

Porpidia soledizodes (lichenized ascomycota) in North America

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ABSTRACT. – The occurrence of the sorediate species *Porpidia soledizodes* (Nyl. ex Lamy) J.R. Laundon in North America is confirmed based on a collection from the zinc contaminated superfund site at Lehigh Gap, Carbon Co., Pennsylvania. Another recent collection from Connecticut is also referable to *P. soledizodes* and two earlier collections from eastern Canada that were provisionally referred to this species are re-examined.

Recently, while surveying the lichen communities of Lehigh Gap, Carbon County, Pennsylvania, two of us (JCL & NMH) observed a large population of a sorediate crustose lichen that we had not seen previously while collecting in eastern North America. The species was abundant on acidic rock talus on the upper slopes of the western side of the Gap and had significant cover in several plots being studied by the third author. We collected several specimens of the lichen and brought them back to Philadelphia where TLC revealed that they contained stictic acid and we determined that they likely represented a species of *Porpidia*, a determination supported by the presence of immature apothecia on some of the collections. The first author agreed to examine the specimens and determined that they represented *P. soledizodes* (Nyl. ex Lamy) J.R. Laundon, a species not definitely previously reported from North America. Richard Harris, at the New York Botanic garden (NY), kindly sent us four more sterile, sorediate, saxicolous crusts containing stictic acid from north-east North America and one, from Connecticut (see below), was also *P. soledizodes*.

Porpidia soledizodes is characterized by having a thin, gray areolate thallus containing stictic acid (K+ yellow, Pd+ orange), lacking an amyloid medulla, and with numerous, small (ca. 0.3 mm diam.), discrete, usually tuberculate soralia containing blue-grey or cream-colored soredia (Fig. 1A). Poorly developed specimens may have a scurfy, almost non-existent thallus. Apothecia are rare, but suggest that this taxon is the sorediate counterpart of *P. crustulata* (Ach.) Hertel & Knoph (Rambold 1989, Gowan & Ahti 1993). *Porpidia soledizodes* is a frequent species in northern and central Europe where it occurs on siliceous rocks and pebbles in lowland situations (Galloway & Coppins 1993). It has also been reported from Australia (Rambold 1989).

Porpidia soledizodes superficially resembles *P. tuberculosa* (Sm.) Hertel & Knoph, but that species has a thallus containing confluent acid (K–, Pd–) and an amyloid (I+ blue) medulla. Three other sorediate *Porpidia* taxa that contain stictic acid are known from eastern North America: *P. ochrolemma* (Vain.) Brodo & R. Sant., *P. superba* f. *sorediata* Fryday, and the un-named sorediate morph of *P. albocaulerulescens* (Wulfen) Hertel & Knoph. *Porpidia ochrolemma* is easily distinguished by its persistently orange thallus, whereas *P. superba* f. *sorediata* has a smooth, cracked-areolate, creamy-white thallus with raised soralia and occurs on basic and/or flushed rocks in upland areas (Fryday 2005), and *P. albocaulerulescens* differs in having a paler (creamy to pale gray), smooth, continuous, cracked-rimose, thallus that is usually much thicker than that of *P. soledizodes*. The sorediate morph of *Porpidia albocaulerulescens* is also usually fertile (Gowan 1989a), in which case it is readily distinguishable from *P.*

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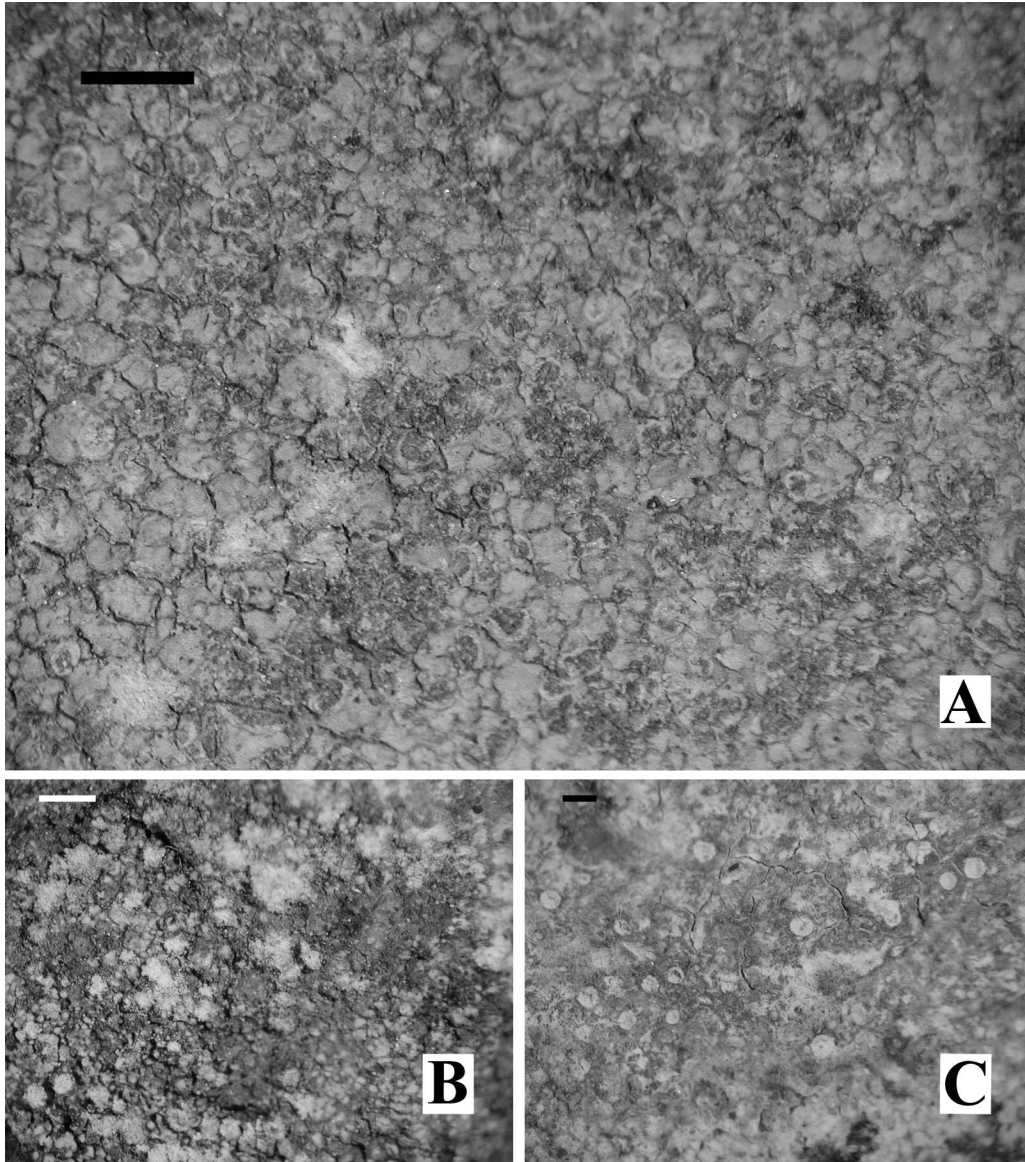


Figure 1. *Porpidia soledizodes*: A, *Lendemer 6758* from Pennsylvania; B, *Gowan 3573* from New Brunswick; C, *Waghorne 308* from Newfoundland. Scales: A = 1 mm; B & C = 0.5 mm.

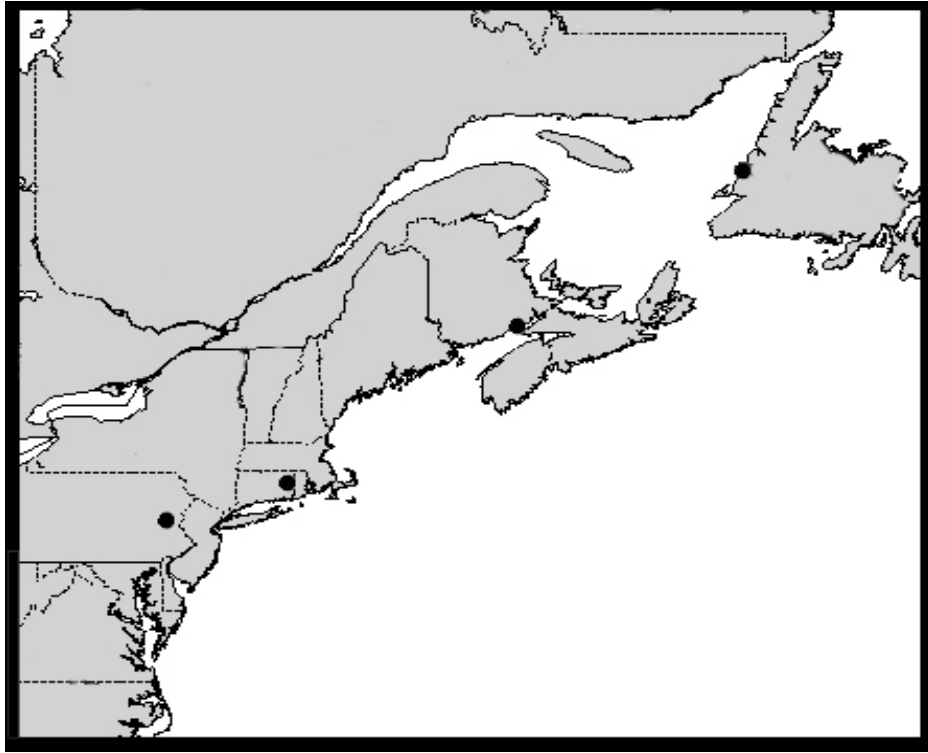


Figure 2. The North American distribution of *Porpidia soledizodes*.

soledizodes by its innate, heavily pruinose apothecia. The collection of *P. soledizodes* from Lehigh Gap has several sessile, non-pruinose apothecia.

Gowan (1989a) mentions two collections from eastern Canada as possibly belonging in *P. soledizodes*. One of these, collected by Waghorne from Newfoundland (see below; Fig 1C), matches the description of *P. soledizodes* except that the thallus lacks stictic acid. However, lichens that usually produce stictic acid often lack lichen substances or produce norstictic acid in its place (e.g. *Rhizocarpon reductum* Th. Fr.; Fryday 2000). In fact, Gowan (1989b) found that 34% of the 134 specimens of, the closely related, *P. crustulata* that she tested lacked lichen compounds. As the alternative determinations; that this is a specimen of, the morphologically identical, *P. tuberculosa* but lacking both confluent acid and an amyloid medulla, or it is an undescribed species, are even less likely, it is our opinion that this specimen represents a specimen of *P. soledizodes* lacking stictic acid. The other specimen mentioned by Gowan (op. cit.), from New Brunswick (see below; Fig 1B), although containing stictic acid is more problematic because it has a thin, slightly granular thallus and slightly convex and effuse soralia with white, farinose soredia. Although Gowan says the substratum is HCL+ rock, three pieces were tested with 15% HCl and 50% HNO₃ but no effervescence was observed. This specimen is provisionally referred to *P. soledizodes*, but the possibility that it is an anomalous specimen of *P. superba* f. *sorediata*, or that it belongs in a genus other than *Porpidia*, cannot be discounted. We consider that Gowan (1989a) was correct not to accept *P. soledizodes* as a North American species on the strength of these two specimens but, given the new positive records from Pennsylvania and Connecticut reported here, they should now be considered as additional records of that species (see Figure 2 for the distribution of *P. soledizodes* in North America).

Interestingly, both the New Brunswick and Pennsylvania collections support a lichenicolous fungus with small perithecia and hyaline, 1-septate ascospores measuring ca. 15 x 5 μm. However, these are not congeneric as the perithecia on the New Brunswick collection are ca. 0.05 mm in diam. and immersed in the thallus areoles, whereas those on the Pennsylvania collection are ca. 0.1 mm diam. and occur in small “islands” where the thallus is apparently absent. There are also anatomical differences in that the New Brunswick collection has persistent (although sparse), simple paraphyses and an I– hymenium, whereas the Pennsylvania collection has an I+ blue hymenium but no apparent paraphyses.

Sorediate crustose lichens are one of several groups that are generally overlooked and under collected in North America so the discovery of a species previously unknown from North America is not surprising. The discovery is significant because when Nash (1974) surveyed the lichens of Lehigh Gap he found a simplified community of fewer than a dozen species none of which attained significant cover. Nash concluded that the simplification of the lichen community of the Gap was due to zinc, cadmium, and lead contamination from a zinc smelter in the nearby town of Palmerton, Pennsylvania, 2 km to the northeast. The discovery of *Porpidia soledizodes* and other lichens in the Lehigh Gap is a clear indication that the lichen community is in the early stages of recovery following the closure of the smelter in Palmerton in 1980. The changes in the lichen community of Lehigh Gap will be discussed in detail in a separate publication (Howe and Lendemer in prep.).

SPECIMENS EXAMINED. – **USA.** CONNECTICUT. WINDHAM CO.: Windham, W of Windham Airport, SSW of Mansfield Hollow Dam, Mansfield Hollow State Park, 41°41' N 72°11'W, ca. 100 m, *Cladonia*-dominated gravel barren, artificial talus slope of dam, and outwash area blow dam, 28 July 2002, *R.C. Harris 46229* (NY!). PENNSYLVANIA. CARBON CO.: Lehigh Water Gap Superfund Site, W-side of Lehigh Gap above railroad grade, along transect line, SE of Palmerton, Lehighon Quad., 40°47'30"N, 75°37'47"W, 600 ft. [183 m.], rocky, north-facing slope, contaminated by cadmium, lead and zinc, on rock, 2 May 2006, *J.C. Lendemer 6758 & N.M. Howe* (PH!, MSC!). **CANADA.** NEWFOUNDLAND. Near Lark Harbor, Bay of Islands, *A. C. Waghorne 308* (MIN!). NEW BRUNSWICK. SAINT JOHN CO.: Fundy National Park, mouth of Rossiter Brook, north-facing cliffs above brook's estuary, 45°32'N 65°06'W well lighted, HCl+ rock, 23 June 1980, *S. P. Gowan 3573* (CANL!).

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