

Plectocarpon stereocaulicola (Roccellaceae, Ascomycota), a new lichenicolous fungus from Bolivia

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Abstract: A new gall-inducing lichenicolous fungus, *Plectocarpon stereocaulicola* Kukwa, Etayo and Flakus, is described from Bolivia from the thalli of *Stereocaulon* sp. The new species is characterized by black, epruinose rounded ascomata with a carbonized surface and a thalline pseudo-margin, as well as a non-carbonized, light brown sterile stromatic tissue in the lower part and 3-septate ascospores becoming brown and ornamented when mature.

Key words: Andes, biodiversity, lichens, Neotropics, South America, *Stereocaulon*, taxonomy

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Introduction

The lichenicolous genus *Plectocarpon* Fée (*Roccellaceae*, *Arthoniales*) is characterized by multilocular stromata, usually inducing gall-like structures on the host thalli, *Opegrapha*-like asci surrounded by branched and anastomosing paraphyses, and usually 3-septate, rarely 1 or (4–)5–6(–7)-septate ascospores, which sometimes become brown at maturity. It consists of 34 species parasitizing various lichen genera, mainly belonging to the *Peltigerales*, but also members of *Cladoniaceae*, *Ramalinaceae*, *Parmeliaceae* and *Sphaerophoraceae* in the *Lecanorales* (Diederich & Etayo 1994; Ertz *et al.* 2005; Etayo 2007; Etayo & Sancho 2008; Zhurbenko *et al.* 2008). In this paper we describe the first species parasitizing *Stereocaulon*.

Material and Methods

The morphology and anatomy were examined using NIKON SMZ800 and NIKON ECLIPSE 80i (DIC)

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microscopes. The anatomy was studied on material mounted in water, KOH solution (K), and for ascus structure Lugol's iodine solution without (I) or with pre-treatment with KOH (K/I). The measurements of ascospores were made in water and K, all other measurements only in water.

The New Species

Plectocarpon stereocaulicola Kukwa, Etayo & Flakus sp. nov.

Mycobank No.: MB 564554

Species superficially similar to *Plectocarpon latisporum* (on *Pseudocyphellaria coriifolia*), which also forms galls with a thalline pseudo-margin, but differs in ascomata with a non-carbonized, light brown sterile stromatic tissue in the lower part, larger ascospores 20–28(–30) × 6.5–8.0 µm and a different host (*Stereocaulon* sp.).

Typus: Bolivia, Dept. La Paz, Prov. Nor Yungas, below Unduavi village, near Rio Unduavi, 16° 18' 50" S, 67° 54' 35" W, 3135 m, Yungas cloud forest, on thallus of saxicolous *Stereocaulon*, A. Flakus 22222, J. Etayo & O. Plata (KRAM—holotypus; LPB, UGDA, hb. Etayo—isotypi).

(Fig. 1A–G)

Ascomata developing apically on pseudopodetia or pseudopodetial branches, sometimes directly on the surface of pseudopodetia (then usually shortly stipitate), single or rarely confluent, black, rounded, flattened to convex, inducing the formation of galls with

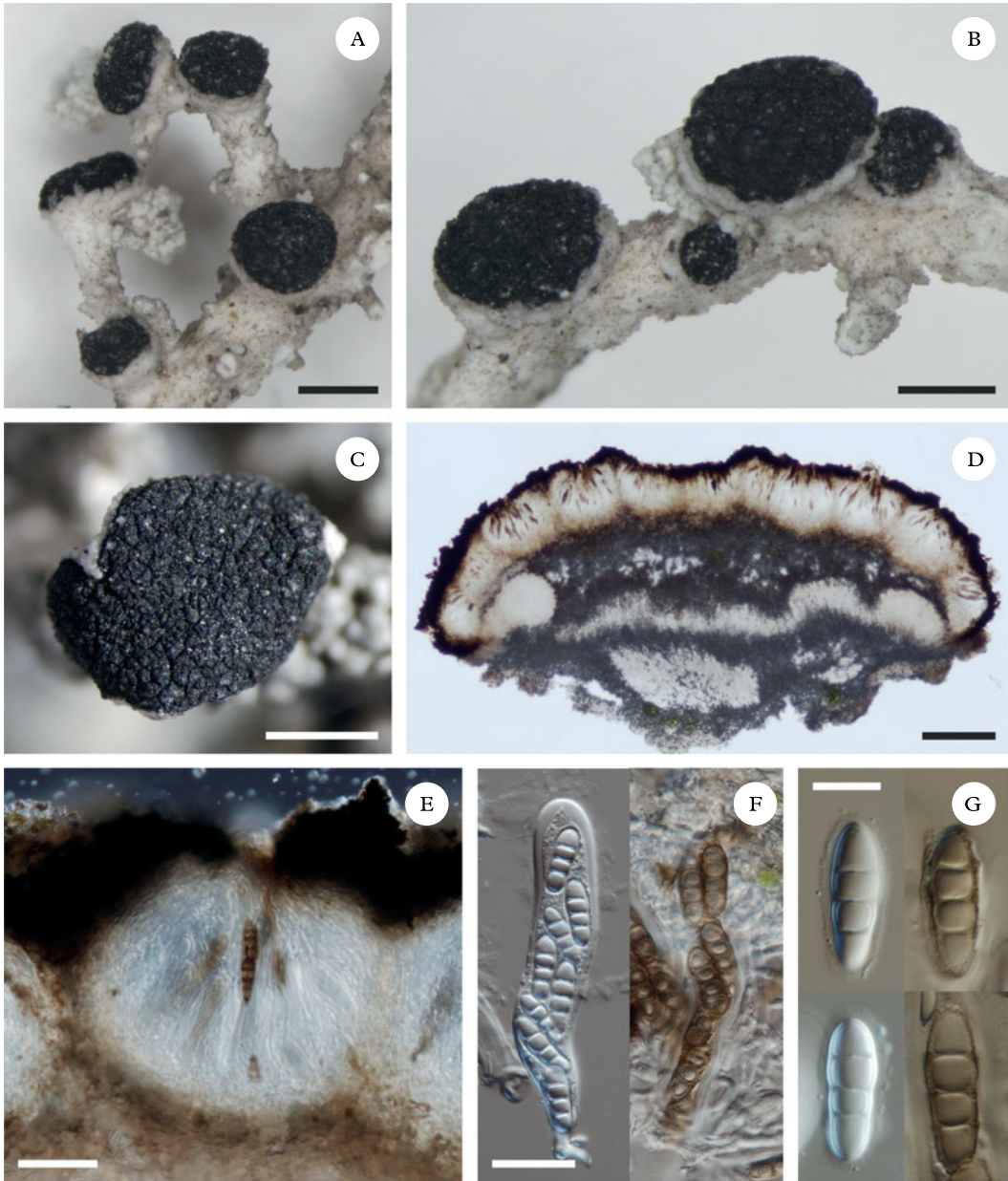


FIG. 1. *Plectocarpon stereocaulicola* (holotype). A & B, habit of the fungus inducing galls with thalline pseudo-margin; C, carbonized, rough and cracked surface of stroma; D, section through multilocular stroma; E, fertile loculus; F, asci with young (left) and mature, brown ascospores with a granular-rugose surface (right); G, young, hyaline ascospores with gelatine episporium (left), and mature, brown ascospores with a granular-rugose episporium (right). Scales: A & C = 1 mm; B = 0.5 mm; D = 250 μ m; E = 50 μ m; F = 25 μ m; G = 10 μ m. In colour online.

constricted base and thin to thick thal-line pseudo-margin, surface rough, cracked and epruinose, 0.3–2.0(–2.5) mm diam. *Stroma* multilocular, with carbonized surface, sterile stromatic tissue developed between fertile loculi prosoplectenchymatic, not carbonized, pale brown, K+ olive-brownish, N+ reddish brown or N–, 20–25 µm in lateral, 25–75 µm in basal zones, without immersed crystals, but in upper part distinctly carbonized, dark orange-brown to blackish; pigment not dissolving, granular (better seen in K), K+ olive-brown (with slightly greyish green appearance when in lower concentration), N+ reddish brown (Atra-brown; Meyer & Printzen 2000). *Hymenium* hyaline, 100–150 µm high, fertile loculi *c.* 150–260 µm diam.; hymenial gel I+ blue, K/I+ blue. *Paraphyses* abundant, richly branched and sometimes anastomosed, septate, 1.5–3.0 µm thick, apically not distinctly enlarged and not darker. *Asci* clavate, (6–)8-spored, 65–85(–115) × 15–20 µm, *Opegrapha*-type, with only apical ring K/I+ blue. *Ascospores* hyaline, smooth, thick-walled when young, becoming brown when mature and with a distinct granular-rugose epispore, 3-septate, slightly constricted at the septa, all cells are more or less equal in length, 20–28(–30) × 6.5–8.0 µm in water, 20–28(–30) × (6.5–)7.0–9.0 µm in K, length/breadth ratio (2.5–)3.0–3.6 (*n* = 20), gelatine perispore distinct (especially in young ascospores), hyaline, up to 2 µm thick (better seen in K).

Pycnidia intermixed with the ascomatal loculi in the same stroma, very small, *c.* 40–50 µm diam., with hyaline wall; conidiogenous cells elongate cylindrical, 7–10 × 1.5–2.0 µm; microconidia bacilliform, hyaline, simple, 3–5 × 1 µm.

Host. The species inhabits saxicolous thalli of an unidentified sorediate *Stereocaulon* sp. It causes galls surrounded by a thal-line border on the host thallus; no other damage to the host thallus was visible. Remarkably, we have found this new fungus only on this particular sorediate *Stereocaulon* species, and not on other more frequent taxa occurring in the same localities.

Distribution and habitat. The new species is known from two Bolivian localities. It has been found in the Paramo Yungeño open vegetation and Yungas cloud forest.

Notes. *Plectocarpon latissporum* Ertz et al., which also forms galls with a thal-line pseudo-margin and finally brown granulose ascospores, is the most similar species to *P. stereocaulicola*. However, it can be distinguished by its dark brown to black stromatic tissue below fertile loculi, comparatively shorter ascospores (17.0–)19.0–22.8(–25.0) × (5.5–)6.2–7.6(–8.0) µm, and unrelated foliose *Pseudocyphellaria coriifolia* as a host (Ertz et al. 2005).

Plectocarpon pseudosticta Fée, another species growing on *Pseudocyphellaria*, also shows some similarities in gall formation, but has dark brown to black stromatic tissue below loculi and smaller, (16.0–)18.2–22.7(–24.0) × (4.8–)5.2–5.9(–6.0) µm, ascospores with a larger (3.3–4.1) length/breadth ratio (Ertz et al. 2005).

The new species also superficially resembles *P. cladoniae* R. Sant and *P. usneaustralis* Etayo, owing to the round, black, rough and warted ascomata with carbonized upper part and induction of galls with a thal-line pseudo-margin (Ertz et al. 2005; Etayo 2007). However, both species can easily be distinguished by the dark brown (*P. cladoniae*) or carbonized (*P. usneaustralis*) lower part of sterile stromatic tissue and different hosts, *Cladonia* and *Usnea* respectively. Additionally *P. cladoniae* has (4–)5-septate ascospores and *P. usneaustralis* develops comparatively smaller ascomata, 0.4–0.7(–1.3) µm diam. (Ertz et al. 2005; Etayo 2007).

By its 3-septate ascospores and non-carbonized sterile stromatic tissue in the lower part, *P. stereocaulicola* is also similar to *P. cristalliferum* Christnach et al. and *P. scrobiculatae* Diederich & Etayo. However, both of these have a non-carbonized surface of stromata. Furthermore, *P. cristalliferum* does not induce gall formation, the discs of ascomata have whitish points due to immersed crystals, ascospores are smaller, 15–21 × 3.5–4.5 µm (Ertz et al. 2005), and it inhabits thalli of *Sticta*. *Plectocarpon scrobiculatae* parasitizes

Lobaria scrobiculata and has similarly sized ascospores, but they are never brown when mature, and the ascomata are reddish brown (pigment K–, N–), with radially arranged loculi (Diederich & Etayo 1994).

Opegrapha stereocaulicola Alstrup & D. Hawksw. is the only other member of the family *Roccellaceae* that grows on *Stereocaulon* species. It differs from *Plectocarpon stereocaulicola* by its elongate, lirelliform, non-stromatic ascomata, an exciple that is carbonized even below the hymenium, brownish distal cells of paraphyses and smaller asci (50–65 µm long); ascospores are also 3-septate (rarely with up to 5 septa), but smaller and measure 19–21 × 5–6 µm (Alstrup & Hawksworth 1990).

Additional specimens examined (both on *Stereocaulon* sp.). **Bolivia:** Dept. La Paz: Prov. Nor Yungas, near Pongo village, 16°19'28"S, 67°57'21"W, 3822 m, Paramo Yungeño vegetation, 2011, *M. Kukwa* 9395 (LPB, UGDA); *ibid.*, 2011, *A. Flakus* 22925 & *M. Kukwa* 10110 (BR, LPB, UGDA, hb. Flakus).

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