Hymenelia parva (Hymeneliaceae, Ostropomycetidae): A new species from Newfoundland, Canada

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The new species *Hymenelia parva* is described from a single locality on the Avalon Peninsula, Newfoundland, Canada. It differs from all previously described species of the *Hymenelia*/*Ionaspis* complex by the combination of its small apothecia, lack of apothecial pigmentation, negative epihymenium reactions, green chlorococcoid photobiont and occurrence on siliceous rocks.

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Introduction

The family Hymeneliaceae consists of saxicolous, crustose lichenized fungi that are most frequent in the cool-temperate to subpolar regions of both hemispheres. As currently circumscribed (Lücking et al. 2016), it includes three genera: the monotypic, well-circumscribed *Tremolecia* Hertel, and the more diverse, and poorly delimited *Hymenelia* Kremp. and *Ionaspis* Th. Fr. The genera *Hymenelia* and *Ionaspis* were traditionally separated by their different photobionts: *Trentepohlia* in *Ionaspis* and a green chlorococcoid alga in *Hymenelia* (Magnusson 1933, Jørgensen 1989), although it was generally accepted that this distinction was artificial (Clauzade & Roux 1985, Coppins & Purvis 1992). Lutzoni & Brodo (1995) performed a cladistic analysis of morphological-anatomical and enzyme electrophoresis data and showed that two genera could be recognized, but that a rearrangement of the species was required. This new arrangement was generally accepted but the distinction between the two genera appeared just as artificial as the previous arrangement and was based on less distinctive, easily observable characters. Kantvilas (2014) highlighted these issues and concluded that the best course of action, pending a full morphological-molecular revision, was to recognize only one genus for the *Hymenelia-Ionaspis* complex. We agree with Kantvilas (2014) and, consequently, describe our new species in *Hymenelia*, which is the older of the two names. We also use names in *Hymenelia* where they exist for species usually included in *Ionaspis* (e.g., *Hymenelia lacustris* (With.) M. Choisy) but, to avoid a potential proliferation of unnecessary names, we do not make new combinations in *Hymenelia* for names in *Ionaspis* where none exist (e.g., *Ionaspis alba* Lutzoni).

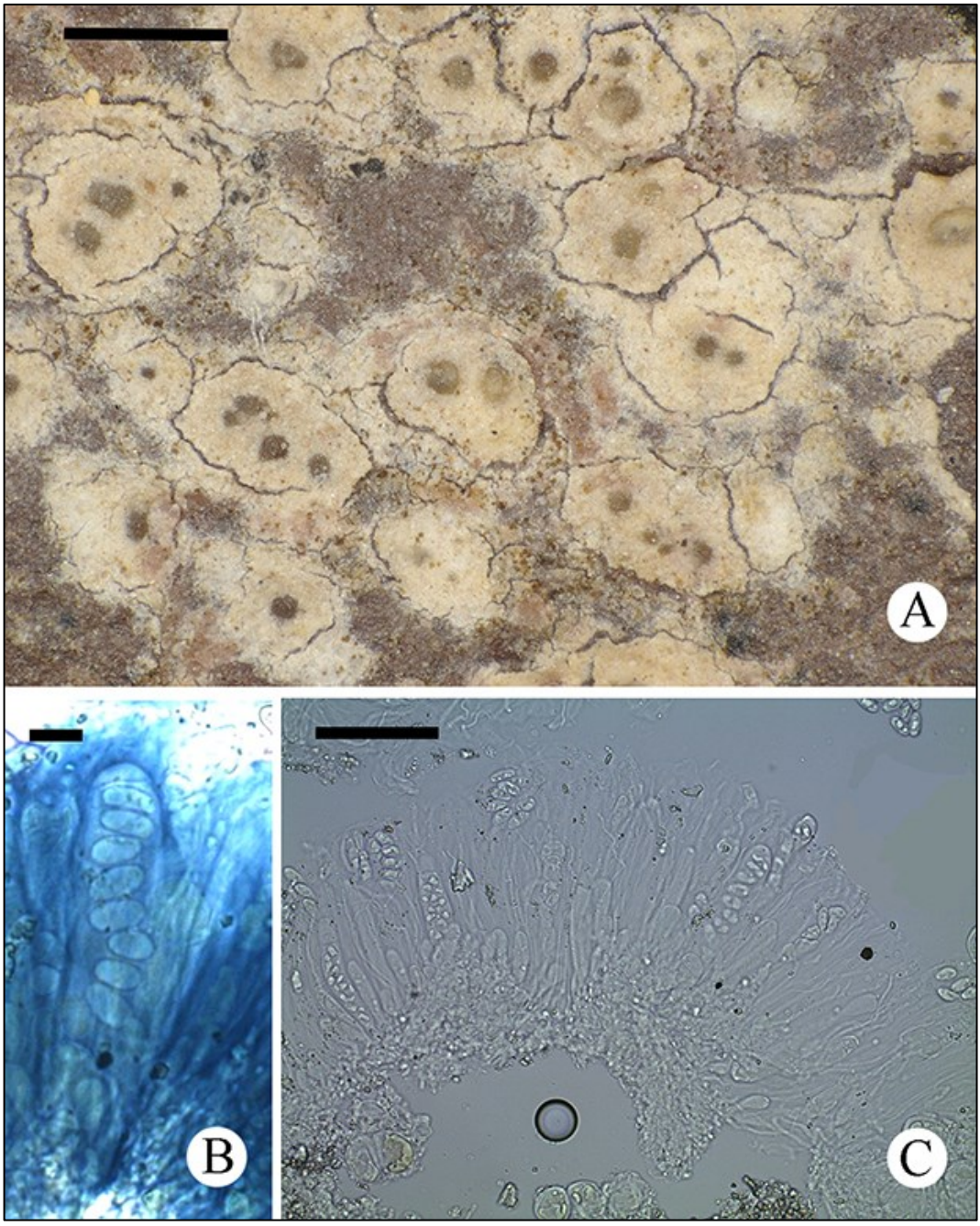

Figure 1. *Hymenelia parva* (*McCarthy 2266*, holotype). A. thallus with apothecia. B. ascus with ascospores (in IKI). C. hymenium with asci and ascospores. Scales: A = 0.5 mm; B = 10 µm; C = 50 µm.

Material and Methods

Observations of apothecial anatomy were made using light microscopy on hand-cut sections, mounted in water, 10% KOH (K) and Lugol's Iodine (IKI). Apothecia pigments were tested with K and N (50% nitric acid). Initial measurements of apothecial tissues were made in water, whereas asci, ascospores, paraphyses and hyphae were measured in K. Ascospore measurements are presented in the format: (smallest measurement–) **mean** ±standard deviation (–largest measurement).

Taxonomy

Hymenelia parva **Fryday & J.W. McCarthy, sp. nov.**
Mycobank 824529

Diagnosis: Distinguished from all other species of *Hymenelia* and *Ionaspis* by a combination of its small apothecia (0.1–0.15 (–0.2) mm diam.), lack of apothecial pigmentation, negative epihymenium reactions, chlorococcoid photobiont and occurrence on siliceous rocks.

Type: **Canada**. *Newfoundland and Labrador*: Newfoundland, Avalon Peninsula, St. Mary's Bay, Colinet Arm, mouth of Rocky River, Colinet, Route 91, turnaround at end of Rocky River Road, 47.21728°N, 53.56069°W, 5 m, soft reddish-brown shale on seashore with saltwater influence (presence of seaweed on rocks), 2011-05-29, *John W. McCarthy 2266* (MSC, holotype (MSC 0154921); CANL, NBM, isotypes). Fig. 1.

Description: Thallus effuse, thin (< 0.05 mm), composed of scattered patches, rarely more than 1–2 mm across, each consisting of a few areoles, sometimes coalescing to form larger patches; areoles 0.3–0.6 mm across, white to cream coloured (unpigmented), greenish when wet; medulla IKI–. Photobiont chlorococcoid, cells 7–14 µm diam., rarely becoming ovoid to 19×14 µm.

Apothecia small, 0.1–0.15 (–0.2) mm diam., 1 (–2), rarely more/areole, internally unpigmented; disc urceolate, colourless, 0.06–0.12 (–0.17) mm diam., becoming slightly convex when wet, surrounded by a proper margin visible as a white zone, 0.01–0.02 mm wide. Proper exciple poorly developed, composed of conglutinate, vertically-orientated hyphae. Hymenium 70–75 µm tall, IKI+ blue; paraphyses slender (c. 1 µm wide), mostly simple, rarely branching and anastomosing near the base, not capitate; epihymenium K –, N –; asci cylindrical, 50–60 × 10–12 (–15) µm, becoming somewhat clavate (up to 20 µm wide), outer wall IKI+ blue, inner wall, apical dome and asci contents IKI–; ascospores simple, colourless, thin-walled, (9.0–) **11.05** ±1.11 (–12.9) × (4.5–) **5.36** ±0.79 (–7.6) µm (n=13), usually broadly ellipsoid but some narrower (l/b ratio 2.4:1) and others almost subglobose (l/b ratio (1.58–) **2.08** ±0.31 (–2.74), n=13), often with 1–2 oil droplets that stain IKI+ yellow-orange. Hypothecium poorly developed, colourless. Conidiomata not observed.

Chemistry: All spot tests negative, tlc not performed.

Etymology: From the Latin *parvus* (small, little) referring to small apothecial and ascospore dimensions relative to other species in the genus.

Ecology and Distribution: The type locality is part of the Avalon Forest Ecoregion, characterized by sheltered, productive *Abies-Betula* forests known for the striking abundance of oceanic fruticose and foliose corticolous lichen species including *Alectoria sarmentosa* (Ach.) Ach.,

Figure 2. Habitat of *Hymenelia parva*. A. *Hymenelia parva* is the white lichen on the rock to the left. B. closer view of *Hymenelia parva*. Scale = 50 cm.

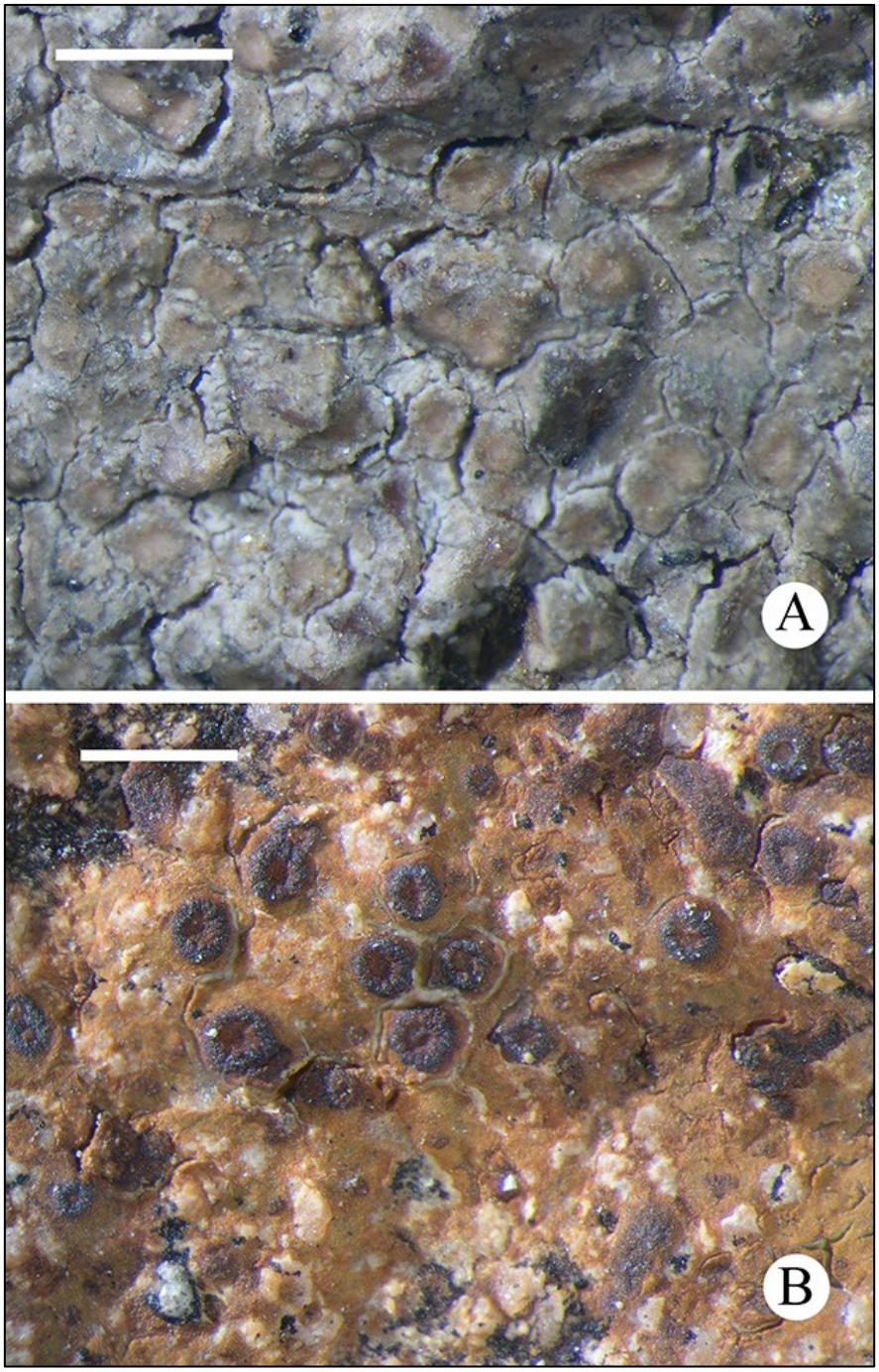

Figure 3. Species apparently most similar to *Hymenelia parva*. A. *Hymenelia alba* (*Brodo 4399 B*). B. *Hymenelia ceracea* (*Clayden 25892*). Scales = 1.0 mm.

Bryoria americana (Motyka) Holien, *Erioderma pedicellatum* (Hue) P.M. Jørg., *Platismatia norvegica* (Lynge) W.L. Culb. & C.F. Culb. and *Usnea longissima* Ach. (Ahti 1983; Damman 1983). Maritime influences are dominant, with prevailing fog-laden southerly winds characteristic of these distinctly boreal perhumid-oceanic forests (Clayden *et al.* 2011).

The new species is known only from the type locality: generally southwest-facing sedimentary beds approximately 10–12 m high with water seepage along bedding planes, at the mouth of a river, 4–5 m from high tide mark where they would be periodically affected by salt/brackish water wave splash. *Hymenelia parva* occurs on the lowest beds, from approximately 0.5–2 m high, mostly on the vertical face of fractured, sedimentary beds of red sandstone, mudstone and siltstone, more rarely on flat and slightly inclined rock surfaces (Fig. 2). Associated lichen species include *Porpidia tuberculosa* (Sm.) Hertel & Knoph, *Rhizocarpon reductum* Th. Fr., *Scoliciosporum umbrinum* (Ach.) Arnold and *Verrucaria muralis* Ach., all species typical of an early-stage succession pioneer community. *Abies balsamea* (L.) Mill., *Picea mariana* (Mill.) Britton, Sterns & Poggenb., *Alnus viridis* spp. *crispa* (Aiton) Turrill, *Carex* spp. and herbs occur along the river bank.

Discussion: The new species is immediately distinguished in the field by its pale areolate thallus and minute, unpigmented, urceolate apothecia. Most North American species of the *Hymenelia/Ionaspis* complex have either a *Trentepohlia* photobiont, pigmented apothecia, an epihymenium that reacts with K or N, or occur on calcareous rocks. Only four species have a photobiont other than *Trentepohlia*, unpigmented apothecia, an unreactive epihymenium, and occur on siliceous rocks. Of these, *Ionaspis alba* (Lutzoni 1994) is most similar to *H. parva* but usually has a darker thallus, occurs in deciduous forests, has larger apothecia, and a smooth, continuous to slightly rimose thallus (Fig. 3A). *Hymenelia ceracea* (Arnold) M. Choisy has ± sessile apothecia with a raised, well-developed, darkly pigmented proper margin (Fig. 3B), whereas *H. lacustris* (With.) M. Choisy (syn. *I. lacustris* (With.) Lutzoni) and *H. obtecta* (Vain.) Poelt & Vězda (syn. *I. obtecta* (Vain.) R. Sant.) both have a rusty, red-brown thallus and larger ascospores.

Additional specimens examined: **Canada**, *Newfoundland and Labrador*: Newfoundland, St. Mary's Bay, Colinet Arm, Colinet, Route 91, turnaround at end of Rocky River Road, mouth of Rocky River, 47.21728°N, 53.56069°W, 5 m, sedimentary beds of sandstone, mudstone, siltstone along mouth of river, on siliceous sedimentary rock, 2017-08-05, *John W. McCarthy* (*3246*) & *Eileen Penney* (MSC (MSC0242606)).

Hymenelia ceracea (Arnold) M. Choisy: **Canada**, *New Brunswick*: Northumberland Co., Nepisiguit Protected Area, SW-NE orientated ridge between tributaries of Seventy-Five Mile Brook, 47.40953°N, 66.66389°W, 504 m, SW-facing treeless scree slope, 2016-08-13, *S.R. Clayden 25892* (MSC, NBM); Kings Co., south side of Hwy 1 between Norton and Sussex, 45.67660°N, 65.60201°W, 160 m, roadbank with low sandstone outcrops, 2016-06-15, *S.R. Clayden 25745* (NBM); *Newfoundland and Labrador*: Newfoundland, Avalon Peninsula, Avalon Wilderness Reserve, Blackwoods Pond, 47.02374°N, 53.23495°W, 194 m, *Cladonia-Racomitrium* ericaceous maritime heath with *Abies balsamea-Picea mariana* tuckamoor and scattered sedimentary rocks, 2015-07-24, *John W. McCarthy* (*2933 B*) *& Charles McCarthy* (NBM); *ibid*., Bay D'Espoir Highway (Route 360), 37 km north of St. Alban's road junction (Route 361), 48.24807°N, 55.48969°W, 216 m, roadside trail and embankment next to *Abies balsamea* feathermoss stand, on siliceous rock, 2015-09-15, *John W. McCarthy* (*3109 A*) & *Teuvo Ahti* (NBM).

Ionaspis alba Lutzoni: **USA**, *Massachusetts*: Barnstable Co. (Cape Cod), Chatham, Morris Island, on granitic boulder in oak woods, 1962, *Brodo 4399 B* (MSC, isoparatype).

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