Oct 2006. On a return visit to this locality with S. R. Clayden in Jun 2007, lobes from two thalli were collected for further analysis. This material will be deposited in the herbarium of the Provincial Museum of Newfoundland and Labrador as: Canada, Newfoundland and Labrador, Avalon Peninsula, Halls Gullies, 47.38°N, 53.44°W, Clayden 17632 (NFM). (The values for latitude and longitude are rounded here to protect the exact location of the thalli.)

Jørgensen (2000) recorded this species, with some doubt, north of Tennessee and suggested that the northern specimens might represent a different, probably undescribed species. Its discovery on the island of Newfoundland was therefore important. The specimens are more characteristic, with elongate lobes and continuous, marginal soredia, though not typically limbiform as in the type specimen, and with punctiform laminal soralia, rarely seen in subtropical material (though sometimes present). However, it was possible to identify the chemical contents with certainty by HPLC to wrightiin, a substance (Maass & Hanson 1986) which is known so far only from *Erioderma mollissimum* and its fertile counterpart *E. wrightii*. This was clearly not an unknown, unidentifiable substance, as recorded from an earlier New Brunswick collection that was too small for further research (Jørgensen 2000). It can now safely

Figure 1. Two thalli of *Erioderma mollissimum* on a balsam fir (*Abies balsamea*), Avalon Peninsula, Newfoundland. 1×. Photo: S. R. Clayden.

be concluded that *E. mollissimum* occurs disjunctly as far north as the island of Newfoundland in North America, which is its northernmost locality, though it is often poorly developed there due to the harsh environment. Several additional localities, none with more than a few thalli, have been found subsequently on the Avalon Peninsula, all but one in the Halls Gullies area, and the other near Placentia, about 35 km to the southwest (E. Conway, M. Pitcher, pers. comm.). In Nova Scotia, a number of additional occurrences of *E. mollissimum* have been discovered since 2004 (Cameron & Neily 2008; Cameron & Neily, pers. comm.).

These occurrences are of considerable phytogeographical interest because *Erioderma mollissimum* on the eastern side of the Atlantic does not occur further north than Serra do Gerês in Portugal at about 40°N (Tavares 1950). It is definitely a subtropical element in the lichen flora of Newfoundland. Few such species have been reported. Among them is *Coccocarpia palmicola*, which occurs quite frequently in humid balsam fir (*Abies*

balsamea) forests on the Avalon Peninsula and elsewhere on the island (Ahti 1983). Notably, *C. palmicola* is present at all sites where *Erioderma pedicellatum* or *E. mollissimum* are known. Like them, it is lichenized with *Scytonema*, a rare photobiont in lichens at these latitudes. A further *Scytonema*-containing lichen, *Lichinodium sirosiphoideum*, occurs in the *Coccocarpia-Erioderma* community (Tønsberg 1993), suggesting that these species may form a "photobiont-mediated guild" in the sense of Rikkinen (2003).

These lichens also belong to a distinctly oceanic assemblage of species in Newfoundland, best represented on the Avalon Peninsula (Ahti 1983). However, most of these, unlike *E. mollissimum*, have predominantly boreal ranges. They include, for example, *Cavernularia hulterii*, *Fuscopannaria ahlneri*, *Lecidea roseotincta* and *Platismatia norvegica*. These latter species are part of the boreal, oceanic Trøndelag element as described from Norway (Holien & Tønsberg 1996). Hemiboreal and temperate oceanic lichens are less numerous in Newfoundland. *Degelia plumbea* and *Nephroma laevigatum* are among them, but a number of species occurring in oceanic climatic sectors in the nearby, mainly hemiboreal, Canadian Maritime Provinces are absent. For example, no *Hypotrachyna*, *Parmotrema* or *Sticta* species are known in Newfoundland.

The habitats of *Erioderma mollissimum* on the Avalon Peninsula are within the range of those of *E. pedicellatum* (Maass & Yetman 2002). It occurs on the trunks of balsam fir trees, often with the liverwort *Frullania tamarisci* ssp. *asagrayana*, in wet to mesic, fir-dominated forests in areas with frequent fog of marine origin. These stands are most often located near open peatlands. The ground layer of the wetter sites is dominated by somewhat minerotrophic *Sphagnum* species, especially *S. girgensohnii*, and the fern *Osmunda cinnamomea* is often abundant. On adjoining, more mesic slopes, dominance of the forest understory may shift to feather mosses (*Hylocomium splendens*, *Pleurozium schreberi*), and it was in such a site that the thalli of *E. mollissimum* reported here were found. Physiographically, the Halls Gullies area is part of a complex of low, closely-spaced, moraine-ridges alternating with wet hollows.

Topographic relief is low, mostly under 25 m. High relative humidity is maintained in the forests on slopes and ridges by their proximity to the adjoining hollows.

Overall, the lichen community on fir at the collection locality (and other *Erioderma* sites) is an acidophilous one. But the scattered occurrence here of *Lobaria scrobiculata*, *Fuscopannaria ahlneri* and *Parmeliella parvula*, in addition to the two *Erioderma* species and *Coccocarpia*, may be indicative of some mineral nutrient enrichment relative to otherwise similar sites where these species are lacking. Based on measurements made in Nova Scotia, Maass and Yetman (2002) reported a mean pH of about 4.2 (range 3.8–4.7) for the outer bark of fir trees bearing thalli of *C. palmicola* and *L. scrobiculata*. The sub-surface bark was slightly less acidic, but still ≤ 5.1 . These pH values are lower than those generally reported for trees supporting a "Lobarion" community, e.g., 5.0–6.0 in western Europe (James et al. 1977). Other lichens on the fir trunk (to 2 m above the ground) on which *E. mollissimum* was collected include *Alectoria sarmentosa*, *Biatorea pycnidia*, *Bryoria bicolor*, *B. trichodes* ssp. *americana*, *Cladonia squamosa*, *Fuscopannaria ahlneri*, *Hypogymnia incurviformis*, *H. physodes*, *H. vittata*, *Lopadium disciforme*, *Mycoblastus caesius*, *Ochrolechia androgyna*, *Parmelia squarrosa*, *Platismatia glauca*, *P. norvegica*, *Sphaerophorus globosus* and *Thelotrema lepadinum*.

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