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Athelia sibirica new to North America and a key to the species of *Athelia* in Alaska and the Yukon Territory

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Summary. Previously known from only three collections made in Sweden and Siberia, the apparently rare *Athelia sibirica* (Jülich) J. Erikss. & Ryvarden (*Basidiomycota*: *Atheliales*), is described and illustrated from an Alaskan collection. The bisterigmate basidia, clamp-connections at nearly all septa, and relatively large basidiospores distinguish this species from all others in the genus. The fungus fruits on the wood of *Alnus* Mill., *Betula* L. and *Populus* L., and is considered to have a circumboreal distribution. To facilitate the identification of unnamed collections of *Athelia* Pers. a key is provided to the eight species known to occur in Alaska and the Yukon.

INTRODUCTION

A trip in 1996 to Alaska by one of us (JJW) yielded some fungal collections of special interest. One of these collections represents a species of *Athelia* Pers. (*Basidiomycota*: *Atheliales*, see Ginns & Lefebvre (1993)) not previously reported from North America.

The species of *Athelia* have been regarded as wood-inhabiting fungi principally because the fruiting bodies are found on bark and wood of fallen limbs and trunks. However, several species have quite different habitats. Two are plant pathogens: *Athelia arachnoidea* (Berk.) Jülich causes a rot of carrots in cold storage (Adams & Kropp 1996), as well as being parasitic on lichens (Hawksworth *et al.* 1995); *Athelia rolfsii* (Curzi) C. C. Tu & Kimbr., commonly seen as the *Sclerotium rolfsii* Sacc. state, causes Southern Blight on a wide variety of turfgrasses and herbaceous plants (Ginns & Lefebvre 1993). Four species, including two from North America, *A. epiphylla* Pers. and *A. poeltii* Jülich, are perhaps symbiotic (basidiolichens) or parasitic with filamentous *Cyanophyceae* (algae) (Jülich 1978). In North America, Ginns (1998) provided a synopsis of the principal characters of the genus, and Ginns & Lefebvre (1993) reviewed the distribution, ecology, hosts, nomenclature, cultural characters, and literature for the 20 species reported from the continent. However, there are no keys designed specifically for North American species.

Alaska covers over 580,000 square miles and the Yukon is 207,000 square miles in extent. Despite the vast and varied forests in Alaska and the Yukon, the wood-inhabiting fungi (particularly the *Basidiomycetes* commonly grouped as polypores, corticioids and jelly fungi) are relatively poorly known. Volk *et al.* (1994)

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summarised the state of our knowledge of this group in Alaska and, as a result of Burdsall's 754 Alaska collections were able to report 254 wood-inhabiting fungi, of which 151 were new records for the state. In the Yukon 267 species of wood-inhabiting fungi are represented in Evans *et al.* (1978), Gilbertson & Ryvarden (1986), and Ginns & Lefebvre (1993), the three major references on Yukon wood-inhabiting fungi, and in an unpublished manuscript by J. Ginns. When compared with the 463 species of just the *Corticiaceae* in North Europe (Ginns 1998), it is clear that considerable work is required before we will understand the distribution, frequency and ecology of wood-inhabiting fungi in Alaska and the Yukon.

The purpose of this paper is to document the occurrence of *A. sibirica* in North America, and to facilitate the identification of unnamed specimens of *Athelia* species from Alaska and the Yukon.

Material and methods

Microscopic features of the basidiomes were examined using 2% (w/v) aqueous Potassium Hydoxide, Melzer's Reagent (Hawksworth *et al.* 1995), and 0.05% (w/v) Cotton Blue in lactic acid. Abbreviations for herbarium names, i.e. DAOM, SYRF, are those listed in Holmgren *et al.* (1990).

Taxonomic description

Athelia sibirica (*Jülich*) *J. Erikss. & Ryvarden*, The *Corticiaceae* of North Europe 2: 129 (1973). Type: USSR, Tomskaya Obl., Narym Distr., Oct. 1933, *Krawzew* (PR 662079, n.v.).

Athelia arachnoidea (Berk.) Jülich var. *sibirica* Jülich, Willdenowia, Beih. 7: 62 (1972).

Basidiomes effuse, 3 × 1 cm long and broad. Hymenial surface smooth, grey-white, a thin pellicle. Context white, very thin (<100 µm), texture indistinct. Margin white, sparse, adnate, cottony to pruinose, 0.5 – 4.0 mm wide. Hyphal system monomitic. In Melzer's Reagent no staining was observed. In Cotton Blue hyphal, basidial and spore walls were cyanophilous. Generative hyphae loosely woven, 3 – 5 µm diam, with a single clamp-connection at most septa, the other septa lacking clamp-connections, branches diverging at right angles, the walls hyaline, thin, cyanophilous, some encrusted with acicular crystals 5.0 × 0.5 µm. Cystidia, hyphidia, etc. lacking. Basidioles often with a stalk 14 – 15 × 4 – 5 µm, and with a swollen head 10 – 11 × 8 µm, the walls hyaline, thin, cyanophilous. Basidia clavate, (14 –)20 – 26 × 7 – 8 µm (n = 17), with a clamp-connection at the base, (1 –)2-sterigmate, each up to 8 µm long, the walls hyaline, thin, cyanophilous. Spores ellipsoid, most with the apex slightly narrower than the base, 11 – 13 × (5.0 –)5.5 – 6.0 µm (n = 20), the walls thin, hyaline, smooth, cyanophilous. Fig. 1.

Collection examined. U.S.A.: Alaska, Yentna R., 28 Sept. 1996, *J. J. Worrall* 768A (SYRF).

Habitat. Fruiting bodies growing over bark on log of *Betula papyrifera* Marsh. Associated type of rot uncertain.

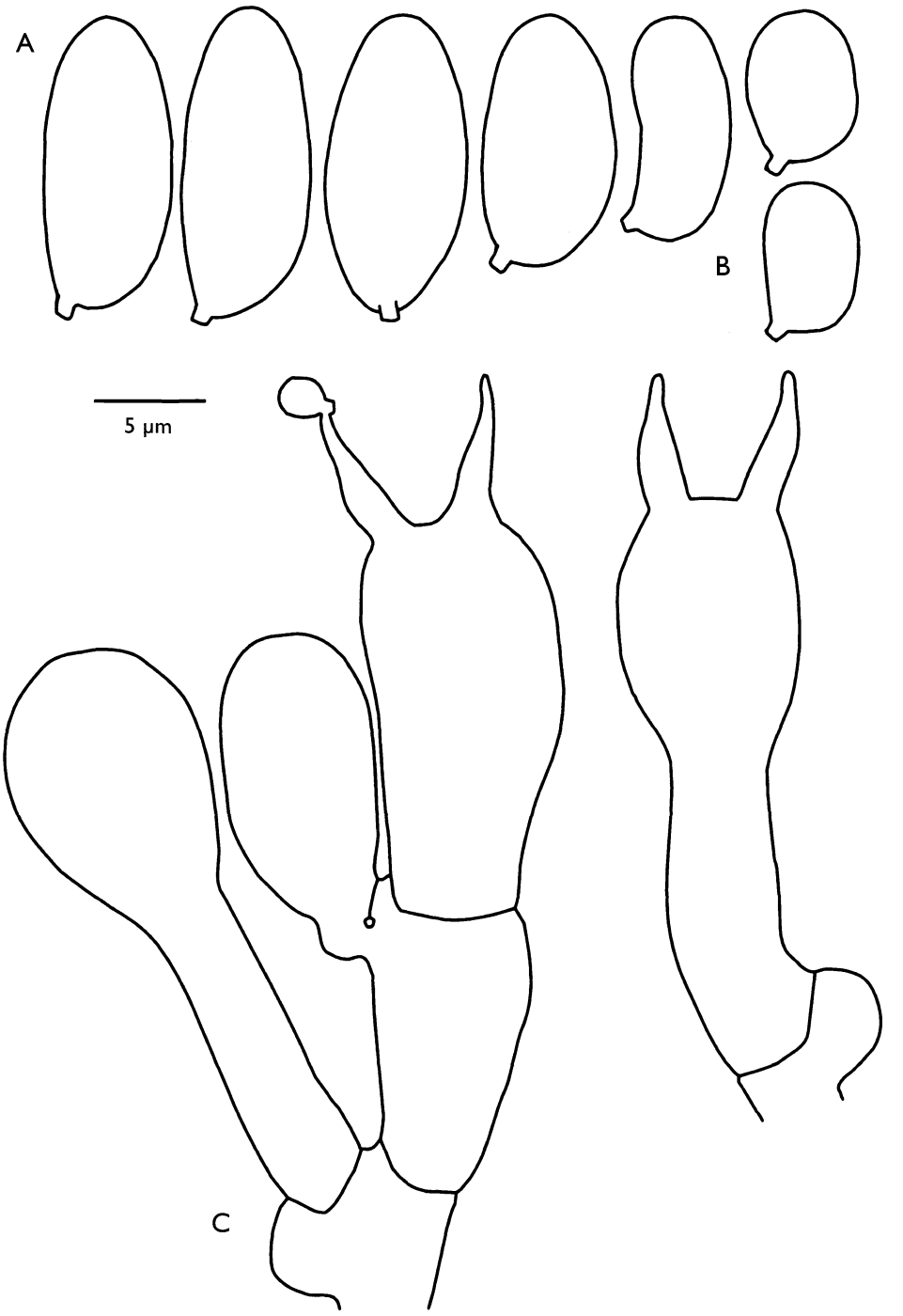

FIG. 1. *Athelia sibirica*. **A** four basidiospores; **B** three developing basidiospores seen floating in a mount; **C** two basidia and two developing basidia. Drawn from *Worrall* 768A by J. Ginns.

KEY TO *ATHELIA* SPECIES KNOWN FROM ALASKA AND THE YUKON

Seven of the eight species included in this key are based upon reports in Volk *et al.* (1994), Ginns & Lefebvre (1993), and Ginns (unpubl).

1. A single clamp-connection at nearly all septa 2
   Clamp-connections lacking or only at the base of basidia or only on some septa of the basal hyphae 5
2. Spores up to 6 µm long ..... *A. bombacina* Pers.
   Spores 6.5 – 13.0 µm long 3
3. Most basidia with two sterigmata ..... *A. sibirica*
   Most basidia with four sterigmata 4
4. Spores broadly ellipsoid, rarely subglobose, 6.5 – 8.5(–10) × 4.5 – 5.5 µm ..... *A. neuhoffii* (Bres.) Donk
   Spores ellipsoid, 7 – 11 × 3.5 – 4.5 µm ..... *A. fibulata* M. P. Christ.
5. Basidia with two sterigmata. Spores narrowly ellipsoid, 8 – 11(– 12) × 4.0 – 5.5(– 6.0) µm. Clamp connections lacking except a single clamp connection on some septa of the basal hyphae ..... *A. arachnoidea*
   Basidia with four sterigmata. Spores cylindrical to broadly ellipsoid to globose, 4.0 – 8.0 µm long 6
6. Spores globose, 4 – 5(– 6) µm diam., the walls typically 0.5 µm thick ..... *A. coprophila* (Wakef.) Jülich
   Spores cylindrical to broadly ellipsoid, 5 – 7(– 8) × 2.2 – 3.8 µm 7
7. Spores cylindrical, 5.5 – 7.0(– 8.0) × 2.2 – 2.6 µm. A single clamp-connection on some septa of the basal hyphae ..... *A. acrospora* Jülich
   Spores broadly ellipsoid, 5.0 – 6.5 × 3.0 – 3.8 µm. Clamp-connections lacking ..... *A. decipiens* (Höhn. & Litsch.) J. Erikss.

Athelia sibirica is apparently a rare species of circumboreal distribution that fruits on dead wood of broad-leaved trees. Previously it was known from three collections; two from Lappland, Sweden (Eriksson & Ryvarden 1973), and one from Siberia (district Narym) (Jülich 1972). It has been found fruiting on *Alnus* Mill., *Betula* L. and *Populus* L. The distinguishing characters of this fungus are the bisterigmate basidia, clamp-connections at nearly all septa, and relatively large spores.

A cyanophilous reaction, the bluing of cell walls in Cotton Blue in Lactic Acid or Lactophenol, was observed in *Athelia sibirica*, but it has not otherwise been reported in the genus *Athelia* (Eriksson & Ryvarden 1973; Ginns 1998; Jülich & Stalpers 1980). Parts of the basidiomes of *Athelia sibirica* and a collection of *Athelia neuhoffii* (Canada: British Columbia, Penticton, 30 Dec., 1997, *Ginns* 14569, DAOM) were examined after 12 h. in Cotton Blue reagent. In both species cell contents stained blue to blackish-blue when cytoplasm was present. In these cells it was difficult to distinguish between bluing of the cell walls and staining of cell contents. Thus a cyanophilous reaction was evaluated by observing staining of walls of cells which lacked contents. Walls of hyphae, basidioles, basidia and spores were blue, a positive reaction. Thus two species of *Athelia* have cyanophilous cell walls, and the remaining species need to be tested to determine how widespread the phenomenon is in this

genus and whether it is a useful character to distinguish between otherwise similar species and similar genera.

The relatively widespread *Athelia epiphylla* Pers. has not been reported from Alaska or the Yukon. However, it is likely to occur in the Yukon, at least, because Baranyay (1968) reported seven collections from the Northwest Territories, all within 240 km (150 miles) of the Yukon. The circumscription of *A. epiphylla* is unsettled and some mycologists consider the name to represent a species complex (Eriksson & Ryvarden 1973). If features of *A. epiphylla* were entered into the key above, they would lead to *A. acrospora.*

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