

Anthracoidea eburneae, sp. nov. (*Anthracoideaceae*)

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Abstract. *Anthracoidea eburneae* on *Carex eburnea* from Canada is described and illustrated.

Keywords: *Anthracoidea*, Canada, *Carex eburnea*, smut fungi, taxonomy

Introduction

Species of *Anthracoidea* have been considered by Vánky (1979) to be restricted to host plants belonging to the same or closely related sections of *Carex*. In his monograph of *Anthracoidea*, Kukkonen (1963: 63) noted smaller spore sizes of smutted Canadian specimens of *Carex eburnea* (section *Albae*), compared with the spore sizes of *A. caricis-albae*, the only species of *Anthracoidea* on this section of *Carex*. We confirmed this observation after obtaining on loan a specimen of *Anthracoidea* on *Carex eburnea* from the Herbarium of the University of Turku, Finland (TUR), and consider it as belonging to a new species.

Material and methods

Dried specimens from the mycological collection of TUR were examined under light (LM) and scanning electron (SEM) microscopes. For LM observations, spores were mounted in lactophenol solution on glass slides, gently heated to boiling point to rehydrate the spores, and then cooled. Spore measurements are given in the form: min–max (extreme values) [mean \pm 1 standard deviation]. For SEM, spores were attached to specimen holders by double-sided adhesive tape and coated with gold with an ion sputter. The surface structure of spores was observed at 10 kV and photographed with a JEOL SM-6390 scanning electron microscope.

Taxonomy

Anthracoidea eburneae Denchev & T. Denchev, sp. nov.

Figs 1–4

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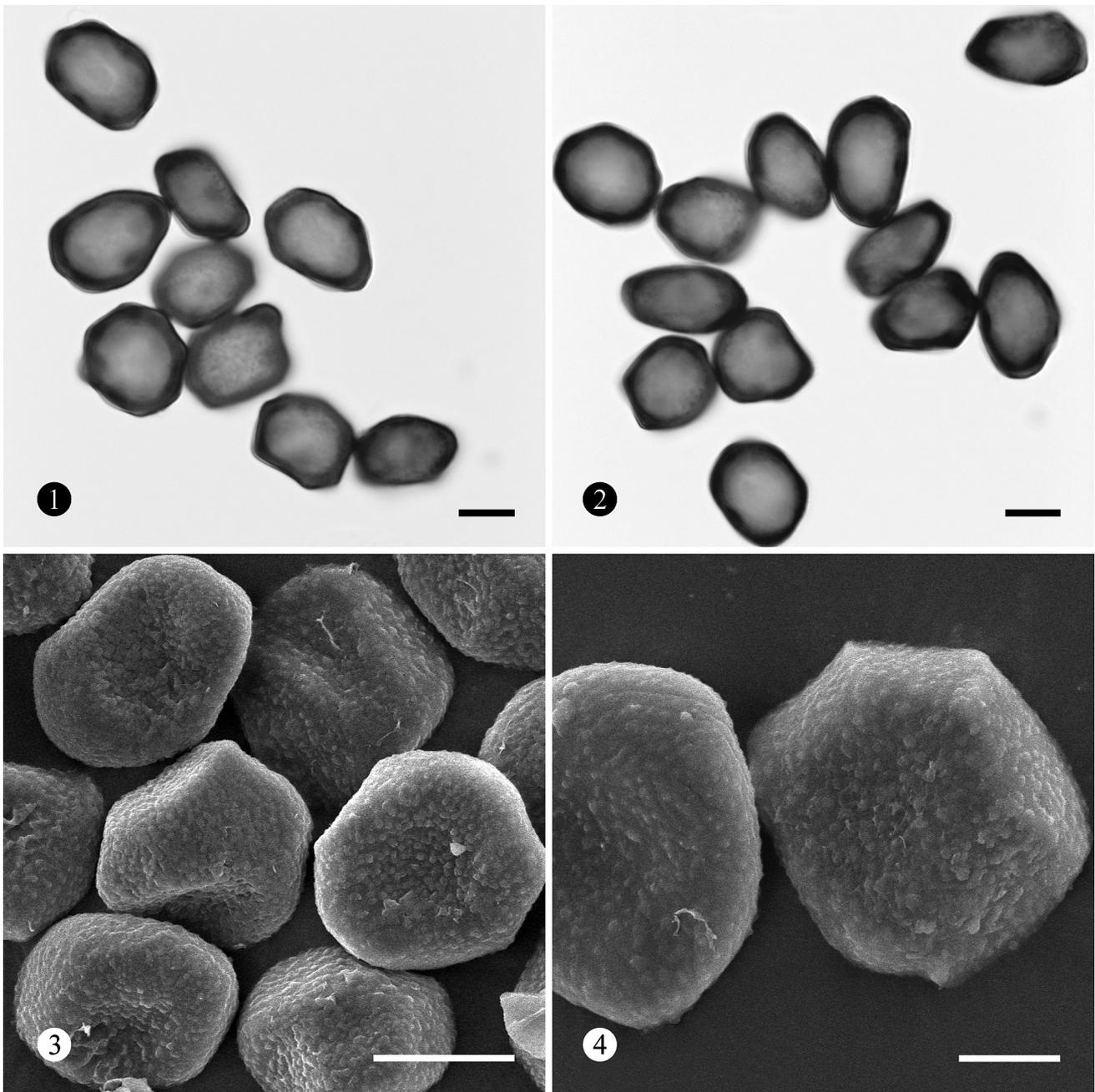
Sori in ovarii in inflorescentia dispersi, sicut corpora ovoidea, globosa vel subglobosa, nigra, 1,2–1,8 mm longa, in superficie pulverei. *Sporae* a fronte visus irregulares vel subpolygonales, (15–) 16–22,5 (–24) \times 12,5–19 [18,9 \pm 1,7 \times 15,7 \pm 1,4] μ m, a latere visus 10–12,5 μ m, atro-rufobrunneae vel rufobrunneae; paries inaequaliter incrassatus, 1,5–3,5 μ m crassus, plerumque 1–4 gibberis internis, et maculis lucem refringentibus; superficie verruculosa.

Holotype on *Carex eburnea* Boott: CANADA, British Columbia, Alaska Highway, Mile 431, along Toad River, on a ledge by the road, 26 July 1960, leg. I. Kukkonen (no. 529) & J.A. Calder (as *Anthracoidea* sp., TUR 73787).

Etymology: the name refers to the host species.

Sori in ovaries, scattered in the inflorescence, as ovoid, globose or subglobose, black, hard bodies, 1.2–1.8 mm long, when young covered by a thin membrane, later becoming exposed; spore mass of the mature sori powdery on the surface. **Spores** flattened, in plane view irregular to subpolygonal in outline, occasionally with small protuberances, in plane view (15–) 16–22.5 (–24) \times 12.5–19 [18.9 \pm 1.7 \times 15.7 \pm 1.4] μ m (n = 200), in side view 10–12.5 μ m thick, dark or middle reddish brown, wall unevenly thickened, 1.5–3.5 μ m thick, mostly with 1–4 internal swellings, usually light-refractive

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Figs 1–4. Spores of *Anthracoidea eburneae* on *Carex eburneae* in LM and SEM (Holotype). Scale bars: 1–3 = 10 μ m; 4 = 5 μ m

areas present; verruculose, warts up to 0.3 μ m high. In SEM some warts partly confluent forming small groups or short rows. **Spore germination** unknown.

Distribution: on *Cyperaceae*: *Carex* – subgen. *Carex*, sect. *Albae*: *Carex eburneae*, North America (Canada).

Three species of *Carex* belong to section *Albae*: *C. alba* Scop. – a Temperate-Eurasiatic species, *C. ussuriensis* Kom. from East Asia (Far East of Russia, Korean Peninsula, and NE China), and *C. eburneae* from North America (Egorova 1999). *Carex eburneae* is widely distributed on limestone in North America (from Alaska to Newfoundland, and southward into the Ozark Mts, the Cumberland Plateau, and the Southern

Appalachian Mts; with southern disjunct populations in Alabama and Mexico) (Gillespie 2005). In *Carex* section *Albae*, a second American species, *C. mckittrickensis* P.W. Ball. (from the Guadalupe Mts, Texas), was recognized in *Flora of North America* (Ball & Reznicek 2002) but molecular analyses did not support its segregation from *C. eburneae* (Gillespie 2005).

On members of sect. *Albae* only one species of *Anthracoidea*, *A. caricis-albae* (Syd.) Kukkonen (on *Carex alba* and *C. ussuriensis*), was known. The following features are characteristic of *A. caricis-albae*: (i) subpolygonal to very irregularly polygonal or elongated spores, (ii) presence of

conspicuous protuberances, (iii) large size of the spores (up to 30 μm long, sometimes up to 32 μm), (iv) uneven and unusually thick wall, which may reach up to 7 μm at the angles, protuberances, and the elongated ends of the spores, (v) when present, 1 or 2 indistinct internal swellings, difficult to observe in cases of dark coloured spores and thick walls (Vánky 1994, Denchev & Minter 2010). For comparison, the following spore measurements of *A. caricis-albae* are given: 17.5–30 (–32) \times 15–22.5 [23.6 \pm 2.6 \times 18.2 \pm 1.6] μm (n = 100) (Vánky *Ustilag. exs.*, no. 255, on *Carex alba*, Switzerland).

Anthracoidea eburneae is distinctly different from *A. caricis-albae* possessing spores that are more regular and of medium size, with small protuberances (if any), thinner walls, and mostly with 1–4 internal swellings.

A second unidentified specimen from Canada, of *Anthracoidea* on *Carex eburnea*, kept in TUR, was also studied by us. Its spores measured 16–22.5 \times 13–20.5 [19.1 \pm 1.4 \times 16.3 \pm 1.5] μm (n = 100). The spore shape and measurements, and wall thickness of that material are identical with these obtained for *Anthracoidea eburneae* but its wall internal swellings were found to be indistinct.

Specimen examined: on *Carex eburnea*: CANADA, Northwest Territories, Mackenzie Mountains, Keele River at Canad. Wildlife Service Camp, 64°12' N, 127°25' W, 17 July 1970, W.J. Cody, no. 18945 (as *Anthracoidea* sp., TUR 66255, ex DAOM 133687).

The variability of the wall internal swellings needs to be studied on additional Canadian specimens of *Anthracoidea* on *Carex eburnea*.

Sections *Graciles* and *Indicae* are closely related to sect. *Albae* (Hendrichs *et al.* 2004, Guibert 2008). No species of *Anthracoidea* are known on members of these sections.

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