

Three new taxa of *Camillea* from Costa Rica

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Three new taxa of *Camillea* from Costa Rica are described. *C. coroniformis* has distinctive ostiolar rims and ascospores ornamented with contiguous rods. *C. labiatirima* has slightly ornamented ascospores with a germ slit. This is the first among species of *Camillea* reported to have an ascospore germ slit. *C. heterostoma* var. *microspora* has smaller ascospores than the typical variety.

Keywords: *Camillea*, Costa Rica, Pyrenomycetes, Xylariaceae.

The new taxa of *Camillea* described here were obtained during a collecting workshop organized by the Costa Rican National Biodiversity Institute (INBio) during July, 2001. Collecting sites were located in northwestern Costa Rica.

Materials and methods

Asci and ascospores were examined by differential interference microscopy (DIF) in mounts of water, 10% KOH, and Melzer's iodine reagent. Ascospores were scrutinized by scanning electron microscopy (SEM) using the procedure of Rogers (1977). Type material was deposited at the herbarium of INBio, Santo Domingo, Heredia, Costa Rica.

Taxonomic part

Camillea labiatirima J. D. Rogers, F. San Martín & Y.-M. Ju, **sp. nov.** – Figs. 1–6.

Stroma fragmentarium, applanatum, probabiliter late effusum, ca. 1 mm crassum; superficies stromatis atra; textura sub superficie et inter perithecia carbonacea. Perithecia tubularia, 0.3–0.5 mm diam et usque ad 1 mm alta. Ostiola umbilicata interdum marginibus elevatis. Asci 185–220 µm longitudine tota × 10–12 µm crassi, partibus sporiferis 150–210 µm longitudine, stipitibus 10–35 µm

longitudine, annulo apicali in liquore iodato Melzeri cyanescenti, plus minusve cupulato, $7.5\text{ }\mu\text{m}$ alto $\times$ $6\text{ }\mu\text{m}$ lato. Ascosporae subhyalinae, unicellulares, ellipsoideo-inequilaterales, sub lente et per SEM observatae depressionibus non profundis ornatae, $25\text{--}28 \times (7.5\text{--})9.5\text{--}11\text{ }\mu\text{m}$, rima germinativa curta protrusa in latere concava insertae. Paraphyses angustae abundantes. Status anamorphicus ignotus.

Stroma applanate, fragmentary, probably widespreading, ca. 1 mm thick; surface dull black; strongly carbonaceous beneath surface and between perithecia. – Perithecia tubular, 0.3–0.5 mm diam $\times$ up to 1 mm high. – Ostioles umbilicate, some with raised rims. – Asci 185–220 μm total length $\times$ 10–12 μm broad, the spore-bearing parts 150–210 μm long, the stipes 10–35 μm long, with apical ring bluing in Melzer's iodine reagent, more or less cupulate, $7.5\text{ }\mu\text{m}$ high $\times$ 6 μm broad. – Ascospores subhyaline, unicellular, ellipsoid-inequilateral, minutely ornamented with shallow depressions by light microscopy and SEM, $25\text{--}28 \times (7.5\text{--})9.5\text{--}11\text{ }\mu\text{m}$, with short protruding germ slit on concave side. – Paraphyses narrow, abundant. – Anamorph unknown.

Etymology. – for the lipped-shape of the ascospore germ slit.

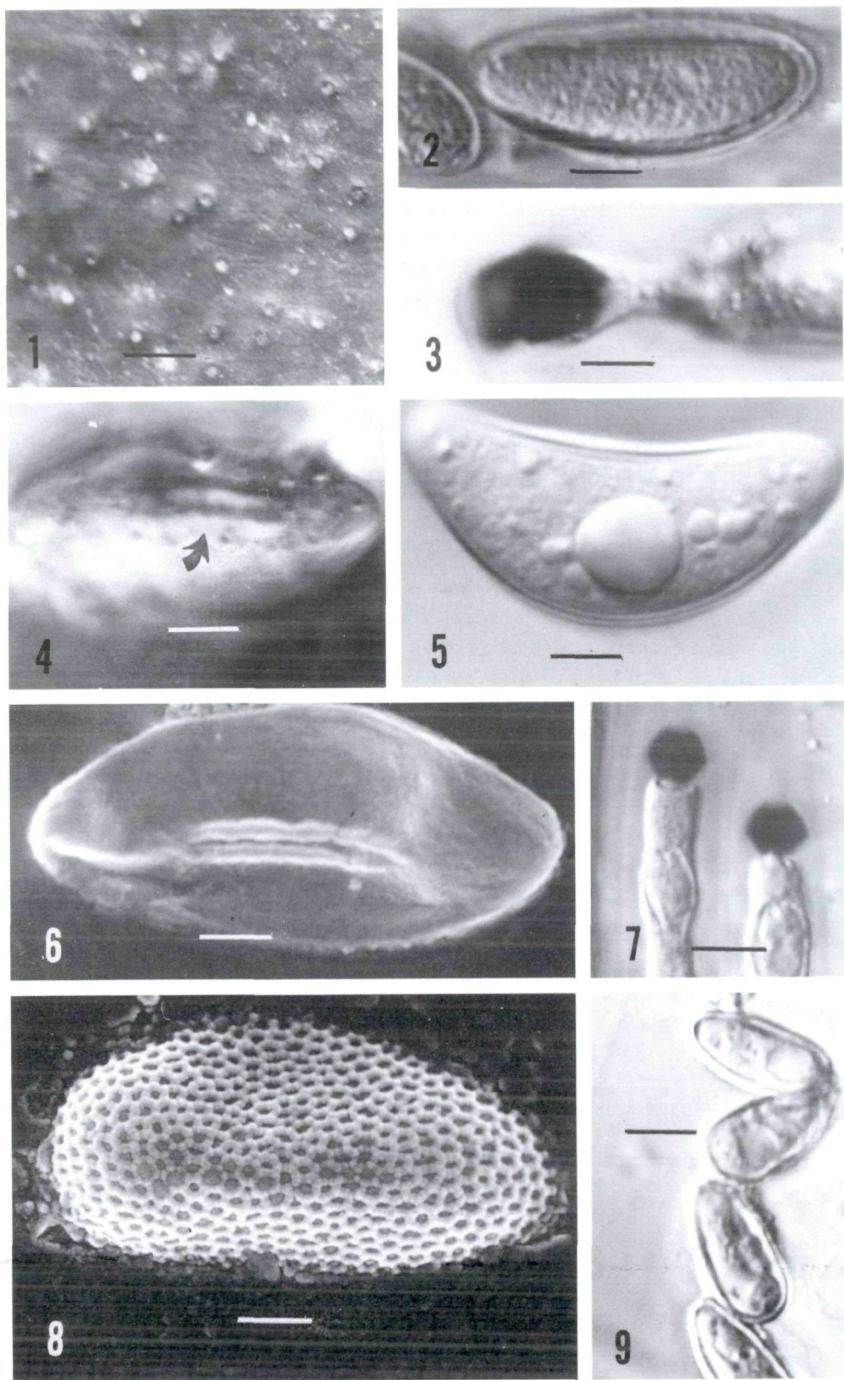
Specimen examined. – Costa Rica, Volcán Arenal Conservation Area, on dead wood, leg. F. San Martín, J. D. Rogers no. 26, 15 July 2001, holotype, INB3370610.

Camillea labiatirima is unique among *Camillea* species in having a slightly ornamented ascospore wall with a distinct protruding germ slit. In this respect it resembles a *Biscogniauxia*. However, the ascus apical ring with a concave apex and rounded base is of the *Camillea* type and resembles that of *C. guzmanii* San Martín & J. D. Rogers and *C. magnifica* San Martín & J. D. Rogers (San Martín & Rogers, 1993). Rings of this more or less cupulate morphology are unknown among *Biscogniauxia* species. Another taxon showing both *Biscogniauxia* and *Camillea* characteristics is *B. reticulospora* Y.-M. Ju & J. D. Rogers, which has faintly reticulate, dark-colored ascospores (Ju & al., 1998). Cultures bearing anamorphs would probably add precision and confidence in assigning *C. labiatirima* and *B. reticulospora* to genera, but, unfortunately, neither has yielded cultures. If future studies, including cultures, show that one or both of these taxa are indeed *Camillea*, one or two new subgenera might be required to accommodate them.

Camillea heterostoma (Mont.) Læssøe, J. D. Rogers & Whalley var. ***microspora*** J. D. Rogers, San Martín & Y.-M. Ju, var. **nov.** – Figs. 7–9.

A varietate typica differt in ascosporis $9\text{--}12 \times 4.5\text{--}5\text{ }\mu\text{m}$.

Differs from the typical variety in ascospores $9\text{--}12 \times 4.5\text{--}5\text{ }\mu\text{m}$.



Specimen examined. – Costa Rica, Lomas de Barbudal, on dead wood of *Psidium* sp., leg. F. SanMartín, J. D. Rogers no. 42, 14 July 2001, holotype, INB3370609.

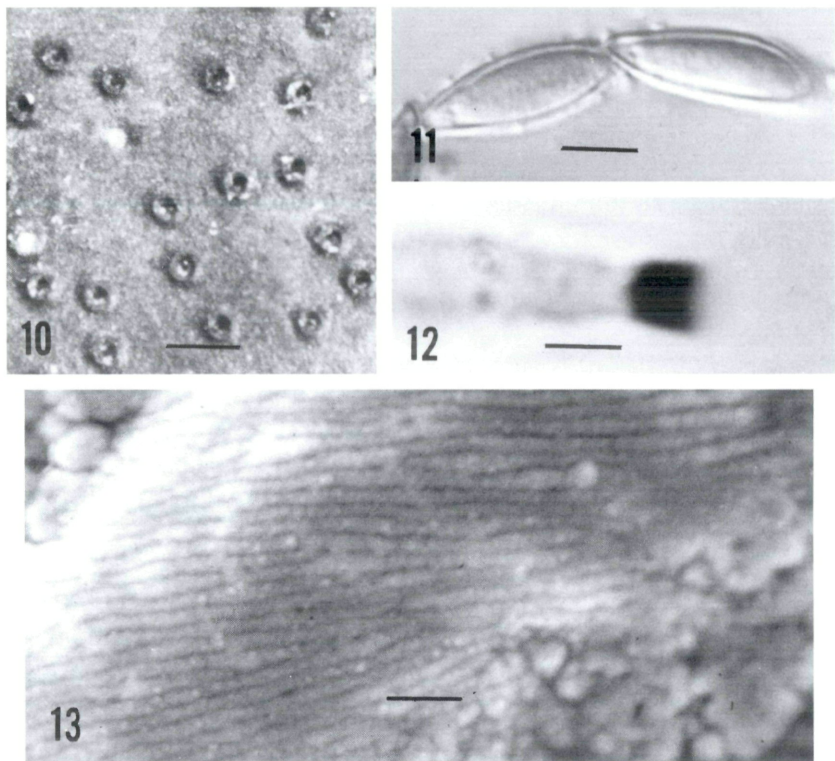
The present fungus is undoubtedly a variant of *C. heterostoma*, based on ascospore shape and poroid ornamentation, stromatal color, and characteristic wedge-shaped ostiolar rims (see Læssøe & al., 1989). Moreover, the broad coarse paraphyses are packed with a frothy material, as are those of the typical variety (Læssøe & al., 1989). A large-spored variety, var. *macrospora* (Miller) Læssøe, J. D. Rogers & Whalley, was previously erected (Læssøe & al., 1989). None of the varieties have been cultured. *Camillea amazonica* Læssøe, J. D. Rogers & Whalley has ascospores that are similar in size and ornamentation to var. *microspora*, but the stroma of the former fungus is shiny black rather than brown.

Camillea coroniformis J. D. Rogers, F. San Martín & Y.-M. Ju, sp. nov. – Figs. 10–13.

Stromata applanata marginibus distinctis, discoidea vel irregularia, usque ad 2 cm longa $\times$ 2 cm lata $\times$ minus quam 1 mm crassa. Superficies atra; textura proxime sub superficie et inter perithecia carbonacea. Perithecia tubularia, 0.3 mm diam $\times$ 0.5–0.7 mm alta. Ostiola punctata vel aliquantum elevata annulo elevato cincta. Asci 120–135 μ m longitudine tota $\times$ 7 μ m crassi, partibus sporiferis 100–110 μ m longitudine, stipitibus 15–25 μ m longitudine, annulo apicali in liquore iodato Melzeri cyanescenti, basi rotundata et apice concava, 3 m alto $\times$ 3 μ m lato. Ascosporae subhyalinae, unicellulares, ellipsoideae-inequilaterales vel falcatae apicibus angustatis, sub lente levibus, per SEM observatae virgis arcte contiguas, 14–16 $\times$ 5–6 μ m. Rima germinationis nulla. Paraphyses angustae abundantes. Status anamorphicus ignotus.

Stromata applanate with distinct margins, discoid to irregular, up to 2 cm long $\times$ 2 cm broad $\times$ less than 1 mm thick. Surface dull black; carbonaceous beneath surface and between perithecia. – Perithecia tubular, 0.3 mm diam $\times$ 0.5–0.7 mm high. – Ostioles punctate to somewhat elevated surrounded by raised annulus. – Asci 120–135 μ m total length $\times$ 7 μ m broad, the spore-bearing parts 100–110 μ m long, the stipes 15–25 μ m long with apical ring bluing in

Figs. 1–9. – *Camillea labiatirima* and *C. heterostoma* var. *microspora*. – 1–6. *C. labiatirima*. – 1. Stromatal surface showing umbilicate ostioles with or without raised rims. – 2. Somewhat immature ascospore showing slight roughness. – 3. Ascus apical ring. – 4. Ascospore, out of focus, showing short protruding germ slit (arrow). – 5. Ascospore showing general morphology. – 6. Ascospore showing prominent protruding germ slit. – 7–9. *C. heterostoma* var. *microspora*. – 7. Upper parts of asci showing apical rings. – 8. Ascospore showing punctate-reticulate wall at high magnification. – 9. Ascospores. – Fig. 1 by photomacrography. Figs. 2–5, 7 and 9 by DIF. Figs. 6 and 8 by SEM. Figs. 2, 4, 5, 9 from water mounts. Figs. 3 and 7 from Melzer's iodine mounts. Figs. 6 and 8 from gold-coated preparations. – Bars: 1 = 0.5 mm; 2–4, 7 and 9 = 5 μ m; 5 = 4.5 μ m; 6 = 3.5 μ m; 8 = 1.5 μ m.



Figs. 10–13. – *Camillea coroniformis*. – 10. Stromatal surface showing raised rims or crowns surrounding ostioles. – 11. Two ascospores. – 12. Upper part of ascus showing ascus apical ring. – 13. Surface of ascospore at high resolution and magnification showing closely packed rods. – Fig. 10 by photomacrography. Figs. 11 and 12 by DIF. Fig. 13 by SEM. Fig. 11 from water mount. Fig. 12 from Melzer's iodine mount. Fig. 13 from gold-coated preparation. – Bars: 10 = 0.2 mm; 11 and 12 = 5 μ m; 13 = 0.5 μ m.

Melzer's iodine reagent, rounded at base and concave at apex, 3 μ m high $\times$ 3 μ m broad. – Ascospores subhyaline, unicellular, ellipsoid-inequilateral to falcate with acute apices, smooth by light microscopy, by SEM composed of tightly packed rods, 14–16 $\times$ 5–6 μ m, without a germ slit. – Paraphyses abundant. – Anamorph unknown.

Etymology. – Refers to the crown-like ostiolar rims.

Specimen examined. – Costa Rica, Lomas de Barbudal, on dead wood of *Citrus* sp., leg. F. San Martín, J. D. Rogers no. 23, 14 July 2001, holotype, INB3370608.

Camillea coroniformis has ascospores with a wall that appears by SEM to be composed of spirally arranged, parallel rods or ribs. In this respect they resemble ascospores of *C. fusiformis* M. A. Whalley

(M. A. Whalley, 1995), *C. leprieurii* Mont., *C. labellum* Mont., *C. stellata* Læssøe, J. D. Rogers & Whalley, and *C. venezuelensis* (J. H. Miller) Dennis (Læssøe & al., 1989). A distinct substructure between the rods was not observed. However, an amorphous substance on the ascospore surface, which we were unable to remove, interfered with observations and resulted in comparatively few useable images. The more or less cupulate ascus apical ring depicted in Fig. 12 is also seen in *C. labiatirima* and some other taxa (see earlier herein). The regular slightly raised rings surrounding the ostioles of *C. coroniformis* seem similar to those of *C. fusiformis* (M. A. Whalley, 1995). Unfortunately, cultures were not obtained for either of these species.

Discussion

Camillea is an intriguing genus that is obviously related to *Biscogniauxia*. It differs from the latter genus in having hyaline to pale ascospores that are usually ornamented and appear to lack germ slits; in having an anamorph that bears the conidiogenous apparatus on an ampulla; and in having an ascus apical ring that is usually as high, or higher, than broad and more or less diamond-shaped or cupulate (Ju & al., 1998; Læssøe & al., 1989). Until relatively recently it was believed that *Camillea* is largely confined to the American tropics, with several temperate representatives, and that *Biscogniauxia* is cosmopolitan. Recent contributions by M. A. Whalley and associates, however, have shown the existence of two unique species in Asia (Whalley & al., 1996; Whalley & al., 1999). Sánchez-Ballesteros et al. (2000) showed, in a molecular study that included a small number of *Camillea* and *Biscogniauxia* representatives, that these genera are closely related. Indeed, the limited data derived from complete sequences of the internal transcribed spacer region, including the 5.8S rRNA gene, could be interpreted to support a congeneric relationship of the taxa involved (see Sánchez-Ballesteros & al., 2000). Morphologically, however, these genera are clearly distinct, except where taxa show features of both genera, e. g. *B. reticulospora* and *C. labiatirima*. Unfortunately, we were unable to culture these two highly interesting taxa and, especially, to assess the morphology of their anamorphs. Thus, the relationships among taxa of *Biscogniauxia* and *Camillea* continue to be an exciting puzzle.

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