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## LIZONIA EMPERIGONIA, A BRYOPHILOUS FUNGUS NEW TO NORTH AMERICA FROM QUÉBEC

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**Résumé** – Le *Lizonia emperigonia* (Ces. & De Not.) De Not. est un champignon bryophile de la famille des Pseudopérissporiacées qui infecte les corbeilles à anthéridies du *Polytrichum commune* et du *P. juniperinum* et finit par les remplir de ses périthèces noirs. Au cours d'une herborisation récente dans la Réserve écologique du Pin-Rigide, M.R.C. Le Haut-Saint-Laurent, dans le sud du Québec, nous avons découvert le *L. emperigonia* poussant sur le *P. strictum*. C'est la première mention du *L. emperigonia* pour l'Amérique du Nord et la première mention du *P. strictum* comme hôte de ce champignon. [Traduit par la revue.]

**Mots-clés** : *Lizonia emperigonia*, champignon bryophile, mousses, Québec.

**Abstract** – *Lizonia emperigonia* (Ces. & De Not.) De Not., a bryophilous fungus in the Pseudoperisporiaceae, infects the antheridial cups of *Polytrichum commune* and *P. juniperinum*, filling them with black perithecia. On a recent collecting trip, *L. emperigonia* was discovered in the Réserve écologique du Pin-Rigide, M.R.C. Le Haut-Saint-Laurent, in southern Québec, growing on *P. strictum*. It is new to North America, and *P. strictum* is a new host for the fungus.

**Key words**: *Lizonia emperigonia*, bryophilous fungus, mosses, Québec.

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### Introduction

If ever there was an understudied group of organisms, it is the bryophilous fungi, those fungi that occur only on bryophytes. There has never been a concerted study of the fruit-body forming bryophilous fungi in North America, and almost all previous workers are European. In July 2013, I took a seminar on the subject at the Eagle Hill Institute in Maine, U.S.A. (<http://www.eaglehill.us/>), offered by the current world authority, Peter Döbbeler of Munich, Germany. In those five days, we learned how to look for these mostly very small fungi, and even though I had seldom seen them previously in all my moss identification work, they prove to be not uncommon if one knows how to look for them. One of the few such fungi that can actually be seen in the field is the genus *Lizonia* (Pseudoperisporiaceae), which infects the antheridial cups of Polytrichaceae, utilizing the developing antheridia for its nutrition.

### Discussion

In 2016, the annual A. LeRoy Andrews Foray, focusing on bryophytes and lichens in northeastern North America, met for the first time in Canada, on its 40<sup>th</sup> anniversary. The meeting was held in southern Québec near the north shore of Lake Champlain, with Jean Gagnon as the local organizer. Jean generously offered to stay on a few extra days beyond the foray if anyone was interested in additional field work in the area. In addition to myself, Richard Harris and Tom Phillips stayed on

for additional collecting. With a smaller group, we were able to visit sites that were too fragile to withstand a group of 40. On our last field day, while collecting in Réserve écologique du Pin-Rigide, I came across a large population of male plants of *Polytrichum strictum* Menzies ex Brid. Even though I have searched hundreds of *Polytrichum* males for the *Lizonia* without success, nevertheless hope springs eternal, and once again I got on my hands and knees to look at the antheridial cups with my 7× hand-lens. Eureka! Right away I saw that the antheridial cups were filled with small, black perithecia, and called the others over to see it.

*Lizonia* was first described as a subgenus of *Cucurbitaria* Gray by Cesati and De Notaris (1863), for three species. Shortly afterward, De Notaris (1863) raised *Lizonia* to the generic level, but only transferred a single species, *L. emperigonia*. Subsequently, von Höhnelt (1911) typified the genus with *L. emperigonia*. There are currently four species of *Lizonia* that infect Polytrichaceae antheridial cups (Döbbeler 1978), but many more non-bryophilous species have been added to the genus. Whether they actually belong there has not been evaluated.

The bryophilous species of *Lizonia* are told apart by spore size and by the number of ascospores per ascus. *Lizonia emperigonia* has 8 spores/ascus, and the spores are 33–40 × 9–12 µm, the largest of any of the bryophilous species. *Lizonia emperigonia* most often occurs on *Polytrichum commune* Hedw., but the Québec collection was from *P. strictum*.

Racovitza (1959), in his pioneering work on bryophilous fungi, reported the hosts as also including *P. juniperinum* Hedw., *P. piliferum* Hedw. and *P. formosum* Hedw. (as *P. attenuatum* Menzies ex Brid.) from Europe. Thus, the occurrence of *L. emperigonia* on *P. strictum* is a new host record. It is also the first record of this species for North America. Other species of *Lizonia* appear to be circumboreal and occur wherever their hosts occur (Döbbeler & Hertel 2013).

The collection site was Réserve écologique du Pin-Rigide. In the area in which we were collecting, the habitat is primarily a sandstone barren and is dominated by *Pinus resinosa*, not *P. rigida* as the name of the reserve implies. The population of *Polytrichum strictum* was in a small depression among the sandstone. The habitat was not typical of what one normally expects for *P. strictum*, i.e., *Sphagnum* bogs. However, the plants have the typical dense tomentum on the stems, and the leaves are shorter than those of typical *P. juniperinum*. So, although the ecology is atypical, the morphology fits well with *P. strictum*. The two species are sometimes synonymized (Allen 2014). The moss population was about a square meter in area and consisted of sterile and male shoots. Although my experience is limited, I am under the impression that these fungi that infect antheridial cups are more likely to occur when there is a large population of male plants rather than just scattered males. While on a previous field trip in West Virginia, U.S.A., I found a large population of male plants of *P. juniperinum*; I found no *Lizonia* there, but the antheridial

cups were rather filled with small tan-colored apothecia of *Durella polytrichina* (H.Karst.) Racov. (Helotiaceae), the only species in that genus occurring on bryophytes. Although the *Polytrichum* disperses its sperm via a splash-cup mechanism, at least the initial infection must be from air-borne ascospores, and larger *Polytrichum* populations offer a larger target. How the *Lizonia* gets from one antheridial cup to another is not clear. It is possible that their ascospores are also dispersed via the splash-cup mechanism, but there are no data one way or another.

### Collection

The collection of *Lizonia emperigonia* was sufficient to distribute duplicates. These are deposited at BPI, DAOM, ILLS, H, M, and NY (02696330). In addition, Jean Gagnon collected a portion of the population, and his collection (# 64.6) is deposited in the herbarium of Université Laval (QFA). The exact locality data are as follows:

**Canada. Québec.** Municipalité régionale de comté (M.R.C.) Le Haut-Saint-Laurent, municipalité de canton de Franklin, Réserve écologique du Pin-Rigide, at the corner of rang des Savary and chemin Demers, 45°05'07" N - 73°51'49" W, alt. ca. 75 m; Potsdam sandstone barrens with *Pinus resinosa* dominant; in antheridial cups of *Polytrichum strictum*; 20 September 2016, William R. Buck 63963. Figure 1.



Figure 1. *Lizonia emperigonia* in the antheridial cups of *Polytrichum strictum* (Buck 63963, NY). Antheridial cups are 2 mm across. (Photograph taken by Roger Smith).

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I particularly thank Jean Gagnon for organizing the 40<sup>th</sup> A. LeRoy Andrews Foray at Saint-Paul-de-l'Île-aux-Noix in southern Québec, and for generously offering to stay longer for those who wanted to collect more. Peter Döbbeler is my mentor for bryophilous fungi, and he identified my specimen to species. Roger Smith took the spectacular photograph. Ted Ahti suggested that the host was *Polytrichum strictum* rather than *P. juniperinum*. Marie Davey and an anonymous reviewer are thanked for useful suggestions.

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