

## *Ionaspis alba* (Ascomycotina, Hymeneliaceae), a New Lichen Species from Eastern North America

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**Abstract.** *Ionaspis alba* sp. nov., described from the Appalachian–Great Lakes region, is a lichenized ascomycete superficially resembling *I. odora* and sharing morphological characteristics with *Hymenelia lacustris*. It is characterized by olive-gray to brownish-gray thalli, small whitish to light-brownish apothecial disks, thin subhymenium, small ascospores, short conidia, trebouxoid photobiont, and the lack of an epihymenial pigment and epipsamma. It is a xerophilous and sciophilous species of small boulders in temperate deciduous forests of eastern North America.

In a study on generic redelimitation of the *Ionaspis*–*Hymenelia* complex (Lutzoni 1990; Lutzoni & Brodo 1995), a distinctive xerophilous and sciophilous lichen-forming ascomycete was discovered growing on small boulders in deciduous forests of the Appalachian–Great Lakes region. No other species of *Ionaspis* or *Hymenelia* is known in this habitat or to have a distribution restricted to this region. A statistical analysis of anatomical and morphological data recorded from North American material of these two genera corroborates the unique characteristics of this lichen suggested by the ecology and phytogeography (Lutzoni & Brodo 1995) and justifies its recognition as a new species.

In the following description of the new species, the numerical codes included in parentheses and adjacent to color descriptions represent colors recorded using the U.S. National Bureau of Standards (Kelly & Judd 1976) and a chart of centroid colors (Kelly 1965). Measurements are usually given by five numbers [ex. (1.5–)4.0–8.5–13.5(–27.0)]. The numbers in parentheses are the most extreme measures recorded. The two numbers that are not in parentheses and not underlined are the lower and upper limit of the standard deviation applied to the average. The underlined number is the overall average.

*IONASPIS ALBA* Lutzoni sp. nov. (FIG. 1)

*Hymeneliae lacustris* similis sed differt thallis pleurumque dilute viridi-griseis aut pergriseo-olivaceis, aliquando brunneo-griseis; discis apotheciorum pleurumque pallido-griseis aut dilute fulvogriseis, excipulo proprio anulum tenuem albidum circum discum formanti, generaliter sine pigmentis epihymenialibus; ascosporis (9.5–)11.1–12.4–13.8(–16.5) × (3.0–)5.2–5.8–6.4(–8.0) μm; in umbrosis aridisque in saxis parvis in sylvis caducis in Montibus Appalachiensibus et regione Lacuum Magnum habitat.

**HOLOTYPE.** CANADA. QUÉBEC (47°06'10", 70°09'10"). L'ISLET CO.: Saint-Aubert, 396 m alt., NNW exp., 3° slope, *Tilio americanae*–*Aceretum sacchari* var. *Taxus canadensis*, 80.08.13, Jean, Lutzoni & Gagné 9794-L3, CANL 084990 (CANL).

*Thallus* pale greenish-gray to dark grayish-olive (111, 112, 113), or yellowish to brownish-gray (64, 79, 93), never rusty brown; epilithic; continuous, rimose or rimose-areolate; sometimes with shiny upper surface; (1.3–)4.6(–8.5) cm diam.; photobiont trebouxoid. *Apothecia* round to subangular, rarely irregular; density (5.0–)6.9–13.3–19.7(–32.5)/6.25 mm<sup>2</sup>; occasionally confluent; *apothecial disks* mostly light gray to yellowish-white (92, 264), or light grayish-yellowish-brown (76, 79), rarely light to deep orange (51, 52, 53), often with a proper exciple forming a thin whitish ring around disk; shape mostly unchanged from young to mature stages, staying concave, almost flat or flat, at most becoming almost flat in maturity; (48.2–)97.3–157.7–218.1(–337.4) μm diam.; *apothecial margins* not prominent, at most slightly prominent when young, remaining so or becoming slightly prominent to rarely prominent at maturity; (0.0–)23.3–48.4–73.4(–120.5) μm thick; *epihymenium* hyaline, HNO<sub>3</sub> and KOH negative; *hymenium* hyaline, (57.5–)70.8–87.5–104.3(–127.5) μm thick, IKI negative, HNO<sub>3</sub> and KOH negative; *subhymenium* hyaline, (12.5–)20.5–27.5(–42.5) μm thick, IKI<sup>+</sup> blue or negative, HNO<sub>3</sub> and KOH negative; *hypothecium* hyaline, (0.0–)8.4–26.4–44.4(–87.5) μm thick; *lateral proper exciple* hyaline, (8.0–)36.6–40.4–44.2(–100.0) μm thick, HNO<sub>3</sub> and KOH negative, textura very variable; *basal proper exciple* hyaline, (0.0–)5.5(–12.5) μm thick, HNO<sub>3</sub> and KOH negative, textura prismatica or obliqua; *epipsamma* (see Poelt 1969, p. 32) very rarely present; if present, very thin and almost entirely restricted to apothecial margin; *paraphyses*

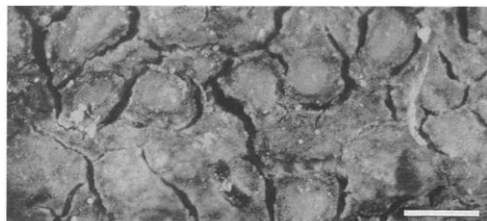


FIGURE 1. *Ionaspis alba*, holotype (CANL 084990). Close-up of apothecial disks; scale = 0.44 mm.

straight, ramifications almost entirely restricted to apex, poorly anastomosed, slightly constricted to moniliform, larger at apex. *Ascus tholus* IKI-. *Ascospores* (9.5–)11.1–12.4–13.8(–16.5) × (3.0–)5.2–5.8–6.4(–8.0) μm, mostly halonate with halo dense (as for *H. lacustris*) to very diffuse, 8 per ascus, mostly aseriate, rarely uniseriate, most often agglomerated in a gelatinous sheet when forced out of the ascus. *Pycnidia* (25–)40(–70) μm diam., hyaline to tan, imbedded to prominent. *Conidia* bacilliform, (2.5–)3.3(–3.9) × 1.0 μm. *Chemistry*, no typical lichen substances.

Sciophilous and saxicolous on dry siliceous boulders in deciduous forests. Appalachian–Great Lakes region (Fig. 2).

*Additional specimens examined.*—CANADA. NEW BRUNSWICK. ALBERT CO.: Gowan 2241 (CANL). ONTARIO. ALGOMA DISTRICT: Brodo 6948 (CANL, WIS). FRONTENAC CO.: Wong 2895 (CANL). THUNDER BAY DISTRICT: Slate Islands, Wetmore 25144 A (MIN). QUÉBEC. L'ISLET CO.: Jean 9772-L3 (QEF); Jean & Jean 9835-L5 (1/2) (QEF); Jean & Lutzoni 9839-L15, 9841-L1, 9841-L2 (QEF); Jean et al. 9771-L4, 9785-L4, 9785-L6, 9785-L8, 9788-L1, 9788-L2, 9790-L4 (1/2) (QEF). ARGENTEUIL CO.: Brodo 25021 (CANL). BROME CO.: Nuyt 9373 1/4, 10.176, 10.177, 10.177 L1 (QEF).

U.S.A. ILLINOIS. RANDOLPH CO.: Skorepa 2605 (WIS). MASSACHUSETTS. BARNESTABLE CO.: Brodo 4399b (CANL). MICHIGAN. MECOSTA CO.: Harris 12768-A-2X (MICH, NY). MINNESOTA. PINE/CHISAGO CO.: Chengwatana State Forest, Schuster 399, 692a-2X (CANL, MIN). NEW JERSEY. BERGEN CO.: Nearing (MICH). NEW YORK. ORANGE CO.: Nearing (US). SUFFOLK CO.: Latham 22881 (NYS). WARREN CO.: Harris 16381 (NY). NORTH CAROLINA. MACON/JACKSON CO.: Harris 13767 (NY). OHIO. CUYAHOGA CO.: Wetmore 54062 (MIN).

Specimens of *Ionaspis alba* were previously identified as *I. odora* (Brodo 1968) or *Hymenelia lacustris* in North America. A statistical analysis of discrete and continuous morphological characters showed that *I. alba* is significantly distinct from other hymenelioid lichens (Lutzoni 1990; Lutzoni & Brodo 1995). The same analyses showed that the *lacustris* group (now recognized within *Ionaspis*, Lutzoni & Brodo 1995) was most similar to *I. alba*. In the same study, cladistic analyses of both morphological and allozyme data in the *Ionaspis*–*Hymenelia*

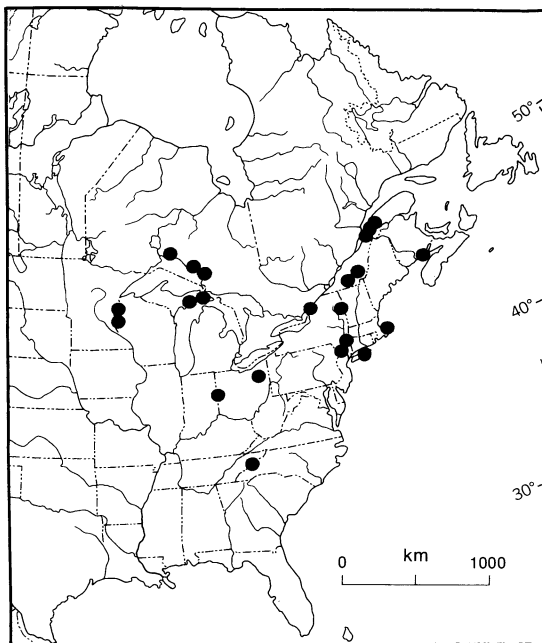


FIGURE 2. Known distribution of *Ionaspis alba*.

*menelia* complex suggested a close phylogenetic relationship between *I. alba*, the *odora* group (i.e., all *Ionaspis* species with an HNO<sub>3</sub>+ orange and KOH+ violet epihymenium), and the *lacustris* group. The sister species to *I. alba* is still undetermined; the morphological data suggest that it is a member of the *lacustris* group, whereas the allozyme data strongly support a species within the *odora* group (Lutzoni & Brodo 1995).

*Ionaspis* and *Hymenelia* comprise very small, crustose species, with cryptic morphologies, imposing severe restrictions on the discovery of distinct autapomorphies. Moreover, the species most similar to *I. alba*—*H. lacustris* [including North American specimens identified as *H. ceracea* (Gowan & Brodo 1988)]—is very polymorphic, thereby making diagnostic character states for *I. alba* even more difficult to identify (Lutzoni 1990). The most readily observable character that distinguishes *I. alba* from the *lacustris* and *odora* groups is the color of the thallus and apothecial disk. The thallus often has a light to dark olive-gray color, sometimes almost black; rarely will it have a brownish-gray color, but it never has the rusty-brown color typical of *H. lacustris*. The apothecia of *I. alba* are typically pale gray, resulting from the absence of an orange-brown epipsamma (see Poelt 1969, p. 32) on the apothecial disk (often forming a thick layer covering the hymenium of *H. lacustris*) and the lack of acetone-soluble pigments (found in species of the *odora* group). The epipsamma, rarely seen in specimens of *I. alba*, is very thin and almost entirely restricted

to the apothecial margin. The upper surface of the thallus of *I. alba* is often slightly shiny, differing in that respect from the mat surface of *H. lacustris* and *I. odora*.

Other equally important, but more cryptic, characters that segregate *I. alba* from other hymenelioid species are its significantly narrower ascospores and the straight (rather than undulate) paraphyses that are consistently broader at the apex (rather than being of uniform width from apex to base). *Ionaspis alba* has significantly shorter ascospores than *H. lacustris*, and can be distinguished from *I. odora* by its significantly shorter conidia, thinner subhymenium, lower apothecial density, negative hymenial reaction to KOH, and trebouxiod photobiont (Lutzoni & Brodo 1995).

The habitat of *I. alba* is drastically different from the typical aquatic environment of *H. lacustris*. The latter is found on boulders in brooks or streams, on wet cliffs, or on rocky lake shores. *Ionaspis odora* is reported from the marginal zone of rivers and lakes, or at some distance from the water (Jørgensen 1989; Magnusson 1933). *Ionaspis alba* is a sciophilous species, whereas *H. lacustris* and *I. odora* are heliophilous. Specimens identified as *H. ceracea* from Fundy National Park in New Brunswick by Gowan and Brodo (1988) seem more xerophilous than is typical of *H. lacustris*. They were reported from boulders in openings or at the edges of deciduous forests, showing a more heliophilous character than is usual of *I. alba*. Gowan and Brodo (1988) distinguished *H. ceracea* from *H. lacustris*, based on the presence of a fairly distinct red brown margin on slightly emergent apothecia in the former. A statistical study of these specimens of *H. ceracea* showed no significant differences with *H. lacustris* (Lutzoni 1990).

The geographical distribution of *I. alba* is unique for the *Ionaspis*–*Hymenelia* complex in that it is restricted to the eastern temperate region of North America (Fig. 2). The majority of species in these two genera have arctic, or arctic–alpine distributions, with some occurrences in the boreal regions. The distribution of *H. lacustris* overlaps that of *I. alba*

but also extends north to Baffin Island and includes disjunct populations in northeastern Alaska and on the coast of British Columbia (Lutzoni 1990).

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