

The genus *Xylaria sensu lato* (*Xylariaceae*) in Guadeloupe and Martinique (French West Indies) I. Taxa with penzigoid stromata

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Abstract: This survey deals with the *Xylaria* taxa with penzigoid stromata, i.e., with sessile to subsessile stromata wider than high, collected in the French West Indies in the course of an ongoing inventorial work on the mycobiota of these islands initiated in 2003. Based on the evaluation and comparison of their morphological characters, eighteen taxa are described, illustrated and commented, including seven known taxa, viz.: *X. alboareolata*, *X. berteroi*, *X. boergesenii*, *X. flabelliformis*, *X. frustulosa*, *X. globosa* and *X. lechatii*, only the last having been reliably reported previously from these islands. The following eight species are described as new, viz.: *X. conopeicola*, *X. entomelaina*, *X. leptosperma*, *X. obtusispora*, *X. papillatoides*, *X. parvula*, *X. peltiformis* and *X. rhytidosperra*. The new combination *X. cantareirensis* is proposed for a taxon formerly placed in the obsolete genus *Penzigia*. The two further collections CLL 5109 and MJF 13098 that could not be unambiguously identified are likewise described but not named, pending more material being collected. A dichotomous identification key and a synoptic figure plate of stromata are presented.

Keywords: Ascomycota, pyrenomycetes, saproxylic fungi, taxonomy, tropical mycology, *Xylariales*, *Xylarioideae*.

Résumé : cette étude porte sur les taxons penzigioïdes de *Xylaria*, c'est-à-dire à stromas sessiles à subsessiles plus larges que hauts, récoltés lors de missions d'inventaire de la fonge des Antilles françaises commencées en 2003. En se fondant sur l'évaluation et la comparaison de leurs caractères morphologiques, dix-huit taxons sont décrits, illustrés et commentés, comprenant d'une part sept taxons connus, à savoir *X. alboareolata*, *X. berteroi*, *X. boergesenii*, *X. flabelliformis*, *X. frustulosa*, *X. globosa* et *X. lechatii*, ce dernier seulement déjà signalé des Antilles françaises. D'autre part, huit taxons nouveaux sont proposés, comprenant *X. conopeicola*, *X. entomelaina*, *X. leptosperma*, *X. obtusispora*, *X. papillatoides*, *X. parvula*, *X. peltiformis* et *X. rhytidosperra*. La nouvelle combinaison *X. cantareirensis* est proposée pour un taxon placé auparavant dans le genre abandonné *Penzigia*. Enfin, deux récoltes qui n'ont pas pu être identifiées de façon certaine, CLL 5109 et MJF 13098, sont également décrites mais ne sont pas nommées, dans l'attente de nouvelles récoltes. Une clé d'identification dichotomique et une planche synoptique des stromas sont présentées.

Mots-clés : Ascomycota, champignons saproxyliques, mycologie tropicale, pyrénomycètes, taxinomie, *Xylariales*, *Xylarioideae*.

Introduction

The genus *Xylaria* Hill ex Schrank is currently the largest genus of the family *Xylariaceae* Tul. & C. Tul., with over 800 epithets listed in MycoBank, including species in *Penzigia* Sacc. and *Xylospira* Dumort. After revision of most of the corresponding material, removal of repetitive names, synonyms, excluded and doubtful taxa and inclusion of missing names and undescribed species, this number can be reduced to roughly 400 (Ju, conference at IMC 10, 2014).

A large scale phylogenetic study including 86 *Xylaria* species and 34 species from related xylariaceous genera in the subfamily *Xylarioideae* showed that, as currently conceived, *Xylaria* is highly paraphyletic (HSIEH *et al.*, 2010), and congruent results were obtained by U'REN *et al.* (2016). In this context, and in absence of a world monograph, identification of *Xylaria*-like fungi remains often challenging and this study could not have been achieved without continuous help and advice from Dr. Ju. The classification of these fungi, including the species dealt with here, should be revised in the future to match with phylogenetic data and *Xylaria* itself might turn out to be restricted to species showing close phylogenetic affinities with *X. hypoxylon* (L. : Fr.) Grev., the type species. In the meantime, we keep using *Xylaria* in the broad sense defined by HSIEH *et al.* (2010) in their introduction.

This paper initiates a planned series of three dealing with species of *Xylaria* in the French Caribbean islands of Guadeloupe and Martinique. It starts here with the species with sessile, wider than high stromata, commonly referred to as “penzigoid”, in reference to the genus *Penzigia* introduced by SACCARDO (SACCARDO & PAOLETTI, 1888) to accommodate such species with a deviating macro-morphology. The segregation of *Penzigia* from *Xylaria* has not been followed by most of mycologists (DENNIS, 1974; LÆSSØE, 1989; ROGERS, 1990) and based on cultural data obtained from *P. cranioides* Sacc. & Paol., the type species, JU & ROGERS (2001) synonymized *Penzigia* with *Xylaria*. Though this taxonomic decision was largely accepted and later supported by molecular data (HSIEH *et al.*, 2010), the term “penzigoid”

is still in use to characterize small, sessile species of *Xylaria*, including stunted forms of species ordinarily featuring upright stromata. As demonstrated by HSIEH *et al.* (2010), segregating species with penzigoid stromata from those with upright stromata either less than or more than 5 mm wide does not follow at all a natural classification but will be implemented in this series of paper since it appears to be the most convenient way to preliminarily sort out a large number of *Xylaria* spp. based on characters that can be readily evaluated to the naked eye. This was successfully implemented e.g., in several surveys of tropical *Xylaria* spp. by ROGERS *et al.* (1987; 1988) and SAN MARTÍN & ROGERS (1989). Taxa occasionally featuring ambiguous morphological habit precluding their assignment to only one group are included in the keys to relevant other groups.

This survey of the genus *Xylaria* is the continuation of similar taxonomic studies carried out on the xylariaceous genera *Hypoxylon* Bull., *Annulohypoxylon* Y.-M. Ju, J.D. Rogers & H.-M. Hsieh, *Biscogniauxia* Kuntze, *Rosellinia* De Not. and *Nemania* S.F. Gray in the same region (FOURNIER *et al.*, 2015; 2016; 2017a; 2017b; 2018). The reader is referred to the first above publication for details on the framework within which this work was carried out, and for the salient ecological features characterizing these two islands. The material described in these publications, including the *Xylaria* spp. dealt with herein and in the coming papers, was collected during the repeated field trips to these islands initiated in 2003 (COURTECUISSÉ, 2006).

The plentiful material of penzigoid *Xylaria* spp. collected during our forays was thoroughly examined and compared with species described in literature and with some samples from Taiwan kindly provided by Dr. Ju. *Stilbohypoxyton* Henn., a genus monographed by PETRINI (2004), is nested within *Xylaria sensu lato* (HSIEH *et al.*, 2010) and shares many morphological traits with some penzigoid *Xylaria* spp., especially those with synnematus asexual morphs. Therefore, species of *Stilbohypoxyton* were also considered for comparison with our collections. Comparison with kretzschmaroid species of *Kretzschmaria* Fr. (ROGERS & JU, 1998) featuring small gregarious turbinate stromata was likewise considered. This led to the identifi-

cation of sixteen taxa including seven known taxa, viz.: *X. alboareolata* Y.-M. Ju & J.D. Rogers, *X. berteroi* (Mont.) Cooke ex J.D. Rogers & Y.M. Ju, *X. boergesenii* (Ferd. & Winge) P.F. Cannon, *X. flabelliformis* (Schwein.) Berk. & M.A. Curtis, *X. frustulosa* (Berk. & M.A. Curtis) Cooke, *X. globosa* (Spreng.) Mont. and *X. lechatii* Y.-M. Ju, H.-M. Hsieh, J.D. Rogers & J. Fourn. Eight new taxa are proposed to accommodate collections that could not be equated to known taxa, viz.: *X. conopeicola* J. Fourn. & Lechat, *X. entomelaina* J. Fourn. & Lechat, *X. leptosperma* J. Fourn. & Lechat, *X. obtusispora* J. Fourn. & Lechat, *X. papillatoides* J. Fourn. & Lechat, *X. parvula* J. Fourn. & Lechat, *X. peltiformis* J. Fourn. & Lechat and *X. rhytidosperra* J. Fourn. & Lechat; furthermore, we introduce the new combination *X. cantareirensis* (Henn.) J. Fourn. & Lechat for *Hypoxylon cantareirensis* Henn. [= *Penzigia cantareirensis* (Henn.) J.H. Miller]. Two collections, CLL 5109 and MJF 13098, could not be unambiguously equated to known species but appeared to lack distinctive features on which the erection of new species could be based. They are therefore described and illustrated without specific name until they can be better documented. The distinctive morphological features of all these collections and their differences with known taxa are illustrated and commented. We propose a dichotomous identification key to the *Xylaria* taxa dealt with in this survey, and we likewise propose a synoptic figure plate for comparing the stromata of all taxa at the same scale.

The first records of *Xylariaceae* from Guadeloupe and Martinique date back to ROUSSEL (1870) and Duss (1903). Roussel recorded *X. cubensis* (Mont.) Fr. and *X. globosa* from Guadeloupe and Duss listed fourteen species of *Xylaria*, mostly from Guadeloupe, viz.: *X. anisopleura* (Mont.) Fr., *X. dichotoma* (Mont.) Mont., *X. digitata* (L.) Grev., *X. filiiformis* (Alb. & Schwein.) Fr., *X. flabelliformis*, *X. gomphus* Fr., *X. grammica* (Mont.) Mont., *X. hyperythra* (Mont.) Mont., *X. hypoxylon*, *X. ianthino-velutina* (Mont.) Mont., *X. platypoda* (Lév.) Fr., *X. polymorpha* (Pers.) Grev., *X. scopiformis* Mont., *X. tabacina* (J. Kickx f.) Fr., and two species of *Penzigia*, viz.: *P. dealbata* (Berk. & M.A. Curtis) Sacc. & Paol. and *P. obovata* (Berk.) Speg. *Xylaria anisopleura* is regarded as a synonym of *X. globosa*, and *X. tabacina* a synonym of *X. telfairii* (Berk.) Sacc., two species dealt with respectively in the present study and in part II. *Xylaria digitata*, *X. filiiformis*, *X. hypoxylon* and *X. polymorpha* are distributed in temperate regions and all tropical records of these species turn out to be misidentifications. *Xylaria dichotoma*, known to occur on monocots, was likely misidentified as it was recorded on rotten stumps of *Eugenia jambos*, a dicot tree. *Xylaria scopiformis* is an invalidly published name (Ju *et al.*, 2016) that should be abandoned for the great confusion resulting from its various interpretations. *Xylaria flabelliformis*, *X. hyperythra*, *X. ianthino-velutina* and *P. obovata* are among the species that we recorded during this study and subsequently in parts II and III (the latter as *X. tuberoides* Rehm). *Xylaria gomphus*, *X. grammica*, *X. platypoda* and *P. dealbata* are known from tropical records and might be expected in Guadeloupe or Martinique but we did not encounter them during this study. As the material reported by Roussel and Duss cannot be accessed for a revision according to modern taxonomic concepts (FOURNIER *et al.*, 2017a), we unfortunately have to regard them as dubious, though our above comments suggest that several of them represent species that likely occur in French West Indies. Duss (1903) recorded *H. dussianum* Pat., a small, black, hypoxylid ascomycete that was assigned to *Xylaria* by Ju & ROGERS (1996) in their revision of *Hypoxylon*. Judging from the protologue of *H. dussianum*, it is probably a synonym of *X. flabelliformis*, resembling the penzigoid collection of this species that we illustrate in this paper (see notes under *X. flabelliformis*).

As a result, the only well-documented *Xylaria* species known from Guadeloupe prior to this study is the recently described *X. lechatii* (Ju *et al.*, 2012), all other records in this paper and in the coming ones being novelties for Guadeloupe and Martinique.

Materials and methods

Refer to FOURNIER *et al.* (2018). In the following descriptions, we emphasize the diagnostic importance of the thickness and texture of the outer stromatal crust, which appears fairly consistent for a given species. A thin soft crust is termed leathery; it can be easily cut with a razor blade without crumbling and it is easily deformed by pressure of a needle when rehydrated in a drop of water (to be checked under the stereomicroscope). A thick (> 100 µm) and hard crust is termed carbonaceous; it crumbles when one attempts to section it with a razor blade and is not deformed by pressure of a needle when rehydrated. Intermediate forms exist, either thick and leathery or thin and carbonaceous. In confusing cases, the test of the needle after rehydration remains the best way to distinguish the leathery texture from the carbonaceous texture.

Taxonomy

Xylaria alboareolata Y.-M. Ju & J.D. Rogers, *North American Fungi*, 7 (9): 18 (2012). Plate 2.

≡ *Xylaria areolata* (Berk. & Curtis) Y.-M. Ju & J.D. Rogers, *Mycotaxon*, 73: 394 (1999).

Stromata solitary or scattered in small groups, at times in contact, superficial, pulvinate to hemispherical, 3–7(–9) mm diam × 2–3.5 mm thick, sessile, the base broadly attached; surface dark grey, plane, without exposed perithecial contours, mottled with white persistent polygonal scales 0.3–0.7 mm diam densely incrustated with minute shiny black granules; hard-textured, subsurface a carbonaceous crust 170–200 µm thick; interior white to brownish grey, fibrous, partly lacunose. **Perithecia** obovoid to subglobose, 1 mm high × 0.7–0.9 mm diam. **Ostioles** bluntly papillate, blackish, 80–120 µm diam, opening between the white scales.

Asci cylindrical, with (6–)8 slightly overlapping uniseriately arranged ascospores, the spore-bearing parts 185–210 × 12–13.5 µm, the stipes 30–55 µm long, with apical apparatus 6.5–8.8 × 4.3–5.5 µm (Me = 7.9 × 4.8 µm, N = 25), slightly urn-shaped with a sharp upper lateral rim, strongly bluing in Melzer's reagent. **Paraphyses** copious, hyphal, thin-walled, remotely septate, 6–6.5 µm wide at base, tapering to 1.5–2 µm wide above asci, embedded in mucilaginous material. **Ascospores** (27.6–)28.2–33.1(–35.8) × (8.4–)8.7–10.2(–10.8) µm, Q = (2.8–)2.9–3.7(–4), N = 60 (Me = 30.6 × 9.4 µm, Qe = 3.3), ellipsoid-inequilateral to suboblong with broadly rounded ends, often slightly ventrally concave, unicellular, dark brown to blackish brown, with a narrow, longitudinal, straight, central germ slit slightly less than spore length on the ventral side; with bipolar secondary appendages, not stained by blue ink, best seen in India ink; epispore smooth.

Asexual morph on the natural substrate not seen. Cultures on PDYA yielding stromata but no asexual morph according to Ju & ROGERS (1999) (as *X. areolata*).

Specimens examined: FRENCH WEST INDIES: GUADELOUPE: Basse-Terre, Capesterre-Belle-Eau, Grand-Étang, hygrophilic rainforest, on a dead corticated branch, 6 Sept. 2005, *leg.* J. Chabrol, CLL 5372 (LIP; HAST 142964); Basse-Terre, Petit-Bourg, Rivière Tambour, hygrophilic rainforest, on a dead corticated branch, 3 Sept. 2005, *leg.* C. Lécuru, CLL 5326 (LIP; HAST 142965); Basse-Terre, Petit-Bourg, Rivière Moustique, hygrophilic rainforest, on a dead corticated branch, 5 Sept. 2005, *leg.* C. Lécuru, CLL 5360 (LIP); Basse-Terre, Saint-Claude, Matouba, Victor Hughes track, hygrophilic rainforest, on a dead corticated branch, associated with *Kretzschmaria sandvicensis*, 4 Sept. 2005, *leg.* C. Lechat, CLL 5333 (LIP) (depauperate); Basse-Terre, Sainte-Rose, Sofaïa, hygrophilic rainforest, on bark, 1 Sept. 2005, *leg.* C. Lechat, CLL 5297 (LIP) (depauperate); Basse-Terre, Sainte-Rose, Sofaïa, chemin des Contrebandiers, hygrophilic rainforest, on bark, 15 Aug. 2008, *leg.* C. Lechat, CLL 8231 (LIP). MARTINIQUE: Case-Pilote, Fond

Dichotomous key to the penzigoid *Xylaria* taxa known from French West Indies

1	Stromata 0.5–2(–2.5) mm diam	2
1	Stromata more than 2.5 mm diam	11
2	Ascospores less than 16 µm long in average	3
2	Ascospores 20–33 µm long in average.....	9
3	Ascospores equilateral to slightly inequilateral	4
3	Ascospores strongly inequilateral	6
4	Stromata leathery, smooth, pale greyish brown; ascospores 13 × 6.7 µm in average, equilateral	<i>X. lechatii</i>
4	Stromata carbonaceous, cracked to warted, blackish brown to black; ascospores smaller	5
5	Stromata shortly stipitate, associated with a synnematus asexual morph; ascospores 10 × 4.2 µm in average, slightly inequilateral	<i>X. sp. CLL 5109</i>
5	Stromata sessile, lacking associated synnematus asexual morph; ascospores 11.6 × 4.9 µm in average, equilateral	<i>X. obtusispora</i> sp. nov.
6	Ascospores with a germ slit clearly less than spore-length	7
6	Ascospores with a germ slit almost spore-length	8
7	Ascospores surrounded by a thin mucilaginous sheath, 11.6 × 4.1 µm in average, Qe = 2.8	<i>X. leptosperma</i> sp. nov.
7	Ascospores lacking a mucilaginous sheath, 12.5 × 5.1 µm in average, Qe = 2.5.....	stunted forms of <i>X. arbuscula</i> (part III)
8	Stromata with superficial white scales and a white central umbo; ascospores 14.6 × 5.8 µm in average, Qe = 2.5, with a long, straight germ slit.....	<i>X. papillatoides</i> sp. nov.
8	Stromata with superficial tan pellicle, convex; ascospores 15.9 × 7.1 µm in average, Qe = 2.3, with a short, sigmoid germ slit	<i>X. parvula</i> sp. nov.
9	Ascospores 32.8 × 10.1 µm in average, epispore appearing ornamented with linear “rods”; germ slit short, oblique	<i>X. rhytidosperma</i> sp. nov.
9	Ascospores less than 25 µm in average, smooth-walled, with long spiralling germ slit	10
10	Entostroma white; ascospores 20.8 × 7.2 µm in average, with obtuse ends	<i>X. boergesenii</i>
10	Entostroma black; ascospores 24.5 × 10.6 µm in average, with acute to slightly pinched ends.....	<i>X. entomelaina</i> sp. nov.
11	Stromata sessile	12
11	Stromata more or less shortly stipitate.....	17
12	Stromata with a thin leathery crust; ascospores 5.5 × 2.4 µm, pale olivaceous brown, equilateral, lacking a visible germ slit	<i>X. frustulosa</i>
12	Stromata carbonaceous; ascospores much larger, brown to blackish brown, with a visible germ slit	13
13	Stromata with white scales or white to cream coating	14
13	Stromata with grey to brown scales or lacking superficial coating	15
14	Stromata with white superficial scales; ascospores 30.6 × 9.4 µm in average, blackish brown, with bipolar secondary appendages	<i>X. alboareolata</i>
14	Stromata with white to cream coating; ascospores 22.2 × 8.7 µm in average, dark brown, lacking secondary appendages	<i>X. cantareirensis</i> comb. nov.
15	Ascospores 19.4 × 8 µm in average, with conspicuous germ slit.....	<i>X. conopeicola</i> sp. nov.
15	Ascospores less than 12 µm long in average, with inconspicuous germ slit	16
16	Ascospores 11.4 × 6.7 µm in average, blackish brown, slightly inequilateral	<i>X. berteroi</i>
16	Ascospores 9.3 × 5.1 µm in average, dark brown, strongly inequilateral.....	<i>X. flabelliformis</i>
17	Ascospores less than 16 µm in average	18
17	Ascospores more than 23 µm in average.....	19
18	Ascospores 9.6 × 4.9 µm in average, with a long straight germ slit	subsessile forms of <i>X. martinicensis</i> var. <i>microspora</i> (part III)
18	Ascospores 15.6 × 6.1 µm in average, with a short sigmoid germ slit and a thin mucilaginous sheath	<i>X. sp. MJF 13098</i>
19	Stromata discoid, up to 8.3 mm diam, flat-topped to slightly convex, with minute grey scales; ascospores 23.6 × 8.4 µm in average	<i>X. peltiformis</i> sp. nov.
19	Stromata subglobose to clavate, ellipsoid, turbinate or fusiform, up to 15 mm diam	20
20	Stromata subglobose to clavate, ellipsoid, turbinate or fusiform, coarsely warted, dark brown to black; crust leathery; ascospores 25 × 7.9 µm in average with a diagonal germ slit	<i>X. globosa</i>
20	Stromata subglobose to obovoid, smooth, dark grey, crust carbonaceous; ascospores 25.8 × 6.8 µm in average with a longitudinal germ slit	subsessile forms of <i>X. tuberoides</i> (part II)

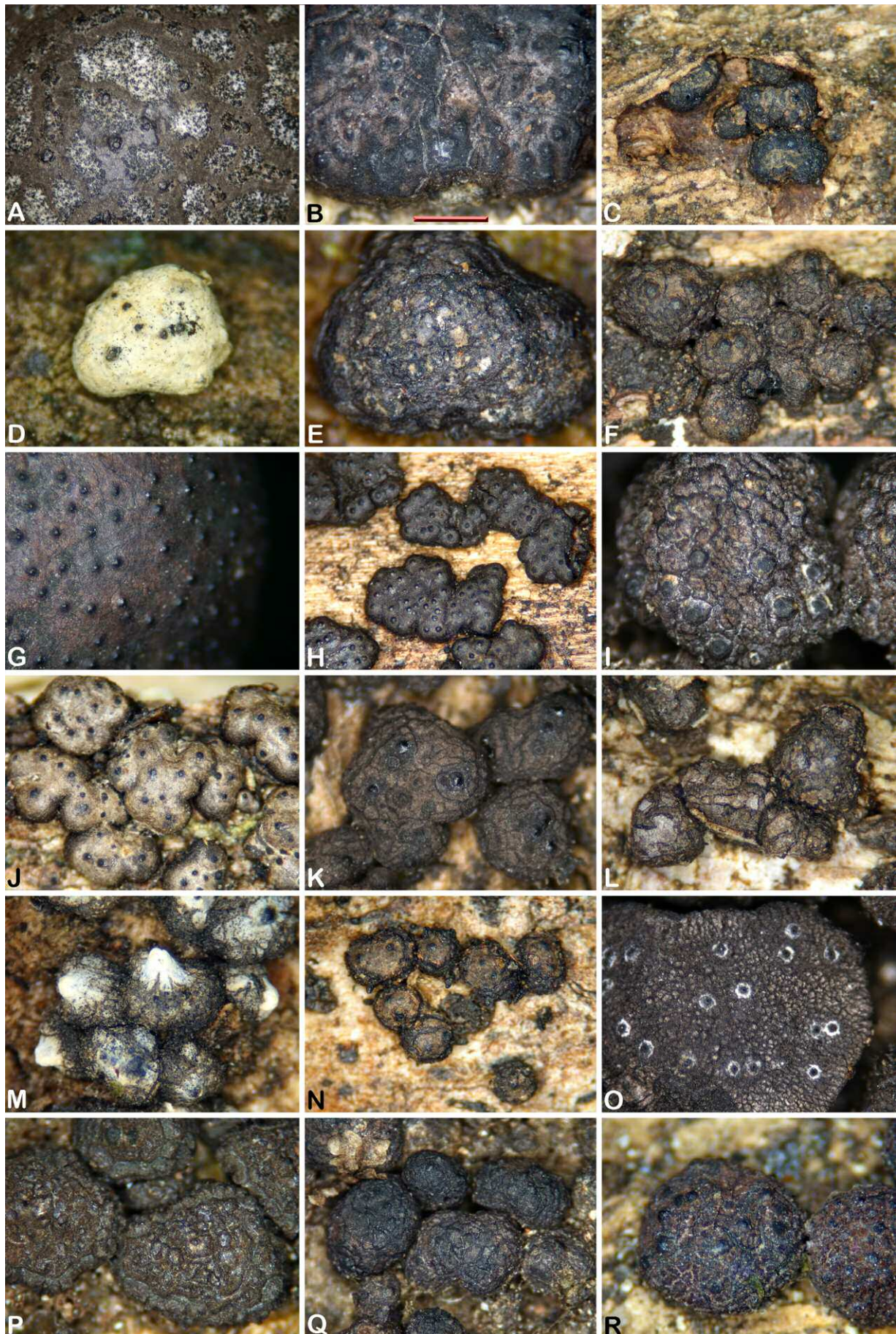


Plate 1 – Comparison at the same scale of stromata of penzigoid *Xylaria* taxa known from Guadeloupe and Martinique

A: *X. alboareolata* CLL 5372; B: *X. berteroi* MJF 15177; C: *X. boergesii* CLL 5430; D: *X. cantareirensis* CLL 5437; E: *X. conopeicola* MJF 14079 (holotype); F: *X. entomelaina* MJF13288 (holotype); G: *X. flabelliformis* FC 5376; H: *X. frustulosa* MJF 07227; I: *X. globosa* CLL 0732; J: *X. lechatii* CLL 6075 (holotype); K: *X. leptosperma* MJF 13387 (holotype); L: *X. obtusispora* MJF 15173 (holotype); M: *X. papillatoides* CLL 8258 (holotype); N: *X. parvula* MJF 13336 (holotype); O: *X. peltiformis* MJF 14155 (holotype); P: *X. rhytidosperra* CLL 6062-2 (paratype); Q: *Xylaria* sp. CLL 5209; R: *Xylaria* sp. MJF 13098. Scale bar (B) = 1 mm.

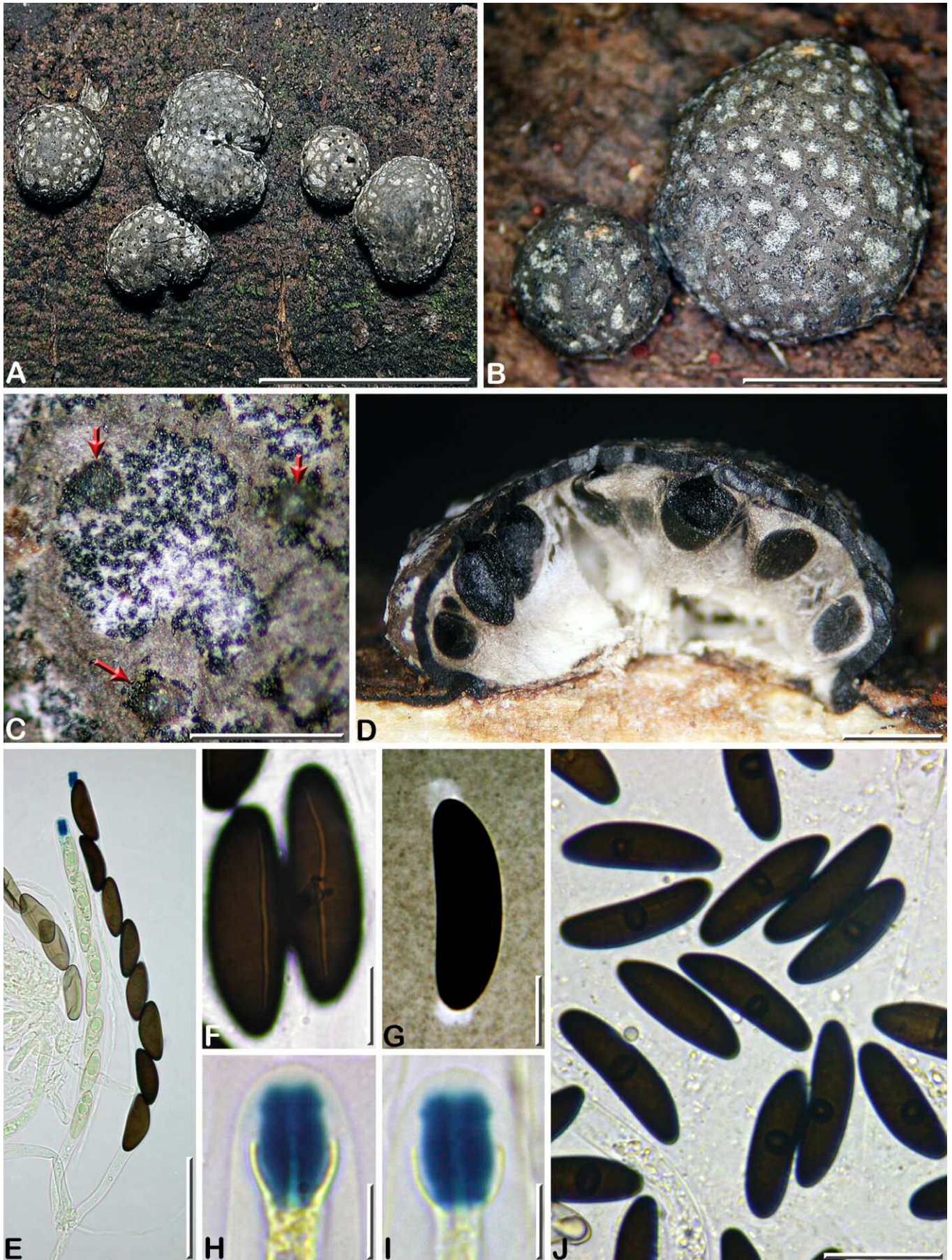


Plate 2—*Xylaria alboareolata*

A: CLL 5236; B-D, F, G: CLL 5372; E, H-J: MJF 16182. A, B: Stromata in top view; C: Stromatal surface in close-up showing papillate ostioles (arrows) and shiny black granulations associated with white scales; D: Stroma in vertical section (broken) showing a broadly attached base, a thick carbonaceous crust and a greyish white interior; E: Immature and mature asci, in Melzer's reagent; F: Two ascospores in ventral view showing a germ slit, in 1% SDS; G: Ascospore in side view showing bipolar appendages, in India ink; H, I: Ascospores showing apical apparatus, in Melzer's reagent; J: Ascospores in 1% SDS. Scale bars: A = 10 mm; B = 5 mm; C = 0.5 mm; D = 1 mm; E = 50 μ m; F, G = 10 μ m; H, I = 5 μ m; J = 20 μ m.

Boucher, mesophilic rainforest, on dead corticated log of *Mangifera indica* L. (Anacardiaceae), 31 Jul. 2016, *leg.* J. Fournier, MJF 16053 (LIP); Case-Pilote, Fond Bourlet, Prise d'eau, hygrophilic rainforest, on bark, associated with *Kretzschmaria cf. clavus*, 9 Dec. 2005, *leg.* C. Lechat, CLL 5628 (LIP); Case-Pilote, Savane Saint-Cyr, trail to Plateau Concorde, hygrophilic rainforest, on a dead corticated trunk, associated with *Xylaria berteroi*, 25 Aug. 2007, *leg.* C. Lechat, MJF 07098-2 (LIP); Le Morne-Rouge, La Propreté forest trail, hygrophilic rainforest, on moss-covered bark, 24 Aug. 2007, *leg.* C. Lechat, MJF 07056 (LIP); *ibid.*, dead corticated branch of Mahogany (*Swietenia macrophylla* King, *Meliaceae*), 6 Jun. 2014, *leg.* J. Fournier, MJF 14068 (LIP); *ibid.*, dead corticated trunk, 9 Aug. 2016, *leg.* J. Fournier, MJF 16182 (LIP); Saint-Joseph, Rivière Blanche, hygrophilic rainforest, on bark, 4 Sept. 2003, *leg.* C. Lécureu, CLL 0864 (LIP).

Known distribution: Likely pantropical: Known from Cuba (holotype), Guadeloupe (this paper), Hawaii (ROGERS & JU, 2012), Martinique (this paper), Mayotte (JF, unpublished data), Taiwan (JU & ROGERS, 1999).

Comments: *Xylaria alboareolata* is a distinctive species, characterized by dark grey, pulvinate, strongly carbonaceous stromata mottled with persistent white scales. Its large blackish brown ascospores with broadly rounded ends and bipolar secondary appendages are likewise typical. Under closer examination, the white superficial scales appear seated on a dense matrix of minute, persistent shiny black granules. Overmature stromata eventually turn dull black but the black granules remain and provide a good taxonomic marker after the white scales have vanished.

Xylaria tuberosides Rehm is usually stipitate and will therefore be described in part II, but it can occasionally feature sessile stromata somehow resembling those of *X. alboareolata*. It can be distinguished by an almost smooth surface just roughened by minute greyish scales and lacking black granulations, and smaller ascospores 25.8 × 6.8 µm in average, with narrowly rounded ends and lacking mucilaginous secondary appendages.

In our experience, *X. alboareolata* shows a marked preference for hygrophilic rainforest and frequently occurs on dead trunks or big branches.

Xylaria berteroi (Mont.) Cooke ex J.D. Rogers & Y.M. Ju, *North American Fungi*, 7(9): 18 (2012). Plate 3, Table 1.

Stromata solitary or scattered in small groups, erumpent becoming superficial, pulvinate to peltate, orbicular, deformed by mutual pressure when in contact, flat-topped to slightly convex, occasionally slightly concave, 1.2–8.5 mm diam × 1.5–2.6 mm thick, sessile, the base attached by a narrow cylindrical to laterally flattened, usually central connective; surface copper brown, greyish or blackish, without exposed perithecial contours, typically reticulately cracked but sometimes almost smooth; hard-textured, subsurface a carbonaceous crust 120–150 µm thick; interior white to cream-coloured, corky, solid. **Perithecia** obovoid to subglobose,

0.65–0.8 mm high × 0.5–0.6 mm diam. **Ostioles** conic-papillate to obtusely papillate, blackish, 80–120 µm diam at base, the base sometimes surrounded by a grey discoid halo.

Asci cylindrical, with (6–)8 slightly overlapping uniseriately arranged ascospores, the spore-bearing parts 78–90 × 8–9 µm, the stipes 120–155 µm long, with apical apparatus 1.1–1.6 × 2.3–2.8 µm (Me = 1.3 × 2.6 µm, N = 40), discoid-cuneate, strongly bluing in Lugol's solution, bluing more weakly in Melzer's reagent but showing a bipartite structure with an upper pulvillus bluing very faintly (not included in measurements). Paraphyses copious, hyphal, thin-walled, remotely septate, 4–5 µm wide at base, tapering to 1.5–2 µm wide above asci, embedded in mucilaginous material. **Ascospores** (9.8–)10.5–12.5(–13.3) × (5.7–)6–7.7(–7.8) µm, Q = (1.4–)1.5–1.9(–2.1), N = 300 (Me = 11.4 × 6.7 µm, Qe = 1.7), ellipsoid slightly inequilateral with broadly to narrowly rounded ends, unicellular, dark brown to blackish brown, with a blurred, longitudinal, straight, central germ slit less than spore length on the ventral side, lacking secondary appendages and mucilaginous sheath; epispore smooth.

Asexual morph on the natural substrate not seen. Cultures on OMA yielding stromata and conidiogenous cells of the asexual morph, according to CALLAN & ROGERS (1990) [as *Xylaria enteroleuca* (Speg.) P. Martin].

Specimens examined: FRENCH WEST INDIES: GUADELOUPE: Basse-Terre, Saint-Claude, Beausoleil, track to Plateau Dimba, hygrophilic rainforest, on a dead decorticated branch, 9 Sept. 2003, *leg.* C. Lechat, CLL 0986 (LIP). MARTINIQUE: Case-Pilote, Morne Rose, mesophilic rainforest, on a dead corticated branch, 1 Sept. 2010, *leg.* J. Fournier, MJF 10311 (LIP); *ibid.*, 14 Jun. 2015, MJF 15077 (LIP); *ibid.*, 14 Jun. 2015, MJF 15088 (LIP); Case-Pilote, Savane Saint-Cyr, track to Plateau Concorde, hygrophilic rainforest, on a dead corticated trunk, associated with *X. alboareolata*, 25 Aug. 2007, *leg.* C. Lechat, MJF 07098 (LIP); Fort-de-France, Colson forest, hygrophilic rainforest, on a dead corticated branch, 6 Sept. 2003, *leg.* C. Lechat, CLL 0934 (LIP); Fort-de-France, edge of the parking lot of Maison forestière de la Donis, hygrophilic rainforest, on a dead, hanging corticated branch of *Citrus* sp., 15 Jun. 2014, *leg.* J. Fournier, MJF 14171 (LIP); Fort-de-France, Pitons du Carbet forest, bottom of the trail of Fond Baron, hygrophilic rainforest, on recently dead corticated branch, 19 Jun. 2015, *leg.* J. Fournier, MJF 15175 (LIP; HAST 142966); Saint-Joseph, Rivière Blanche, hygrophilic rainforest, on a dead partly decorticated branch 1.5 cm diam, 4 Sept. 2003, *leg.* C. Lechat, CLL 0850 (LIP).

Known distribution: Likely pantropical: Known from Chile (holotype), French Guiana (JF, unpublished data), Guadeloupe (this paper), Hawaii (ROGERS & JU, 2012), Martinique (this paper), México (TAPIA *et al.*, 2017), Panamá (CARMONA *et al.*, 2009, as *X. enteroleuca*), South Africa (MARTIN, 1970), Taiwan (JU & ROGERS, 1999), Thailand (JF, unpublished data).

Comments: *Xylaria berteroi* is distinguished from other penzigoid species by the combination of pulvinate, strongly carbonaceous, multiperitheciate, sessile stromata attached to the substrate by a narrow connective, with conspicuous papillate ostioles and reticu-

Table 1 – Ascospore dimensions in five collections of *X. berteroi* from Guadeloupe and Martinique, showing a narrow range of intraspecific variations. Extreme values are in parentheses.

Collections numbers	Ascospore measurements	Q = quotient l/w N = number of measurements	Mean values
CLL 0986	(10.1–)10.6–12.3(–13) × (5.7–)6.2–6.9(–7.2) µm	Q = (1.5–)1.6–1.9(–2), N = 60	Me = 11.5 × 6.5 µm Qe = 1.8
MJF 07098	(10.6–)11–12.5(–13.3) × (6.3–)6.9–7.7(–7.8) µm	Q = (1.4–)1.5–1.8(–2), N = 60	Me = 11.7 × 7.3 µm Qe = 1.6
MJF 14171	(9.8–)10.5–11.7(–12.4) × (5.7–)6–6.8(–7.6) µm	Q = (1.5–)1.6–1.8(–2), N = 60	Me = 11 × 6.4 µm Qe = 1.7
MJF 15077	(9.8–)10.5–12.2(–13.2) × (5.8–)6.1–7(–7.2) µm	Q = (1.4–)1.6–1.9(–2), N = 60	Me = 11.4 × 6.6 µm Qe = 1.7
MJF 15175	(10–)10.8–12.2(–12.9) × (5.9–)6.1–6.9(–7.1) µm	Q = (1.5–)1.6–1.9(–2.1), N = 60	Me = 11.4 × 6.5 µm Qe = 1.8
Cumulated values	(9.8–)10.5–12.5(–13.3) × (5.7–)6–7.7(–7.8) µm	Q = (1.4–)1.5–1.9(–2.1), N = 300	Me = 11.4 × 6.7 µm Qe = 1.7

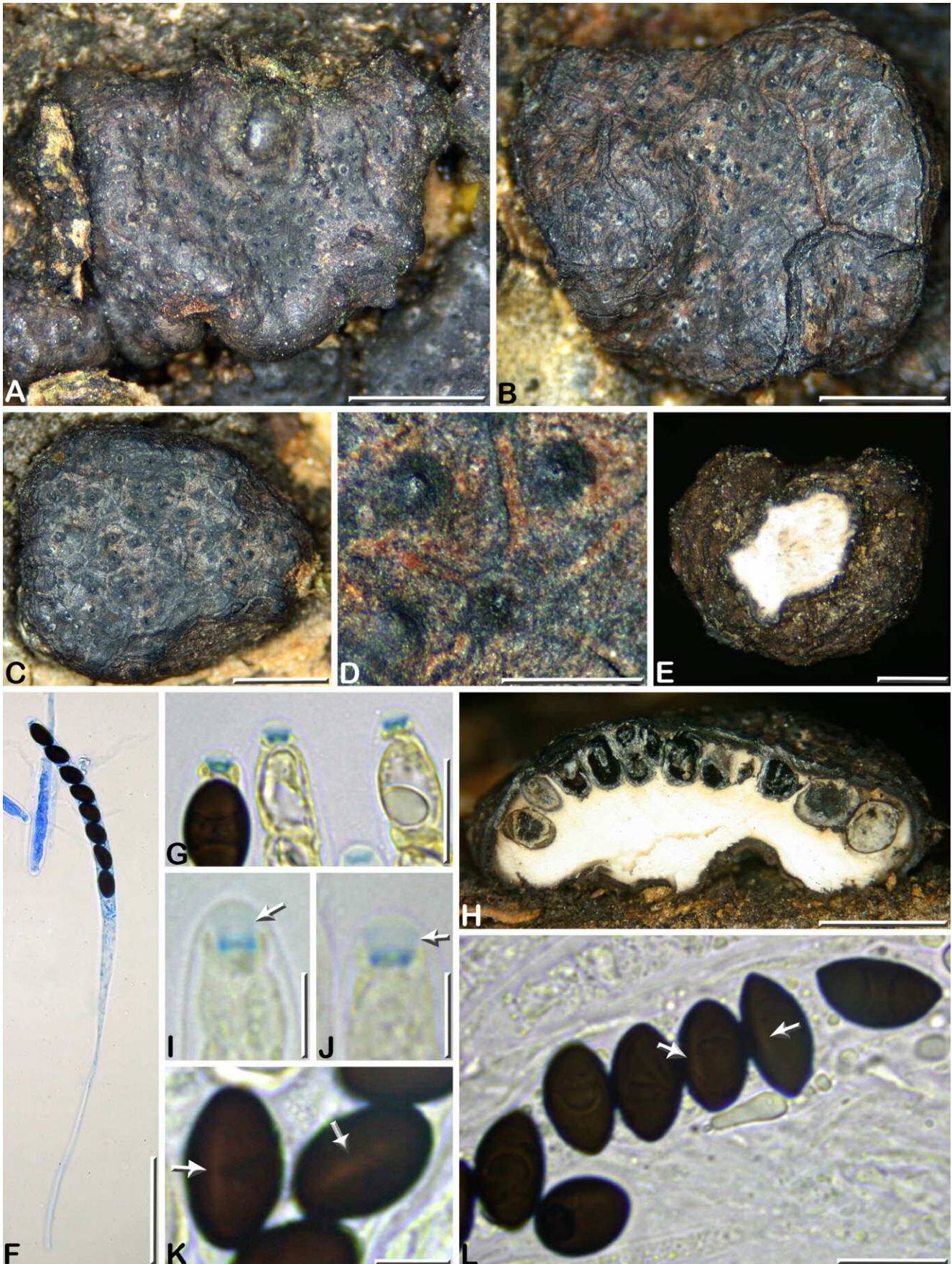


Plate 3 – *Xylaria berteroi*

A-D, F, H-L: MJF 15077; E, G: MJF 14171. A: Erumpent stromata in top view showing a slightly concave surface lacking superficial cracks; B, C: Stromata in top view showing a reticulately cracked surface and prominent papillate ostioles; D: Stroma surface in close-up showing papillate ostioles within a network of fine cracks; E: Reverse of a detached stroma showing a narrow central connective; F: Long-stipitate ascus, in blue Pelikan® ink diluted in 1% SDS; G: Ascus apical apparatus, in Lugol's solution; H: Stroma in vertical section showing a narrow connective at base, a thick carbonaceous crust and a white, solid interior; I, J: Ascus apical apparatus in Melzer's reagent appearing bipartite, with a faintly amyloid upper part (arrows); K: Two ascospores in ventral view showing a blurred germ slit, in 1% SDS (arrows); L: Ascospores narrowly to broadly ended, some showing a faint germ slit (arrows), in 1% SDS. Scale bars: A-C, H = 2 mm; D = 0.2 mm; E = 1 mm; F = 50 µm; G, L = 10 µm; I-K = 5 µm.

lately cracked brown to black surface, long stipitate asci with a small discoid-cuneate apical apparatus and weakly inequilateral blackish brown ascospores 10–12.5 × 6–7.7 µm with an obscure germ slit less than spore-length.

It may be mistaken for a small *Kretzschmaria* Fr., from which it can be distinguished by its stromata firmly attached to the substrate by a narrow connective, an internal tissue not disintegrating at maturity, a minute discoid apical apparatus and small, broadly ellipsoid ascospores. Its placement in the PO clade of *Xylaria* distant from that of *Kretzschmaria* was confirmed by molecular evidence based on material from Hawaii and Taiwan (HSIEH *et al.*, 2010).

The examination of material from various origins sharing a similar typical ascospore morphology shows a wide variation range in stromatal colour, degree of cracking on stromatal surface and ostiolar morphology. When taken separately, these characters appear too variable to be diagnostic, but their combination most often enables to distinguish *X. berteroi* from related penzigoid *Xylaria* spp.

Ascospores ends vary from narrowly to broadly rounded in the same collection but the proportion of ascospores with broadly rounded ends appears higher in the collections from Guadeloupe and Martinique than in those from French Guiana, Taiwan and Thailand that we examined. JU & ROGERS (1999) even described ascospores of material from Taiwan “with narrowly rounded to abruptly pinched ends”. Such variations can be expected from a widespread species and in absence of correlations between these variations and those of stromata, we follow ROGERS & JU (2012) in their wide concept, based on which they synonymized *X. enteroleuca* with *X. berteroi*.

CALLAN & ROGERS (1990) reported in a collection from Hawaii the presence of “a tiny cellular appendage on one end of immature spores”, a feature we did not observe in the material that we studied.

Xylaria boergesenii (Ferd. & Winge) P.F. Cannon, *Systema Ascomycetum*, 6 (1): 176 (1987). Plate 4, Table 2.

Stromata erumpent through the periderm, becoming superficial, scattered, solitary or in contact forming small irregular clusters on in short linear rows, subglobose to ellipsoid-pulvinate, 1–5-peritheciate, 1–1.6 mm diam × 0.7–1 mm thick, with barely exposed perithecial contours, sessile, on a broadly attached, slightly constricted base; surface dull black, obscurely roughened, bearing scattered bark particles and soft reddish brown outermost coating cracking into polygonal scales on upper part of stromata; hard-textured, subsurface a carbonaceous crust 60–80(–100) µm thick; interior white to greyish, fibrous, solid, poorly developed around the perithecia. **Perithecia** subglobose, 0.4–0.6 mm diam. **Ostioles** obtusely papillate, black, slightly shiny, often minutely porate.

Asci cylindrical, with (6–)8 slightly overlapping uniseriately arranged ascospores, the spore-bearing parts 148–168 × 9–11 µm, the stipes 40–60 µm long, with apical apparatus 3.8–5.4 × 2.8–3.4 µm (Me = 4.4 × 3.2 µm, N = 60), tubular with a marked upper rim, bluing in Melzer’s reagent. **Paraphyses** copious, hyphal, thin-walled, filiform, 1.5–2 µm wide, embedded in mucilaginous material. **Ascospores** (17.5–)18.3–23.9(–25.1) × (6.2–)6.4–7.9(–8.5) µm, Q = (2.4–)2.6–3.5(–3.7), N = 180 (Me = 20.8 × 7.2 µm, Qe = 2.9), ellipsoid-inequilateral with narrowly to broadly rounded ends, subballantoid, unicellular, dark brown, with a conspicuous spiralling germ slit almost spore-length originating from the ventral side, lacking secondary appendages and mucilaginous sheath; epispore smooth.

Asexual morph on the natural substrate not seen.

Specimens examined: FRENCH WEST INDIES: GUADELOUPE: Basse-Terre, Petit-Bourg, forest track of Jules, hygrophilic rainforest, on dead corticated branchlet 1.5 cm diam, 1 Sept. 2004, *leg.* C. Lechat, CLL 2239 (LIP); Basse-Terre, Sainte-Rose, Sofaia, path to Saut des Trois Cornes, hygrophilic rainforest, dead corticated branch, associated with *Hypoxylon cypraeisporum* J. Fourn. & Lechat, 3 Sept. 2005, *leg.* C. Lechat, CLL 5425-2 (LIP); *ibid.*, 3 Sept. 2005, *leg.* C. Lechat, CLL 5430 (LIP; HAST 142967).

Known distribution: Caribbean: Guadeloupe (this paper), US Virgin Islands (CANNON, 1987), México (SAN MARTÍN, 1992).

Comments: Our collections match well in all respects with the detailed description of *X. boergesenii* given by CANNON (1987), who transferred this taxon from the monotypic genus *Spirogramma* Ferd. & Winge to *Xylaria*. *Spirogramma* had been created to accommodate a xylariaceous fungus of unclear affinities, characterized by ascospores featuring a conspicuously spiral germ slit. CANNON (1987) showed that sigmoid to spiral germ slits exist in several distantly related xylariaceous genera and cannot serve as a discriminant character at genus level. This conclusion was largely followed and the placement of this fungus in *Xylaria* is still recognized as pertinent. *Xylaria* was shown to be paraphyletic (HSIEH *et al.*, 2010) and should undergo further splitting based on phylogenetic studies in the future. For the time being, the affinities of *X. boergesenii* with other members of *Xylaria sensu lato* remain unclear until molecular data become available.

Xylaria boergesenii is well defined by its small, few-peritheciate, weakly carbonaceous stromata and its subballantoid ascospores 20.8 × 7.2 µm in average with a long, spiral germ slit extending almost spore-length. Its small-sized and dull black stromata may account for only a few known records of this species, making its distribution difficult to assess. However, it is noticeable that *X. boergesenii* was collected thrice from Guadeloupe but not from Martinique, despite a much more extensive sampling in the latter island.

Table 2 – Ascospore and apical apparatus dimensions in three collections of *X. boergesenii* from Guadeloupe, showing the range of intraspecific variations, compared with data from CANNON (1987). Extreme values are in parentheses.

Collections numbers	Ascospore measurements	Q = quotient l/w N = number of measurements	Mean values	Ascal apical apparatus
CLL 2239	(19.4–)20.2–23.9(–25.1) × (6.2–)6.4–7.7(–8.1) µm	Q = (2.6–)2.8–3.5(–3.7), N = 60	Me = 21.8 × 7.1 µm Qe = 3.1	Me = 4.9 × 3.3 µm
CLL 5425-2	(17.5–)18.3–20.3(–21.4) × (6.5–)6.6–7.5(–8) µm	Q = (2.5–)2.51–3(–3.1), N = 60	Me = 19.3 × 7 µm Qe = 2.7	Me = 4.2 × 3.2 µm
CLL 5430	(19.5–)20.1–22.4(–23) × (6.5–)6.9–7.9(–8.5) µm	Q = (2.4–)2.6–3.1(–3.4), N = 60	Me = 21.3 × 7.4 µm Qe = 2.9	Me = 4.2 × 3.1 µm
Cumulated values	(17.5–)18.3–23.9(–25.1) × (6.2–)6.4–7.9(–8.5) µm	Q = (2.4–)2.6–3.5(–3.7), N = 180	Me = 20.8 × 7.2 µm Qe = 2.9	Me = 4.4 × 3.2 µm
CANNON (1987)	20–25 × 7–9 × 6–8 µm		Me = 22.5 × 7 µm Qe = 3.2	4 × 3 µm

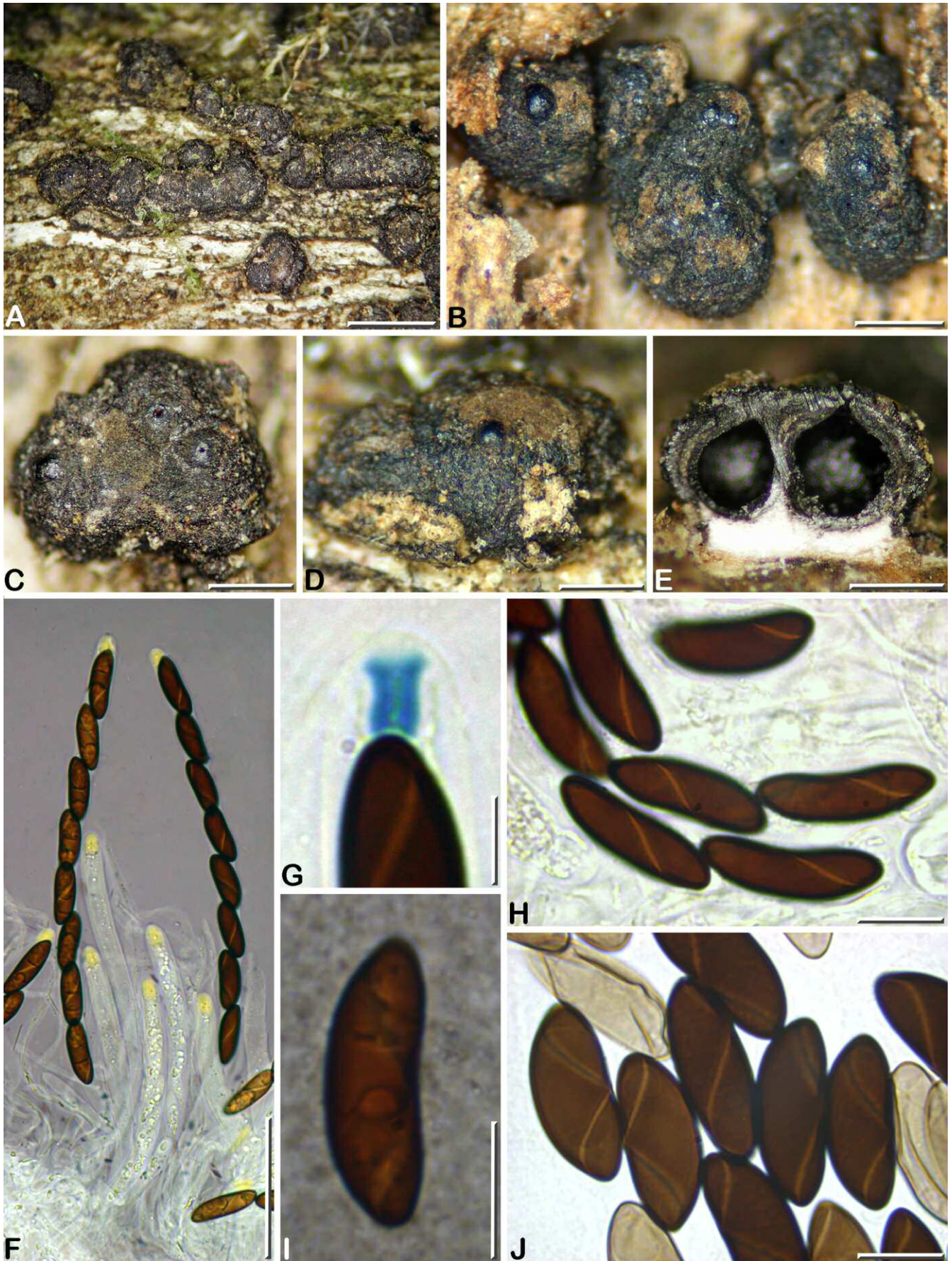


Plate 4 – *Xylaria boergeseni*

A, C-J: CLL 2239; B: CLL 5430. A: Habit of stromata on host surface; B: Stromata erumpent through a crack of bark, showing shiny black ostioles and brown scales on upper surface; C: Stroma in top view showing a roughened surface and papillate ostioles; D: Stroma in side view showing remnants of the lifted bark at base, a rounded ostiole and a brown coating; E: Stroma in vertical section showing a thin carbonaceous crust and a broadly attached base with white soft tissue; F: Immature and mature asci, in black Pelikan® ink; G: Ascilar apical apparatus in Melzer's reagent; H: Ascospores in 1% SDS; I: Ascospore in India ink, showing the absence of appendage or sheath; J: Ascospores (swollen) in PVA-lactophenol, showing fully spiralling germ slits on both sides. Scale bars: A = 2 mm; B-E = 0.5 mm; F = 50 µm; G = 5 µm; H-J = 10 µm.

As shown below, two new penzigoid species from French West Indies, *X. entomelaina* and *X. parvula*, feature ascospores with strongly sigmoid to spiral germ slits and share with *X. boergeseni* very small, few-peritheciate stromata with a brown outermost coating. They can be readily distinguished from each other based on ascospore dimensions and morphology but their morphological similarities and their Caribbean origin suggest some possible close relationship, on which molecular investigations will hopefully shed some light in the future.

Xylaria cantareirensis (Henn.) J. Fourn. & Lechat, *comb. nov.* – MycoBank MB 827198. Plates 5–6. Table 3.

Basionym: *Hypoxylon cantareirens* Henn., *Hedwigia*, 43: 207 (1904)

Original diagnosis: “*H. cantareirens* P. Henn. n. sp.; stromatibus orbiculare convexis, depressis, gregariis, interdum confluentibus, 2–6 mm diam., atrocarbonaceis, cinereo vel cretaceo pruinosis, ostiolis atris, papillatis, pertusis; peritheciis immersis, ovoideis ca. 1 mm diam.; ascis cylindraco-clavatis, obtusis, 8-sporis ca. 180 × 10–13 μ, paraphysibus hyalinis, filiformibus; sporis oblique monostichis, oblonge navicularibus, obtusis vel subacutiusculis, atris, 23–30 × 9–12 μ.

Serra da Cantareira: An abgestorbenen Baumstämmen. 1902. No. 767”.

Stromata scattered to densely gregarious, often in contact and coalescent, erumpent from bark through the periderm, more rarely seated on decorticated wood, subglobose to pulvinate, convex to flat-topped, 1–15-peritheciate, 1–1.8(–2.3) mm high × 1–3.6(–5.2) mm diam, sessile, on a narrow to broad central connective. Stro-

matal surface coated with a persistent, waxy, white to cream outer layer spreading either over the whole stroma or only present on top, gradually wearing off after maturity, revealing a dull black carbonaceous crust encrusted with small black, carbonaceous, superficial granules gradually showing through the white coating; perithecial contours unexposed; outer crust carbonaceous, 80–120 μm thick, black; interior white, solid, fibrous to spongy, turning yellowish with age, eventually disintegrating when overmature. **Perithecia** immersed, subglobose to laterally flattened by mutual pressure, 0.65–0.8 mm diam. **Ostioles** bluntly papillate, black, often inconspicuous but up to 150–170 μm diam on overmature stromata.

Asci cylindrical, with (6–)8 overlapping uniseriately arranged ascospores, the spore-bearing parts 137–185 × 11–13 μm, the stipes 45–78 μm long, with apical apparatus tubular with a sharp to obtuse upper rim, 3.6–6.2 × 2.3–4.1 μm (Me = 5.2 × 3.5 μm, N = 120), bluing in Melzer’s reagent. **Paraphyses** copious, hyphal, thin-walled, filiform, 6–10 μm wide at base, tapering to 1.5–2.5 μm wide above asci, embedded in mucilaginous material. **Ascospores** (18.2–)19.1–26.9(–29.9) × (6.7–)7.6–10.4(–11.3) μm, Q = (2–)2.2–3(–3.4), N = 360 (Me = 22.2 × 8.7 μm, Qe = 2.6), ellipsoid strongly inequilateral with narrowly rounded to subacute ends, at times beaked or slightly pinched, unicellular, dark brown to blackish brown, with a longitudinal, straight germ slit almost spore-length on the ventral side; lacking secondary appendages or mucilaginous sheath; epispore smooth.

Asexual morph present on immature stromata, consisting of synnemata arising mostly on sides. Synnemata 250–500 μm high, narrowly clavate, cream-coloured, the stipe turning blackish, with a slightly swollen villose head 80–170 μm diam, of intertwined hyaline thin-walled septate hyphae 2–4.5 μm diam. Conidiogenous cells palisadic, barely prominent at the periphery of fertile head, cylindrical,

Table 3 – Ascospore and apical apparatus dimensions in eight collections from Brazil, French Guiana, Guadeloupe and Martinique referable to *X. cantareirensis*, showing the range of intraspecific variations, compared with the type from Brazil and a collection from México. Extreme values are in parentheses.

Collections numbers	Ascospore measurements ; Q = quotient l/w N = number of measurements	Mean values	Apical apparatus
CLL 0863 Martinique	(21.2–)22.3–25.7(–26.2) × (7.6–)8.2–9.4(–9.7) μm Q = (2.4–)2.5–2.9(–3.1), N = 60	Me = 23.9 × 8.9 μm Qe = 2.7	5–5.8 × 3–4.1 μm Me = 5.3 × 3.5 μm
CLL 2212 Martinique	(18.7–)19.1–21.1(–22.9) × (7.3–)7.7–8.9(–9.3) μm Q = (2.1–)2.2–2.6(–3), N = 60	Me = 20.1 × 8.3 μm Qe = 2.4	5–5.5 × 3.5–4.1 μm Me = 5.2 × 3.7 μm
CLL 5437 Guadeloupe	(22–)23.7–26.9(–29.9) × (8.6–)8.9–10.4(–11.3) μm Q = (2.2–)2.3–3(–3.4), N = 60	Me = 25.3 × 9.7 μm Qe = 2.6	5.3–6.1 × 3.6–4.4 μm Me = 5.7 × 4 μm
CLL 8275 Martinique	(18.2–)19.6–22.3(–23.6) × (7–)7.8–9.4(–9.7) μm Q = (2–)2.2–2.8(–3.1), N = 60	Me = 20.9 × 8.5 μm Qe = 2.5	4.5–5.4 × 3.1–4 μm Me = 5 × 3.6 μm
MJF 10052 Martinique (with synnemata)	(18.5–)20.6–23.8(–25.3) × (7.3–)7.9–9(–9.6) μm Q = (2.2–)2.4–2.9(–3.1), N = 60	Me = 22 × 8.4 μm Qe = 2.6	3.6–4.9 × 2.3–3.3 μm Me = 4.2 × 2.9 μm
MJF 14028 Martinique	(18.5–)19.7–22.4(–23.6) × (6.7–)7.6–8.9(–10.3) μm Q = (2.1–)2.3–2.8(–3), N = 60	Me = 21 × 8.2 μm Qe = 2.6	5.7–6.2 × 3.2–3.8 μm Me = 5.9 × 3.5 μm
Cumulated values	(18.2–)19.1–26.9(–29.9) × (6.7–)7.6–10.4(–11.3) μm Q = (2–)2.2–3(–3.4), N = 360	Me = 22.2 × 8.7 μm Qe = 2.6	3.6–6.2 × 2.3–4.1 μm Me = 5.2 × 3.5 μm
CLL 7103 French Guiana (with synnemata)	(21.9–)23.4–27.1(–28.9) × (7.5–)8.3–9.7(–10.4) μm Q = (2.4–)2.5–3.1(–3.3), N = 60	Me = 25.1 × 8.9 μm Qe = 2.8	4.7–5.8 × 3.2–4 μm Me = 5.2 × 3.6 μm
CT 78.259 Brazil (with synnemata)	(25.1–)26.5–29.7(–30.6) × (8.9–)9.4–10.9(–11.7) μm Q = (2.4–)2.6–3(–3.2), N = 60	Me = 28.1 × 10.1 μm Qe = 2.8	5.8–6.7 × 3.7–4.5 μm Me = 6.2 × 4.1 μm
Hennings Brazil	23–30 × 9–12 μm	Me = 26.5 × 10.5 μm	nd
San Martín México	(20–)20.5–24.5 × 8–9.5(–10) μm	Me = 22.5 × 8.8 μm Qe = 2.6	nd
Large-spored collections	(21.2–)22.3–26.9(–29.9) × (7.6–)8.2–10.4(–11.3) μm Q = (2.2–)2.3–3(–3.4), N = 120	Me = 24.6 × 9.3 μm Qe = 2.6	5–6.1 × 3–4.4 μm Me = 5.5 × 3.8 μm
Small-spored collections	(18.2–)19.1–23.8(–25.3) × (6.7–)7.6–9.4(–10.3) μm Q = (2–)2.2–2.9(–3.1), N = 240	Me = 21 × 8.4 μm Qe = 2.5	3.6–6.2 × 2.3–4.1 μm Me = 5 × 3.4 μm

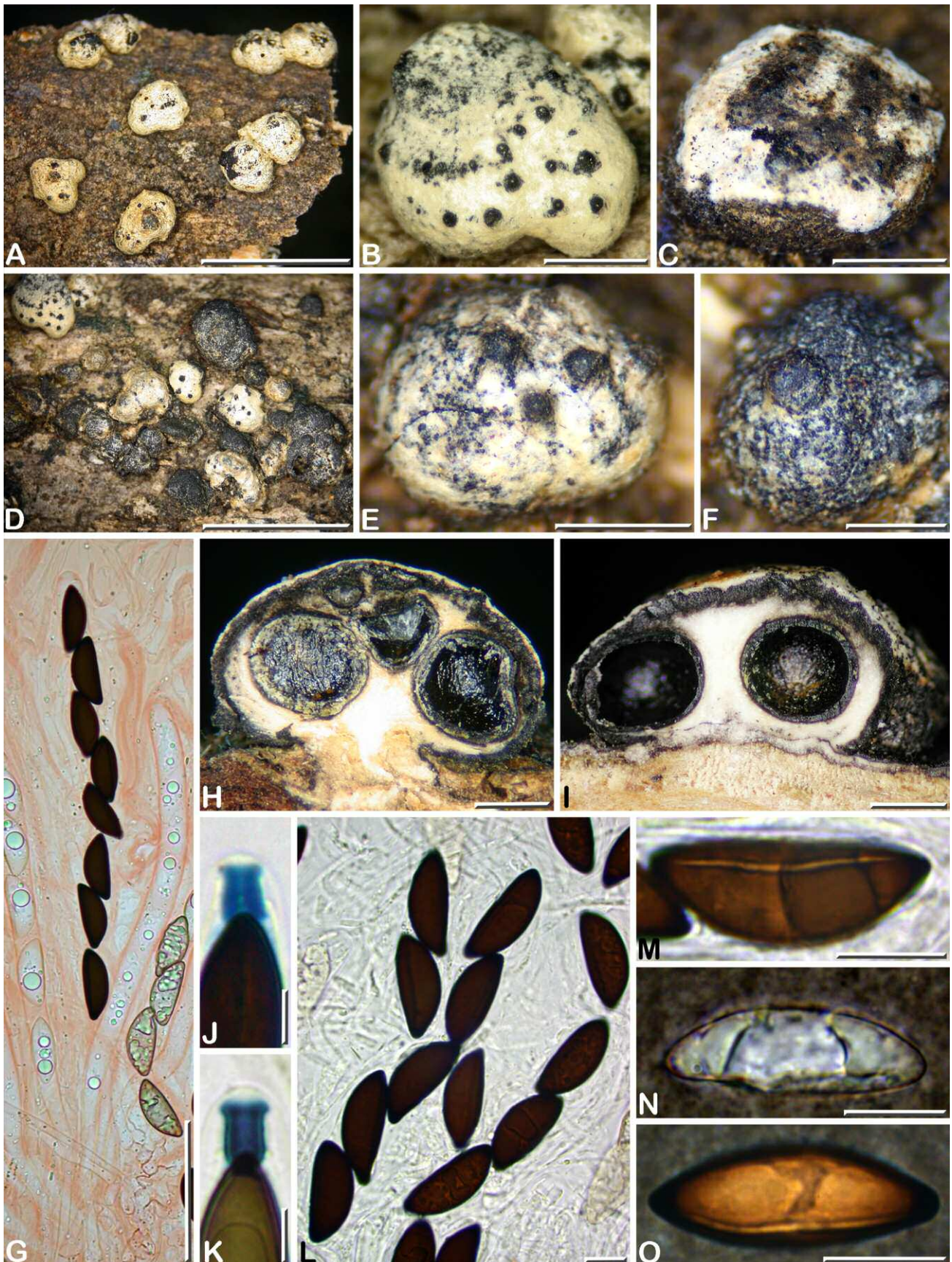


Plate 5 – *Xylaria cantareirensis* (large-spored)

A,B, D-H, J-O: CLL 5437; C, I: CLL 0863. A: Mature stromata on host surface; B, C, E: Mature stromata showing a white to cream coating and variously prominent ostioles; D: Mature stromata mixed with black overmature stromata; F: Overmature stroma in close-up showing a black granular surface and a wide and prominent ostiole; G: Mature and immature asci, in Congo red with 1% SDS; H, I: Stromata in vertical section showing a relatively thick black outer crust, a white soft interior and a sessile base; J, K: Tubular ascial apical apparati in Melzer's reagent; L: Ascospores in 1% SDS, some showing beaked or slightly pinched ends; M: Barely mature ascospore in latero-ventral view showing a long germ slit on the ventral side; N: Immature hyaline ascospore in side view showing the absence of appendage or slimy sheath, in India ink; O: Mature ascospore in India ink showing the absence of appendage or sheath and a long germ slit on the ventral side. Scale bars: A, D = 5 mm; B, C, E = 1 mm; F, H, I = 0.5 mm; G = 50 µm; J, K = 5 µm; L-O = 10 µm.

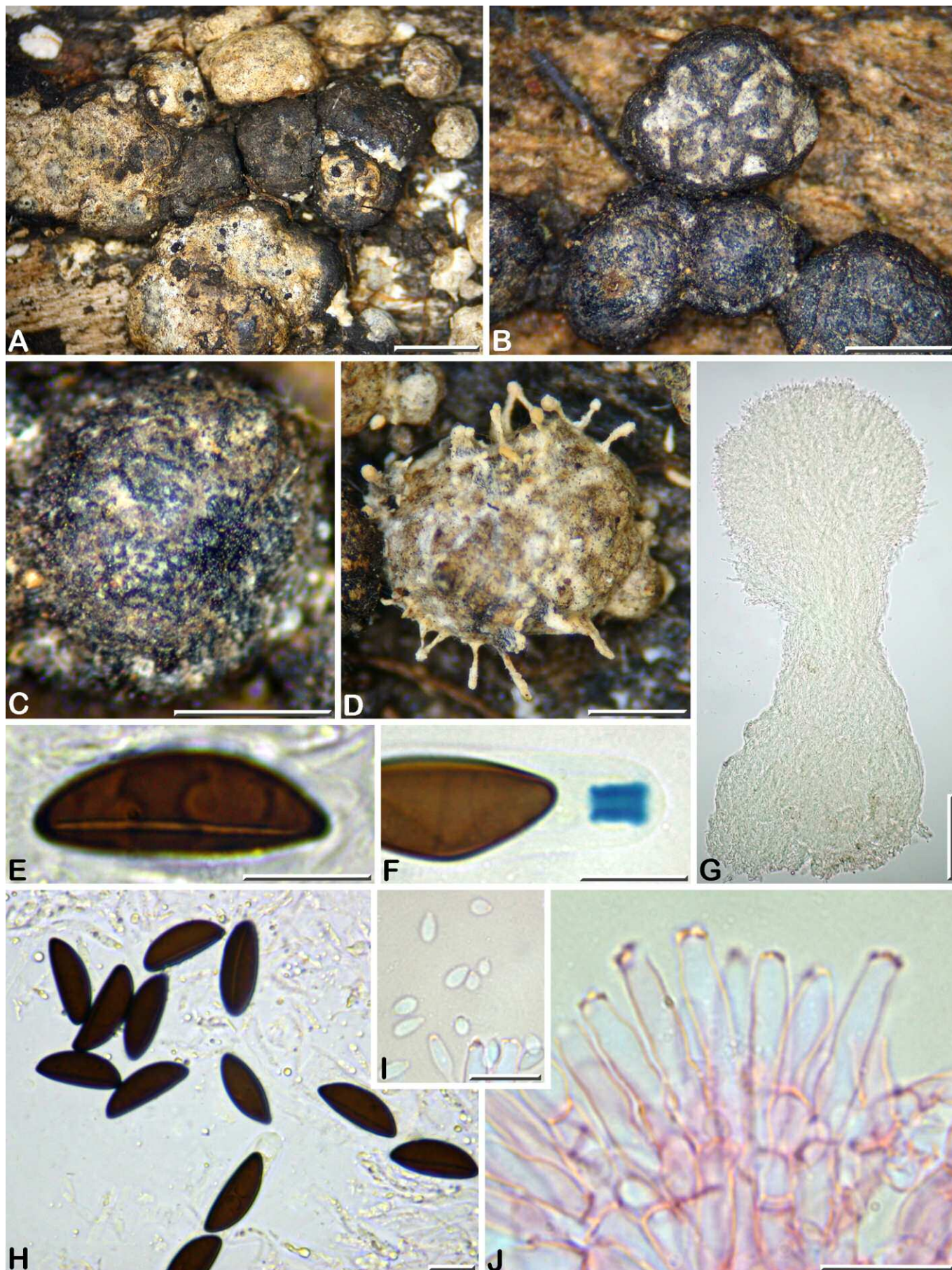


Plate 6 – *Xylaria cantareirensis* (small-spored)

A, D–J: MJF 10052; B, C: CLL 8275. A: Mature and immature stromata mixed with black overmature stromata; B: Mature stroma with white scales along with blackish overmature stromata; C: Overmature stroma in close-up showing a black granular surface and a barely papillate ostiole; D: Immature stroma bearing synnemata; E: Ascospore in latero-ventral view showing a germ slit, in 1% SDS; F: Ascus tip showing an apical apparatus, in Melzer’s reagent; G: Synnema in crush mount, in 3% KOH; H: Ascospores in 1% SDS; I: Conidia, in Congo red in 1% SDS; J: Palisadic conidiogenous cells, in Congo red in 1% SDS. Scale bars: A = 2 mm; B, D = 1 mm; C = 0.5 mm; E, F, H–J = 10 µm; G = 50 µm.

straight to sinuous, simple to furcate at base, $9\text{--}17 \times 2.7\text{--}3.6 \mu\text{m}$, bearing terminal denticulate conidial secession scars; conidia produced holoblastically in sympodial sequence, subglobose to narrowly ellipsoid, hyaline, smooth, $2.5\text{--}4.5 \times 2\text{--}2.3 \mu\text{m}$.

Specimens examined: BRAZIL: Roraima, estrada Boa Vista-Venezuela, 9 km after Boca de Mata, on corticated branchlet, 2 Dec. 1977, *leg.* C.T. Rogerson, as *Hypoxylon oodes*, C.T. 78.259 (NY). FRENCH GUIANA: Cayenne, Crique Macouria, hygrophilic rainforest, on a dead woody liana ca. 1 cm diam, 1 Mar. 2007, *leg.* C. Lechat, CLL 7103 (JF). FRENCH WEST INDIES: GUADELOUPE: on a dead corticated branch, Nov. 2005, *leg.* C. Lechat, CLL 5437 (LIP; HAST 142968). MARTINIQUE: Gros-Morne, Rivière Rouge, Pierre Denis, hygrophilic rainforest, on a dead corticated branch, 29 Aug. 2004, *leg.* C. Lechat, CLL 2212 (LIP); Le Lorrain, Rivière Pirogue, mesophilic rainforest, corticated branch, associated with *Stilbohypochnon quisquiliarum* (Mont.) J.D. Rogers & Y.-M. Ju, 4 Jun. 2014, *leg.* J. Fournier, MJF 14028 (LIP; HAST 142969); Le Prêcheur, Anse Couleuvre, coastal mesophilic forest, dead decorticated trunk of *Lonchocarpus roseus* D.C. (*Fabaceae*), 23 Aug. 2010, *leg.* J. Fournier & C. Lechat, MJF 10052 (LIP); Le Morne-Rouge, Circuit Sainte-Cécile, hygrophilic rainforest, on a dead corticated branch 2 cm diam, 22 Aug. 2008, *leg.* C. Lechat, CLL 8275 (LIP; HAST 142970); Saint-Joseph, Rivière Blanche, hygrophilic rainforest, on a dead corticated branch 1.5 cm diam, 4 Sept. 2003, *leg.* C. Lechat, CLL 0863 (LIP).

Known distribution: Brazil (HENNINGS, 1904; this paper), French Guiana and French West Indies (this paper), Hawaii (USA) (ROGERS & JU, 2012) and México (SAN MARTÍN, 1992).

Comments: The above collections are primarily characterized by pulvinate, sessile, carbonaceous stromata with a persistent white to cream-coloured coating and dark brown inequilateral ascospores $20\text{--}30 \times 7.5\text{--}10 \mu\text{m}$ with a straight germ slit almost spore-length. This set of characters matches well *Penzigia cantareirensis* (Henn.) J.H. Miller (Ju, pers. comm., 2005), a taxon so far only known from the type collection in Brazil (HENNINGS, 1904). However, subsequent samples from Martinique and examination of herbarium collections from Brazil and French Guiana showed that additional material has ascospores still in the size range as that given in the protologue of *P. cantareirensis* (as *Hypoxylon cantareirensis* Henn.), but ascospores of four collections from Martinique deviate in being smaller (small-spored), averaging $21 \times 8.4 \mu\text{m}$ vs. $24.6 \times 9.3 \mu\text{m}$ (large-spored) [Table 3]. A case could be made that the small-spored material represents a different taxon but a thorough examination of all available collections showed that ascospore size ranges overlap (Table 3), and that ascospore dimensions are not correlated with any other differential character. Moreover, morphological features like ostiolar morphology and density of superficial black granules on stromata appeared variable, irrespective of ascospore dimensions. The presence of synnemata of the asexual morph associated with immature stromata is a feature that could not be used as a differential character since it has been encountered both in two large-spored collections from Brazil and in a small-spored collection from Martinique (Table 3). Thus, in absence of unambiguous morphological characters to support the segregation of a small-spored variety, we prefer to lump all the material we studied under the same name, awaiting for a better insight based on a wider sampling. SAN MARTÍN (1992) reported from México two similar challenging small-spored collections referable to *P. cantareirensis* that he filed as *P. cf. cantareirensis*. His description strongly suggests that he was dealing with the same taxon as what we encountered in Guadeloupe and Martinique.

The collection CLL 5437 was included in a multigene phylogeny of *Xylaria sensu lato* as *Penzigia cantareirensis* by HSIEH *et al.* (2010), who showed its affinities with those species forming the HY clade comprising *X. hypoxylon*, the type species. As the genus name *Penzigia* was shown to be a later synonym of *Xylaria* (JU & ROGERS, 2001), and as the affinities of this fungus with *Xylaria* are supported by

molecular data and a typically palisadic geniculosporium-like asexual morph, we propose the new combination *X. cantareirensis* (Henn.) J. Fourn & Lechat to accommodate it.

Two *Xylaria* species, viz: *X. papillata* Syd. (DENNIS, 1958; 1961) and *X. papillatoides* (this paper) resemble *X. cantareirensis* in having small, carbonaceous stromata coated with a persistent white outer layer and strongly inequilateral brown to dark brown ascospores. Both differ from *X. cantareirensis* by the presence of a conspicuous central umbo on stromata and by slightly smaller ascospores respectively $15\text{--}20 \times 8\text{--}10 \mu\text{m}$ and $16\text{--}19 \times 6\text{--}8 \mu\text{m}$. While ascospores of *X. papillatoides* feature a straight germ slit like those of *X. cantareirensis* (this paper), those of *X. papillata* further differ by a sigmoid germ slit.

Xylaria conopeicola J. Fourn. & Lechat, *sp. nov.* – MycoBank MB 827199. Plates 7–8, Table 4.

Diagnosis: Differs from the *Xylaria* taxa resembling *X. atrosphaerica* by stromata bearing conspicuous greyish polygonal scales, inconspicuous ostioles and early colonization of small dying branches in the canopy.

Holotype: FRENCH WEST INDIES: MARTINIQUE: Le Morne-Rouge, La Propreté, forest trail, hygrophilic rainforest, on a recently fallen dead corticated branchlet of Mahogany (*Swietenia macrophylla* King, *Meliaceae*), 6 Jun. 2014, *leg.* J. Fournier, MJF 14079 (LIP; HAST 142971, Isotype).

Etymology: Meaning canopy-dweller, from Latin *conopeum* = mosquito net, veil, and by extension canopy, plus suffix *-cola* = dweller, for the habitat on upper branches in rainforest.

Stromata superficial, separate, rarely in contact, pulvinate to depressed-spherical, $1.3\text{--}3.4 \text{ mm diam} \times 1.3\text{--}2.4 \text{ mm thick}$, subglobose to slightly ellipsoid in top view, sessile, with a narrow to broad connective at the base; surface dark grey to dull black, without visible perithecial contours, roughened by irregular cracks and grey to ochraceous scales persistent at maturity but worn off in overmature stromata, occasionally bearing stiff black hairs $150\text{--}200 \mu\text{m}$ high; subsurface a carbonaceous crust $150\text{--}200 \mu\text{m}$ thick; interior white, greyish at base, fibrous, disintegrating with age. **Perithecia** subglobose, $0.5\text{--}0.7 \text{ mm diam}$. **Ostioles** barely papillate, black, inconspicuous.

Asci cylindrical, with 6–8 obliquely uniseriately arranged ascospores, often swollen in upper part with ascospores biseriately arranged beneath a tapered apex, the spore-bearing parts $(70\text{--})110\text{--}120 \mu\text{m long} \times 10\text{--}15\text{--}(18) \mu\text{m wide}$, the stipes $70\text{--}115 \mu\text{m long}$, with apical apparatus tubular to slightly urn-shaped, with an obtusely rounded upper rim, easily deformed under pressure, $4.5\text{--}6.4 \times 2.8\text{--}4 \mu\text{m}$ (Me = $5.3 \times 3.4 \mu\text{m}$, N = 100), bluing in Melzer's reagent. **Paraphyses** hyphal, sparsely guttulate, $2.5\text{--}3 \mu\text{m wide}$ at base, tapering to $1\text{--}1.5 \mu\text{m wide}$ above asci, embedded in mucilaginous material. **Ascospores** $(16.7\text{--})17.7\text{--}21.6\text{--}(23.4) \times (5.9\text{--})6.4\text{--}9.2\text{--}(10.2) \mu\text{m}$, Q = $(1.9\text{--})2.1\text{--}3\text{--}(3.2)$, N = 300 (Me = $19.4 \times 8 \mu\text{m}$, Qe = 2.4), ellipsoid slightly inequilateral with narrowly to broadly rounded ends, dark brown, with a conspicuous, diagonal, straight or slightly sigmoid germ slit $12\text{--}14\text{--}(17) \mu\text{m long}$ on the less convex side, rarely on the more convex side; no sheath or appendages detected in India ink; epispore smooth.

Asexual morph on the natural substrate not seen.

Known distribution: Guadeloupe, Martinique.

Other specimens examined (paratypes): FRENCH WEST INDIES: GUADELOUPE: Basse-Terre, Petit-Bourg, La Mamelle, hygrophilic rainforest, on a dead corticated twig, 13 Aug. 2011, *leg.* C. Lechat, CLL-GUAD 11032 (LIP). MARTINIQUE: Fort-de-France, Absalon, track to Plateau Michel, hygrophilic rainforest, ca. 350 m, on a recently fallen corticated branchlet of Mahogany (*Swietenia macrophylla* King, *Meli-*



Plate 7 – *Xylaria conopeicola*

A: MJF 07293; B-E, G: MJF 14079 (Holotype); F: MJF 14051; H: MJF 14046; I-K: CLLGUAD 11032. A: Habit of scattered stromata on host surface; B: Two adjacent stromata in top view showing superficial greyish scales; C: Three adjacent somewhat overmature stromata in top view, lacking most of superficial scales; D: Stroma in side view showing greyish scales on upper half; E: Stromatal surface in close-up showing ochraceous scales and inconspicuous ostioles (arrows); F: Stroma in side view, showing thick ochraceous scales; G: Stroma in vertical section showing perithecia beneath a thick carbonaceous crust, a broadly attached base and fibrous basal tissue; H: Ostiole in close-up; I: Two adjacent stromata in side view; J: Stromatal surface in close-up showing two papillate ostioles (arrows); K: Stroma in vertical section (broken) showing a carbonaceous outer crust and poorly developed white internal tissue. Scale bars: A = 5 mm; B, C = 2 mm; D, F, G, I = 1 mm; E, H, J = 0.2 mm; K = 0.5 mm.

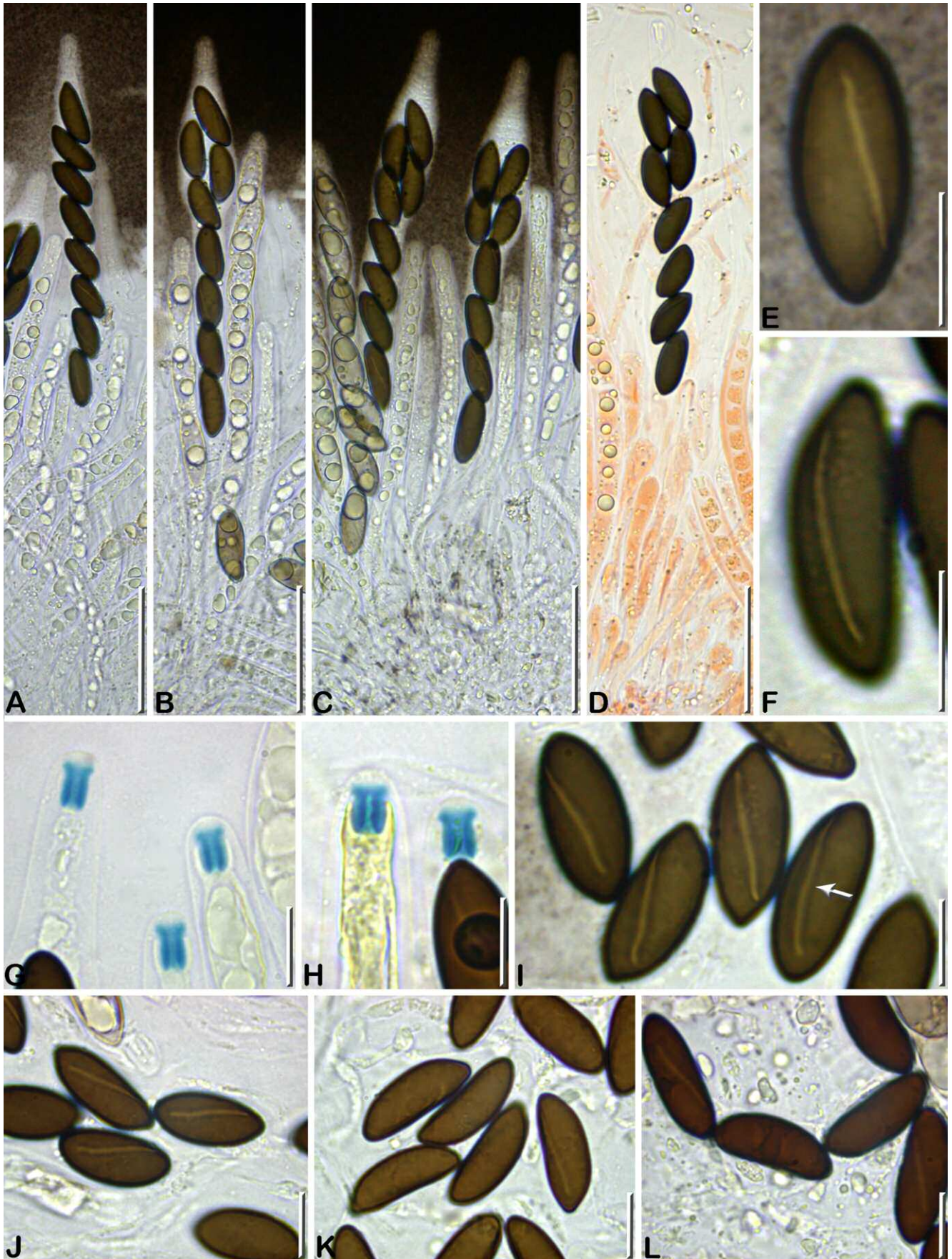


Plate 8 – *Xylaria conopeicola* and *X. atosphaerica*

A-D: MJF 16173; E-G, I, J: MJF 14079 (holotype); H: MJF 14046; K: CLLGUAD 11032; L: *X. atosphaerica* Ju 92052313. A-C: Mature and immature asci with uni- to partly biserially arranged ascospores, in India ink (note the tapered apex of mature asci and the mucilaginous hamathecium); D: Mature ascus with biserially arranged upper ascospores and some paraphyses, in Congo red and 3% KOH; E: Ascospore in India ink showing no trace of appendage or mucilaginous sheath; F: Ascospore in latero-dorsal view showing a germ slit; G, H: Ascus apical apparatus of immature and mature asci, in Melzer's reagent; I: Three ascospores in ventral view showing obliquely oriented germ slits, one in dorsal view showing an unusually placed germ slit (arrow), in diluted India ink; J-L: Ascospores of three different specimens, in 1% SDS, some showing a germ slit. Scale bars: A-D = 50 μ m; E-L = 10 μ m.

Table 4 – Ascospore dimensions in five collections of *X. conopeicola* from Guadeloupe and Martinique, showing the range of intraspecific variations, compared with those of *X. atrophaerica* available in literature and from a specimen from Taiwan. Extreme values are in parentheses.

Collections numbers	Ascospore measurements	Q = quotient l/w N = number of measurements	Mean values
MJF 07293	(17.9–)18.8–21.1(–22.9) × (6.7–)7.7–8.7(–10.1) μm	Q = (1.9–)2.3–2.7(–2.9), N = 60	Me = 20 × 8.2 μm Qe = 2.4
CLL GUAD 11032	(17.6–)18.3–20(–21.6) × (5.9–)6.4–7.3(–7.5) μm	Q = (2.5–)2.6–3(–3.2), N = 60	Me = 19.1 × 6.9 μm Qe = 2.8
MJF 14046	(16.7–)17.7–20(–20.7) × (7.2–)7.8–8.6(–9.1) μm	Q = (2–)2.1–2.5(–2.7), N = 60	Me = 18.7 × 8.2 μm Qe = 2.3
MJF 14079 (holotype)	(17.5–)18.2–20.5(–21.2) × (7–)7.3–8.4(–8.5) μm	Q = (2.1–)2.2–2.7(–2.9), N = 60	Me = 19.1 × 7.9 μm Qe = 2.4
MJF 16173	(18–)19–21.6(–23.4) × (7.6–)8–9.2(–10.2) μm	Q = (2.1–)2.2–2.6(–2.8), N = 60	Me = 20.3 × 8.6 μm Qe = 2.4
Cumulated values	(16.7–)17.7–21.6(–23.4) × (5.9–)6.4–9.2(–10.2) μm	Q = (1.9–)2.1–3(–3.2), N = 300	Me = 19.4 × 8 μm Qe = 2.4
Holotype of <i>X. atrophaerica</i> from Australia	20.4 [21.9–23.3] 24.8 × 7.1 [7.6–8.1] 8.7 μm	Q = 2.4 [2.7–3] 3.3, N = 10	Me = 22.6 × 7.9 μm Qe = 2.9
<i>X. cf. atrophaerica</i> from Sulawesi	17.6–22 × 7.3–9 μm		Me = 19.8 × 8.2 μm Qe = 2.4
<i>X. atrophaerica</i> from French Guiana	(17–)18–20(–21) × 6–7 μm		Me = 19 × 6.5 μm Qe = 2.9
<i>X. atrophaerica</i> from Taiwan Ju 92052313	(18.7–)19.1–21.5(–23.5) × (6.6–) 6.9–7.8(–8.4) μm	Q = (2.4–) 2.6–3 (–3.3), N = 60	Me = 20.3 × 7.3 μm Qe = 2.8

aceae), 15 Jun. 2014, *leg.* J. Fournier, MJF 14046 (LIP); *ibid.*, same host and ecology, 15 Jun. 2014, *leg.* J. Fournier, MJF 14051 (LIP); Le Morne-Rouge, La Propreté, forest trail, hygrophilic rainforest, on recently fallen dead corticated branchlet of Mahogany (*Swietenia macrophylla* King, *Meliaceae*), 24 Aug. 2007, *leg.* J. Fournier, MJF 07086 (LIP); *ibid.*, same host and ecology, 29 Aug. 2007, *leg.* C. Lécure, MJF 07293 (LIP); *ibid.*, same host and ecology, 9 Aug. 2016, *leg.* J. Fournier, MJF 16173 (LIP); *ibid.*, same host and ecology, 9 Aug. 2016, *leg.* J. Fournier, MJF 16176 (LIP); Marigot, Habitation Denel, Perou forest, 350–400 m, hygrophilic rainforest, on recently fallen dead corticated branchlet of Mahogany (*Swietenia macrophylla* King, *Meliaceae*), 7 Jun. 2014, *leg.* J. Fournier, MJF 14084 (LIP); Schoelcher, Plateau Boucher, forest trail of Rivière Blanche, hygrophilic rainforest, on recently fallen dead corticated branchlet of Mahogany (*Swietenia macrophylla* King, *Meliaceae*), 15 Jun. 2014, *leg.* J. Fournier, MJF 14163 (LIP).

***Xylaria atrophaerica*:** TAIWAN: I-lan Co., Yuan-shan, Fu-shan, on bark of *Machilus thunbergii*, 23 May 2003, Ju Y.-M. & Hsieh H.-M. 92052313 (HAST).

Comments: Among penzigoid species of *Xylaria* featuring small black subglobose stromata not over 4 mm diam, those with ascospores 18–20 × 6–7 μm with a diagonal germ slit less than spore length are usually referred to as *X. atrophaerica* (Cooke & Massee) Callan & J.D. Rogers (CALLAN & ROGERS, 1990; ROGERS *et al.*, 1987). The original description of *X. atrophaerica* (as *Hypoxyton atrophaericum*) by COOKE & MASSEE (1894), collected in Australia (Queensland), reads: “Stroma erumpent-superficial, subglobose, 2 mm diam., separate, rarely connate, gregarious, black, externally papillate, perithecia peripheral, in one series, ovate, mamillate, asci cylindrical, sporidia fusiform, straight or curved, unequal-sided, rather acute at the ends, narrow, clear brown, 22 × 6 μm (rarely 8 μm)”. This fairly vague description gave rise to different interpretations for material from various origins having in common ascospores similar in shape, dimensions and germ slit morphology. ROGERS *et al.* (1987) described a collection from Indonesia (North Sulawesi) they referred to *Penzigia cf. atrophaericum* (Cooke & Massee) J.H. Miller with reservations because they stated that the “type material is so depauperate that we did not seek ascospores”. Their description deviates from the material illustrated above by

soft-textured stromata with a smooth, finely cracked surface and papillate ostioles. A collection from French Guiana was described and cultured by CALLAN & ROGERS (1990), primarily deviating from the material we collected by faintly moriform stromata with a narrow connective ca. 1 mm × 1 mm and a finely cracked surface. A collection reported from Taiwan and cultured by JU & ROGERS (1999) was shown to differ in culture from the Guianese collection by the lack of yellow pigmentation in colonies and smaller conidia. Material of *X. atrophaerica* from Taiwan, kindly sent by Dr. Ju, proved different from ours by slightly exposed perithecial contours and the presence of conspicuous papillate ostioles on a raised-discooid base 0.2–0.25 mm diam. As stated by ROGERS *et al.* (1987), the type material is not in good condition, making the concept of *X. atrophaerica* ill-defined and the name appears to have been applied to collections featuring fairly different stromatal morphology. Upon a recent revision of the type material by Dr. Ju, a few ascospores in good condition could be measured (*pers. comm.*, 2018) and these data are included in Table 4.

Xylaria atroglobosa H.X. Ma, Lar. N. Vassiljeva & Yu Li (MA *et al.*, 2012) was said to bear resemblance with *X. atrophaerica* and thus was likewise compared with our collections. Its larger stromata 3–6 × 6–12 mm, and its larger ascospores (24–)24.5–27(–29) × 7.5–9 μm clearly set it apart from our material. The conspicuous secondary appendage at one end described by MA *et al.* (2012) could have been a further differential character but it turned out to be merely an oily droplet attached to an ascospore end, not an appendage (Ju, *pers. comm.*, 2018).

As the collections from Guadeloupe and Martinique illustrated above differ from those reported in the literature as *X. atrophaerica* by stromata with conspicuous grey to ochraceous scales, inconspicuous ostioles and a peculiar ecology suggesting an aerial lifestyle in the canopy and a strong host-preference for Mahogany branchlets, the new name *X. conopeicola* is proposed to accommodate them.

The eight collections from Martinique were made in Mahogany plantations, on dead, recently fallen branchlets showing a thick orange brown pith typical of the small branches of this tree. *Xylaria conopeicola* is not uncommon on such fallen branches but fertile stromata in good condition only occur on undecayed branches re-

cently fallen from the canopy. It is noteworthy that stromata found on decayed branches having stayed on the litter are always depauperate and that developing stromata do not occur in these conditions. This strongly suggests an aerial and likely endophytic lifestyle for this fungus which can be seen as an early colonizer of dying branches before they fall onto the ground, an ecology most unusual in the genus *Xylaria*.

As shown on Plate 7, figs. I–K, the collection from Guadeloupe is slightly deviating from the four collections from Martinique. Its stromata are scattered on a corticated twig of an undetermined tree that is clearly not Mahogany; they feature more conspicuously papillate ostioles, their surface is roughened but lack thick scales, the carbonaceous crust is less than 100 µm thick and the internal soft whitish tissue is much less developed; moreover, its ascospores are slightly narrower (Plate 8, fig. K; Table 4). For the time being, we prefer to include it in our concept of *X. conopeicola* but further collections might show it represents a different species.

Xylaria entomelaina J. Fourn. & Lechat, *sp. nov.* – MycoBank MB 827200. Plate 9.

Diagnosis: Differs from other small species of penzigoid *Xylaria* 1–1.5 mm diam by the combination of thick tan scales on top of stroma, a carbonaceous crust 60–80 µm thick, black soft tissue between the perithecia and at base, papillate ostioles on a raised-discoid base and blackish brown, strongly inequilateral ascospores averaging 24.5 × 10.6 µm with pinched ends and a strongly sigmoid, slightly spiralling germ slit less than spore-length.

Holotype: FRENCH WEST INDIES: MARTINIQUE: Case-Pilote, Fond Boucher, xero- to mesophilic forest, on a decorticated branch on the ground, 17 Aug. 2013, *leg.* C. Lechat, MJF 13288 (LIP; HAST 142972, Isotype).

Etyymology: From Greek ἐντος = inside and μέλας = black, for the black soft internal stromatal tissue.

Immature stromata 0.6–0.8 mm diam, entirely tan, coarsely warted, not associated with an asexual morph. **Mature stromata** densely gregarious, superficial, 1(–4)-peritheciate, 0.8–1.5 mm diam × 0.9–1.4 mm thick, subglobose, sessile or with obconical base centrally attached to the substrate, slightly convex at apex. Stromatal surface coarsely cracked and warted, black, with a tan outermost layer forming large scales on top around the ostioles, persistent at maturity, vanishing with age; wall carbonaceous, 60–80 µm thick; interior blackish, soft, solid, encasing the perithecia, white at the very base. **Perithecia** subglobose 0.5–0.6 mm diam. **Ostioles** rounded-papillate to raised-discoid, 0.2–0.25 mm diam at base, black.

Asci cylindrical, with (4–6)–8 slightly overlapping uniseriately arranged ascospores, the spore-bearing parts 155–180 µm long × 11.5–14.5 µm wide, the stipes 54–68(–90) µm long, with apical apparatus cylindrical with a sharp subapical rim, 6.3–7.7 × 5–6 µm (Me = 6.9 × 5.5 µm, N = 25), strongly bluing in Melzer's reagent. **Paraphyses** copious, hyphal, thin-walled, remotely septate, 8–10 µm wide at base, tapering to 1.5–2 µm wide above asci, sparsely guttulate, embedded in mucilaginous material. **Ascospores** (22.1–) 22.7–26.2(–27.7) × (9.5–)9.8–11.2(–12.1) µm, Q = (2–)2.1–2.6(–2.7), N = 60 (Me = 24.5 × 10.6 µm, Qe = 2.3), ellipsoid-inequilateral with narrowly rounded to acute, often pinched ends, dark brown, unicellular, lacking appendages or mucilaginous sheath, with a conspicuous sigmoid, slightly spiralling germ slit on the flattened side, slightly less than spore-length; episore smooth.

Known distribution: Martinique, known only from the type collection.

Comments: *Xylaria entomelaina* is a minute penzigoid species characterized by mostly uniperitheciate stromata up to 1.5 mm

diam with a thin coarsely warted carbonaceous crust overlain by a tan cracked layer on top, obtusely papillate ostioles on a raised-discoid base, a blackish interior and large ascospores with acute to pinched ends and a spiralling germ slit. This combination of characters is distinctive and does not fit a known taxon.

Stilbohypoxylon quisquiliarum (Mont.) J.D. Rogers & Y.-M. Ju has to be considered for its small subglobose, subsessile stromata and its ellipsoid-inequilateral ascospores with a sigmoid slightly spiralling germ slit. Unlike *X. entomelaina*, its stromata have long-persistent vivid yellow superficial scales and their interior is cream to light brown; furthermore it differs by significantly larger ascospores 27.5–28.5 × 13–13.5 µm (PETRINI, 2004). According to HSIEH *et al.* (2010), *S. quisquiliarum* is nested in the PO clade of *Xylaria* and thus could have been included in this survey as it occurs in FWI.

Xylaria boergesenii (CANNON, 1987; this paper) is similar to *X. entomelaina* in having small stromata with a tan superficial layer, a thin carbonaceous crust and ascospores with a spiralling germ slit but it can be distinguished by a white internal tissue and smaller ascospores 20.8 × 7.2 µm in average with more broadly rounded ends and a more strongly spiralling germ slit.

Xylaria parvula (this paper) likewise features stromata less than 1 mm diam with a tan superficial layer and ascospores with a strongly sigmoid germ slit. It differs from *X. entomelaina* in having a thick leathery crust, a white internal tissue and smaller ascospores 15.9 × 7.1 µm in average, subreniform with broadly rounded ends and surrounded with a thin mucilaginous sheath. Assessing in the future the phylogenetic affinities of *X. entomelaina* with other morphologically similar penzigoid species and with *S. quisquiliarum* might be of interest.

Xylaria flabelliformis (Schwein.) Berk. & M.A. Curtis, *Journal of the Linnean Society, Botany*, 10: 381 (1869). Plate 10.

Stromata superficial, not in contact, depressed-spherical, 12–17 mm diam × 6–7 mm thick, sessile, the base umbilicate with a narrow central connective surrounded by revolute margins; surface copper brown to brownish black, without exposed perithecial contours, smooth, just roughened by the ostioles, coated with a thin, minutely cracked reddish brown pellicle; hard-textured, subsurface a carbonaceous crust 150–250 µm thick; interior white, corky, solid to hollow in places. **Perithecia** subglobose 0.5–0.6 mm diam to laterally flattened 0.7–0.85 mm high × 0.35–0.45 mm diam. **Ostioles** conic-papillate to obtusely papillate, black, 80–120 µm diam at base.

Asci cylindrical, with 8 slightly overlapping uniseriately arranged ascospores, the spore-bearing parts 68–78 × 5.5–6.5 µm, the stipes longer than the spore-bearing parts, fragile, not measured, with apical apparatus 1.3–1.8 × 1.5–1.9 µm (Me = 1.6 × 1.8 µm, N = 20), short cylindrical to slightly trapezoid, bluing in Melzer's reagent. **Paraphyses** copious, hyphal, thin-walled, 1–2 µm wide, embedded in mucilaginous material. **Ascospores** (7.4–)8.7–9.7(–10.3) × (4.3–) 4.6–5.4(–5.6) µm, Q = (1.6–)1.7–2(–2.1), N = 60 (Me = 9.3 × 5.1 µm, Qe = 1.8), ellipsoid strongly inequilateral with broadly rounded ends, unicellular, dark brown, with an inconspicuous, longitudinal, straight, narrow, central germ slit 2–2.5 µm long on the ventral side, lacking secondary appendages and mucilaginous sheath; episore smooth.

Asexual morph on the natural substrate not seen, referred to xylocremium-like by ROGERS (1984).

Specimen examined: FRENCH WEST INDIES: GUADELOUPE: Basse-Terre, Saint-Claude, slopes of Nez Cassé mountain, ca. 1000 m, hygrophilic rainforest, on unknown substrate, likely a twig, 26 Oct. 1993, *leg.* J. Vivant, communicated by F. Candoussau, FC 5376 (LIP).

Known distribution: Worldwide (Ju *et al.*, 2016).

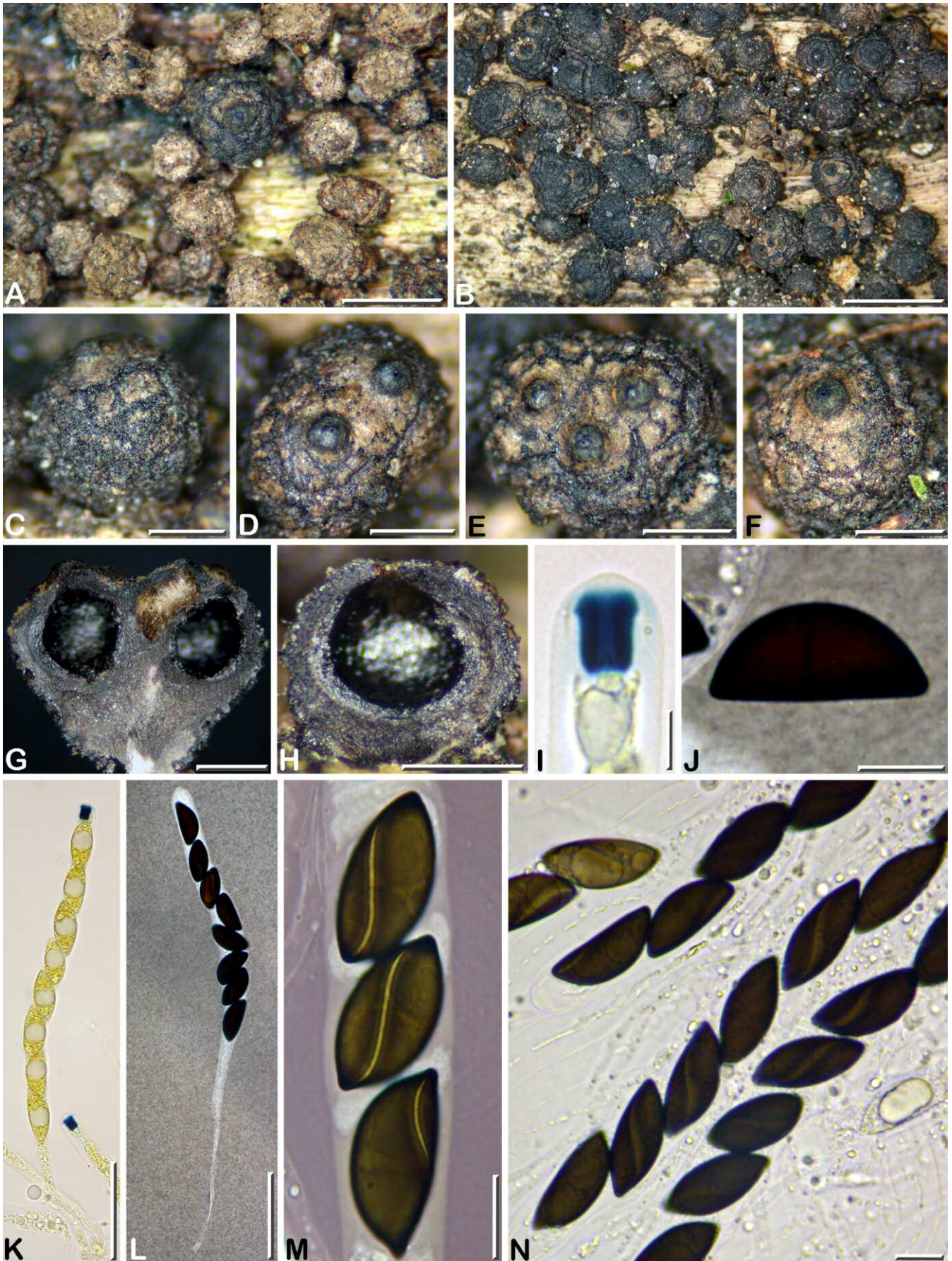


Plate 9 – *Xylaria entomelaina*

MJF 13288 (Holotype). A: Mature black stroma amongst crowded immature stromata with tan surface; B: Crowded mature stromata; C: Uniperitheciate stroma in side view showing a warted surface and apical scales; D-F: Stromata in top view showing a cracked tan coating and raised-discoid ostioles; G, H: Stromata in vertical section showing a thin carbonaceous outer crust and blackish tissue around and beneath the perithecia; I: Ascus apical apparatus, in Melzer's reagent; J: Ascospore in side view, in diluted India ink; K: Immature ascus, in Melzer's reagent; L: Mature ascus, in diluted India ink; M: Ascospores (swollen) in side and ventral view showing a germ slit and pinched ends, in black Pelikan® ink; N: Ascospores in 1% SDS, some showing a germ slit. Scale bars: A = 1 mm; B = 2 mm; C-H = 0.5 mm; I = 5 µm; J, N = 10 µm; K, L = 50 µm.

Comments: This *Xylaria* is first confusing, as it cannot be equated to a known penzigoid species. However, its strongly carbonaceous stromata with a smooth copper brown surface roughened by papillate ostioles and its small dark brown ascospores with broadly rounded ends and with an inconspicuous straight germ slit clearly remember the key features of the recently resurrected *X. flabelliformis* (Ju *et al.*, 2016), of which this collection appears to be a stunted, sessile form. After revision of *X. fusca* C.G. Lloyd and *X. laevis* C.G. Lloyd, Ju *et al.* (2016) clarified the status of the species formerly

confused with *X. cubensis*. The epithet *cubensis* is now retained for species with upright stromata having short-fusoid, equilateral ascospores $7-9.5 \times 4-4.5 \mu\text{m}$ with narrowly rounded to acute ends and a conspicuous straight germ slit spore-length; *X. laevis* is a synonym of *X. cubensis*, a species of subtropical to tropical distribution. *Xylaria flabelliformis* is the oldest name for externally similar species with inequilateral ascospores with broadly rounded ends and an inconspicuous germ slit, that has been well documented by ROGERS (1984), as *X. cubensis*. Unlike *X. cubensis*, *X. flabelliformis* has a tropical

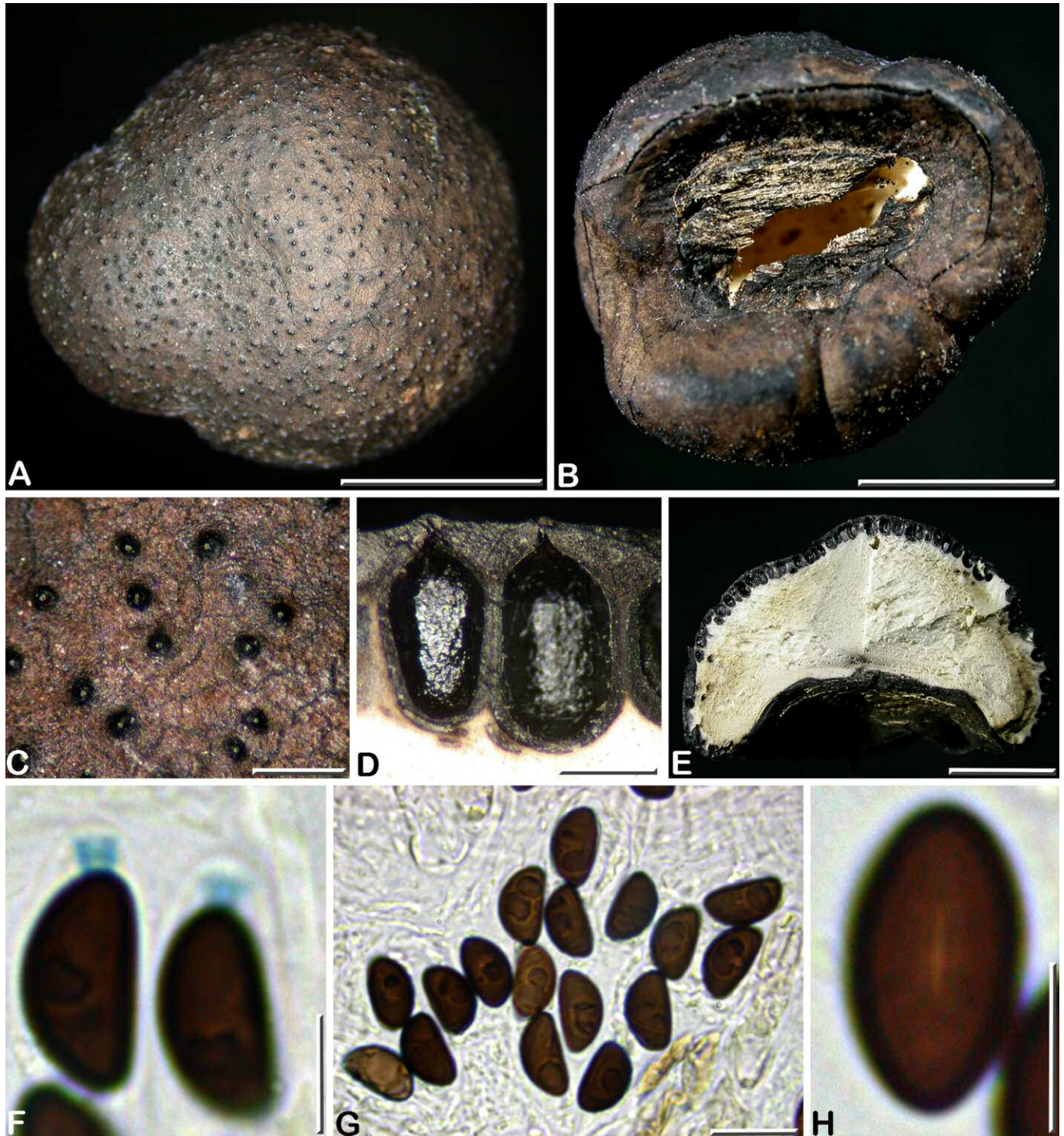


Plate 10 – *Xylaria flabelliformis*

FC 5376. A: Pulvinate stroma in top view; B: Reverse of the previous stroma, showing revolute margins around an umbilicate zone of attachment bearing remnants of wood fibres and a hollow interior; C: Stromatal surface in close-up showing black papillate ostioles within a network of minute cracks; D: Stroma in vertical section showing two perithecia immersed under a thick carbonaceous crust; E: Stroma in vertical section showing revolute margins and white solid interior beneath the perithecial layer; F: Ascospores in Melzer's reagent; G: Mature and barely mature ascospores in side view, in 1% SDS; H: Ascospore in ventral view showing a narrow, short germ slit, in heated chloral-lactophenol. Scale bars: A, B, E = 5 mm; C = 0.5 mm; D = 0.2 mm; F, H = 5 μm ; G = 10 μm .

but also a temperate distribution (Ju *et al.*, 2016; FOURNIER, 2014, as *X. cubensis*).

The ascospores of this penzigoid specimen slightly differ from those recorded from eleven typical upright stromata of *X. flabelliformis* (coming paper part II) in being relatively wider, viz. 8.7–9.7 × 4.6–5.4 µm (Qe = 1.8) vs. 7.8–10.2 × 3.4–4.7 µm (Qe = 2.2). As they stand in the size range accepted for this species (ROGERS, 1984; VAN DER GUCHT, 1995) and also feature a same inconspicuous short germ slit that can be detected better only after having cleared out the ascospore contents in heated chloral-lactophenol or PVA-lactophenol, which appears to be highly diagnostic of *X. flabelliformis*, our identification to this species appears justified. The unusually high elevation at which this fungus was collected (1000 m), involving more humidity and lower temperatures, may have accounted for the deviating morphology of stromata and ascospores.

JU & ROGERS (1999) reported the occurrence of a hypoxylid form of *X. cubensis* from Taiwan, with “stromata discoid and not constricted at base”, much like what we described above. SAN MARTÍN (1992) likewise recorded penzigoid forms of *X. cubensis* (= *X. flabelliformis*) from México, with cultural characteristics conforming to those of typical *X. flabelliformis*.

DUSS (1903) reported from Guadeloupe the new species *Hypoxylon dussianum* Pat., which was excluded from *Hypoxylon* and assigned to a penzigoid *Xylaria* sp. by JU & ROGERS (1996). We have not examined this material but judging from the protologue of *H. dussianum* attached below, it appears that it is likely a sessile form of *X. flabelliformis* in almost all respects identical with the collection that we described above, the main difference being the smaller perithecia recorded by PATOILLARD (in DUSS, 1903) in the protologue attached and translated below. Dr. Ju revised the type collection of *H. dussianum* and recorded larger perithecia 0.4–0.5 mm diam (pers. comm., 2018), more in agreement with those of *X. flabelliformis* and thus supporting the supposed synonymy.

Hypoxylon dussianum Pat. – in *Énumération méthodique des champignons recueillis à la Guadeloupe et à la Martinique*: 74 (1903)
« Globuleux, sessile, épars ou groupé, brun noir, ponctué par les ostioles à peine saillants, fragile, blanc en dedans. Périthèces immergés, dispersés sur toute la périphérie, noirs, ovoïdes-arrondis 1/4 de millim. de diam., spores noires, ovoïdes, inéquilatérales, petites (8–10 × 5–6 µm). Sur le tronc d'un *Tournefortia volubilis*. – Camp Jacob (Guadeloupe). (511).

Espèce analogue à *H. areolatum* B. et C., mais à spores petites. Strome de 6–10 millim. lisse entre les ostioles (ni tessellé ni aréolé); écorce carbonacée fragile, trame interne molle, blanche, rayonnante. Pourrait être placé dans le genre *Penzigia*, mais il s'en éloigne par la couleur noire de la surface. »

Translation: Globose, sessile, scattered or clustered, brownish black, punctate with barely papillate ostioles, fragile, interior white. Perithecia immersed, spreading over the whole surface, black, ovoid to rounded, 0.25 mm diam, ascospores black, ovoid, inequilateral, small (8–10 × 5–6 µm). On the trunk of *Tournefortia volubilis*. – Camp Jacob (Guadeloupe). (511).

Species similar to *H. areolatum* B. & C. but with small spores. Stroma 6–10 mm, smooth between the ostioles (neither tessellate nor areolate); crust carbonaceous, fragile, internal tissue soft, white, radiating. Might be placed in *Penzigia*, from which it deviates by its black surface.

Xylaria frustulosa (Berk. & M.A. Curtis) Cooke, *Grevillea*, 12 (61): 5 (1883). Plate 11.

Immature sterile stromata first hemispherical to pulvinate, 0.6–1.3 mm diam, with a cinnamon powdery coating, turning pulvinate, 1.5–2.6 mm diam, surface greyish with cinnamon tones. **Mature stromata** superficial on wood, eruptent through bark, pulvinate,

flat-topped to slightly convex on wood, more convex on bark, irregularly orbicular, 0.9–2.9 mm diam, 0.5–0.8 mm thick on wood, to 1.3 mm thick on bark, separate to most often coalescent into irregular groups, subsessile, attached to the wood by a wide central connective; surface black with a brownish tone, smooth to wrinkled, with barely exposed to strongly exposed perithecial contours, consisting of a thin leathery crust 15–20 µm thick continuous with a thin black layer obliquely penetrating the underlying wood at base; interior white to cream-coloured, soft, solid. **Perithecia** ovoid to subglobose, 0.2–0.3 mm high × 0.2–0.25 mm diam. **Ostioles** obtusely papillate to hemispherical, conspicuous, black, ca. 80 µm diam at base.

Asci cylindrical, slightly fusiform or clavate, with eight slightly overlapping uniseriately arranged ascospores, the spore-bearing parts 36–40 × 4–4.5 µm, the stipes 15–28 µm long, with apical apparatus 0.5–0.7 × 0.9–1.2 µm (Me = 0.6 × 1.1 µm, N = 20), discoid, faintly bluing in Melzer's reagent. **Paraphyses** copious, hyphal, thin-walled, remotely septate, diverticulate, branched, 4–4.5 µm wide at base, tapering to 1.5–2 µm wide above asci, embedded in mucilaginous material. **Ascospores** (4.8–)5.1–5.9(–6) × (1.8–)2.2–2.6 (–2.8) µm, Q = (2–)2.1–2.5(–3.1), N = 60 (Me = 5.5 × 2.4 µm, Qe = 2.3), ellipsoid-equilateral to suboblong, with broadly rounded ends, unicellular, pale olivaceous brown, without visible germ slit, lacking secondary appendages and mucilaginous sheath; epispore smooth.

Asexual morph on the natural substrate not seen. Cultures on PDYA yielding palisadic conidiogenous cells of the asexual morph and fertile stromata, according to JONG & ROGERS (1970) [as *Penzigia frustulosa* (Berk. & Curtis) J.H. Miller]. VAN DER GUCHT (1996) reported loosely palisadic conidiogenesis on cushion-like conidiogenous structures from a culture on OMA.

Specimens examined: FRENCH WEST INDIES: GUADELOUPE: Basse-Terre, Petit-Bourg, Bois Sergent, mesophilic rainforest, on a dead corticated trunk, 23 Nov 2006, leg. C. Lechat, CLL 6002–2 (LIP, HST 142973). MARTINIQUE: La Trinité (Caravelle peninsula), Tartane, Pointe Rouge, coastal meso- to xerophilic forest, on dead decorticated blackened wood, 21 Aug. 2007, leg. J. Fournier, MJF 07010 (LIP); *ibid.*, 31 Aug. 2007, leg. J. Fournier, MJF 07227 (LIP); *ibid.*, on bark, 29 Aug. 2010, leg. J. Fournier, MJF 10234 (LIP); La Trinité, (Caravelle peninsula), Balata, xerophilic coastal forest, on bark, 11 Aug. 2013, leg. C. Lechat, MJF 13123 (LIP); Le Prêchur, Anse Couleuvre, coastal mesophilic rainforest, on rotten wood, 13 Aug. 2007, leg. C. Lechat, CLL 7227 (LIP); Sainte-Marie, La Philippe, coastal mesophilic rainforest, on dead decorticated wood, 21 Aug. 2013, leg. J. Fournier, MJF 13355 (LIP).

Known distribution: Likely pantropical: Known from Cuba (holotype), Guadeloupe (this paper), Martinique (this paper), Mayotte (JF, unpublished data), Papua New Guinea (VAN DER GUCHT, 1995), Taiwan (JU & ROGERS, 1999), Thailand (JF, unpublished data), USA (MILLER, 1961; JONG & ROGERS, 1970) and Venezuela (DENNIS, 1970).

Comments: Stromata of *X. frustulosa* do not clearly evoke those commonly encountered in *Xylaria* in being flattened to pulvinate and often coalescent into larger hypoxylid compound stromata. Its minute, pale brown ascospores apparently lacking a germ slit are likewise atypical, which accounts for its former placement, according to the synonyms listed by MycoBank, in various xylariaceous genera such as *Hypoxylon* (*H. frustulosum* Berk. & M.A. Curtis), *Nummularia* [*N. frustulosa* (Berk. & M.A. Curtis) Sacc.], *Penzigia* [*P. frustulosa* (Berk. & M.A. Curtis) L.W. Mill.] and *Kretzschmaria* [*K. frustulosa* (Berk. & M.A. Curtis) P.M.D. Martin]. Its more recent placement in the hypocrealean genus *Sarawakus* C.G. Lloyd [as *S. frustulosus* (Berk. & M.A. Curtis) Lar.N. Vassiljeva] (VASILJEVA, 1998) is undoubtedly the most fanciful but reflects well the deceiving morphology of this species when it is superficially examined. However, it can be recognized as a member of *Xylariaceae* by its pigmented ascospores produced in unitunicate asci provided with an amyloid apical apparatus

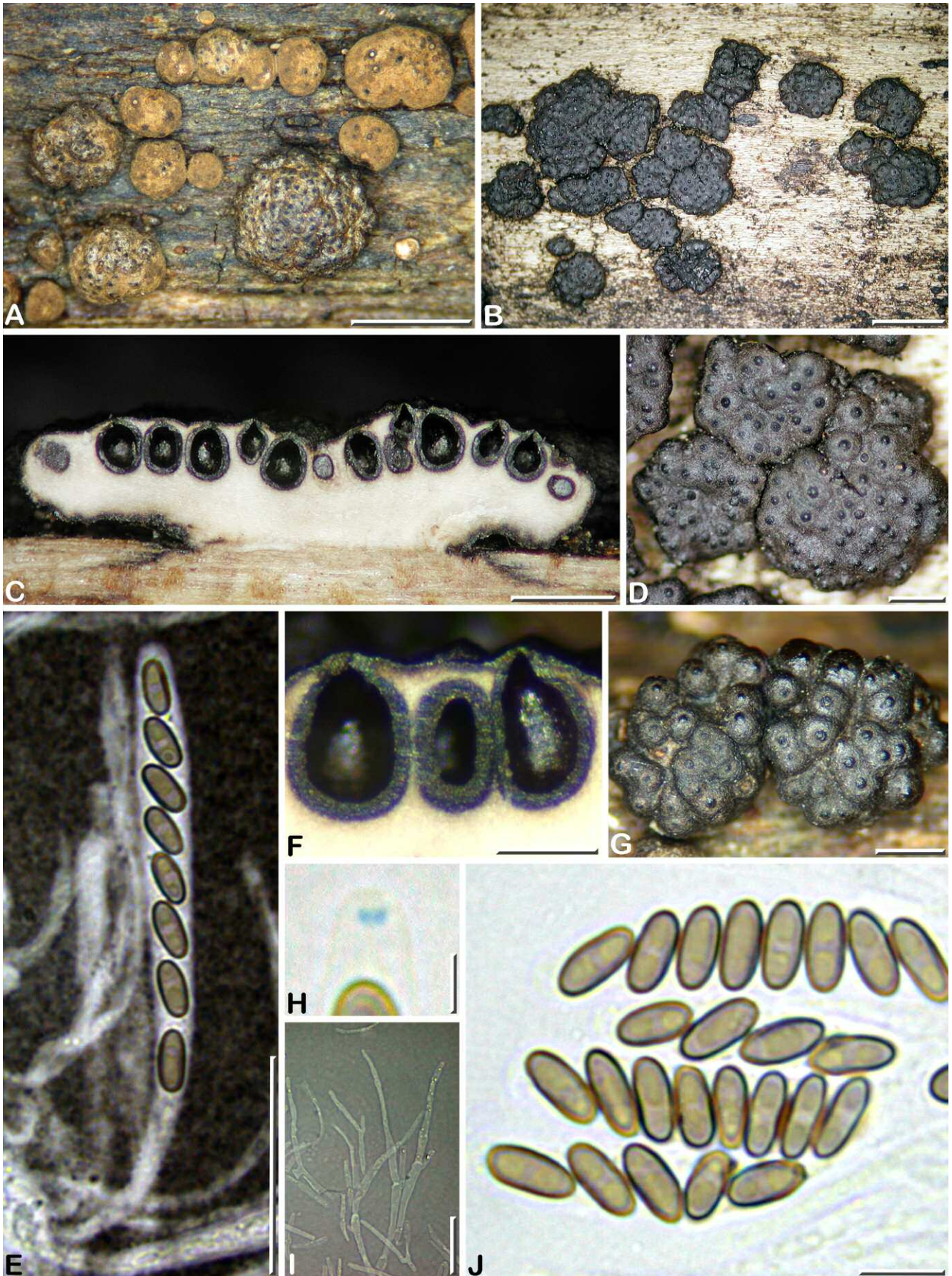


Plate 11 – *Xylaria frustulosa*

A, G: MJF 07010; B-F, H-J: MJF 07227. A: Immature stromata and primordia on blackened wood; B: Habit of coalescent mature stromata on host surface; C: Stroma in vertical section showing a central connective, perithecia and white soft interior (note the black line penetrating the underlying wood); D: Stromata in top view showing slightly exposed perithecial contours and coarsely papillate ostioles; E: Ascus and paraphyses, in India ink; F: Vertical section of upper part of a stroma in close-up showing a very thin black crust above the perithecia; G: Two adjacent stromata in top view showing strongly exposed perithecial contours; H: Ascular apical apparatus, in Melzer's reagent; I: Branched paraphyses, in black Pelikan® ink; J: Ascospores in 1% SDS. Scale bars: A, B = 2 mm; C, D, G = 0.5 mm; E, I = 20 µm; F = 0.2 mm; H = 2 µm; J = 5 µm.

and its stromata featuring a solid white interior and being attached to the substrate by a central connective, which does not markedly differ from most of penzigoid species of *Xylaria*. The affinities of the present species with *Xylaria* were demonstrated by JONG & ROGERS (1970) who obtained in culture an asexual morph with palisadic conidiogenous cells typical of *Xylaria*. The phylogenetic study of *Xylaria sensu lato* by HSIEH *et al.* (2010) confirmed this result, showing two collections of *X. frustulosa* from Guadeloupe and Taiwan being identical and placed in the PO clade, on a sister branch to *X. feejeensis* (Berk.) Fr.

Xylaria frustulosa is a widespread species but its sexual morph as found in nature was only documented by VAN DER GUCHT (1995), who described a short straight germ slit on ascospores, a feature we were not able to unambiguously detect, even after mounting ascospores in PVA-lactophenol in order to clear out the ascospore content. It is interesting to note that we share her observations on a strong preference of *X. frustulosa* for coastal, rather dry forests.

Xylaria globosa (Spreng.) Mont., *Annales des Sciences Naturelles, Botanique, sér. IV*, 3: 103 (1855). Plates 12–13. Table 5.

≡ *Sphaeria globosa* Spreng., *K. svenska Vetensk-Akad. Handl., ser. 3*, 41: 50 (1820).

Stromata gregarious in small or large groups, superficial, usually simple, highly variable in shape, ranging from subglobose to clavate, ellipsoid, turbinate or fusiform, subsessile on a narrow central connective to long-stipitate, the fertile head 3–15(–22) mm high × (1.8–) 3–14(–18) mm diam, the stipe 1–10(–35) mm high × 1–2 mm diam; surface blackish brown to dull black, coarsely cracked into prominent warts, appearing nodulose due to deep wrinkles and furrows, with perithecial contours lacking to slightly exposed; the stipes with black hairs or tomentum at base; subsurface leathery to slightly carbonaceous, 80–100 µm thick; immature stromata cylindrical, upright, 1–3 mm high, covered at fresh state by bright orange exudation droplets forming a thin orange pellicle upon drying, turning dark grey on top, not yielding an asexual morph; interior solid, woody, white to cream, typically with orange to salmon colour in the stipe. **Perithecia** subglobose 0.6–0.9 mm diam. **Ostioles** barely papillate, on a discoid, flattened to convex base 180–280 µm diam, black, occasionally overlain with white substance.

Asci cylindrical to slightly clavate, with (4–6–)8 overlapping uniseriately arranged ascospores, the spore-bearing parts 130–152 × 11–13.5 µm, the stipes 85–180 µm long, with apical apparatus cylindrical to slightly urn-shaped, apically flattened with a faint obtuse rim, 6.9–10.3 × 4.4–5.5 µm (Me = 8.4 × 5 µm, N = 60), strongly bluing in Melzer's reagent. **Paraphyses** copious, hyphal, thin-walled, 6–9 µm wide at base, tapering to 2 µm wide above asci, sparsely guttulate, embedded in scanty mucilaginous material. **Ascospores** (20.6–)21.2–30.2(–31.4) × (6.3–)6.7–9.3(–10) µm, Q = (2.4–)2.6–4(–4.5), N = 600 (Me = 25 × 7.9 µm, Qe = 3.2), fusiform-inequilateral to navicular in side view, frequently ventrally concave, with narrowly rounded, at times slightly pinched ends, medium to dark brown, unicellular, with a conspicuous, oblique to diagonal, slightly sigmoid germ slit on the flattened side, much less than spore-length, lacking appendages or mucilaginous sheath; epispore smooth.

Asexual morph on the natural substrate consisting of sterile primordial stromata covered with orange exudation droplets. Cultural characteristics on OMA including occurrence of sterile stromata similar to those observed on natural substrate were reported by ROGERS *et al.* (1988).

Known distribution: Pantropical.

Specimens examined: FRENCH WEST INDIES: GUADELOUPE: Basse-Terre, Capesterre-Belle-Eau, third Carbet waterfall, hygrophilic rainforest, on dead decorticated wood, 23 Nov. 2006, *leg.* C. Lechat, CLL 6033 (LIP; HAST 142974); Basse-Terre, Petit-Bourg, Carrère, in the private

garden of Félix Lurel, on a dead corticated branch, Nov. 2005, *leg.* C. Lechat, CLL 5403 (LIP) (primordia only); Basse-Terre, Petit-Bourg, Natural Park of Guadeloupe, Maison de la Forêt, hygrophilic rainforest, on dead decorticated wood, 24 Nov. 2006, *leg.* C. Lechat, CLL 6053 (LIP); Basse-Terre, Sainte-Rose, Sofaïa, hygrophilic rainforest, on bark, 1 Sept. 2005, *leg.* R. Courtecuisse, CLL 5300 (LIP); Basse-Terre, Saint-Claude, Matouba, Victor Hugues track, hygrophilic rainforest, on dead wood, 12 Aug. 2011, *leg.* C. Lechat, CLLGUAD 11019 (LIP); Basse-Terre, Vieux-Fort, Ravine Blondeau, hygrophilic rainforest, on dead wood, 22 Nov. 2006, *leg.* C. Lechat, CLL 6024 (LIP). MARTINIQUE: Case-Pilote, Crête Jean-Louis, hygrophilic rainforest, on dead wood, associated with *X. peltiformis*, 4 Sept. 2003, *leg.* C. Lechat, CLL 0794 (LIP); *ibid.*, on dead wood, 21 Aug. 2005, *leg.* C. Lechat, CLL 5092; *ibid.*, on dead wood, 21 Aug. 2005, *leg.* C. Lechat, CLL 5096; Case-Pilote, Morne Bois-Laroche, mesophilic rainforest, on dead wood, 22 Aug. 2005, *leg.* C. Lécure, CLL 5134 (LIP; HAST 142975); Case-Pilote, Plateau Concorde, hygrophilic rainforest, 600–650 m, on dead wood, 27 Aug. 2010, *leg.* J. Fournier, MJF 10167 (LIP); Fonds-Saint-Denis, Morne Gaubert, mesophilic rainforest, on dead wood, 16 Aug. 2011, *leg.* C. Lechat, CLLMAR 11003 (LIP); Fort-de-France, Absalon, track to Plateau Michel, hygrophilic rainforest, 400–500 m, on dead wood, 15 Aug. 2013, *leg.* J. Fournier, MJF 13227 (LIP); Fort-de-France, Fontaine Didier, hygrophilic rainforest, on a dead trunk, 19 Aug. 2013, *leg.* J. Fournier, MJF 13315 (LIP); Fort-de-France, forest track of Fond Baron, hygrophilic rainforest, on bark, 14 Jun. 2014, *leg.* J. Fournier & C. Lechat, MJF 14158 (LIP; HAST 142976); Le Marigot, right bank of Lorrain River, lowland rainforest, on dead wood, 8 Jun. 2014, *leg.* J. Fournier, MJF 14095 (LIP); Le Morne-Rouge, circuit Sainte-Cécile, hygrophilic rainforest, on dead wood, 22 Aug. 2008, *leg.* C. Lechat, CLL 8268 (LIP; HAST 142979); Le Morne-Rouge, La Propreté, forest track in Hibiscus plantation, hygrophilic rainforest, on dead wood, 29 Aug. 2008, *leg.* C. Lechat, CLL 8366 (LIP; HAST 142980); Le Morne-Rouge, La Propreté, forest track in Mahogany plantation, hygrophilic rainforest, on dead wood and bark, 24 Aug. 2007, *leg.* J. Fournier, MJF 07064 (LIP); *ibid.*, on dead wood, 24 Aug. 2007, *leg.* J. Fournier, MJF 07070 (LIP); *ibid.*, on bark, 24 Aug. 2007, *leg.* J. Fournier, MJF 07083 (LIP); *ibid.*, on bark, 24 Aug. 2007, *leg.* J. Fournier, MJF 07085 (LIP); *ibid.*, on bark of Hibiscus (*Hibiscus elatus* Sw., *Malvaceae*), 29 Aug. 2007, *leg.* J. Fournier, MJF 07196 (LIP); *ibid.*, on bark of Hibiscus, 6 Jun. 2014, *leg.* J. Fournier, MJF 14070 (LIP); *ibid.*, dead corticated branch of Hibiscus (*Hibiscus elatus* Sw., *Malvaceae*), associated with *X. peltiformis*, 12 Jun. 2014, *leg.* J. Fournier, MJF 14140-1 (LIP); *ibid.*, on rotten bark, 9 Aug. 2016, *leg.* J. Fournier, MJF 16181 (LIP); Le Prêcheur, Anse Couleuvre, coastal mesophilic rainforest, on dead wood, 3 Sept. 2003, *leg.* C. Lechat, CLL 0726 (LIP); *ibid.*, on dead wood, 3 Sept. 2003, *leg.* C. Lechat, CLL 0732 (LIP); *ibid.*, on dead wood, 2 Dec. 2006, *leg.* C. Lechat, CLL 6133 (LIP); *ibid.*, on dead wood, 2 Dec. 2006, *leg.* C. Lechat, CLL 6139 (LIP); *ibid.*, on dead wood, 23 Aug. 2007, *leg.* C. Lechat, MJF 07042 (LIP); *ibid.*, on dead wood, 21 Aug. 2010, *leg.* J. Fournier, MJF 10032 (LIP); *ibid.*, on dead wood, 23 Aug. 2010, *leg.* C. Van Wonterghem, MJF 10064 (LIP); *ibid.*, on dead wood, 24 Aug. 2010, *leg.* J. Fournier, MJF 10084 (LIP); *ibid.*, on dead wood, 6 Aug. 2013, *leg.* J. Fournier, MJF 13032 (LIP); *ibid.*, on dead wood, 4 Aug. 2016, *leg.* J. Fournier, MJF 16115 (LIP); *ibid.*, on dead wood, 4 Aug. 2016, *leg.* J. Fournier, MJF 16117 (LIP); Le Saint-Esprit, Bois La Charles, mesophilic rainforest, on dead wood, 24 Aug. 2004, *leg.* C. Lechat, CLL 2061 (LIP); *ibid.*, on dead wood, 19 Aug. 2005, *leg.* C. Lechat, CLL 5124 (LIP; HAST 142977); *ibid.*, on dead wood, 29 Aug. 2005, *leg.* C. Lécure, CLL 5258 (LIP; HAST 142978); *ibid.*, on bark, 8 Dec. 2005, *leg.* C. Lechat, CLL 5616 (LIP); *ibid.*, on dead wood, 30 Aug. 2010, *leg.* J. Fournier, MJF 10251 (LIP); Les Anses-d'Arlet, coastal mesophilic rainforest, on dead wood, 17 Aug. 2011, *leg.* C. Lechat, CLLMAR 11020 (LIP); Macouba, Trou Navet, hygrophilic rainforest, on a dead corticated branch, 13 Aug. 2013, *leg.* J. Fournier, MJF 13181 (LIP); *ibid.*, on a dead corticated branch, 13 Aug. 2013, *leg.* J. Fournier, MJF 13190 (LIP); Sainte-Luce, Montravail forest, hygrophilic rainforest, on dead wood, 7 Dec. 2005, *leg.* C. Lechat, CLL 5604 (LIP); *ibid.*, on bark, 30 Jul. 2016, *leg.* J. Fournier, MJF 16034 (LIP);

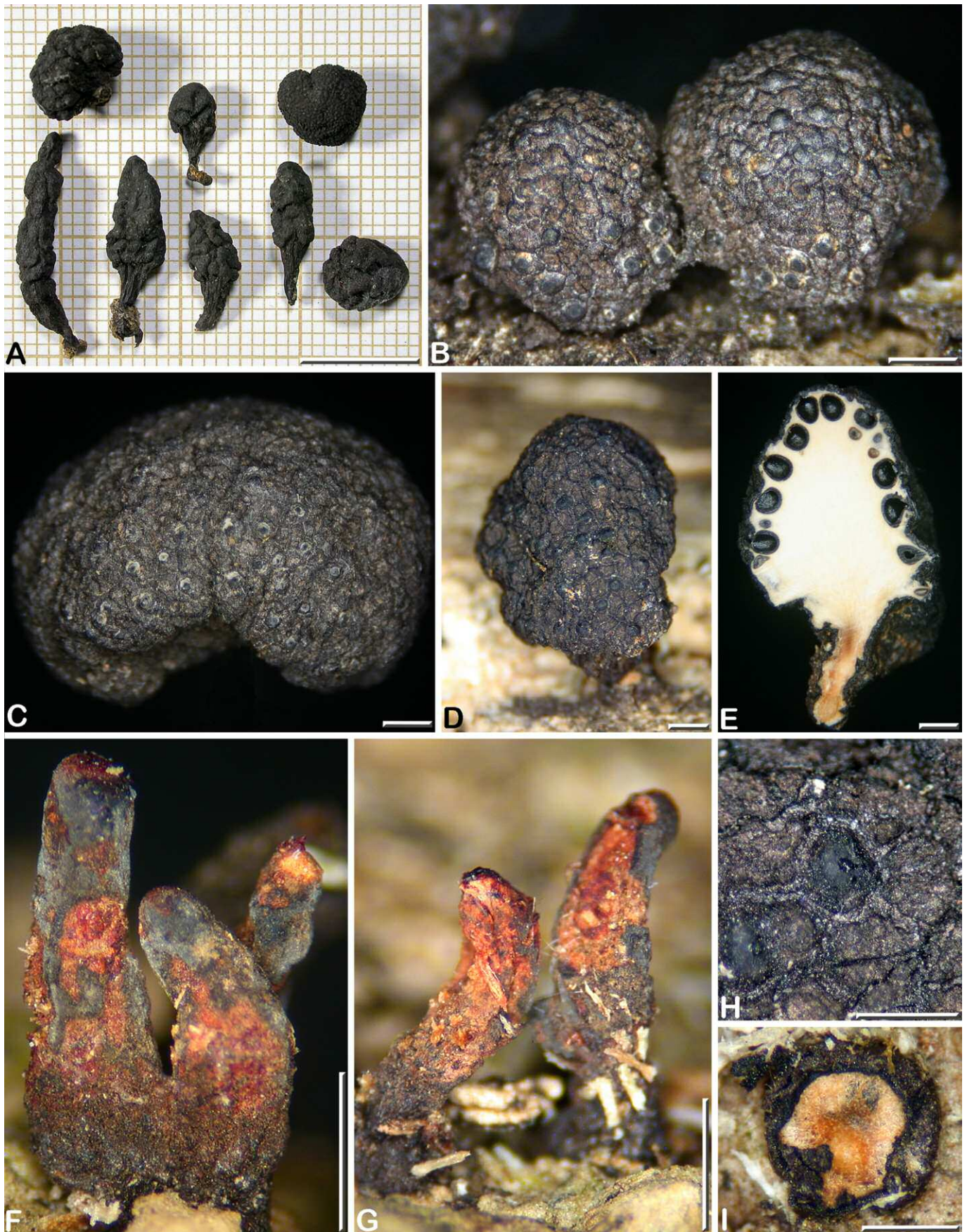


Plate 12 – *Xylaria globosa*

A: CLL 6033; B: CLL 0732; C: CLL 5258; D, E, H: MJF 16117; F, G, I: MJF 13032. A: Habit of differently shaped stromata from a same collection; B: Two subsessile subglobose stromata in side view showing coarsely cracked surface and ostioles on a black discoid base; C: Ventrally concave stroma in side view showing ostioles surrounded by a ring of white substance; D: Shortly stipitate stroma; E: Stipitate stroma in vertical section showing white solid internal tissue stained orange in the stipe; F, G: Primordial stromata at dry state, coated by a bright orange pellicle; H: Stromatal surface in close-up showing a black discoid ostiolar area surrounded by large thick scales; I: Broken base of a primordium in top view showing orange interior. Scale bars: A = 10 mm; B-G = 1 mm; H, I = 0.5 mm.

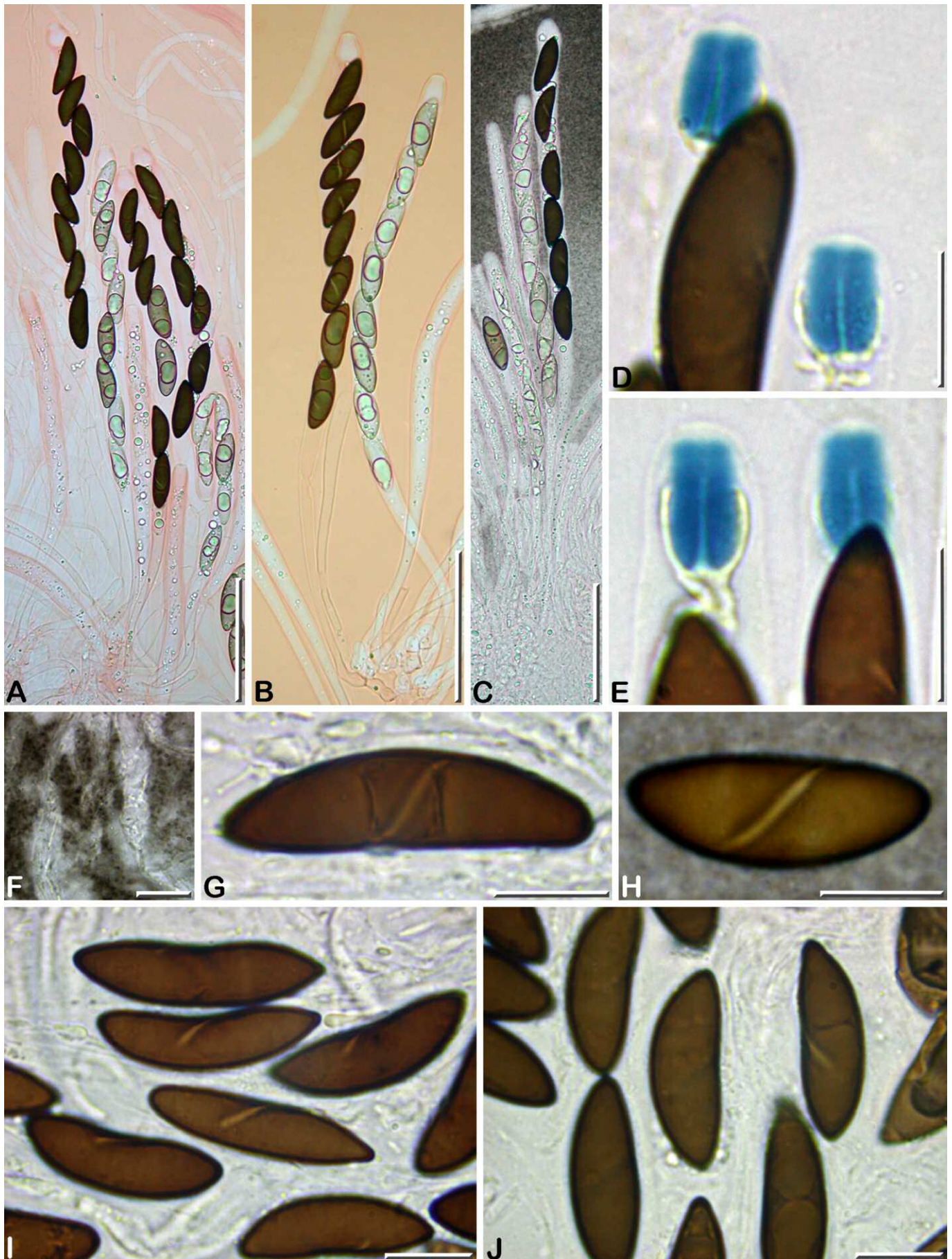


Plate 13 – *Xylaria globosa*

A-D, F, H, J: MJF 16117; E, I: CLL 5258; G: CLL 5134. A-C: Immature and 6–8-spored mature asci, in Congo red in 1% SDS (A, B) and in India ink (C); D, E: Ascus apical apparatuses in Melzer's reagent; F: Paraphyses in India ink, showing traces of mucilaginous material; G: Narrowly fusiform ascospore in latero-ventral view showing a germ slit, in 1% SDS; H: Ascospore in India ink, showing the absence of appendage or slimy sheath and a conspicuous germ slit; I, J: Various shaped ascospores, some showing a germ slit, in 1% SDS. Scale bars: A-C = 50 µm; D-J = 10 µm.

Table 5 – Ascospore dimensions in ten penzigoid collections of *X. globosa* from Guadeloupe and Martinique, showing the range of intraspecific variations, compared with those of *X. anisopleura*/*X. globosa* given in literature. Extreme values are in parentheses.

Collections numbers	Ascospore measurements	Q = quotient l/w N = number of measurements	Mean values
CLL 2061	(22–)23.7–28.8(–30.6) × (6.8–)7.2–8.5(–9.6) μm	Q = (2.7–)3–3.8(–4.3), N = 60	Me = 26.1 × 7.8 μm Qe = 3.3
CLL 5096	(21.4–)22.1–25.6(–27.1) × (6.5–)7–8.2(–8.4) μm	Q = (2.8–)2.9–3.5(–3.8), N = 60	Me = 23.7 × 7.6 μm Qe = 3.2
CLL 5134	(24.4)26–30.2(–31.4) × (7–)7.5–8.9(–9.1) μm	Q = (2.9–)3.1–3.8(–4.5), N = 60	Me = 28.1 × 8.2 μm Qe = 3.4
CLL 5258	(21.8–)23.3–28.4(–30.6) × (6.3–)6.7–8.3(–8.9) μm	Q = (2.6–)3.1–4(–4.4), N = 60	Me = 25.9 × 7.4 μm Qe = 3.5
CLL 5604	(21.7–)22.9–26.6(–29.7) × (7.3–)7.6–8.8(–9.4) μm	Q = (2.5–)2.8–3.4(–3.7), N = 60	Me = 24.7 × 8.2 μm Qe = 3
CLL 6033	(22.2–)23.3–27.3(–30.2) × (7–)7.7–9.1(–9.5) μm	Q = (2.6–)2.7–3.4(–4), N = 60	Me = 25.5 × 8.4 μm Qe = 3.1
CLL 8366	(20.9–)21.7–24.6(–28.1) × (6.5–)6.9–7.8(–8.2) μm	Q = (2.7–)3–3.4(–3.7), N = 60	Me = 23.2 × 7.3 μm Qe = 3.2
MJF 10032	(20.3–)22.7–26.5(–29.1) × (7.3–)7.7–9.3(–10) μm	Q = (2.4–)2.6–3.3(–3.4), N = 60	Me = 24.4 × 8.4 μm Qe = 2.9
MJF 14140-1	(23–)23.7–27.7(–29.9) × (6.2–)7.2–8(–8.2) μm	Q = (2.9–)3.1–3.8(–4), N = 60	Me = 26 × 7.6 μm Qe = 3.4
MJF 16117	(20.6–)21.2–24.6(–27.1) × (6.3–)7–8.3(–9.1) μm	Q = (2.5–)2.8–3.3(–3.7), N = 60	Me = 23.1 × 7.7 μm Qe = 3
Cumulated values	(20.6–)21.2–30.2(–31.4) × (6.3–)6.7–9.3(–10) μm	Q = (2.4–)2.6–4(–4.5), N = 600	Me = 25 × 7.9 μm Qe = 3.2
HLADKI & ROMERO (2010) Argentina	22–30 × 8–9.5 μm	–	Me = 26 × 8.8 μm Qe = 3
JU & ROGERS (1999) Taiwan	(21–)22–27(–30) × 7–9(–9.5) μm	–	Me = 24.5 × 8 μm Qe = 3.1
ROGERS <i>et al.</i> (1988) Venezuela	22–28 × 7.5–9.5 μm	–	Me = 25 × 8.5 μm Qe = 3
SAN MARTÍN & ROGERS (1989) México	22–30 × 7.5–9 μm	–	Me = 26 × 8.3 μm Qe = 3.1
VAN DER GUCHT (1995) Papua New Guinea	22–27 × 7–9 μm	–	Me = 24.2 × 7.8 μm Qe = 3.1

ibid., on dead wood, 30 Jul. 2016, *leg.* J. Fournier, MJF 16045 (LIP); Schoelcher, Fond Lahaye, banks of Fond Lahaye River, mesophilic rainforest, on a dead corticated branch, 12 Aug. 2013, *leg.* J. Fournier, MJF 13148 (LIP); Schoelcher, Case Navire River, mesophilic rainforest, on bark, 5 Aug. 2013, *leg.* J. Fournier, MJF 13012 (LIP); Schoelcher, Duclos River, hygrophilic rainforest, on bark, 28 Aug. 2007, *leg.* J. Fournier, MJF 07168 (LIP).

Comments: Due to its widespread distribution and its highly variable stomatal morphology, this fungus has been variously interpreted and most often referred to *X. anisopleura* (Mont.) Fr. [see VAN DER GUCHT (1995) for notes on synonymy]. As both *X. anisopleura* and *X. globosa* cannot be unambiguously distinguished, the latter name is reinstated for priority reasons.

Xylaria globosa is characterized by subglobose to upright woody-textured stomata usually shortly stipitate, with a coarsely cracked to warted surface and ostioles on a large discoid base; its ascospores 21–30 × 6.7–9.3 μm are fusiform-inequilateral with narrowly rounded ends and a short diagonal to oblique germ slit. It can be confused with the two common tropical species *X. schweinitzii* Berk. & M.A. Curtis and *X. scruposa* (Fr.) Berk. which likewise feature an outer stomatal layer cracking into scales or warts and similar ascospores. The close phylogenetic affinities of these three species were demonstrated by molecular evidence (HSIEH *et al.*, 2010). However, their morphological comparison shows that *X. globosa* differs in having a more coarsely cracked surface and significantly wider ostiolar base; moreover, ascospores of *X. schweinitzii*, though in the same size range as that of *X. globosa* (20–27 × 6–8.3 μm), differ in having a less slanted germ slit; ascospores of *X. scruposa* are significantly smaller in average than those of *X. globosa* (19.4 × 6.5 μm vs. 25 × 7.9 μm), though there is a slight overlap between large-spored collections of *X. scruposa* and small-spored collections of *X. globosa*. A further differential character was revealed during this survey, set-

ting *X. globosa* apart from its relatives — the consistent presence of an orange to salmon colour of the internal tissue at the base of the stipe, usually visible when a stroma is detached from the substrate on which it leaves a discoid orange scar or by vertically sectioning the basal part of the stroma. Young colonies of *X. globosa* on natural substrate are characterized by upright cylindrical primordial stromata covered by bright orange exudation droplets, a unique feature within *Xylaria* which can likewise be observed in culture (ROGERS *et al.*, 1988; Ju, pers. comm.). This orange exudation results in staining the base of developing stomata which is still visible at the very base of mature stomata. This differential character appears highly diagnostic for *X. globosa* since it could be detected likewise in material from French Guiana, India, Mayotte and Togo (personal herbarium of JF) and never occurs in *X. schweinitzii* or *X. scruposa*.

The new species *X. peltiformis* features ascospores averaging 23.6 × 8.4 μm, thus highly similar to those of *X. globosa*, with which it is sometimes associated on natural substrate (this paper). The stomata of *X. peltiformis* are typically flat-topped or slightly convex and their surface is grey to dark grey, finely scaly, with small, barely prominent ostioles and thus can be easily distinguished from those of *X. globosa*.

Xylaria lepidota Y.-M. Ju, H.-M. Hsieh, Lar. N. Vassiljeva & Akulov, described from Russian Far East, resembles *X. globosa* by its small turbinate stomata with a corky-cracked surface and ascospores 22.5–26.5(–28) × (8–)9–10.5 μm. It is primarily distinguished from *X. globosa* by smaller ostioles and ascospore germ slit which is almost spore-length and straight (Ju *et al.*, 2009).

Xylaria globosa is not typically penzigoid, a term usually applied and restricted to species with stomata wider than high. However, we include it in this survey of penzigoid species as it frequently occurs as small subglobose, shortly stipitate to subsessile stomata.

Xylaria lechatii Y.-M. Ju, H.-M. Hsieh, J.D. Rogers & J. Fourn., *Mycologia*, 104 (3): 774 (2012). Plate 14.

Stromata superficial, separate to most often coalescent into irregular groups or linear rows, pulvinate, flat-topped to slightly convex, few-peritheciate, irregularly orbicular, 0.5–2 mm diam × 0.5–0.7 mm thick, sessile, attached to the wood by a wide central connective erumpent through bark; surface pale greyish brown, darkening over maturation, slightly shiny, smooth, with perithecial contours slightly exposed at periphery; subsurface a black leathery crust 40–80 µm thick; interior white, turning yellowish in herbarium material, soft, solid, more developed at base than between the perithecia. **Perithecia** obovoid to subglobose, 0.35–0.5 mm high × 0.25–0.35 mm diam. **Ostioles** obtusely papillate to hemispherical, conspicuous, black, 70–90 µm diam at base.

Asci cylindrical, short-stipitate, with eight obliquely overlapping uniseriately arranged ascospores, the spore-bearing parts 70–85 × 8–11 µm, the stipes 22–38 µm long, with apical apparatus bipartite, composed of a discoid base bluing in Lugol's solution or Melzer's reagent 0.9–1.3 × 2.3–3.2 µm (Me = 1.1 × 2.7 µm, N = 14), beneath a convex pulvillus 1.6–2 × 2.5–2.9 µm (Me = 1.8 × 2.7 µm, N = 14), barely visible in Lugol's solution, faintly stained by diluted blue-black Waterman® ink. **Paraphyses** copious, hyphal, thin-walled, remotely septate, 6–7 µm wide at base, tapering to 1.5–2 µm wide above asci, embedded in mucilaginous material. **Ascospores** (11.6–) 12.1–14(–14.7) × (6–)6.3–7(–7.4) µm, Q = (1.7–)1.8–2.2(–2.4), N = 60 (Me = 13 × 6.7 µm, Qe = 2), ellipsoid-equilateral, with narrowly rounded ends, unicellular, dark brown, with a conspicuous longitudinal, straight germ slit almost spore-length, lacking secondary appendages and mucilaginous sheath but frequently surrounded by adherent mucilaginous remnants after release from ruptured asci; epispore smooth.

Asexual morph on the natural substrate present at base of young stromata, consisting of whitish tufts of upright palisadic conidiophores with geniculate conidiogenous cells yielding fusoid hyaline conidia 6.5–8.5 × 2.5–3 µm. Cultures on OMA white, with plumose margins, sterile (Ju *et al.*, 2012).

Specimen examined: FRENCH WEST INDIES: GUADELOUPE: Basse-Terre, Saint-Claude, Matouba track, hygrophilic rainforest, on a dead corticated branch, 26 Nov 2006, *leg.* C. Lechat, CLL 6075 (LIP, Holotype; HAST 131025, Isotype).

Known distribution: Guadeloupe (Ju *et al.*, 2012).

Comments: *Xylaria lechatii* is well characterized by small, pulvinate, greyish brown stromata with a leathery crust, asci with a bipartite apical apparatus which stains blue in iodine at base only, and dark brown equilateral ascospores averaging 13 × 6.7 µm, with narrowly rounded ends and a conspicuous straight germ slit almost spore-length. As discussed by Ju *et al.* (2012), the most resembling *Xylaria* species is *X. discolor* (Berk. & Broome) Y.-M. Ju, H.-M. Hsieh, J.D. Rogers & Jaklitsch which is distinguished by slightly smaller ascospores, a thinner outer crust and colonies with entire margins. Moreover, these authors showed that the comparison of sequences of both species clearly supports the distinctiveness of *X. lechatii*.

Xylaria leptosperma J. Fourn. & Lechat, *sp. nov.* – MycoBank MB 827201. Plate 15.

Diagnosis: Differs from other small penzigoid *Xylaria* spp. 1–2 mm diam by the combination of cracked stromatal surface, brittle carbonaceous crust 40–50 µm thick, whitish soft and fibrous interior disintegrating with age, coarsely conic-papillate ostioles on a discoid base and medium brown, narrowly fusiform ascospores 11.6 × 4.1 µm in average with a thin mucilaginous sheath and with a straight to slightly sinuous germ slit less than spore-length.

Holotype: FRENCH WEST INDIES: MARTINIQUE: Le Prêcheur, Anse Couleuvre, coastal mesophilic rainforest, at the base of a dead, corticated, blackened stem of a shrub, 23 Aug. 2013, *leg.* C. Lechat, MJF 13387 (LIP, Holotype; HAST 142981, Isotype).

Etymology: From Greek λεπτός = narrow, elongate and σπέρμα = seed, spore, for the narrowly fusiform ascospores.

Stromata densely gregarious, superficial, often in contact, (1–)4–10-peritheciate, 0.8–2 mm diam × 0.9–1.6 mm high, subglobose to depressed-spherical, with the base obconical and centrally attached to the substrate, apex flattened to slightly convex. Stromatal surface brownish black to dull black, reticulately cracked into large greyish-brown scales and low warts; subsurface carbonaceous, 40–50 µm thick, brittle; interior white to yellowish, soft, fibrous, lacunose, disintegrating after maturity. **Perithecia** subglobose 0.5–0.6 mm diam. **Ostioles** coarsely conic-papillate, shiny black, at the centre of a smooth discoid area 150–200 µm diam.

Asci cylindrical, with (6–)8 slightly overlapping uniseriately arranged ascospores, the spore-bearing parts 78–90 µm long × 5.5–6.5 µm wide, the stipes 40–90 µm long, with apical apparatus short-cylindrical with a sharp apical rim, 1.6–2.1 × 1.3–1.5 µm (Me = 1.8 × 1.4 µm N = 25), bluing in Melzer's reagent. **Paraphyses** copious, hyphal, thin-walled, remotely septate, 5–6 µm wide at base, tapering to 1.5–2 µm wide above asci, sparsely guttulate, embedded in mucilaginous material. **Ascospores** (9.9–)10.6–12.6(–13) × (3.4–)3.8–4.5(–4.7) µm, Q = (2.3–)2.5–3.1(–3.4), N = 60 (Me = 11.6 × 4.1 µm, Qe = 2.8), narrowly fusiform, slightly inequilateral, with narrowly rounded ends, olivaceous brown at fresh state, medium brown after desiccation, unicellular, smooth, with a thin, appressed mucilaginous sheath visible in India ink, with a conspicuous, longitudinal, straight, rarely slightly sigmoid, central to displaced towards one end germ slit on the flattened side, 2/3 spore length to slightly less than spore-length.

Asexual morph on the natural substrate not seen.

Other specimens examined (paratypes): FRENCH WEST INDIES: MARTINIQUE: Le Prêcheur, Anse Couleuvre, coastal mesophilic rainforest, on dead blackened wood, 16 Aug. 2013, *leg.* J. Fournier, MJF 13266 (LIP) (overmature); *ibid.*, on dead blackened wood, 23 Aug. 2013, *leg.* J. Fournier, MJF 13372 (LIP) (immature).

Known distribution: Martinique.

Comments: *Xylaria leptosperma* is characterized by small, crowded few-peritheciate stromata up to 2 mm diam with a thin and brittle carbonaceous crust overlain with a reticulately cracked greyish brown outermost layer, coarsely conic-papillate ostioles on a discoid base and a whitish, fibrous interior disintegrating with age. Its narrowly fusiform ascospores 10.6–12.6 × 3.8–4.5 µm with a thin mucilaginous sheath and a germ slit less than spore length clearly set it apart from morphologically similar penzigoid species.

Xylaria obtusispora J. Fourn. & Lechat, *sp. nov.* – MycoBank MB 827204. Plates 16–17. Table 6.

Diagnosis: Differs from other penzigoid *Xylaria* spp. with morphologically similar stromata by subequilateral to oblong ascospores 10.6–12.8 × 4.5–5.2 µm with broadly rounded ends and a conspicuous straight germ slit almost spore-length.

Holotype: FRENCH WEST INDIES: MARTINIQUE: Fort de France, Forest of Pitons du Carbet, bottom of the trail of Fond Baron, hygrophilic rainforest, on recently dead corticated branchlets 0.8–1.5 cm diam, associated with *X. berteroi*, 19 Jun. 2015, MJF 15173 (LIP; HAST 142982, Isotype).

Etymology: From Latin *obtusus* = obtuse, broadly rounded and *spora* = spore, for the broadly rounded ends of ascospores.

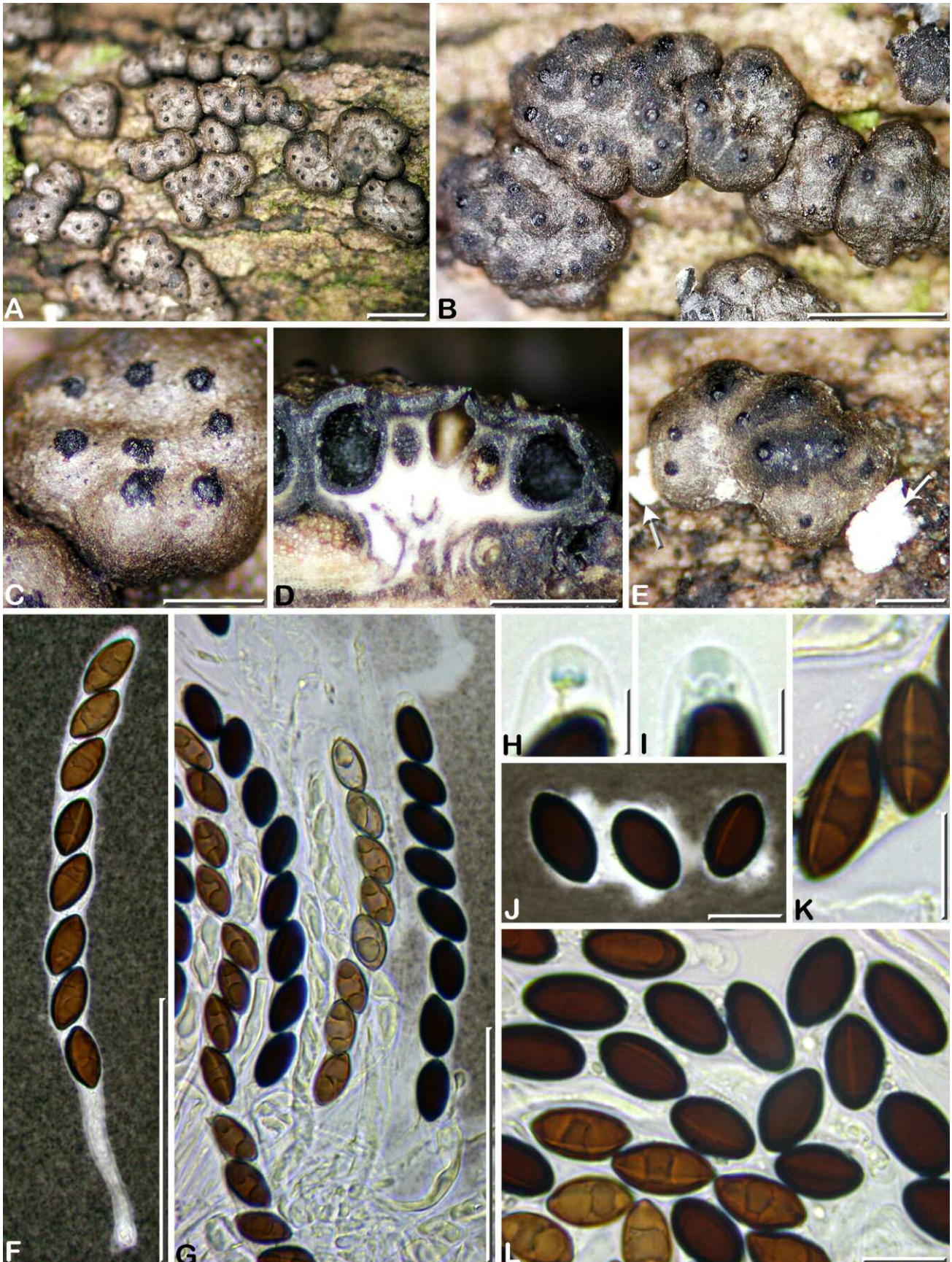


Plate 14 – *Xylaria lechatii*

CLL 6075 (holotype). A: Habit of stromata on host surface; B: Coalescent stromata in top view showing conspicuous ostioles; C: Stromatal surface in close-up showing rounded papillate ostioles obscured by deposits of discharged ascospores; D: Stroma in vertical section showing a thick outer crust, a central connective and solid, soft, white internal and basal tissue; E: Stroma associated with white cottony tufts of the asexual morph (arrows); F: Barely mature ascus, in India ink; G: Immature and mature asci, in India ink; H: Ascus apical apparatus in Lugol's solution, showing a discoid amyloid base beneath a very inconspicuous upper pulvillus; I: Ascus apical apparatus in blue-black Waterman® ink diluted in 1% SDS, showing an upper pulvillus faintly stained; J: Three ascospores freshly released from a ruptured ascus showing mucilaginous substance adherent to their wall; K: Two barely mature ascospores showing a germ slit, in Lugol's solution; L: Immature and mature ascospores in 1% SDS, some showing a germ slit. Scale bars: A, B = 1 mm; C-E = 0.5 mm; F, G = 50 µm; H, I = 5 µm; J-L = 10 µm.

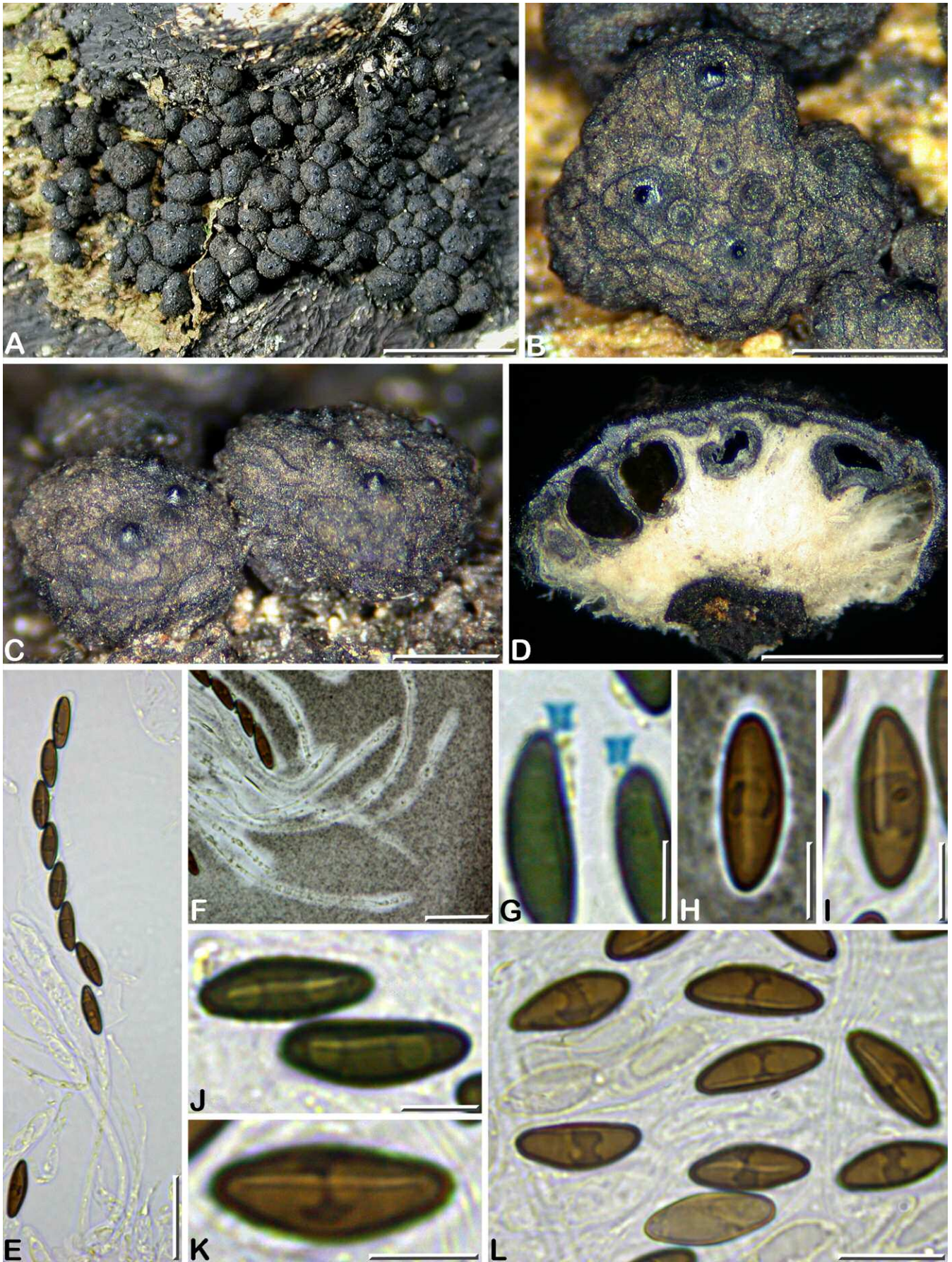


Plate 15 – *Xylaria leptosperma*

MJF 13387 (Holotype). A: Crowded stromata in top view; B: Stroma in top view showing a reticulately cracked surface and shiny black ostioles surrounded with a discoid area; C: Stroma in oblique side view showing coarsely conic-papillate ostioles and a cracked surface; D: Stroma in vertical section showing a thin carbonaceous crust and a whitish, fibrous, lacunose interior; E: Mature ascus in 1% SDS; F: Paraphyses tips coated with mucilage, in India ink; G: Ascus apical apparatus, in Melzer's reagent; H: Ascospore in ventral view showing a straight, central germ slit and a thin mucilaginous sheath, in India ink; I-K: Ascospores in ventral view showing germ slits of various length, in 1% SDS; L: Ascospores in 1% SDS, some showing germ slits, one slightly sigmoid. Scale bars: A = 5 mm; B-D = 1 mm; E, F = 20 μm ; G-K = 5 μm ; L = 10 μm .

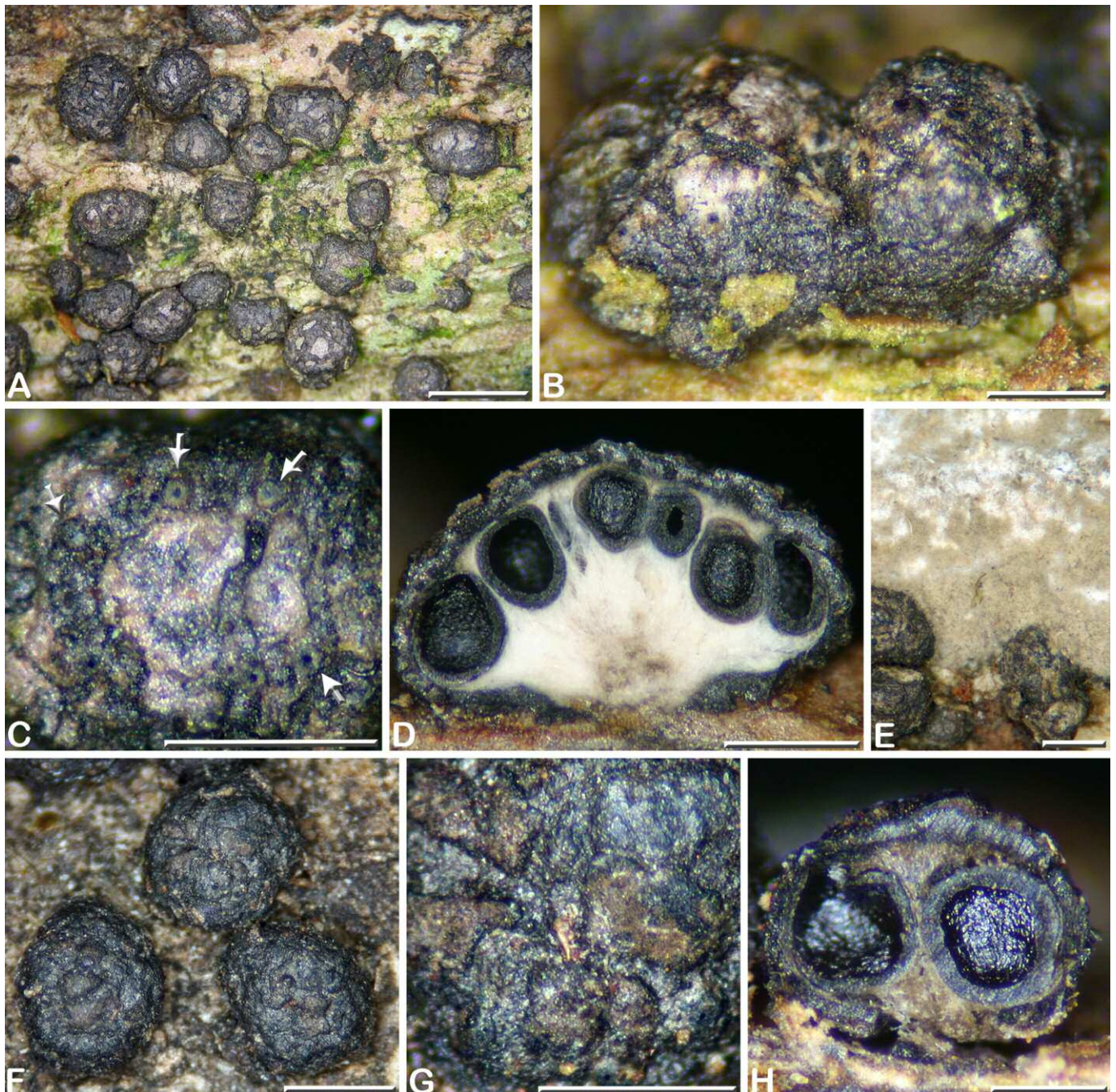


Plate 16 – *Xylaria obtusispora*

A-E: MJF 15173 (holotype); F-H: MJF 13245 (paratype). A, F: Habit of stromata on host surface; B: Two adjacent stromata showing roughened black sides and pale grey scales on top; C: Stromatal top in close-up showing pale grey scales and discoid ostioles (arrows); D: Sessile stroma in vertical section showing a relatively thick black outer crust, a white soft interior and a narrow connective at base; E: Asexual morph spreading on bark next to a stroma, exposing a superficial brownish grey fluffy layer of conidiophores and conidiogenous cells; F: Stromata in surface view showing thick dark brown scales on a cracked surface; G: Superficial dark brown scales in close-up; H: Sessile stroma in vertical section showing a grey fibrous interior. Scale bars: A = 2 mm; B-E, G, H = 0.5 mm; F = 1 mm.

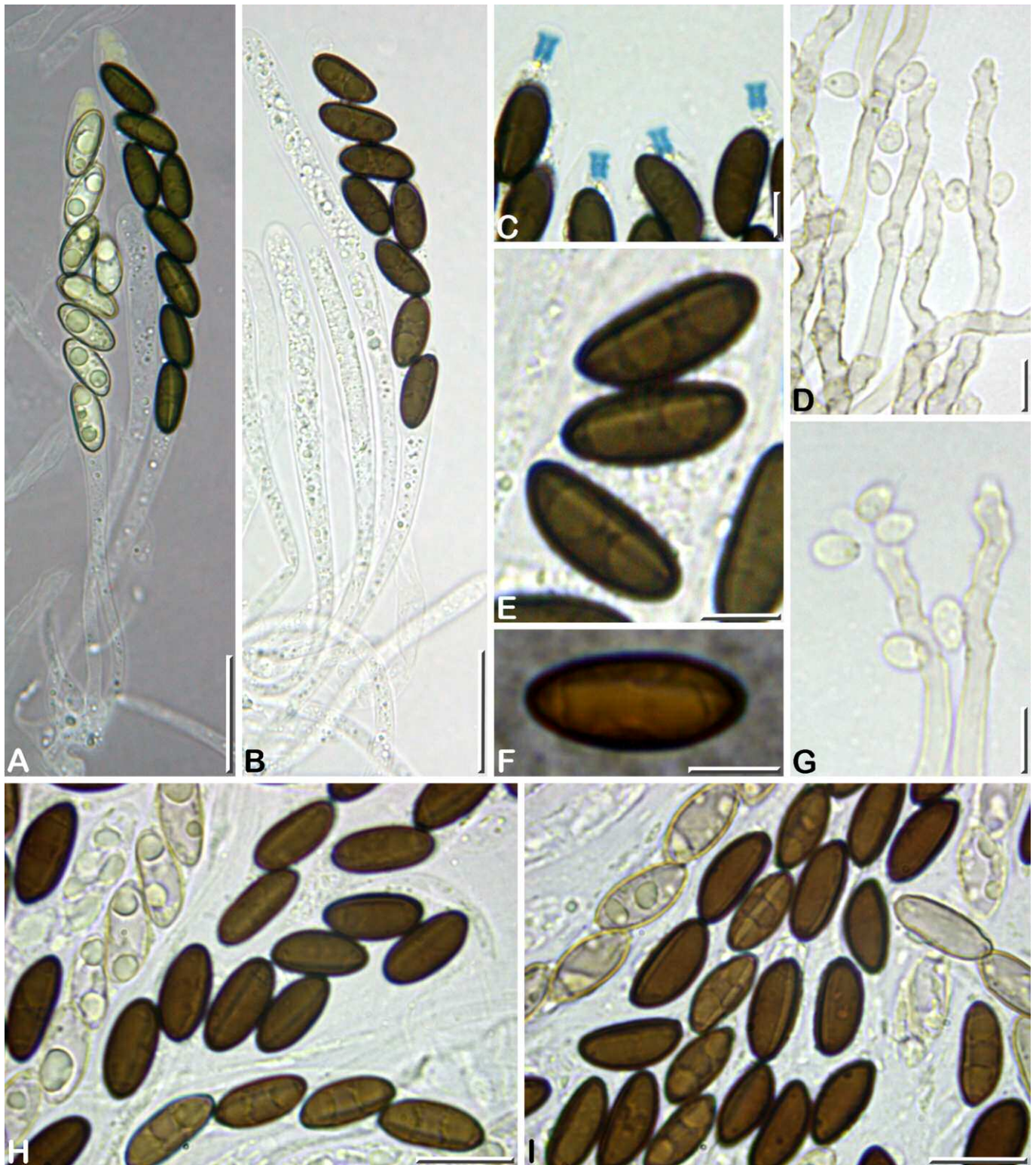


Plate 17 – *Xylaria obtusispora*

A-H: MJF 15173 (holotype); I, J: MJF 13245 (paratype). A, B: Immature and mature asci, in black Pelikan® ink and 1% SDS respectively; C: Tubular ascus apical apparatus in Melzer's reagent; D, G: Geniculate conidiogenous cells and conidia, in 3% KOH; E: Ascospores in ventral view showing a germ slit, in 1% SDS; F: Ascospore in India ink, showing a lack of mucilaginous sheath or appendages; H, I: Immature and mature ascospores in 1% SDS, some in ventral view showing a germ slit. Scale bars: A, B = 20 µm; C-G = 5 µm; H, I = 10 µm

Table 6 – Ascospore dimensions in two collections of *X. obtusispora*, showing a narrow range of variation. Extreme values are in parentheses.

Collections numbers	Ascospore measurements	Q = quotient l/w N = number of measurements	Mean values
MJF 13245	(10.2–)10.6–12(–12.5) × (4.2–)4.5–5.1(–5.3) µm	Q = (2.1–)2.2–2.6(–2.8), N = 60	Me = 11.3 × 4.8 µm Qe = 2.4
MJF 15173 (holotype)	(10.9–)11.2–12.8(–13.7) × (4.3–)4.6–5.2(–5.5) µm	Q = (2–)2.3–2.7(–3), N = 60	Me = 11.9 × 4.9 µm Qe = 2.4
Cumulated values	(10.2–)10.6–12.8(–13.7) × (4.2–)4.5–5.2(–5.5) µm	Q = (2–)2.2–2.7(–3), N = 120	Me = 11.6 × 4.9 µm Qe = 2.4

Stromata gregarious, densely crowded or scattered to coalescent in groups of 2–3, few-peritheciate, erumpent through the periderm to superficial, pulvinate, subglobose to irregularly ellipsoid, convex to almost flat-topped, 0.8–1.7 mm diam × 0.7–1 mm high, sessile, with a narrow to broad connective; surface dark grey to blackish grey, eventually dull black, lacking perithecial contours, roughened by low warts and shallow cracks, with a pale grey to blackish brown outer layer cracking into large polygonal scales, mostly present on top of stromata; crust black, slightly carbonaceous, 50–80 µm thick; interior white to grey, fibrous, solid to lacunose, disintegrating in overmature stromata. **Perithecia** subglobose, 0.4–0.5 mm diam. **Ostioles** faintly papillate to discoid, 40–65 µm diam, pale grey to black, most often inconspicuous.

Asci slightly fusiform, with eight obliquely uniseriately arranged ascospores, biseriately arranged at upper third, the spore-bearing parts 55–67 × 12–14 µm, the stipes 48–70 µm long, with apical ring tubular with a marked upper rim, 2.5–3 × 2–2.5 µm (Me = 2.7 × 2.3 µm, N = 20), bluing in Melzer's reagent. **Paraphyses** filiform, up to 7 µm wide at base, tapering above asci, embedded in mucilaginous material. **Ascospores** (10.2–)10.6–12.8(–13.7) × (4.2–)4.5–5.2(–5.5) µm, Q = (2–)2.2–2.7(–3), N = 120, (Me = 11.6 × 4.9 µm, Qe = 2.4), ellipsoid slightly inequilateral to oblong, mostly with broadly rounded ends, brown to dark brown, with a conspicuous, longitudinal, straight germ slit almost spore-length, on the less convex side when nearly inequilateral; no sheath or appendages observed in India ink; epispore smooth.

Associated asexual morph present on bark next to the stromata of MJF 15173, appearing as a white amorphous hyphal layer bearing fluffy, brownish grey tissue composed of long light brown conidiogenous hyphae, sparingly branched, 2–3 µm wide, smooth, bearing long geniculosporium-like conidiogenous cells 1.8–2.5 µm wide, yielding broadly ovoid subhyaline conidia 3–3.5 × 2.7–3 µm.

Other specimen examined (paratype): FRENCH WEST INDIES: MARTINIQUE: Fort-de-France, Absalon, trail to Plateau Michel, hygrophilic rainforest, on a dead corticated branch, 15 Aug. 2013, *leg.* J. Fournier, MJF 13245 (LIP; HAST 142983).

Known distribution: Martinique (this paper).

Comments: This penzigoid *Xylaria* is characterized by small, subglobose to pulvinate, sessile stromata with conspicuous pale grey to blackish brown scales on a thin carbonaceous crust, inconspicuous ostioles and subequilateral to oblong ascospores 10.6–12.8 × 4.5–5.2 µm with broadly rounded ends and a straight germ slit almost spore-length. As this combination of characters does not match with any known species, we propose to name it *X. obtusispora*, based on the peculiar shape of its ascospores.

Among penzigoid species with a thin black carbonaceous crust and ascospores in the same size range, *X. obtusispora* should be compared with *X. discolor*. *Xylaria discolor* features dark greyish brown stromata lacking persistent scales, asci with an apical apparatus not staining or staining pale blue at base in Melzer's reagent and blackish brown ascospores 9–12 × 5.5–7 µm with narrowly rounded to pinched ends (Ju *et al.*, 2012), all characters deviating from *X. obtusispora*.

Xylaria conopeicola (this paper) is similar in external habit in having small, pulvinate, sessile stromata with large grey scales on surface. It clearly differs by a thicker carbonaceous crust 120–170 µm thick and larger ascospores 17.7–21.6 × 6.4–9.2 µm with acute ends and an oblique, often sinuous germ slit less than spore length.

The collection CLL 5109, described herein separately as *Xylaria* sp., shares with *X. obtusispora* similar densely gregarious subglobose stromata with a thin carbonaceous crust and ascospores in the same size range 9.4–10.9 × 4–4.6 µm. As it slightly deviates by stipitate stromata with more conspicuous ostioles and as its ascospores appear slightly smaller, more inequilateral and have less broadly rounded ends, we are reluctant to include it in our concept of *X. obtusispora* until more material is studied. Synnematal conidiogenous structures were found on some stromata of CLL 5109, with palisadic conidiogenous cells typical of *Xylaria*, that were not observed in the two collections of *X. obtusispora*, which makes a further difference.

The effused, hyphomycetous asexual morph associated with some stromata of *X. obtusispora* illustrated above is not typical of *Xylaria* and is rather reminiscent the asexual morph of a *Nemanja* sp. The occurrence of this asexual morph might be fortuitous and related to the presence of *X. berteroi* on the same branch.

Xylaria papillatoides J. Fourn. & Lechat, *sp. nov.* – MycoBank MB 827206. Plate 18. Table 7.

Diagnosis: Differs from *X. papillata*, with which it shares a similar external morphology, by slightly smaller ascospores 13.6–17.2 × 5.3–6.8 µm vs. 16–19 × 6–8 µm with a straight vs. sigmoid germ slit.

Holotype: FRENCH WEST INDIES: MARTINIQUE: Le Prêcheur, Anse Couleuvre, mesophilic coastal rainforest, on a dead corticated branch, 19 Aug. 2011, *leg.* C. Lechat, CLLMAR 11038 (LIP).

Etymology: Meaning resembling *X. papillata*, from epithet *papillata* plus suffix *-oides* (from Greek εἶδος = form, likeness) for the morphological resemblance.

Stromata densely gregarious, often in contact, erumpent from bark through the periderm or seated on decorticated wood, subglobose to pulvinate, with a pointed, sterile, usually persistent central apex, 1–5(–8)-peritheciate, 0.8–1.8 mm diam × 0.7–1.6 mm high, subsessile, on a narrow central connective up to 0.5 mm high. Stromatal surface grey to blackish grey, eventually black, without exposed perithecial contours, roughened by cracks and encrusted with small black, carbonaceous, superficial granules; with a fibrous, white to cream outer layer splitting into large irregular patches or into radiating strips at the base of the pointed apex, long persistent; outer crust leathery to slightly carbonaceous, 60–80 µm thick, black; interior white, solid, fibrous to spongy, turning yellowish with age. **Perithecia** immersed, subglobose 0.4–0.6 mm diam. **Ostioles** bluntly papillate, black, often inconspicuous.

Asci cylindrical, with 8 overlapping uniseriately arranged ascospores, long-stipitate, the spore-bearing parts 72–95 × 7–8 µm, the stipes 100–120 µm long, with apical ring tubular to slightly urn-shaped, 3–4.1 × 2.3–3.3 µm (Me = 3.6 × 2.7 µm, N = 60), bluing in Melzer's reagent. **Paraphyses** copious, hyphal, thin-walled, filiform, 4–6 µm wide at base, tapering to 1.5–2.5 µm wide above asci, embedded in mucilaginous material. **Ascospores** (13.1–)13.6–17.2

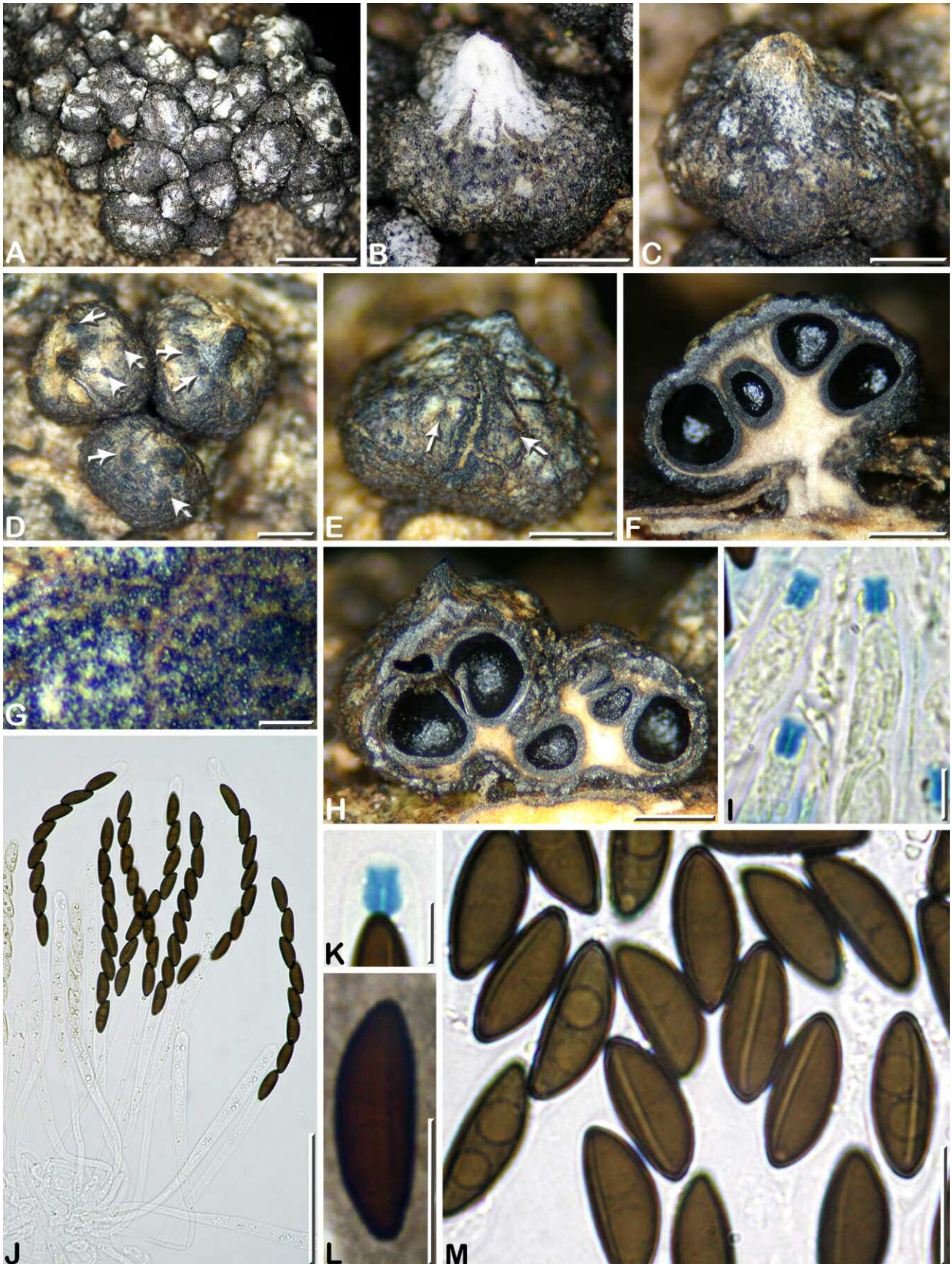


Plate 18 – *Xylaria papillatoides*

A, B, J, M: CLL 8258; C-I, L: CLLMAR 11038 (holotype); K: MJF 16161. A: Densely crowded young stromata on host surface; B: Young stroma showing a central umbo covered with white tissue split at base into radiating strips; C-E: Mature stromata in top view showing a central umbo coated with remnants of white to cream tissue, a roughened to cracked surface and inconspicuous ostioles (arrows); F: Stroma in vertical section showing a relatively thick black outer crust, a white soft interior and a narrow connective at base; G: Stromatal surface in close-up showing minute black carbonaceous granules; H: Two adjacent stromata in vertical section showing poorly developed yellowish internal tissue; I: Tubular to slightly urn-shaped ascial apical apparatus in Melzer's reagent; J: Immature and mature asci, in 1% SDS; K: Urn-shaped ascial apical apparatus, in Melzer's reagent; L: Ascospore in India ink, showing a lack of mucilaginous sheath or appendages; M: Ascospores in 1% SDS, some in ventral view showing a germ slit. Scale bars: A = 2 mm; B-F, H = 0.5 mm; G = 0.1 mm; I, K = 5 μ m; J = 50 μ m; L, M = 10 μ m.

Table 7 – Ascospore dimensions in four collections of *X. papillatoides* from Guadeloupe and Martinique, showing the range of intraspecific variations, compared with those of *X. papillata* reported in literature. Extreme values are in parentheses.

Collections numbers	Ascospore measurements	Q = quotient l/w N = number of measurements	Mean values
CLL 0830	(13.1–)14.4–16.3(–17.2) × (5.1–)5.5–6.8(–7.4) µm	Q = (2–)2.2–2.8(–3.1), N = 60	Me = 15.2 × 6.1 µm Qe = 2.5
CLL 8258	(14.3–)15.3–17.2(–17.9) × (5.4–)5.7–6.5(–6.9) µm	Q = (2.3–)2.5–3(–3.2), N = 60	Me = 16.3 × 6 µm Qe = 2.7
CLL 11038	(13.4–)14.4–16.1(–17.6) × (5.1–)5.3–6.1(–6.8) µm	Q = (2.3–)2.4–2.9(–3.1), N = 60	Me = 15.2 × 5.8 µm Qe = 2.6
MJF 16161	(13.1–)13.6–15.8(–17.1) × (4.8–)5.5–6.1(–6.3) µm	Q = 2.3–2.8(–3.2), N = 60	Me = 14.6 × 5.8 µm Qe = 2.5
Cumulated values	(13.1–)13.6–17.2(–17.9) × (4.8–)5.3–6.8(–7.4) µm	Q = (2–)2.2–3(–3.2), N = 240	Me = 15.3 × 5.9 µm Qe = 2.6
DENNIS (1961) Congo	16–19 × 6–8 µm	–	Me = 17.5 × 7 µm Qe = 2.5

(–17.9) × (4.8–)5.3–6.8(–7.4), Q = (2–)2.2–3(–3.2), N = 240 (Me = 14.6 × 5.8 µm, Qe = 2.5), ellipsoid strongly inequilateral with narrowly rounded ends, unicellular, brown to dark brown, with a conspicuous, straight, longitudinal to slightly oblique germ slit spore-length on the flattened side, lacking secondary appendages or mucilaginous sheath; epispore smooth.

Asexual morph on the natural substrate not seen.

Other specimens examined (paratypes): FRENCH WEST INDIES: GUADELOUPE: Basse-Terre, Saint-Claude, Matouba, Victor Hughes track, hygrophilic rainforest, on a dead corticated branch, 19 Aug. 2008, *leg.* C. Lechat, CLL 8258 (LIP). MARTINIQUE: Case-Pilote, Fond Bourlet, Prise d'Eau, hygrophilic rainforest, on dead decorticated wood, 19 Sept. 2003, *leg.* C. Lechat, CLL 0830 (LIP; HAST 142984); Fort-de-France, Absalon, trail to Plateau Michel, hygrophilic rainforest, on a dead corticated woody liana, 7 Aug. 2016, *leg.* J. Fournier, MJF 16161 (LIP; HAST 142985).

Known distribution: Guadeloupe, Martinique (this paper).

Comments: *Xylaria papillata* Syd. is a distinctive taxon originally described from Congo (DE WILDERMAN, 1909), re-described and illustrated by DENNIS (1958; 1961) but never recorded again, characterized by small, gregarious, penzigoid, sessile stromata bearing a conspicuous central pointed apex coated with a white outer layer and ellipsoid-inequilateral ascospores 16–19 × 6–8 µm (15–20 × 8–10 µm in the original description). The material collected in Guadeloupe and Martinique illustrated above was first referred to *X. papillata* (Ju, pers. comm., 2003), because of its stromata exhibiting the same distinctive features and similar ascospores, though slightly smaller (Table 7). Further slight differences were the diameter of stromata (0.8–1.8 mm vs. 2–4 mm) and the presence of discoid ostioles reported by DENNIS (1961). As, according to DENNIS (1961), “rather similar fungi occur in South Africa and South America”, it appeared that aside from minor differences, our collections could match with *X. papillata*.

However, upon revision of the type specimen of *X. papillata* by Dr Ju (pers. comm.), its ascospores proved to have a sigmoid germ slit, a feature usually highly diagnostic within *Xylariaceae* and unfortunately not recorded by DENNIS (1958; 1961). This observation led Dr Ju to revise his record of *X. papillata* from Taiwan (JU & ROGERS, 1999) and to refer it to *X. xylarioides* (Speg.) Hladki & Romero, as reported by FOURNIER *et al.* (2016). The *Xylaria* spp. with stunted apiculate stromata, most likely belonging to the *X. arbuscula* aggregate (HSIEH *et al.*, 2010), were compared to *X. xylarioides* by HLADKI & ROMERO (2010), who regarded *X. papillata* as a possible synonym. The differences between these closely related species including *X. xylarioides* and *X. papillata* were discussed by FOURNIER *et al.* (2016).

The sigmoid germ slit of ascospores of the type specimen of *X. papillata*, added to the slight morphological differences reported above and the different geographic origin of our four collections from Guadeloupe and Martinique, led us to regard them as representing a different taxon, for which we propose the epithet *papilla-*

toides in reference to the strong morphological resemblance with typical *X. papillata*.

Another penzigoid *Xylaria* species featuring stromata coated with a persistent white outer layer and dark brown strongly inequilateral ascospores with a long straight germ slit that should be compared with *X. papillatoides* is *X. cantareirensis* (this paper). The latter differs by having flat to convex stromata lacking a pointed apex and significantly larger ascospores averaging 22.2 × 8.7 µm but the numerous morphological similarities of *X. cantareirensis*, *X. papillata* and *X. papillatoides* suggest they might be related.

Xylaria parvula J. Fourn. & Lechat, *sp. nov.* – MycoBank MB 827208. Plate 19.

Diagnosis: Differs from other known species of penzigoid *Xylaria* by usually uniperitheciate stromata less than 1 mm diam, combined with a thick, coarsely warted leathery crust with a tan pellicle on top of stroma, weakly papillate ostioles and subreniform ascospores averaging 15.9 × 7.1 µm with broadly rounded ends and a strongly sigmoid, slightly spiralling germ slit slightly less than spore-length.

Holotype: FRENCH WEST INDIES: MARTINIQUE: Le Saint-Esprit, Bois La Charles, mesophilic rainforest, on a dead decorticated branch ca. 2 cm diam, 20 Aug. 2013, *leg.* J. Fournier, MJF 13336 (LIP; HAST 142986, ISOTYPE).

Etymology: From Latin *parvulus* = very small, for the minute stromata consistently less than 1 mm diam.

Stromata densely gregarious, superficial, 1(–2)-peritheciate, 0.6–0.75 mm diam × 0.5–0.6 mm high, subglobose to slightly vertically flattened, apically convex, sessile, centrally attached to the substrate. Stromatal surface black, coarsely warted at sides, coated with a tan pellicle vanishing at sides but persistent on top around the ostioles; crust leathery, 80–120 µm thick, fairly rigid due to its thickness; interior whitish, solid, poorly developed, forming a thin layer around the perithecium, thicker at base, turning brownish or inconspicuous in older stromata. **Perithecia** subglobose 0.4–0.45 mm diam. **Ostioles** obtusely papillate, black, inconspicuous.

Asci cylindrical, with (6–)8 slightly overlapping uniseriately arranged ascospores, the spore-bearing parts 108–120 µm long × 9–10 µm wide, the stipes 50–78 µm long, with apical apparatus acorn-shaped with lower half cylindrical and upper half conical with a truncate apex and a sharp lateral rim, 5.6–6.7 × 4.2–5.1 µm (Me = 6.1 × 4.7 µm, N = 25), strongly bluing in Melzer's reagent. **Paraphyses** copious, hyphal, thin-walled, remotely septate, 6–7 µm wide at base, tapering to 1.5–2 µm wide above asci, embedded in mucilaginous material. **Ascospores** (13.8–)14.7–17.1(–18.2) × (6.2–)6.5–7.6(–7.7) µm, Q = (1.9–)2–2.5(–2.7), N = 60 (Me = 15.9 × 7.1 µm, Qe = 2.3), ellipsoid-inequilateral with broadly rounded ends, often reniform in side view, unicellular, dark brown to blackish brown, smooth, with a thin appressed mucilaginous sheath only visible in India ink, with a conspicuous sigmoid to spiralling germ slit on the ventral side, slightly less than spore-length; epispore smooth.

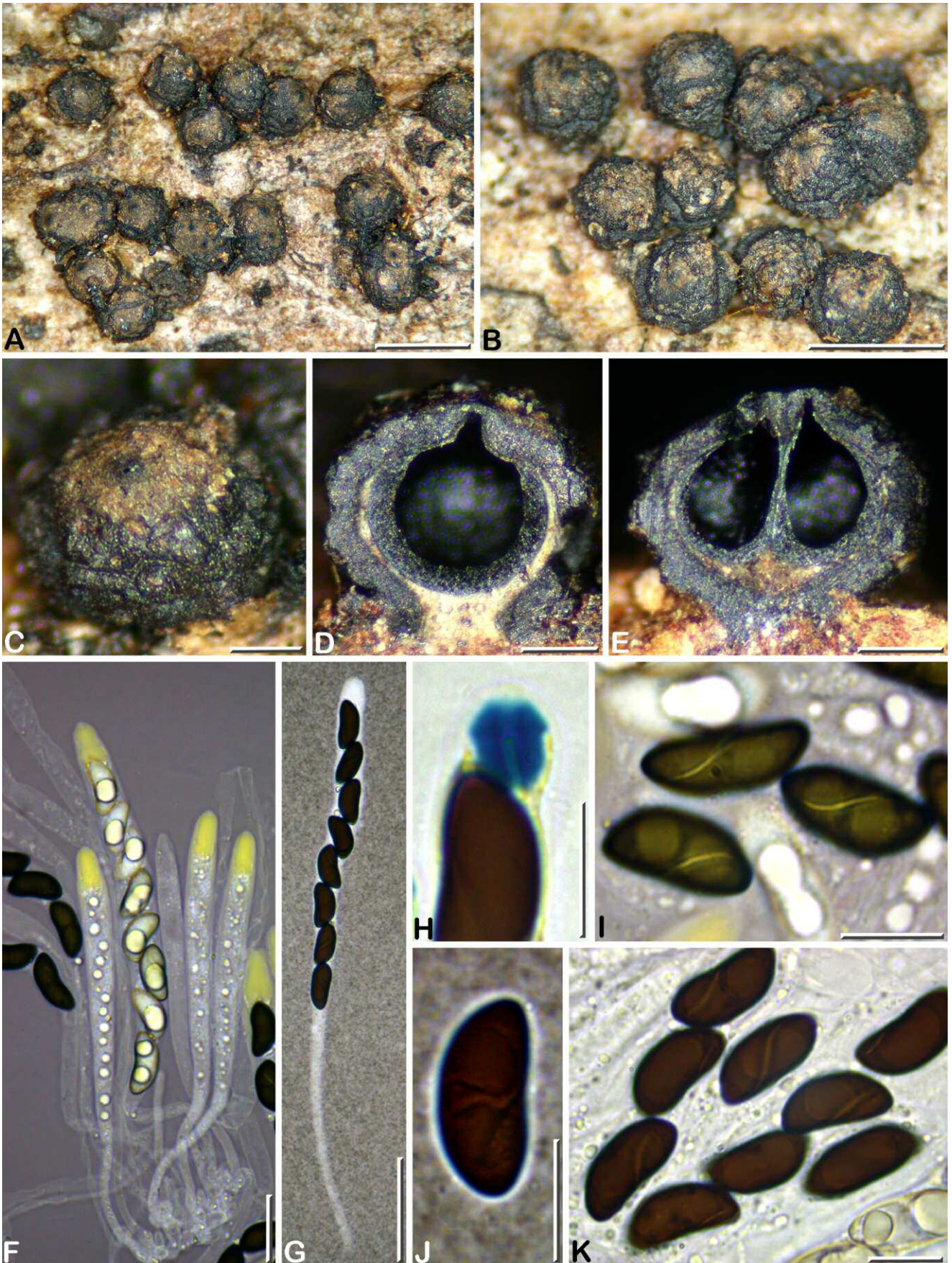


Plate 19 – *Xylaria parvula*

MJF 13336 (Holotype). A, B: Habit of mature stromata on host surface; C: Uniperitheciate stroma in oblique side view showing a warted surface, a smooth tan apical pellicle and a faintly papillate ostiole; D: Uniperitheciate stroma in vertical section showing a narrowed base, a thick leathery outer crust and whitish tissue around and beneath the perithecium; E: Biperitheciate stroma in vertical section showing a thick leathery outer crust and poorly developed brownish tissue beneath the perithecia; F: Immature asci and some paraphyses, in black Pelikan® ink; G: Mature ascus with broken stipe, in India ink; H: Ascinal apical apparatus, in Melzer's reagent; I: Ascospores in ventral and lateral view showing spiralling germ slits, in black Pelikan® ink; J: Mature ascospore in side view showing a thin appressed mucilaginous sheath, in India ink; K: Ascospores in 1% SDS, some showing a germ slit. Scale bars: A, B = 1 mm; C-E = 0.2 mm; F = 20 µm; G = 50 µm; H-K = 10 µm.

Asexual morph on the natural substrate not seen.

Known distribution: Known only from the type collection in Martinique.

Comments: *Xylaria parvula* recalls *X. boergesenii* by its small subglobose stromata with tan scales and inconspicuous ostioles, combined with dark brown somewhat reniform ascospores with a spiralling germ slit. However, it deviates from *X. boergesenii* by smaller and uniperitheciate stromata with a thick leathery stromatal wall, a more massive ascus apical apparatus and shorter ascospores $15.9 \times 7.1 \mu\text{m}$, $Q_e = 2.3$ vs. $20.8 \times 7.2 \mu\text{m}$, $Q_e = 2.9$ (CANNON, 1987; this paper).

It resembles *X. entomelaina* as described above in having minute stromata with tan scales on top and dark brown ascospores with a spiralling germ slit. It is distinguished from *X. entomelaina* by a thick leathery stromatal wall vs. thin and carbonaceous, a white interior vs. black and ascospores averaging $15.9 \times 7.1 \mu\text{m}$ with broadly rounded ends vs. $24.5 \times 10.6 \mu\text{m}$ with pinched ends in *X. entomelaina*.

The collection MJF 13098 is reminiscent of *X. parvula* in several respects and is described herein as *Xylaria* sp. For differences and similarities between both taxa, see the "Comments" under *Xylaria* sp. MJF 13098.

Xylaria peltiformis J. Fourn. & Lechat, *sp. nov.* – MycoBank MB 827210. Plates 20–21. Table 8.

Diagnosis: Differs from *X. globosa* (= *X. anisopleura*) and related species in the *X. polymorpha* aggregate as defined by HSIEH *et al.* (2010) by discoid, flat-topped to slightly convex stromata with thin, minute grey to brown polygonal superficial scales.

Holotype: FRENCH WEST INDIES: MARTINIQUE: Fort-de-France, forest track of Fond Baron, hygrophilic rainforest, on a dead corticated branch on the ground, associated with *Stilbohypoxyton quisquiliarum* and *X. globosa*, 14 Jun. 2014, *leg.* C. Lechat & J. Fournier, MJF 14155 (LIP; HAST 142987, Isotype).

Etymology: From Latin *pelta* = small convex shield and *forma* = shape, for the convex to flattened shield-shaped stromata.

Stromata gregarious in small or large groups, often in contact, superficial, discoid, turbinate to pulvinate, with flat to slightly convex top, 1.3–8.3 mm diam \times 1–3.5 mm high, the base usually obconical ending into a narrow connective, more rarely broadly attached or distinctly stipitate, the stipes up to 3.5 mm high \times 0.8–1.3 mm

diam; surface dull black, minutely reticulately-cracked into thin, persistent, polygonal, grey to dark brown scales rarely over 100 μm in their greatest dimension, with perithecial contours lacking to barely exposed; subsurface black, leathery, 40–70 μm thick; lower side black, reticulately-cracked, often covered in stiff black hairs sometimes also sparsely present on top; immature stromata cinnamon-brown, not associated with an asexual morph; interior solid, woody, white to yellowish, darker with faint orange tinge with age. **Perithecia** subglobose 0.65–0.85 mm diam to obovoid, 0.75–0.85 \times 0.45–0.6 mm. **Ostioles** faintly papillate, rounded, black, ca. 100 μm diam at base, porate, at times surrounded by a disc of white substance.

Asci cylindrical, with (4–6–)8 slightly overlapping uniseriately arranged ascospores, the spore-bearing parts 144–172 \times 11–13 μm , the stipes 80–126 μm long, with apical apparatus slightly urn-shaped, apically flattened with a faint rim, 7.2–8.7 \times 4.8–5.9 μm (Me = 7.8 \times 5.3 μm , N = 80), strongly bluing in Melzer's reagent. **Paraphyses** copious, hyphal, thin-walled, 4–5 μm wide at base, tapering to 2 μm wide above asci, sparsely guttulate. **Ascospores** (20.4–)21.4–26.7(–28.4) \times (6.7–)7.1–9.5(–10.1) μm , Q = (2.2–)2.4–3.4(–3.9), N = 480 (Me = 23.6 \times 8.4 μm , $Q_e = 2.8$), fusiform-inequilateral to navicular in side view, frequently slightly ventrally concave, with narrowly rounded to subacute, often slightly pinched ends, medium to dark brown, unicellular, with a conspicuous, oblique to diagonal, slightly sigmoid germ slit on the flattened side, much less than spore-length, lacking appendages or mucilaginous sheath; epispore smooth.

Asexual morph on natural substrate not seen.

Known distribution: Guadeloupe, Martinique, P. R. China (Hainan).

Other specimens examined (paratypes except ZY 07021):

FRENCH WEST INDIES: GUADELOUPE: Basse-Terre, Capesterre-Belle-Eau, Grand Etang, hygrophilic rainforest, on dead decorticated wood, 6 Sept. 2005, *leg.* C. Lechat, CLL 5385 (LIP; HAST 142988); *ibid.*, 6 Sept. 2005, *leg.* C. Lechat, CLL 5396 (HAST 142989); Basse-Terre, Capesterre-Belle-Eau, third Carbet waterfall, hygrophilic rainforest, on a dead corticated branch, 23 Nov. 2006, *leg.* C. Lechat, CLL 6031 (LIP); *ibid.*, on dead wood, 23 Nov. 2006, *leg.* C. Lechat, CLL 6032 (LIP); *ibid.*, on dead wood, 23 Nov. 2006, *leg.* C. Lechat, CLL 6035 (LIP); Basse-Terre, Goyave, track to Moreau waterfall, hygrophilic rainforest, on bark, 10 Sept. 2003, *leg.* C. Lechat, CLL 1008 (LIP); Basse-Terre, Sainte-Rose, Sofaia, meso- to hygrophilic rainforest, on bark, 1 Sept. 2005, *leg.* C. Lécure, CLL 5298 (LIP; HAST 142990); Basse-Terre, Sainte-Rose, Sofaia, path to Saut des Trois Cornes, hygrophilic rain-

Table 8 – Ascospore dimensions in eight collections of *X. peltiformis* from Guadeloupe and Martinique, showing the range of intraspecific variations, compared with those of a collection from Hainan. Extreme values are in parentheses.

Collections numbers	Ascospore measurements	Q = quotient l/w N = number of measurements	Mean values
CLL 5396	(21.2)22.7–25.8(–28) \times (7.7–)8–9(–9.5) μm	Q = (2.4–)2.6–3.1(–3.6), N = 60	Me = 24.1 \times 8.5 μm $Q_e = 2.8$
CLL 5452	(20.4–)21.8–24.4(–25) \times (7.2–)7.8–8.9(–9.4) μm	Q = (2.3–)2.5–3(–3.3), N = 60	Me = 22.8 \times 8.4 μm $Q_e = 2.7$
CLL 6031	(22.2–)23.5–26.7(–28.1) \times (7.1–)7.6–8.8(–9.6) μm	Q = (2.7–)2.8–3.3(–3.7), N = 60	Me = 25 \times 8.2 μm $Q_e = 3.1$
CLL 6032	(20.8–)21.4–23.6(–26.5) \times (7–)7.6–8.8(–9.2) μm	Q = (2.4–)2.5–3.1(–3.2), N = 60	Me = 22.6 \times 8.2 μm $Q_e = 2.8$
MJF 07185	(21.5–)22.4–24.8(–27.6) \times (6.7–)7.1–8.5(–8.7) μm	Q = (2.6–)2.8–3.4(–3.8), N = 60	Me = 23.6 \times 7.8 μm $Q_e = 3$
MJF 14140	(21.4–)22.2–24.6(–26.1) \times (7.8–)8–9.1(–9.5) μm	Q = (2.3–)2.5–3(–3.2), N = 60	Me = 23.3 \times 8.6 μm $Q_e = 2.7$
MJF 14155 holotype	(20.7–)22.3–26.4(–28.4) \times (7.0–)7.6–9.3(–10.1) μm	Q = (2.2–)2.5–3.3(–3.9), N = 60	Me = 24.1 \times 8.5 μm $Q_e = 2.9$
MJF 14173	(20.7–)22.0–25.6(–27.5) \times (7.8–)8.3–9.5(–10.1) μm	Q = (2.2–)2.4–3.0(–3.3), N = 60	Me = 23.6 \times 8.9 μm $Q_e = 2.7$
Cumulated values	(20.4–)21.4–26.7(–28.4) \times (6.7–)7.1–9.5(–10.1) μm	Q = (2.2–)2.4–3.4(–3.9), N = 480	Me = 23.6 \times 8.4 μm $Q_e = 2.8$
ZY07021 Hainan	(21.4–)22.2–25.4(–26.7) \times (7.3–)7.5–8.5(–9.2) μm	Q = (2.4–)2.7–3.2(–3.5); N = 60	Me = 23.7 \times 8.1 μm $Q_e = 2.9$

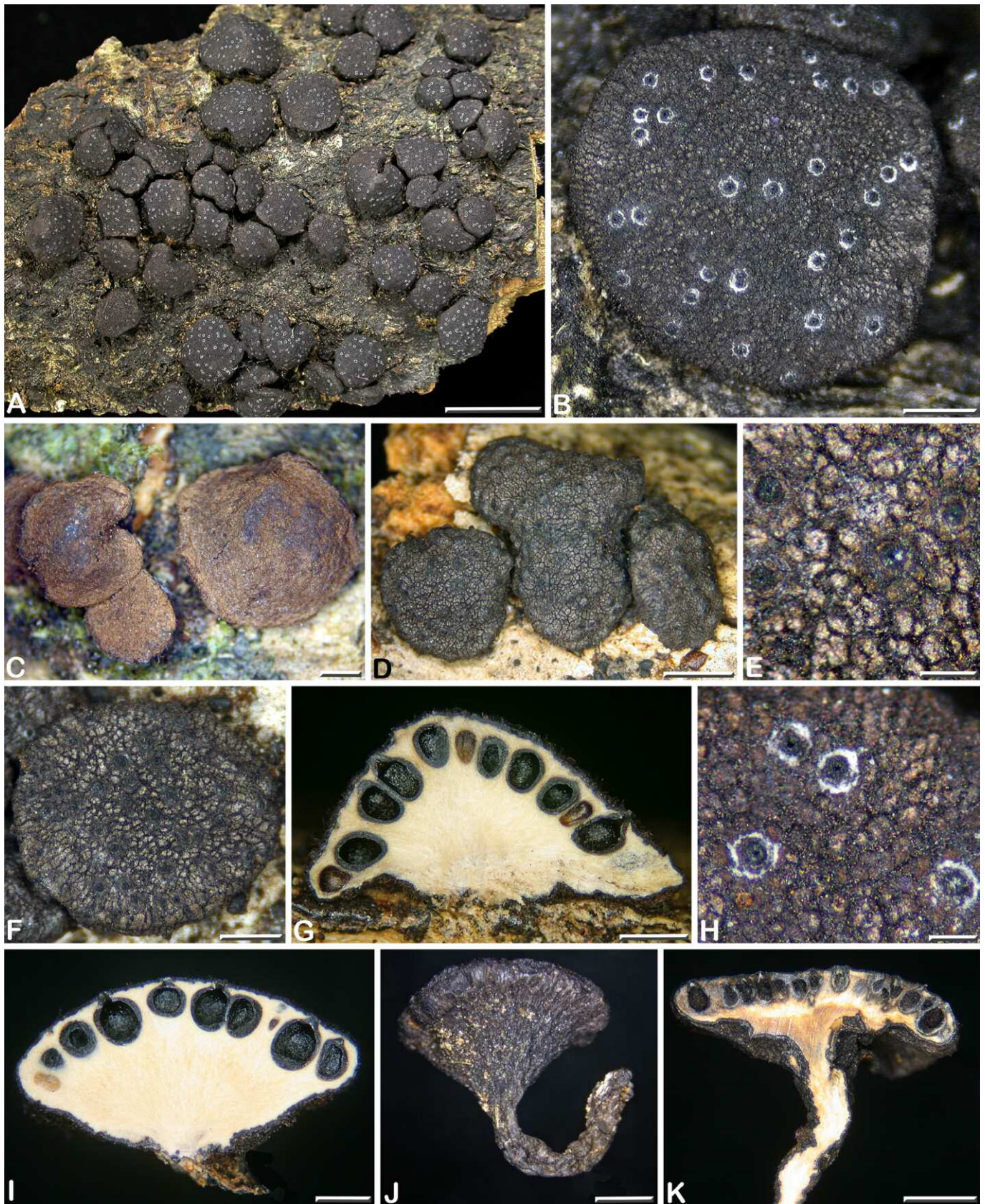


Plate 20 – *Xylaria peltiformis*

A, B, H, I: MJF 14155 (Holotype); C-G: MJF 14140; J, K: CLL 6032. A: Habit of peltate and flat-topped stromata in top view on host surface; B: Flat-topped stroma in top view showing a minutely scaly surface and papillate ostioles, some surrounded by a ring of white substance; C: Immature peltate stromata; D: Mature peltate stromata; E, H: Stromatal surface in close-up showing minute grey scales and black papillate ostioles; F: Flat-topped stroma in top view showing a minutely scaly and faintly reticulate surface and black papillate ostioles; G: Peltate stroma with a broad connective in vertical section; I: Peltate stroma in vertical section, with an obconical base and a narrow connective; J: Stipitate flat-topped stroma in side view; K: Stipitate flat-topped stroma in vertical section (somewhat overmature). Scale bars: A = 10 mm; B, C, F, G, I = 1 mm; D, J, K = 2 mm; E, H = 0.25 mm.

forest, on a dead corticated branch, Nov. 2005, *leg.* C. Lechat, CLL 5452 (LIP; HAST 142991). MARTINIQUE: Case-Pilote, Crête Jean-Louis, hygrophilic rainforest, on a dead corticated branch, associated with *X. globosa*, 4 Sept. 2003, *leg.* C. Lechat, CLL 0794-2 (LIP); Fort-de-France, Pitons du Carbet forest, Fond Mitton, hygrophilic rainforest, on a dead corticated branch, 21 Jun. 2015, *leg.* J. Fournier, MJF 15184 (LIP); Fort-de-France, edge of the parking lot of Maison forestière de la Donis, hygrophilic rainforest, on a dead corticated branch, 15 Jun. 2014, *leg.* J. Fournier, MJF 14174 (LIP; HAST 142992); Le Morne-Rouge, La Propreté, forest track, hygrophilic rainforest, on a dead corticated branch, 24 Aug. 2007, *leg.* J. Fournier, MJF 07064 (LIP); *ibid.*, on a dead corticated branch, 24 Aug. 2007, *leg.* J. Fournier, MJF 07082 (LIP); *ibid.*, on a dead corticated branch of Hibiscus (*Hibiscus elatus* Sw., *Malvaceae*), 29 Aug. 2007, *leg.* J. Fournier, MJF 07185 (LIP);

ibid., same host, 6 Jun. 2014, *leg.* J. Fournier, MJF 14064 (LIP; HAST 142993); *ibid.*, on a dead corticated branch, 6 Jun. 2014, *leg.* J. Fournier, MJF 14071 (LIP); *ibid.*, on a dead corticated branch of Mahogany (*Swietenia macrophylla* King, *Meliaceae*), 12 Jun. 2014, *leg.* J. Fournier, MJF 14127 (LIP); Le Morne-Rouge, La Propreté, Hibiscus plantation, hygrophilic rainforest, on a dead corticated branch of Hibiscus (*Hibiscus elatus* Sw., *Malvaceae*), 12 Jun. 2014, *leg.* J. Fournier, MJF 14140 (LIP); Macouba, Trou Navet, hygrophilic rainforest, on a dead woody fruit of *Sterculia caribaea* R. Br. (*Malvaceae*), associated with *X. rhytidosperra*, 13 Aug. 2013, *leg.* J. Fournier, MJF 13194-2 (LIP).

P. R. CHINA: HAINAN: Dialuo mountain, ca. 1000 m, hygrophilic rainforest, on dead decorticated wood, 8 Aug. 2007, *leg.* Y. Zhang, ZY 07021 (JF).

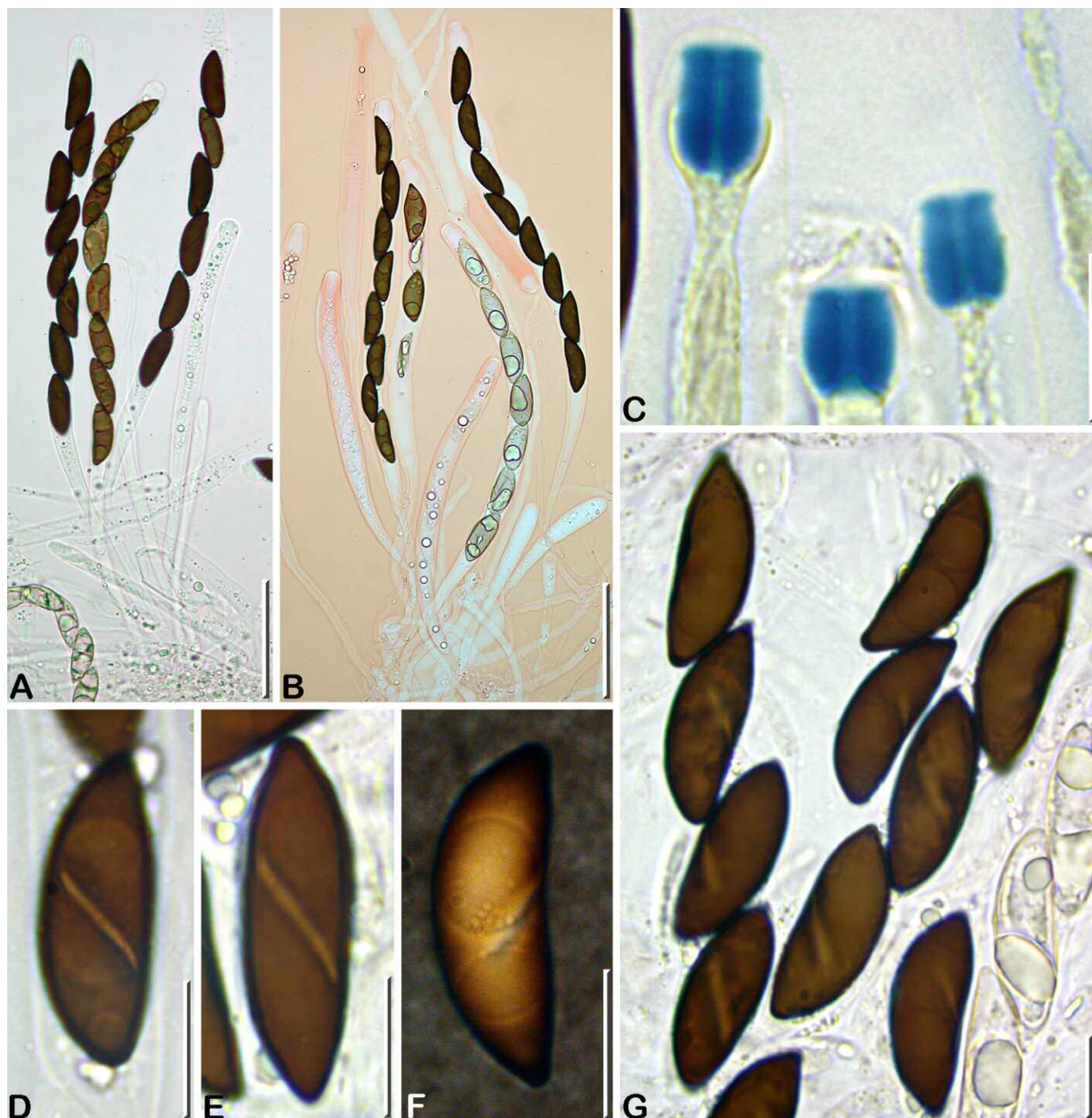


Plate 21 – *Xylaria peltiformis*

A-G: MJF 14155 (Holotype). A, B: Immature and mature asci, in 1% SDS and Congo red in 1% SDS respectively; C: Ascus apical apparatus in Melzer's reagent; D, E: Ascospores in ventral view showing a variously slanted germ slit, in 1% SDS; F: Ascospore in India ink, showing the absence of appendage or slimy sheath; G: Ascospores in 1% SDS, some showing a germ slit. Scale bars: A, B = 50 µm; C-G = 10 µm.

Comments: By its stromata with a reticulately cracked surface and a thin leathery subsurface, combined with large fusiform-inequilateral ascospores with a short oblique germ slit, this *Xylaria* shows obvious affinities with the species of the *X. polymorpha* aggregate as defined by HSIEH *et al.* (2010). It strikingly differs from the species of this group by consistently discoid, convex to flat-topped stromata, whose surface is minutely cracked into thin grey scales. The most resembling species as to the surface cracking pattern and ascospore morphology and dimensions is *X. schweinitzii* Berk. & M.A. Curtis. The stipitate stromata of this widespread tropical taxon exhibit a wide range of morphological variations from clavate to ellipsoid or subglobose, but never appear discoid with a convex to flattened top like what we observed in our numerous collections from Guadeloupe and Martinique. On two occasions, this discoid *Xylaria* was encountered in close association with stromata of *X. globosa* which is readily distinguished by its coarsely warted subglobose to short-ellipsoid or conical stromata with large discoid ostioles.

Our attention was drawn by Dr. Ju on *Penzigia turbinata* (Ellis & Everhart) J.H. Miller, a poorly documented penzigoid species known from Nicaragua, which likewise features turbinate, flat-topped stromata evoking our collections but has significantly smaller ascospores $14.5\text{--}19 \times 6\text{--}7 \mu\text{m}$.

In absence of a known species presenting a similar combination of macro- and micro-morphological characters, the new species *X. peltiformis* is proposed to accommodate our twenty collections from Guadeloupe and Martinique. Based on the highly similar stromatal morphology and ascospores dimensions (Table 8), a collection from Hainan (P. R. China) is equated to *X. peltiformis*, which would imply a markedly disjunct distribution but is more likely the reflect of insufficient sampling.

Recent information on *X. clavus* C.G. Lloyd became available after revision of some "missing" Lloyd's specimens at BPI (Ju *et al.*, 2016). This species, described from Indonesia, resembles *X. globosa* but features turbinate stromata with a hemispherical fertile head. Its ascospores are $23\text{--}26.5 \times 7.5\text{--}8.5 \mu\text{m}$ with a short oblique germ slit, in the same size range as *X. globosa* and *X. peltiformis*. Its stromatal surface appears finely squamulose, unlike that of *X. globosa* but like that of *X. peltiformis*. Since the material of *X. clavus* consists of 11 stromata featuring the same hemispherical head on a narrowly obconical stipe unlike the numerous stromata of our 20 collections of *X. peltiformis* characterized by consistently flat-topped to slightly convex fertile part, this morphological difference appears to warrant the distinctiveness of both species which, however, might be likely closely related.

ROGERS *et al.* (1987) reported from Sulawesi (Indonesia) a collection of a xylariaceous fungus they referred to *Kretzschmaria cf. mauritanica* Pat., characterized by nail-shaped stromata up to 2 mm high \times 4 mm wide with a deeply cracked blackish surface with a white bloom and ellipsoid-inequilateral ascospores $20.6\text{--}25 \times 6.6\text{--}8 \mu\text{m}$ with a short oblique germ slit. Similar material fitting well this description was likewise reported from Papua New Guinea by VAN DER GUCHT (1995), who, in absence of further differential characters, considered these few collections to represent a peltate form of *X. anisopleura* with which it occurred to grow simultaneously. These collections do not match well with the description of *K. mauritanica* given by PATOILLARD (1905) and might represent earlier collections of *X. peltiformis*. PATOILLARD (1905) recorded on the original material of *Sphaeria mauritanica* Durieu & Mont., collected in Algeria (North Africa), the presence of a black crust on burnt palm stumps from which emerge flat-topped "tubercles" on branching stipes, with four-spored asci and brown, navicular ascospores $18\text{--}20 \times 5\text{--}6 \mu\text{m}$, thus significantly smaller than those of *X. peltiformis*. This fungus, as *Hypoxylon mauritanicum* (Durieu & Mont.) Mont., was revised by JU & ROGERS (1996) and assigned to *Xylaria*.

The collection CLL 6032 deviates from other collections of *X. peltiformis* in having clearly stipitate stromata and slightly smaller ascospores averaging $22.6 \times 8.2 \mu\text{m}$ (Table 8). In absence of other

deviating features, including the very typical stromatal surface, these differences are provisionally regarded as abnormalities resulting from external conditions and do not warrant the erection of a different taxon.

Another conspicuous deviating character is the presence of white rings around the ostioles in the collection MJF 14155, the holotype. The occasional presence of white substance around the ostioles is known to occur throughout all xylariaceous genera but no taxonomic importance is given to this character which is inconsistent and most likely results from environmental conditions (SAN MARTÍN & ROGERS, 1989).

Xylaria peltiformis seems to have a strong ecological preference for hygrophilic forests, in which it appears to be not uncommon, on various dicotyledonous hosts.

Xylaria rhytidosperma J. Fourn. & Lechat, *sp. nov.* – MycoBank MB 827212. Plates 22–23. Table 9.

Diagnosis: Differs from *X. glebulosa*, the most resembling penzigoid *Xylaria* species, by coarsely warted immature stromata associated with sterile synnematosous conidiomata, and slightly larger ascospores consistently appearing as ornamented by linear folds.

Holotype: FRENCH WEST INDIES: MARTINIQUE: Le Lorrain, Rivière Pirogue, lowland rainforest, on a dead woody fruit of Mahogany (*Swietenia macrophylla* King, *Meliaceae*), 26 Aug. 2004, *leg.* C. Lechat, CLL 2128 (LIP) (HAST 142994, Isotype).

Etymology: From Greek ῥυτίς, -ῖδος = wrinkle, fold, and σπέρμα = seed, spore, for the ornamented ascospores.

Stromata densely gregarious, often in contact, superficial, pulvinate to subglobose, more rarely turbinate, few-peritheciate, $1.3\text{--}2.5 \text{ mm diam} \times 1\text{--}2.6 \text{ mm high}$, faintly convex on top, on a wide to narrow, often ill-defined connective; surface dark brown to dull black, coarsely roughened by thick, black, soft, pyramid-shaped warts prevailing at immature state, gradually worn off with age and leaving deep cracks delimiting polygonal scales, without visible perithecial contours; subsurface hard-textured, carbonaceous, $80\text{--}100 \mu\text{m}$ thick; immature stromata bear one or two golden brown synnemata on top, rarely on sides, fragile, leaving a brown discoid scar, without traces of conidiogenesis; a different type of upright synnematosous structure occurs at base of immature stromata, simple to branched, up to 0.6 mm high, olivaceous grey with a white apex composed of coiled sterile hyphae; interior white, loosely fibrous. **Perithecia** subglobose, $0.6\text{--}0.8 \text{ mm diam}$. **Ostioles** faintly papillate, black, only visible at maturity.

Asci cylindrical, with (4–6–)8 slightly overlapping uniseriately arranged ascospores, the spore-bearing parts $185\text{--}225 \times 11.5\text{--}15.5 \mu\text{m}$, the stipes $55\text{--}90 \mu\text{m}$ long, with apical apparatus urn-shaped with a sharp subapical rim, $8.1\text{--}10.4 \times 5.4\text{--}6.4 \mu\text{m}$ (Me = $9.4 \times 5.9 \mu\text{m}$, N = 60), strongly bluing in Melzer's reagent. **Paraphyses** copious, hyphal, thin-walled, remotely septate, $6\text{--}8 \mu\text{m}$ wide at base, tapering to $2 \mu\text{m}$ wide above asci, sparsely guttulate. **Ascospores** (26–)28.4–36.5(–38.6) \times (7.8–)8.4–11.1(–11.7) μm , Q = (2.5–)2.8–4(–4.6), N = 300 (Me = $32.8 \times 10.1 \mu\text{m}$, Qe = 3.3), fusiform-inequilateral to navicular in side view, frequently ventrally concave, with narrowly rounded ends, medium to dark brown, unicellular, with a conspicuous, oblique to diagonal, slightly sigmoid germ slit on the flattened side, much less than spore-length, lacking appendages or mucilaginous sheath; epispore smooth, but appearing ornamented by short, straight, variously oriented striations or rod-like structures that belong to the ascospore content and show through the epispore.

Supposed asexual morph on the natural substrate forming upright sterile synnemata at base of immature stromata or fragile conidiomata on top of immature stromata, both composed of strongly coiled pigmented or hyaline hyphae showing no sign of conidiogenesis.

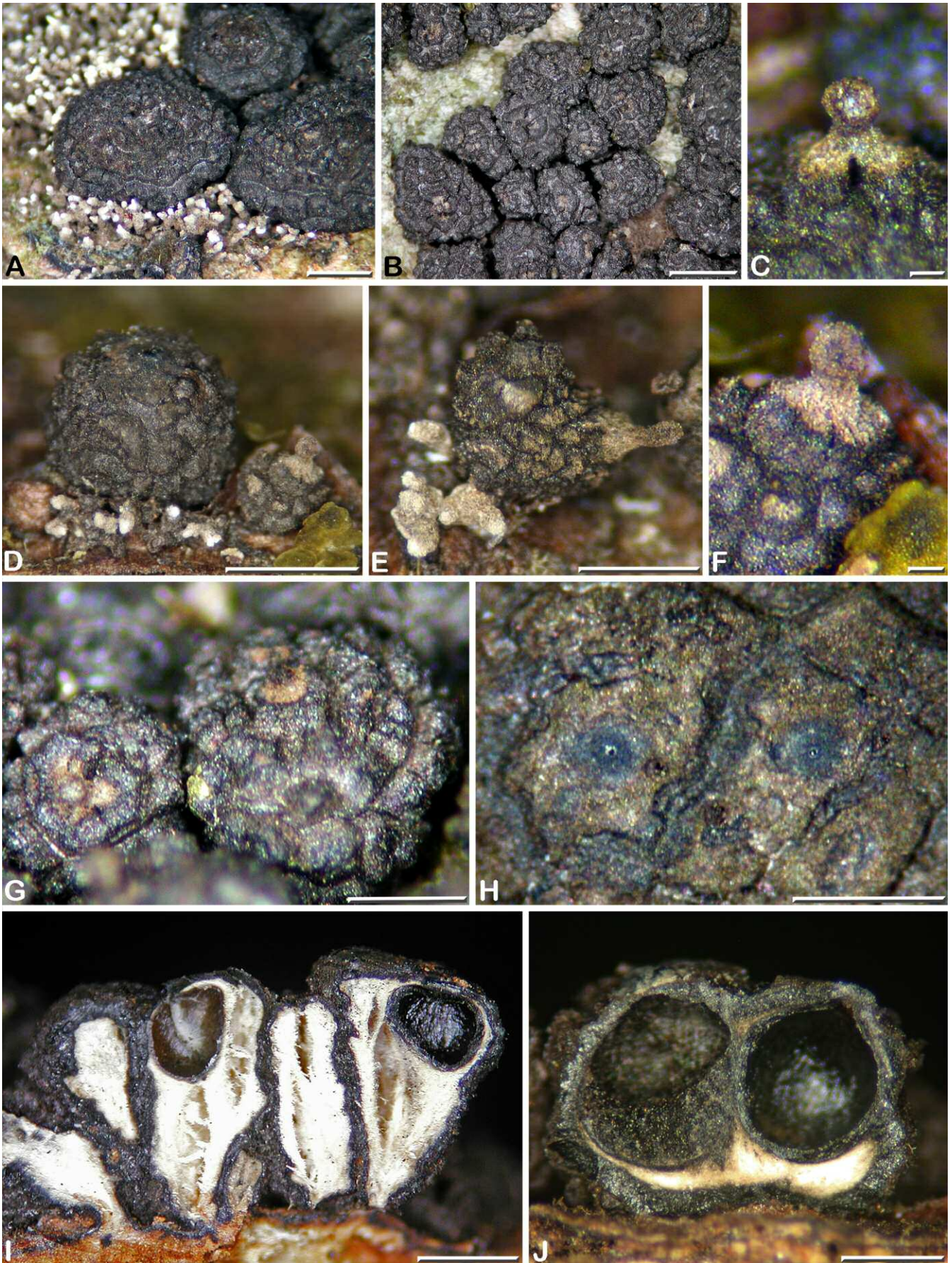


Plate 22 – *Xylaria rhytidosperma*

A, B, G: CLL 6026–2; C–F, J: MJF 14085; H, I: CLL 2128 (Holotype). A: Immature pulvinate stromata associated with sterile upright synnematos conidiomata at margin; B: Crowded immature stromata with coarsely warted surface; C, F: Conidiomata on top of immature stromata; D: Mature stroma associated with upright conidiomata (left) and immature stroma bearing an apical conidioma (right); E: Immature stroma associated with upright conidiomata at base and a lateral conidioma; G: Two immature stromata showing coarsely warted surface and tan conidiomatal abscission scars on top; H: Mature stroma in top view showing deep cracks and faintly papillate ostioles; I: Turbinate stromata in vertical section; J: Sessile stroma in vertical section. Scale bars: A, B, D, I = 1 mm; C, F = 0.1 mm; E, G, H, J = 0.5 mm.

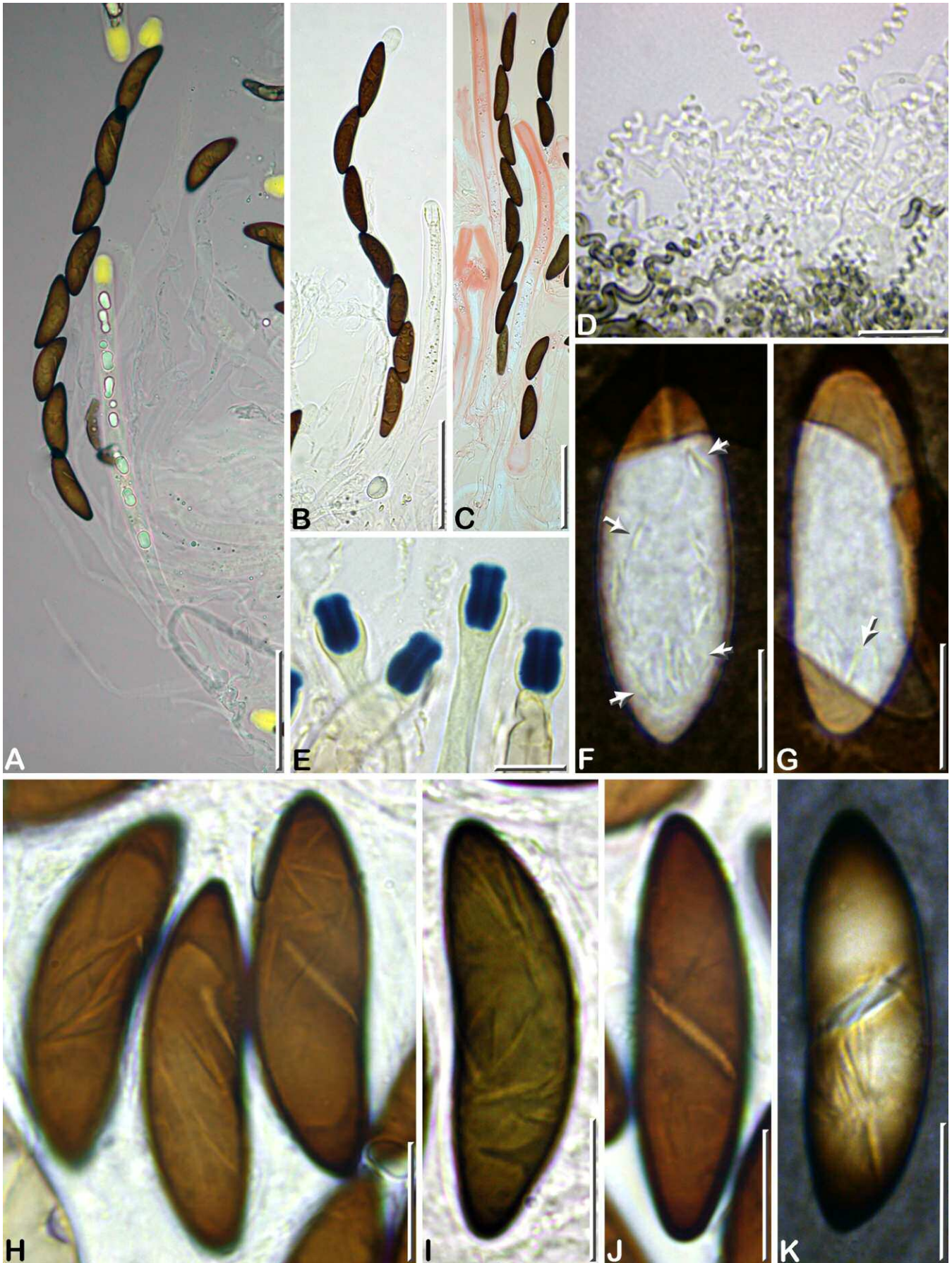


Plate 23 – *Xylaria rhytidosperma*

A-C, E-H, J, K: CLL 2128 (Holotype); D, I: CLL6026-2. A: Immature and mature asci, in black Pelikan® ink; B: Seven-spored ascus, in 1% SDS; C: Immature and mature asci, in Congo red and 1% SDS; D: Pigmented and colourless coiled hyphae from a synnemal tip, in 3% KOH; E: Ascinal apical apparatus in Melzer's reagent; F, G: Ascospores with broken episporium showing refractive rod-like structures within the hyaline content (arrows), in India ink; H, I: Ascospores in lateral to ventro-lateral view showing germ slits and linear ornamentations, in 1% SDS; J: Ascospore in ventral view showing a diagonal germ slit, in 1% SDS (ornamentations are out of focus); K: Ascospore in India ink showing the absence of appendage or slimy sheath. Scale bars: A-C = 50 µm; D-K = 10 µm.

Table 9 – Ascospore dimensions in five collections of *X. rhytidosporma* from Guadeloupe and Martinique, showing the range of intraspecific variations, compared with those of *X. glebulosa* given by JU & ROGERS (1999). Extreme values are in parentheses.

Collections numbers	Ascospore measurements	Q = quotient l/w N = number of measurements	Mean values
CLL2128	(29.2–)30.6–36.1(–37.6) × (7.8–)8.4–10.2(–10.8) μm	Q = (2.9–)3.2–4(–4.6), N = 60	Me = 33.3 × 9.4 μm Qe = 3.6
CLL 6026-2	(26–)28.4–34.3(–37.7) × (9.1–)9.3–10.8(–11.6) μm	Q = (2.5–)2.8–3.4(–4), N = 60	Me = 31.2 × 10 μm Qe = 3.1
JV 415	(30.9–)32–36.5(–38.2) × (9.7–)10–11.1(–11.6) μm	Q = (2.9–)3–3.5(–3.6), N = 60	Me = 34.1 × 10.5 μm Qe = 3.2
MJF 13194	(28.6–)29.8–34.3(–36) × (9.2–)9.6–10.8(–11.7) μm	Q = (2.7–)2.8–3.4(–3.7), N = 60	Me = 31.6 × 10.2 μm Qe = 3.1
MJF 14085	(28.7–)31.4–35.9(–38.6) × (9.2–)9.8–10.9(–11.4) μm	Q = (2.8–)3–3.5(–3.8), N = 60	Me = 33.7 × 10.3 μm Qe = 3.3
Cumulated values	(26–)28.4–36.5(–38.6) × (7.8–)8.4–11.1(–11.7) μm	Q = (2.5–)2.8–4(–4.6), N = 300	Me = 32.8 × 10.1 μm Qe = 3.3
<i>X. glebulosa</i> Ju & Rogers (1999)	27–31 × 8–10 μm	–	Me = 29 × 9 μm Qe = 3.2

Known distribution: Guadeloupe, Martinique.

Other specimens examined (paratypes): FRENCH WEST INDIES:

GUADELOUPE: Basse-Terre, Saint-Claude, Matouba, hygrophilic rainforest, on a dead corticated branch, 8 Dec. 1988, *leg.* J. Vivant, communicated by F. Candoussau as *X. anisopleura*, JV 415 (LIP); Basse-Terre, Vieux-Fort, Ravine Blondeau, hygrophilic rainforest, on a dead corticated branch, 22 Nov. 2006, *leg.* C. Lechat, CLL 6026-2 (LIP); Grande-Terre, Saint-François, Anse Kahouanne, xerophilic coastal forest, on a dead corticated branch, 13 Sept. 2003, *leg.* C. Lécuru, CLL 1096 (LIP). MARTINIQUE: Le Prêcheur, Anse Coulevre, coastal mesophilic forest, on a dead rotten trunk of *Cocos nucifera* (Arecaceae) on river bank, 24 Aug. 2010, *leg.* J. Fournier, MJF 10098 (depauperate) (LIP); Macouba, Trou Navet, hygrophilic rainforest, on a dead woody fruit of *Sterculia caribaea* R. Br. (Malvaceae), associated with *X. peltiformis*, 13 Aug. 2013, *leg.* J. Fournier, MJF 13194 (LIP; HAST 142995); Marigot, Habitation Denel, Perou forest, 350–400 m, hygrophilic rainforest, on a dead corticated branchlet of Mahogany (*Swietenia macrophylla* King, Meliaceae), 7 Jun. 2014, *leg.* J. Fournier, MJF 14085 (LIP; HAST 142996).

Comments: This small penzigoid *Xylaria* is strongly similar to *X. glebulosa* (Ces.) Y.-M. Ju & J.D. Rogers, known from Sri Lanka and Taiwan, in external morphology and in shape and dimensions of ascospores and ascapal apparatus (JU & ROGERS, 1999). A FWI specimen was included by HSIEH *et al.* (2010) in their phylogenetic study of *Xylarioideae* as *Xylaria* cf. *X. glebulosa* (CLL 2128), in which it showed affinities with species in the *X. polymorpha* aggregate. No sequences of typical *X. glebulosa* are available for comparison but some deviating morphological features suggest that the Caribbean fungus represents a different taxon. A thorough examination of the seven collections listed above shows they consistently differ from typical *X. glebulosa* by developing stromata bearing thick pyramid-shaped warts and golden brown sterile conidiomata and in being sometimes associated with sterile uprifgt synnemata on the surrounding host surface; the thick warts persist on mature stromata but gradually disappear with age. The ascospores are larger than those of *X. glebulosa*, averaging 32.8 × 10.1 μm vs. 29 × 9 μm, but with some overlap (Table 9), and lack the frequently pinched ends reported for *X. glebulosa*. The most distinctive character is the presence of linear, rod-shaped, variously oriented “folds” seemingly on the ascospore surface, which was first taken for a possible artifact linked to excessive desiccation of the material or conditions of observation. As this character is consistently present in the seven collections studied and can be observed on freshly collected material as well as on herbarium material, regardless of the mounting medium, we have come to the conclusion that this feature is not an artifact. Scrutinizing the ascospores at high magnification shows that when the focus is made on the germ slit, thus on outermost

surface of the episporium, the “folds” are blurred and become sharper when the focus is slightly deeper. This suggests that the ornamentation is not superficial but possibly lies on the inner side of the episporium. It is by inadvertently putting excess pressure on a coverslip that we realized that ruptured ascospore wall is smooth and that the supposed ornamentation results from refractive rod-like structures present in the ascospore content and showing through the episporium. This character is easily observed on most ascospores of all the studied collections and is unknown by the authors to occur in any other xylariaceous taxon, at least in any similar penzigoid *Xylaria* spp. This character is considered highly diagnostic, and we thus name this fungus *X. rhytidosporma*.

Small sessile subglobose stromata associated with superficial synnemata are usually included in *Stilbohypoxylon* Henn., one of the genera mixed within *Xylaria* as subclades and rendering the latter paraphyletic (HSIEH *et al.*, 2010). None of the species listed by PETRINI (2004) in her revision of *Stilbohypoxylon* matches with the characters of *X. rhytidosporma*.

We likewise considered the comparison with *X. semiglobosa* G. Huang & L. Guo for its supposed resemblance to *X. glebulosa* (HUANG *et al.*, 2015) and thus to our new species. According to the authors, *X. semiglobosa* is characterized by larger stromata 4–14 mm diam with a finely reticulately cracked surface and smaller ascospores (20–)22–25(–27) × 6–7(–9) μm, a set of characters clearly separating it from *X. rhytidosporma*.

***Xylaria* sp. CLL 5109.** Plate 24. Table 10.

Stromata densely crowded, superficial, subglobose to broadly ellipsoid, slightly convex to almost flat-topped, 0.8–1.6 mm diam × 0.7–1.4 mm high, few-peritheciate, sessile to distinctly stipitate, stipe black, hairy to tomentose, 0.2–0.3 mm diam, up to 0.5 mm high; surface blackish, without exposed perithecial contours, roughened by low warts and shallow cracks, with traces of superficial brownish grey scales in places; crust black, slightly carbonaceous, 50–80 μm thick; interior white, fibrous, solid to lacunose, restricted to the lower half. **Perithecia** subglobose, 0.4–0.65 mm diam, to laterally flattened 0.4–0.5 × 0.25–0.35 mm. **Ostioles** faintly conic-papillate to obtusely papillate, 60–85 μm diam at base, black, often inconspicuous.

Asci cylindrical, with eight obliquely uniseriately arranged ascospores, the spore-bearing parts 67–74 × 5.5–6 μm, the stipes 60–70 μm long, fragile and most often ruptured, with apical ring slightly tubular with a faint upper rim, 2.1–2.5 × 1.6–1.8 μm (Me = 2.3 × 1.7 μm, N = 20), bluing in Melzer’s reagent. **Paraphyses** filiform, tapering above asci, embedded in mucilaginous material. **Ascospores** (9.1–)9.4–10.9(–11.6) × (3.6–)4–4.6(–4.7) μm, Q = (2.1–)2.2–2.6(–2.9), N = 60 (Me = 10 × 4.2 μm, Qe = 2.4), ellipsoid-inequilateral with

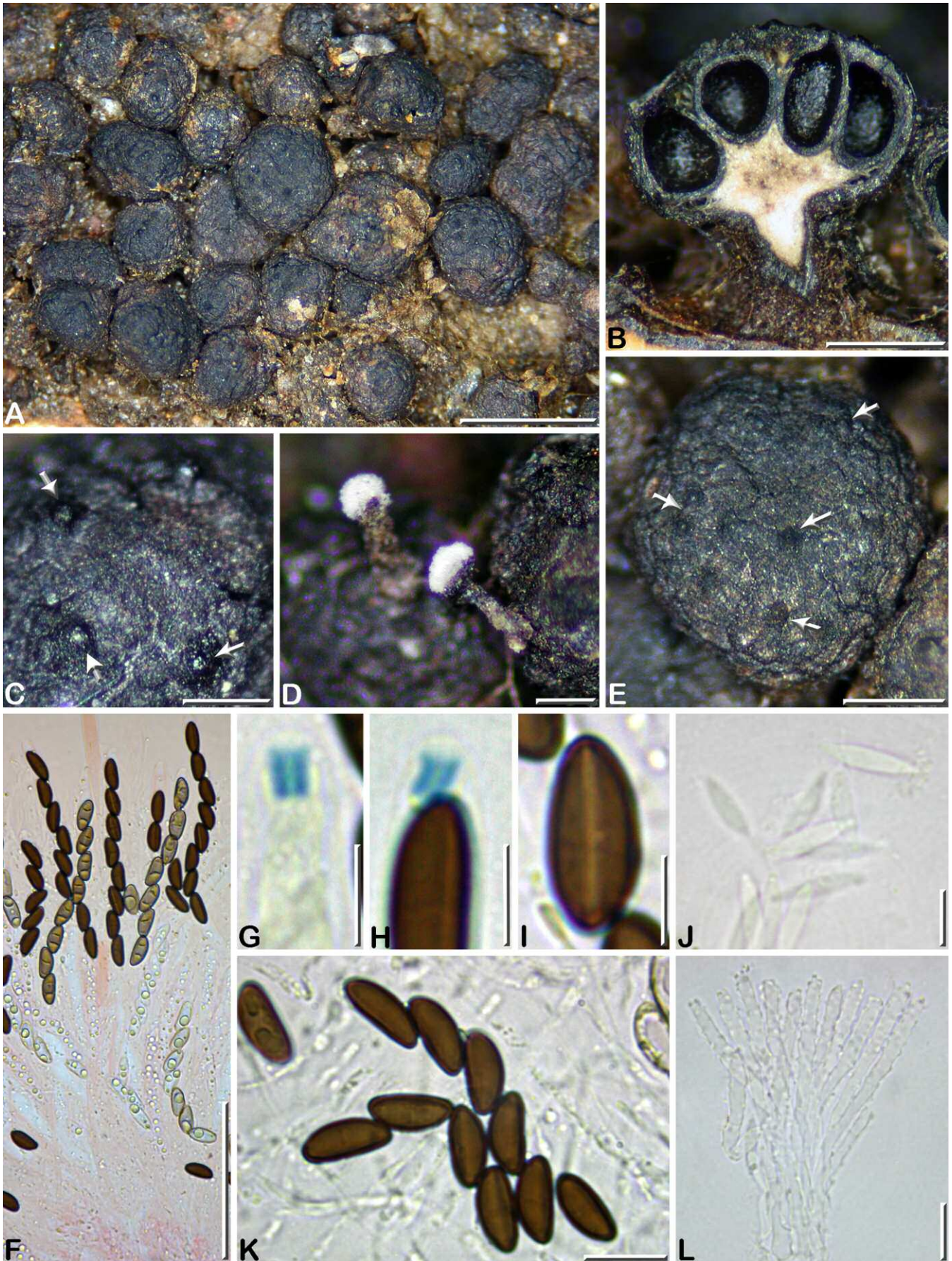


Plate 24 – *Xylaria* sp. CLL 5109

A: Habit of stromata on host surface; B: Stipitate stroma in vertical section showing a relatively thick black outer crust, white soft basal tissue and a tomentose stipe; C: Surface of a stroma in close-up, showing finely papillate ostioles (arrows); D: Two fertile synnemata arising from adjacent stromata; E: Slightly convex stroma showing a moderately cracked surface and papillate ostioles (arrows); F: Immature and mature asci, in Congo red and 1% SDS; G, H: Ascical apical apparatus in Melzer's reagent; I: Ascospore in ventral view showing a germ slit, in 1% SDS; J: Conidia in 1% SDS; K: Ascospores in 1% SDS; L: Bundle of cylindric conidiogenous cells, in 3% KOH. Scale bars: A = 2 mm; B, E = 0.5 mm; C, D = 0.2 mm; F = 50 μ m; G-J = 5 μ m; K, L = 10 μ m.

Table 10 – Ascospore dimensions in CLL 5109, compared with those of *X. obtusispora*. Extreme values are in parentheses.

Collections numbers	Ascospore measurements	Q = quotient l/w N = number of measurements	Mean values
CLL 5109	(9.1–)9.4–10.9(–11.6) × (3.6–)4–4.6(–4.7) μm	Q = (2.1–)2.12–2.6(–2.9), N = 60	Me = 10 × 4.2 μm Qe = 2.4
<i>X. obtusispora</i>	(10.2–)10.6–12.8(–13.7) × (4.2–)4.5–5.2(–5.5) μm	Q = (2–)2.2–2.7(–3), N = 120	Me = 11.6 × 4.9 μm Qe = 2.4

broadly rounded to less often narrowly rounded ends, the ventral side flattened to slightly concave, brown, with a conspicuous longitudinal, straight germ slit almost spore-length on the ventral side; no sheath or appendages observed in India ink; epispore smooth.

Putative asexual morph consisting of synnematos structures arising from the wall of some stromata, 0.17–0.45 mm high, featuring an upright black stipe, apically flared, bearing a white rounded fertile head composed of bundles of straight palisadic geniculosporium-like conidiogenous cells, 22–38 × 2.7–3.5 μm, with scattered denticles; conidia narrowly fusiform, colourless, smooth, 7–9 × 1.8–2.2 μm.

Specimen examined: FRENCH WEST INDIES: MARTINIQUE: Case-Pilote, Fond Bourlet, Prise d'Eau, hygrophilic rainforest, on dead corticated wood, 21 Aug. 2005, *leg.* C. Lechat, CLL 5109 (LIP; HAST 142997).

Known distribution: Martinique (this paper).

Comments: The material illustrated above was first referred to *X. obtusispora* on account of its small subglobose stromata with a thin, warted carbonaceous crust, inconspicuous ostioles and ascospores in a similar size range. Upon further examination, it proved to deviate from *X. obtusispora* by its stipitate stromata and more inequilateral and slightly smaller ascospores (Table 10), which led us to consider it as possibly different until more material of *X. obtusispora* becomes available to have a better understanding of its intraspecific variations. A further differential character is that the synnematal conidiomata encountered in CLL 5109 were absent in *X. obtusispora*.

Three known tropical *Xylaria* spp., viz. *X. apoda* (Berk. & Broome) J.D. Rogers & Y.-M. Ju, *X. heliscus* (Mont.) J.D. Rogers & Y.-M. Ju and *X. intracolorata* (J.D. Rogers, Callan & Samuels) J.D. Rogers & Y.-M. Ju, feature small subglobose to turbinate, flat-topped, stipitate stromata and ascospores 9–12 μm long, that should be compared with the penzigoid *Xylaria* CLL 5109 from Martinique. The three above taxa were transferred from *Kretzschmaria* Fr. to *Xylaria* by ROGERS & JU (1998). *Xylaria apoda* primarily differs by a thicker stromatal crust 100–120 μm thick and light brown, strongly inequilateral to slightly crescentic ascospores 9–11 × 3.5–4.5 μm, with narrowly rounded ends. Both *X. heliscus* and *X. intracolorata* primarily differ from CLL 5109 by a thin leathery stromatal crust and dark brown, broadly ellipsoid-inequilateral ascospores 9–11 × 5–6 μm and 10–12 × 4.5–5 μm, respectively. Moreover, *X. intracolorata* is set apart by the presence of an orange-yellow layer beneath the stromatal surface (ROGERS *et al.*, 1987).

Small subglobose stromata bearing synnematal structures are suggestive of the closely related genus *Stilbohypoxyton*, but no species included in PETRINI's monograph of this genus (2004) appeared to match with the morphological features characterizing our unnamed collection.

***Xylaria* sp. MJF 13098.** Plate 25.

Stromata scattered or in small groups of 2–3, erumpent from bark through the periderm, discoid, turbinate to pulvinate, with flat to slightly convex top, 0.9–3.5 mm diam × 1–1.8 mm high, the base obconical ending into a narrow connective, subsessile at maturity; surface rust-coloured to dull black, minutely reticulately-cracked into thin, rust to orange brown scales on immature stromata, turn-

ing into larger reddish brown to purplish brown scales at maturity, with unexposed perithecial contours; subsurface minutely roughened, leathery, 40–70 μm thick; lower side black, with fugacious scales similar to those on upper side; interior solid, spongy, white to yellowish, persistent. **Perithecia** subglobose 0.4–0.45 mm diam. **Ostioles** bluntly papillate to raised-discoid, blackish, 150–170 μm diam at base.

Asci cylindrical, with eight obliquely uniseriately arranged ascospores, the spore-bearing parts 108–117 × 7–8 μm, the stipes 28–40 μm long, fragile and most often ruptured, with apical ring tubular without marked upper rim, attenuated at base, 4.6–5.3 × 3.4–3.8 μm (Me = 5 × 3.6 μm, N = 15), bluing in Melzer's reagent. **Paraphyses** filiform, 5–6 μm wide at base, tapering above asci, minutely guttulate, embedded in thin mucilaginous material. **Ascospores** (13.2–)14.2–17(–17.9) × (5.2–)5.7–6.4(–6.6) μm, Q = (2.1–)2.3–2.9(–3.1), N = 60 (Me = 15.6 × 6.1 μm, Qe = 2.6), ellipsoid-inequilateral with broadly to narrowly rounded ends, often slightly ventrally concave in side view, unicellular, dark brown to blackish brown, smooth, with a thin appressed mucilaginous sheath only visible in India ink, with a conspicuous oblique, straight to sigmoid germ slit 10–11 μm long on the ventral side.

Asexual morph on the natural substrate not seen.

Specimen examined: FRENCH WEST INDIES: MARTINIQUE: Le Morne-Rouge, Domaine d'Émeraude, hygrophilic rainforest, on a dead corticated branch on the ground next to a brook, 9 Aug. 2013, *leg.* J. Fournier & C. Lechat, MJF 13098 (LIP).

Comments: This penzigoid *Xylaria* is characterized by small turbinate, flat-topped developing stromata with a rust-coloured outermost layer cracked into minute scales and a thin leathery subsurface; mature stromata are pulvinate, with reddish brown to purplish brown scales and large raised-discoid ostioles. Its external morphology is reminiscent of that of *X. peltiformis* which differs by light grey to light brown superficial scales and less conspicuous ostioles (this paper). Moreover, its ascospores have roughly the same shape but are significantly smaller than those of *X. peltiformis*, in average 15.6 × 6.1 μm vs. 23.6 × 8.4 μm.

On the other hand, ascospores of this penzigoid *Xylaria* appear very similar with those of *X. parvula* in shape, germ slit morphology and dimensions (this paper). They even share the presence of a thin persistent mucilaginous sheath around ascospores, an unusual feature most rarely encountered within the *X. polymorpha* aggregate to which it likely belongs based on its ascospore morphology. *Xylaria parvula* markedly differs by small uniperitheciate stromata 0.5–0.6 mm in diam with a thicker leathery wall 80–100 μm thick and less conspicuous ostioles.

Though fairly dubious, it cannot be absolutely ruled out that the collection MJF 13098 is not an abnormal form of *X. parvula*, based on their very similar ascospore morphology. As this collection is scanty and mostly immature we refrain to make any taxonomic decision until more material of *X. parvula* and the above *Xylaria* become available.

We also considered the possibility that two different species are mixed in the same specimen, one immature and sterile, with stipitate stromata and orange brown scales and a mature one with subsessile stromata with darker scales and ascospores resembling those of *X. parvula*. This cannot be ruled out either and supports our view to refrain from any taxonomic decision until these poorly known species can be better documented.

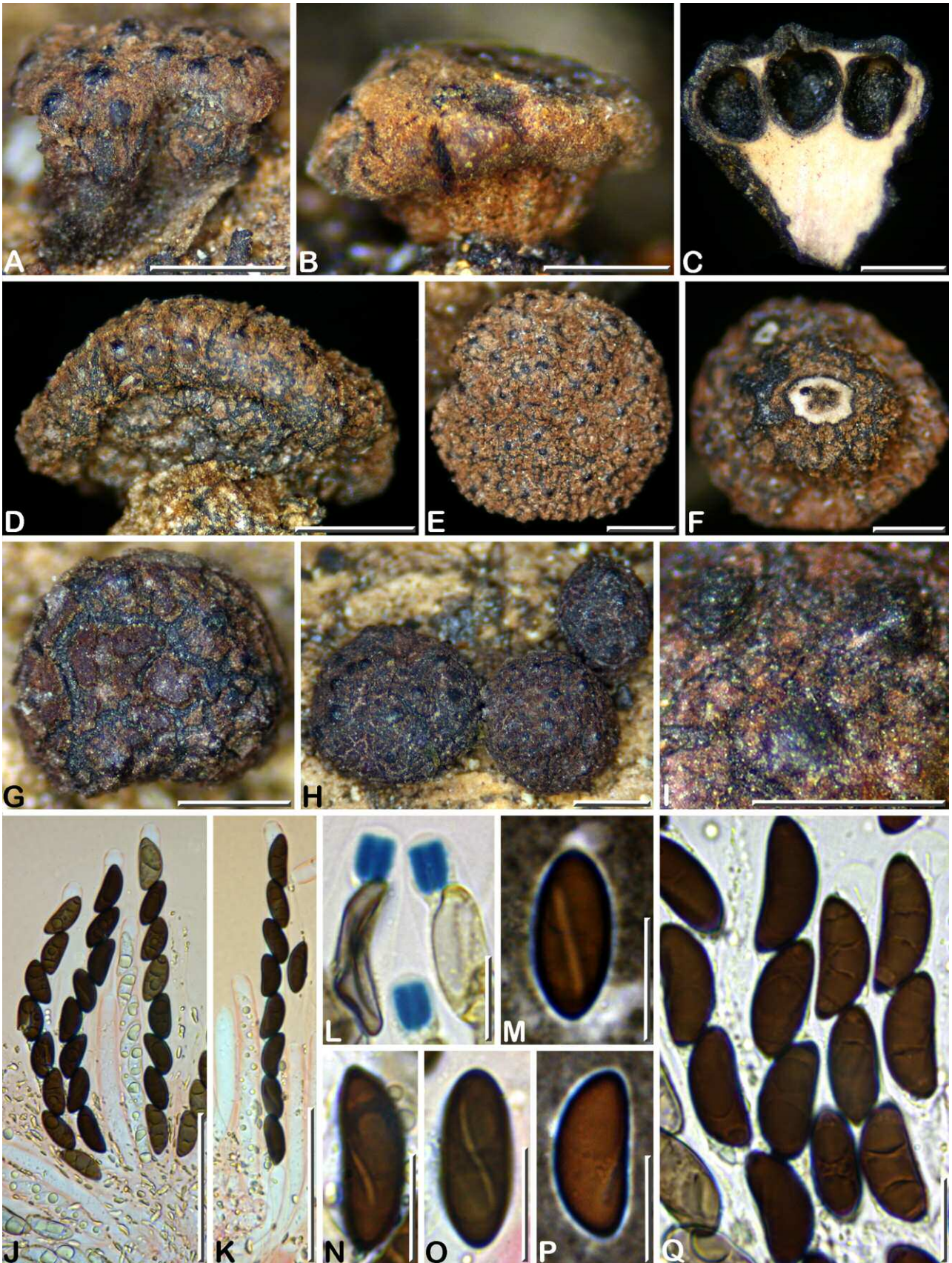


Plate 25 – *Xylaria* sp. MJF 13098

A: Two adjacent turbinate, flat-topped, immature stromata in side view; B: Turbinate immature stroma with convex top, in side view; C: Mature turbinate stroma in vertical section showing a thin black crust and solid whitish interior; D: Discoid immature subsessile stroma showing a narrow attachment to the substrate; E: Discoid, flat-topped immature stroma in top view showing minute rust-coloured scales and black ostioles; F: Reverse of a discoid stroma showing a narrow central connective; G, H: Mature pulvinate stromata with superficial rust-brown scales; I: Stromatal surface of a mature stroma in close-up showing three bluntly papillate ostioles; J, K: Immature and mature short-stipitate asci, in Congo red with 1% SDS; L: Ascilar apical apparatus in Melzer's reagent; M: Ascospore in ventral view showing a straight oblique germ slit and a thin mucilaginous coating, in India ink; N, O: Ascospores in ventral view showing sigmoid germ slits, in 1% SDS and Congo red with 1% SDS respectively; P: Ascospore in side view showing a thin mucilaginous coating, in India ink; Q: Ascospores in 1% SDS. Scale bars: A, D-F, H = 1 mm; B, C, G, I = 0.5 mm; J, K = 50 μ m; L-Q = 10 μ m.

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