

# The genus *Biscogniauxia* (Xylariaceae) in Guadeloupe and Martinique (French West Indies)

Jacques FOURNIER  
Christian LECHAT  
Régis COURTECUISSÉ

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**Abstract:** This survey deals with the *Biscogniauxia* taxa 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, fourteen taxa are described, illustrated and discussed, including four new taxa, viz.: *B. breviappendiculata*, *B. martinicensis*, *B. nigropapillata* and *B. sinuosa* var. *macrospora* and a collection of uncertain taxonomic position tentatively regarded as related to *B. uniapiculata*. The nine known taxa that we recorded include *B. capnodes*, *B. capnodes* var. *limoniispora*, *B. capnodes* var. *theissenii*, *B. citrififormis*, *B. citrififormis* var. *macrospora*, *B. grenadensis*, *B. philippinensis*, *B. uniapiculata* and *B. viscosicentra*. Only three of the taxa that we report here were already known from the Caribbean, viz.: *B. grenadensis*, *B. uniapiculata* and *B. cf. uniapiculata*, and all are new to the French West Indies, except the latter which was collected in Guadeloupe. A dichotomous identification key and a synoptical table of ascospores are presented as well.

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

**Résumé :** cette étude porte sur les taxons de *Biscogniauxia* 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, quatorze taxons sont décrits, illustrés et commentés, comprenant les quatre taxons nouveaux *B. breviappendiculata*, *B. martinicensis*, *B. nigropapillata* et *B. sinuosa* var. *macrospora*, et une récolte de position incertaine provisoirement considérée comme proche de *B. uniapiculata*. Les neuf autres taxons connus que nous avons répertoriés sont *B. capnodes*, *B. capnodes* var. *limoniispora*, *B. capnodes* var. *theissenii*, *B. citrififormis*, *B. citrififormis* var. *macrospora*, *B. grenadensis*, *B. philippinensis*, *B. uniapiculata* et *B. viscosicentra*. Parmi eux, seuls trois taxons étaient déjà connus des Caraïbes, à savoir *B. grenadensis*, *B. uniapiculata* et *B. cf. uniapiculata*, et tous sont nouveaux pour les Antilles françaises, à l'exception du dernier qui provient de Guadeloupe. Une clé d'identification dichotomique et une planche synoptique des ascospores sont présentées.

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

## Introduction

This survey of the genus *Biscogniauxia* Kuntze in the French Caribbean islands of Guadeloupe and Martinique comes after two similar studies carried out on *Hypoxyton* Bull. and on *Annulohypoxyton* Y.-M. Ju, J.D. Rogers & H.-M. Hsieh in the same region (FOURNIER *et al.*, 2015; FOURNIER & LECHAT, 2016). The reader is referred to the former publication for details on the framework within which this work was carried out, and for the salient ecological features characterizing these two islands.

The purpose of these surveys is to describe and illustrate the xylariaceous ascomycetes collected during the repeated field trips to these islands initiated in 2003 (COURTECUISSÉ, 2006). Our two previous publications showed that *Xylariaceae* Tul. & C. Tul., along with *Hypocreales* Lindau, are particularly well represented in Guadeloupe and Martinique, featuring for example 39 taxa of *Hypoxyton* (FOURNIER *et al.*, 2015) and eleven taxa of *Annulohypoxyton* (FOURNIER *et al.*, 2016), with respectively 13 and 3 taxa new to science and several potentially new taxa still under investigation. The results on *Biscogniauxia* we expose herein, with fourteen taxa including four new taxa and one taxon of uncertain taxonomic position, support the view that *Xylariaceae* in these two islands show a high diversity with a high proportion of undescribed, possibly endemic taxa.

The genus *Biscogniauxia* is characterized by corticolous, carbonaceous, orbicular to irregularly elongate bipartite stromata with a fugacious outer layer which is usually disintegrated at maturity or reduced to inconspicuous remnants at margins. Its stromata do not contain coloured granules, nor do they release pigments in 10% KOH. Its asci are unitunicate, cylindrical, short-stipitate and possess an amyloid apical apparatus usually wider than high; its hamathecium is paraphysate; and its ascospores are ellipsoid, brown, usually smooth-walled, one-celled or bear a small cellular appendage at the lower end, have a germ slit and usually lack a slimy sheath or slimy appendages. Its asexual morphs are nodulisporium-like usually with periconiella-like branching pattern according to the classification

proposed by JU & ROGERS (1996), rarely encountered on the natural substrate but most often obtained in culture (Ju *et al.*, 1998).

*Biscogniauxia* belongs to the *Xylariaceae* based on its stromatic ascomata, unitunicate asci with an amyloid apical apparatus, brown ascospores with a germ slit and hyphomycetous asexual morphs with holoblastic conidiogenesis. It is accommodated in the subfamily *Hypoxyloideae* because of its nodulisporium-like asexual morphs. The phylogenetic affinities of *Biscogniauxia* with *Hypoxyloideae* were demonstrated by HSIEH *et al.* (2005) who showed that it clusters with *Camillea* Fr. on a sister clade to *Annulohypoxyton*, *Daldinia* Ces. & De Not. and *Hypoxyton*. Affinities of *Obolarina* Pouzar with *Biscogniauxia* were later demonstrated by PAŽOUTOVÁ *et al.* (2010) and those of *Durotheca* Læssøe, Srikitkulchai, Luangsa-ard & M. Stadler with *Theissenia* Maubl. within the *Hypoxyloideae* demonstrated by LÆSSØE *et al.* (2013). Congruent results were recently published in a large scale multilocus phylogenetic overview of the XYLARIACEAE (U'REN *et al.*, 2016), showing a well-supported *Biscogniauxia* clade within the *Hypoxyloideae* that includes *Camillea* and *Obolarina*. The segregation of the genera comprising the *Biscogniauxia* clade from *Annulohypoxyton*, *Daldinia* and *Hypoxyton* is supported by the absence of stromatal secondary metabolites involving coloured reactions in presence of stromatal fragments with 10% KOH, a key feature of *Annulohypoxyton*, *Daldinia* and *Hypoxyton*. The absence of stromatal secondary metabolites in *Biscogniauxia* and related genera was confirmed by HPLC studies published by STADLER *et al.* (2001) and STADLER & HELLMIG (2005).

Though phylogenetically closely related to *Biscogniauxia* and making it paraphyletic, the genera *Camillea* and *Obolarina* morphologically differ significantly enough from *Biscogniauxia* to be regarded as separate. *Camillea* is primarily distinguished from *Biscogniauxia* by subhyaline to yellowish ascospores featuring a minute reticulate-poroid ornamentation and a different xylocladium-like asexual morph. In *Obolarina* the stromata develop within bark tissues, like in *Biscogniauxia*, but most often remain fully immersed under bark surface and ascospores are released through narrow cracks, making the stromata overlooked until black masses of ascospores are ejected; ostioles are poorly differentiated; asci are clavate and lack an

apical apparatus and the asexual morph obtained in culture is composed of very rudimentary conidiophores (POUZAR, 1986; JU *et al.*, 1998), which sets *Obolarina* apart from *Biscogniauxia*. The monotypic genus *Vivantia* J.D. Rogers, Y.-M. Ju & Cand., represented by *V. guadalupensis* J.D. Rogers, Y.-M. Ju & Cand., should likewise be considered because it resembles *Biscogniauxia* in having widespread carbonaceous, corticolous, possibly bipartite stromata and a nodulisporium-like asexual morph (ROGERS *et al.*, 1996). It deviates from *Biscogniauxia* and most xylariaceous genera by its hyaline ellipsoid two-celled ascospores but its phylogenetic affinities within the *Xylariaceae* and the *Hypoxylodeae* are still unknown.

The taxa currently placed in *Biscogniauxia* conform to the genus concept of *Nummularia* Tul. & C. Tul. erected by TULASNE & TULASNE (1863). For nomenclatural reasons the name *Nummularia* was abandoned and after having been included in section *Applanata* of *Hypoxylon* by MILLER (1961) and in *Numulariola* House by MARTIN (1969), the taxa formerly placed in *Nummularia* were eventually accommodated in *Biscogniauxia*, a genus name resurrected by POUZAR (1979)

to stabilize their status. Further detailed information on nomenclature, taxonomic delimitation, and ecology of *Biscogniauxia* was given by JU *et al.* (1998) in their comprehensive overview of the genus worldwide, with additions by ROGERS *et al.* (1996; 1997) and JU & ROGERS (2001).

The first records of *Xylariaceae* from Guadeloupe and Martinique date back to ROUSSEL (1870), who mentioned two *Xylaria* spp. and a *Hypoxylon* "*rubiginosum*" which most likely does not represent material assignable to *Biscogniauxia*. Duss (1903) mentioned two collections on dead wood from Guadeloupe he referred to as *Nummularia bulliardii* Tul. and one on rotten palm (*Oreodoxa* var. *oleacea*) as *N. pachyloma* Lév. "large form". In absence of microscopic data, this material should be reexamined to be identified in the light of modern taxonomic concepts since the former name [as *B. nummularia* (Bull.) Kuntze] is currently restricted to a temperate European species occurring on *Fagus* and the latter regarded as a synonym of *B. capnodes* by JU *et al.* (1998). All the specimens collected from Guadeloupe and Martinique by Duss, including the

### Dichotomous key to *Biscogniauxia* taxa known from French West Indies

- |    |   |  |
|----|---|--|
| 1  | Ascospores bearing a cellular appendage or with a flat truncate, exceptionally apiculate lower end .....  | 2  |
| 1  | Ascospores lacking a cellular appendage, with a rounded lower end .....   | 9  |
| 2  | Ascospores dark brown to blackish brown.....  | 3  |
| 2  | Ascospores light brown to medium brown.....   | 6  |
| 3  | Ascospores almost equilateral, 9.5–12 × 6–7 µm, with a small, inconspicuous, usually collapsed cellular appendage.....  | <i>B. breviappendiculata</i> sp. nov.              |
| 3  | Ascospores inequilateral, with a conspicuous rounded to broadly conical cellular appendage .....  | 4  |
| 4  | Ascospores 20–24.5 × 10.6–13.6 µm .....   | <i>B. philippinensis</i>                           |
| 4  | Ascospores averaging smaller .....  | 5  |
| 5  | Ascospores strongly inequilateral, 13.1–15.2 × 6.2–7.9 µm, Qe = 2 .....   | <i>B. grenadensis</i>                              |
| 5  | Ascospores slightly inequilateral to almost equilateral, 9.5–12.8 × 7.4–9.8 µm, Qe = 1.3 .....  | <i>B. martinicensis</i> sp. nov.                   |
| 6  | Perithecial contents sticky, due to the presence of allophyses; ascospores 10.1–11.5 × 4.6–5.7 µm, always with a conspicuous rounded cellular appendage ..... | <i>B. viscosicentra</i>                            |
| 6  | Perithecial contents not sticky, ascospores with cellular appendage often collapsed or absent .....   | 7  |
| 7  | Ascospores 8.8–10.6 × 4.5–5 µm, with consistently flat and rarely appendaged lower end .....  | <i>B. uniapiculata</i>                             |
| 7  | Ascospores averaging more than 10 µm long, with appendaged or apiculate lower end .....   | 8  |
| 8  | Ascospores 10.5–12.5 × 5.1–6 µm with appendaged lower end.....  | <i>B. uniapiculata</i> MJF 13191                   |
| 8  | Ascospores 11.4–13.6 × 5.5–6.5 µm, with lower or both ends often apiculate .....  | <i>B. cf. uniapiculata</i> GUAD-213                |
| 9  | Ascospores 34.5–40.8 × 11.5–14.1 µm, episporium with wide longitudinal ridges .....   | <i>B. sinuosa</i> var. <i>macrospora</i> var. nov. |
| 9  | Ascospores averaging less than 20 µm long, episporium smooth .....  | 10   |
| 10 | Ascospores ellipsoid with one or two pinched ends, strongly inequilateral .....   | 11   |
| 10 | Ascospores ellipsoid with rounded ends, almost equilateral .....  | 12   |
| 11 | Ascospores 10.3–11.9 × 6.5–7.7 µm .....   | <i>B. citriformis</i>                              |
| 11 | Ascospores 17.7–19.5 × 8.3–9.8 µm .....   | <i>B. citriformis</i> var. <i>macrospora</i>       |
| 12 | Ascospores 12.8–14.5 × 7.7–8.9 µm, frequently lemon-shaped .....  | <i>B. capnodes</i> var. <i>limoniispora</i>        |
| 12 | Ascospores averaging less than 11 µm long, ellipsoid almost equilateral .....   | 13   |
| 13 | Ascospores blackish brown to blackish, 9–13.3 × 4.6–7.2 µm (Me = 11 × 6 µm) .....   | <i>B. capnodes</i>                                 |
| 13 | Ascospores light to medium brown, averaging less than 10 µm long and more narrowly ellipsoid .....  | 14   |
| 14 | Ostioles punctate; ascospores 8.5–10.9 × 4–5.6 µm, with germ slit always as long as spore length, fairly conspicuous.....                                     | <i>B. capnodes</i> var. <i>theissenii</i>          |
| 14 | Ostioles papillate, black; ascospores more narrowly ellipsoid 8.1–9.4 × 3.4–3.9 µm, with blurred germ slit most often less than spore-length .....            | <i>B. nigropapillata</i> sp. nov.                  |

*Xylariaceae*, were deposited in B and have unfortunately been destroyed and lost during World War II (R. LÜCKING, pers. comm.). As a result, the genus *Biscogniauxia* was so far undocumented in Guadeloupe and Martinique and information on records of neotropical taxa of *Biscogniauxia* was limited to that provided by JU *et al.* (1998) and MILLER (1961) for Central and South America, ROGERS *et al.* (2000) for Venezuela and SAN MARTÍN & ROGERS (1993) for México.

The plentiful material of *Biscogniauxia* collected during our forays was studied based on the morphological taxonomic concepts defined by JU *et al.* (1998). This led to the identification of fourteen taxa including nine known taxa, viz.: *B. capnodes* (Berk.) Y.-M. Ju & J.D. Rogers, *B. capnodes* var. *limoniispora* Y.-M. Ju & J.D. Rogers, *B. capnodes* var. *theissenii* (Syd. & P. Syd.) Y.-M. Ju & J.D. Rogers, *B. citrififormis* (Whalley, Hammelev & Talig.) Van der Gucht & Whalley, *B. citrififormis* var. *macrospora* Van der Gucht & Whalley, *B. grenadensis* (J.H. Mill.) Whalley & Læssøe, *B. philippinensis* (Ricker) Whalley & Læssøe, *B. uniapiculata* (Penz. & Sacc.) Whalley & Læssøe and *B. viscosicentra* J.D. Rogers, F. San Martín & Y.-M. Ju, of which only *B. grenadensis* and *B. uniapiculata* were already known from the Caribbean. A previous collection from Guadeloupe (GUAD-213) with mixed abnormal ascospores either appendaged or apiculate was mentioned by JU *et al.* (1998), but without assigning it to a species. We examined and illustrated a part of this collection and we suggest it might be an abnormal form of *B. uniapiculata* which appears itself to be either a highly variable species or a complex of closely related species.

Four new taxa are proposed to accommodate collections that could not be equated to known taxa, viz.: *B. breviappendiculata* J. Fourn. & Lechat, *B. martinicensis* J. Fourn. & Lechat, *B. nigropapillata* J. Fourn. & Lechat and *B. sinuosa* (Theiss.) Y.-M. Ju & J.D. Rogers var. *macrospora* J. Fourn. & Lechat. Their distinctive features and their differences with known taxa are illustrated and commented and we propose a dichotomous identification key to the *Biscogniauxia* taxa dealt with in this survey. As ascospore morphology appeared most often more discriminant than stromatal morphology, we propose a synoptic figure plate for comparing the ascospores of all taxa at the same scale.

## Materials and methods

The observations were carried out on dry material rehydrated in water. Measurements of asci and ascospores were made in water and ascospores measurements processed with the free software Piximetre 5.2 (<http://ach.log.free.fr/Piximetre/>). In the formula given by this software the values in brackets represent the extreme values (20%) that are not taken into account for the calculation, N represents the number of ascospores measured, Q the quotient length/width, Me the mean values of length  $\times$  width and Qe the mean value of quotient length/width. The amyloid reaction of the ascus apical apparatus was tested by adding a drop of Melzer's reagent to a water mount of perithecial contents. Microscopic observation of the asci and the paraphyses was carried out after 1 min in 1% SDS and mounting in diluted blue Pelikan® ink, black Pelikan® ink or Melzer's reagent. Measurements of stromata, asci and ascus apical apparatus are recorded as height  $\times$  width. Measurements of appendaged ascospores do not include the appendage which may be collapsed or absent. The term punctate is here applied to ostioles appearing as a shallow discoid depression surrounded by a low or slightly prominent rim. In absence of a surrounding rim, ostioles are termed umbilicate. Terminology and observation procedures follow JU *et al.* (1998). Nomenclature follows MycoBank.

Photomicrographs were taken with a Nikon Coolpix 995 digital camera either directly mounted on a stand or, for higher magnifications, through the eyepiece of an Olympus SZ60 stereomicroscope, by the means of a 30 mm diameter adapter. Photomicrographs were taken with the same camera mounted on the trinocular port of a Leitz Orthoplan microscope. The digitized photographs were processed with Adobe Photoshop Elements 10 and the figures assembled with the same software.

## Taxonomy

*Biscogniauxia breviappendiculata* J. Fourn. & Lechat, *sp. nov.* – MycoBank MB820802. Plate 2.

**Diagnosis:** Differs from all *Biscogniauxia* taxa featuring appendaged blackish brown ascospores by smaller, equilateral ascospores averaging  $10.8 \times 6.6 \mu\text{m}$ , with a small, inconspicuous, fugacious cellular appendage.

**Holotype:** FRENCH WEST INDIES: MARTINIQUE: Case-Pilote, Morne-Rose, mesophilic rainforest, on a dead corticated branch, 14 Jun. 2016, *leg.* J. Fournier, MJF 15071 (LIP).

**Etymology:** From Latin *brevis* = short, small and *appendiculatus* = appendaged, for the small, inconspicuous cellular appendages of ascospores.

**Stromata** applanate, orbicular to irregularly lobed, 4–28 mm long  $\times$  3–22 mm wide  $\times$  0.3–0.35 mm thick, with sloping margins, outer dehiscing layer not seen; mature surface dull greyish brown to blackish brown, carbonaceous beneath surface and between perithecia, tissue beneath perithecia inconspicuous, not carbonaceous, underlying bark tissue slightly blackened. **Perithecia** oblong to obovoid, frequently laterally flattened, 0.2–0.25 mm high  $\times$  0.1–0.2 mm wide, opening centrally through individual ostioles. **Ostioles** papillate, apically truncate, shiny black, evenly distributed or in small clusters, contrasting against the dull blackish brown stromatal surface.

**Asci** cylindrical, with (6–)8 obliquely uniseriate ascospores, short-stipitate, the spore-bearing parts  $74\text{--}81 \times 7\text{--}8 \mu\text{m}$ , fragile and easily ruptured at maturity, the stipes  $18\text{--}22 \mu\text{m}$  long, with apical apparatus  $3.1\text{--}3.7 \times 2.8\text{--}3.2 \mu\text{m}$  (Me =  $3.5 \times 3 \mu\text{m}$ ; N = 20), shortly tubular, slightly apically flared, bluing in Melzer's reagent. **Paraphyses** in sparse bundles, hyphal, unbranched, thin-walled, septate, 6–7  $\mu\text{m}$  wide at base, tapering above asci. **Ascospores** (8.9–)9.5–11.9(–12.6)  $\times$  (5.5–)6.1–7(–7.4)  $\mu\text{m}$ , not including appendage, Q = (1.4–)1.5–1.9(–2.1), N = 120 (Me =  $10.8 \times 6.6 \mu\text{m}$ ; Qe = 1.7), dark brown to blackish brown, ellipsoid-equilateral with broadly rounded upper end and truncate lower end, bearing a hyaline, thin-walled conical to hemispherical cellular appendage  $1\text{--}1.6 \mu\text{m}$  long  $\times$   $1.3\text{--}2 \mu\text{m}$  wide (Me =  $1.2 \times 1.6 \mu\text{m}$ , N = 18), often collapsed and inconspicuous at maturity or absent; smooth-walled, with a conspicuous, unilateral, straight germ slit almost spore-length.

**Asexual morph** on the natural substrate not seen.

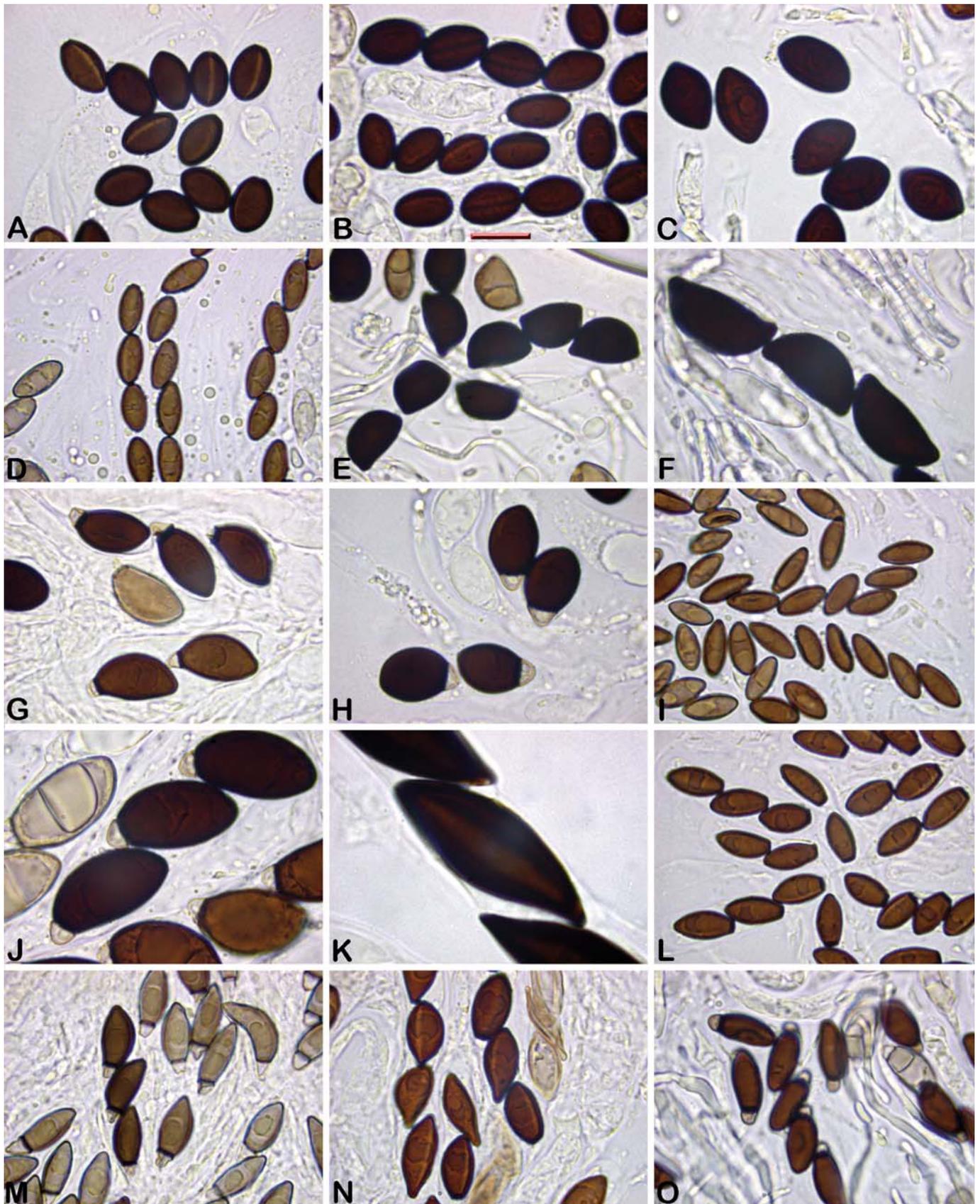
**Known distribution:** Martinique, only known from the holotype.

**Discussion:** This *Biscogniauxia* is characterized by thinly applanate entirely carbonaceous stromata with a blackish brown surface and shiny black papillate ostioles with a truncate top, combined with two-celled, almost equilateral blackish brown ascospores averaging  $10.8 \times 6.6 \mu\text{m}$  with a small, inconspicuous cellular appendage and a conspicuous germ slit almost spore-length.

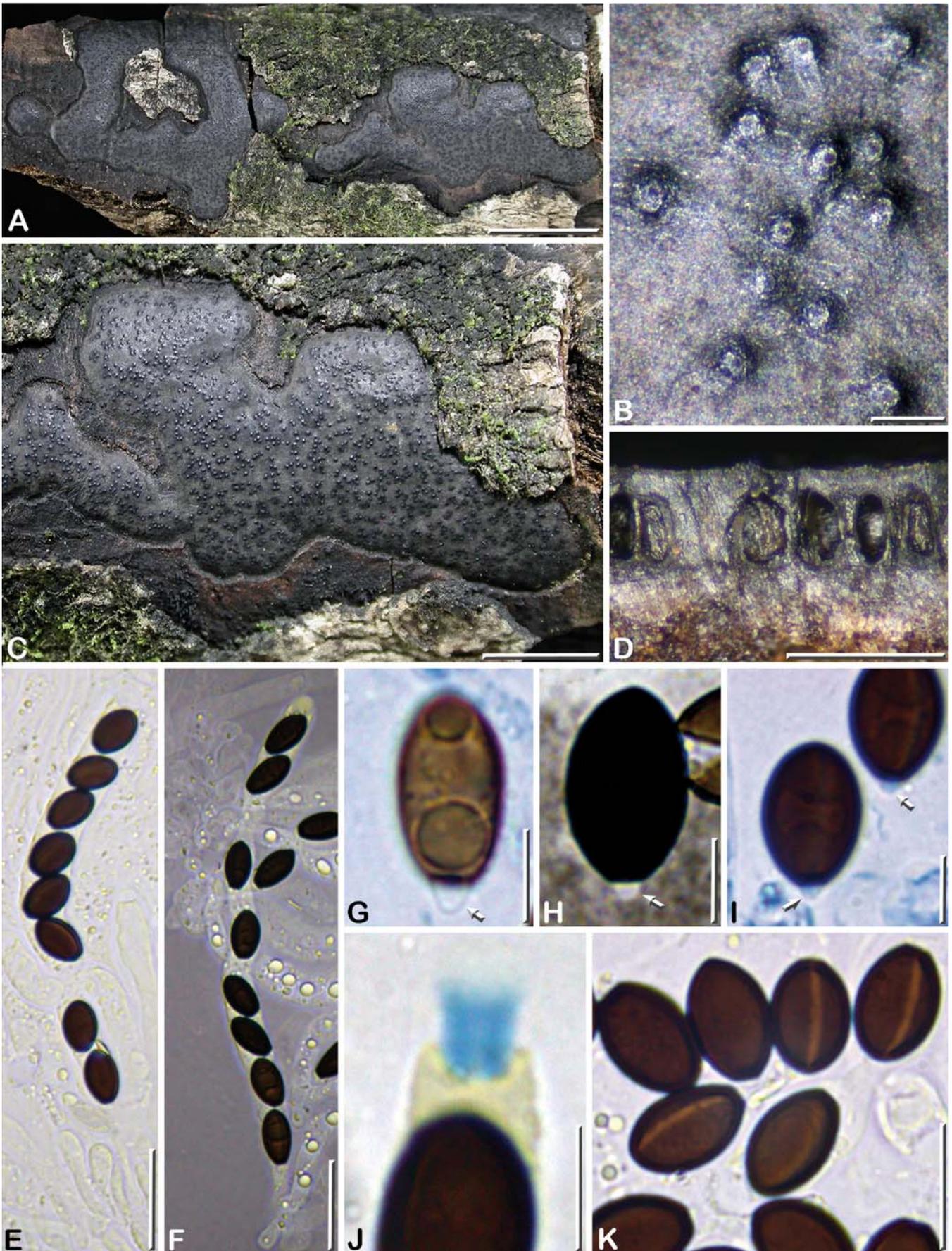
Appendaged ascospores of most *Biscogniauxia* taxa are significantly larger than those of *B. breviappendiculata* (JU *et al.*, 1998; JU & ROGERS, 2001). Among the smaller-spored species, it resembles *B. plumbea* Y.-M. Ju & J.D. Rogers, known from Hawaii, which features a thin stroma 0.4–0.6 mm thick with slightly papillate ostioles and ascospores with small appendages  $1.5\text{--}2 \mu\text{m}$  long. However, the stromatal surface of *B. plumbea* is grey and its ascospores differ in being brown, inequilateral and larger,  $12\text{--}14.5 \times 6\text{--}7 \mu\text{m}$  with a ratio L/w >2, vs. 1.7 in the new species.

Ascospores of *B. doidgeae* (J.H. Miller) Whalley & Læssøe, known from South Africa, are  $8\text{--}11.5 \times 4.5\text{--}5 \mu\text{m}$ , thus comparable with our species as to their length but narrower, paler brown, inequilateral and lacking a germ slit (JU & ROGERS, 2001). Moreover, the stromata of *B. doidgeae* are 2 mm thick, with tubular perithecia and umbilicate ostioles.

Ascospores of *B. uniapiculata*, which is pantropical, are  $10\text{--}14 \times 5\text{--}7 \mu\text{m}$  and, as in our species, their appendages are often collapsed



**Plate 1** – Comparison at the same scale of ascospores of *Biscogniauxia* taxa known from Guadeloupe and Martinique  
 A: *B. breviappendiculata* MJF 15071 (holotype); B: *B. capnodes* MJF 07267; C: *B. capnodes* var. *limoniispora* MJF 07287; D: *B. capnodes* var. *theissenii* MJF 13086; E: *B. citrifomis* MJF 15067; F: *B. citrifomis* var. *macrospora* MJF 13088; G: *B. grenadensis* MJF 10213; H: *B. martinicensis* MJF 14039; I: *B. nigropapillata* CLL 5254 (holotype); J: *B. philippinensis* MJF 13161; K: *B. sinuosa* var. *macrospora* MJF 16072 (holotype); L: *B. unia-piculata* MJF 10244; M: *B. unia-piculata* MJF 13191; N: *B. cf. unia-piculata* GUAD-213; O: *B. viscosicentra* CLL 2346. Scale bar (B) = 10  $\mu$ m.



**Plate 2 – *Biscogniauxia breviappendiculata***

MJF 15071. A, C: Stromata with lobed outline rupturing the bark; B: Shiny black papillate ostioles with truncate top; D: Stroma in vertical section showing the thick carbonaceous subsurface, the perithecia and the indistinct subperithecial tissue; E, F: Mature asci in 1% SDS and black Pelikan® ink respectively; G: Immature ascospore with a conical cellular appendage (arrow), in diluted blue Pelikan® ink; H, I: Mature ascospores with hemispherical to conical cellular appendages (arrows), in India ink and diluted blue Pelikan® ink respectively; J: Ascus apical apparatus, in Melzer's reagent; K: Ascospores in 1% SDS, some showing conspicuous germ slits and truncate bases. Scale bars: A = 10 mm; B = 0.2 mm; C = 5 mm; D = 0.5 mm; E, F = 20 µm; G-J = 5 µm; K = 10 µm.

or absent; however, they differ in being paler brown, frequently inequilateral and in having a germ slit on either side (Ju *et al.*, 1998; this paper). Ascospores of *B. uniaiculata* var. *indica* (Sacc.) Y.-M. Ju & J.D. Rogers resemble those of our species in having a similar size range 10–12 × 6–7.5 µm but they have a longer appendage 2.5–4 µm long and a less than spore-length germ slit. Moreover, stromata of *B. uniaiculata* and its varieties have punctate ostioles, unlike the shiny black papillate ostioles of our species from Martinique.

The new species *B. martinicensis* (this paper) also features small, blackish brown appendaged ascospores but they differ in being more broadly ellipsoid ( $L/w = 1.3$  vs. 1.7) and slightly inequilateral, with an obliquely truncate lower end and a conspicuous persistent cellular appendage. The stromata of *B. martinicensis* are likewise different in having most often punctate ostioles.

The stromata of *B. nothofagi* Whalley, Læssøe & Kile, occurring on *Nothofagus* in Tasmania (Australia), have distinctly papillate ostioles like our new species, but they differ in being 1 mm thick with perithecia 0.5–0.8 mm diam. Moreover, ascospores of *B. nothofagi* are larger and more narrowly ellipsoid 13.2–14.6 × 7.1–8 µm, with a persistent appendage (Whalley *et al.*, 1990).

For these reasons, we feel justified in proposing the new species *B. breviappendiculata* to accommodate this distinctive collection from Martinique.

Upon a superficial examination of ascospores, the very small, often collapsed appendages may be overlooked, which may lead to a confusion with those of the widespread and variable *B. capnodes*. The base of ascospores of *B. breviappendiculata* is consistently truncate, which makes a clear difference with ascospores of *B. capnodes* which are broadly rounded at both ends.

***Biscogniauxia capnodes*** (Berk.) Y.-M. Ju & J.D. Rogers, *Mycotaxon*, 66: 23 (1998). Plates 3–4. Table 1.

**Stromata** applanate to pulvinate, orbicular to ellipsoid-lobed, 3–46 mm long × 3–18 mm wide × 0.5–1 mm thick, often coalescent into elongate to irregular compound stromata, with slightly sloping margins, showing no trace of the outer dehiscing layer; mature surface dark grey, olivaceous brown, dull black to rarely shiny black, slightly uneven, carbonaceous beneath surface and between perithecia; tissue beneath perithecia 0.1–0.2 mm thick, composed of blackened bark tissue, not to slightly carbonaceous. **Perithecia** tubular to ovoid or short-cylindrical, frequently laterally and basally flattened, 0.38–0.85 mm high × 0.18–0.5 mm wide, opening centrally or laterally through individual ostioles, two adjacent perithecia rarely sharing a common ostiole. **Ostioles** punctate to slightly papillate by the presence of a raised rim, ca. 40 µm diam, inconspicuous, mostly evenly distributed, often plugged with greyish substance.

**Asci** cylindrical, with 8 obliquely uniseriate overlapping ascospores, subsessile, the spore-bearing parts 85–97 × 8–10 µm, fragile and easily ruptured at maturity, the stipes 6–15 µm long, with apical apparatus 1.7–3.8 × 3.1–4.1 µm (Me = 2.5 × 3.6 µm; N = 80), discoid to cuboid, at times slightly wedge-shaped, bluing in Melzer's reagent. **Paraphyses** copious, hyphal, unbranched, thin-walled, septate, 6–9 µm wide at base, tapering above asci. **Ascospores** (8.1–)9–13.3(–13.5) × (4.2–)4.6–7.8(–8.1) µm, Q = (1.4–)1.5–2.1(–2.2), N = 540 (Me = 11.1 × 6.2 µm, Qe = 1.8), one-celled, ellipsoid almost equilateral with narrowly to broadly rounded ends, dark brown to blackish brown, smooth-walled, with a conspicuous, unilateral, straight germ slit spore-length or slightly less.

**Asexual morph** on the natural substrate not seen. Asexual morph in culture on OA periconiella-like, based on material from Taiwan (Ju *et al.*, 1998).

**Specimens examined:** FRENCH WEST INDIES: GUADELOUPE: Basse-Terre, Petit-Bourg, Carrère, in the private garden of Félix Lurel, on a dead corticated branch, 11 Aug. 2010, *leg.* C. Lechat, CLLGUAD 007 (LIP);

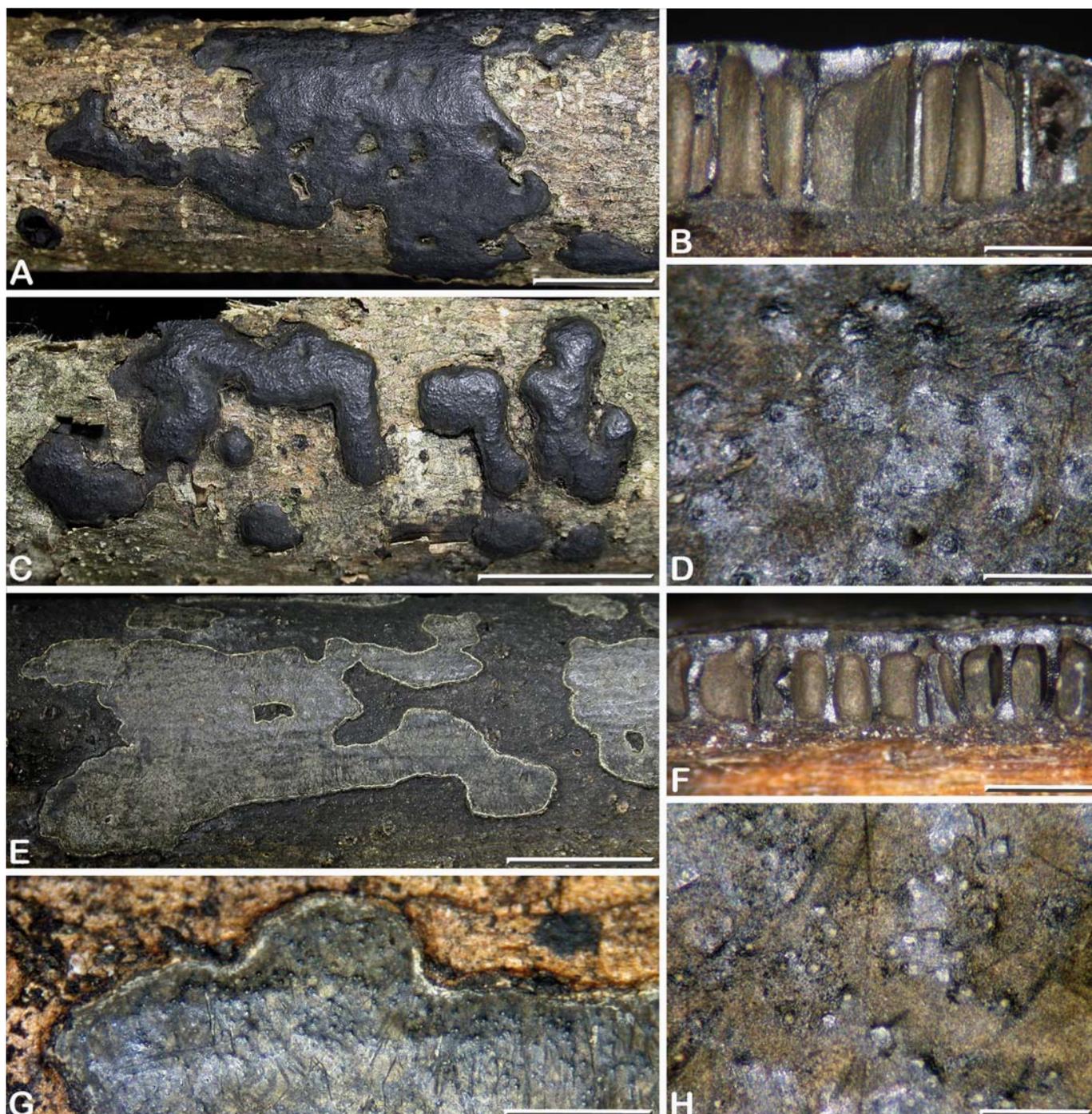
Basse-Terre, Sainte-Rose, Sofaïa, path to Saut des Trois Cornes, mesophilic rainforest, dead corticated branch, 3 Sept. 2004, *leg.* C. Lechat, CLL 2302 (LIP). MARTINIQUE: Les Anses-d'Arlet, track to Morne Salomon, coastal xerophilic forest, on a dead corticated branch ca. 4 cm diam, 5 Aug. 2016, *leg.* J. Fournier, MJF 16123 (LIP); *ibid.*, MJF 16128, MJF 16131, MJF 16135 (LIP); Case-Pilote, Fond Boucher, mesophilic rainforest, on a dead corticated branch, 17 Aug. 2013, *leg.* J. Fournier, MJF 13279 (LIP); *ibid.*, MJF 13303 (LIP); Case-Pilote, Morne Rose, mesophilic rainforest, on a dead corticated branch, 1 Sept. 2010, *leg.* J. Fournier, MJF 10306 (LIP); *ibid.*, MJF 10313 (LIP); *ibid.*, 8 Aug. 2013, MJF 13069 (LIP); *ibid.*, 14 Jun. 2015, MJF 15062 (LIP); *ibid.*, MJF 15086 (LIP); Case-Pilote, Savane Saint-Cyr, track to Plateau Concorde, hygrophilic rainforest, 600–650 m, on a dead corticated branch, 25 Aug. 2007, *leg.* J. Fournier, MJF 07097 (LIP); *ibid.*, MJF 07099 (LIP); *ibid.*, 27 Aug. 2010, MJF 10168 (LIP); Fort-de-France, Ab-salon, track to Plateau Michel, hygrophilic rainforest, on a dead corticated branch, 15 Aug. 2013, *leg.* J. Fournier, MJF 13221 (LIP); *ibid.*, 15 Jun. 2015, MJF 15097 (LIP); *ibid.*, 7 Aug. 2016, MJF 16152 (LIP); Le Diamant, Morne Blanc, trail from Ancinel to Morne du Riz through Morne Fournerey, meso- to xerophilic forest, dead corticated branch, 18 Aug. 2013, *leg.* J. Fournier, MJF 13311 (LIP); La Trinité, Pointe Bateau, coastal meso- to xerophilic forest, on a dead corticated branch, 26 Aug. 2010, *leg.* J. Fournier, MJF 10150 (LIP); *ibid.*, MJF 10155 (LIP); La Trinité, Pointe Rouge, coastal meso- to xerophilic forest, on a dead corticated branch, 22 Aug. 2010, *leg.* J. Fournier, MJF 10043 (LIP); *ibid.*, 29 Aug. 2010, MJF 10237 (LIP); *ibid.*, 1 Aug. 2016, *leg.* J. Fournier, MJF 16070 (LIP); La Trinité (Caravelle peninsula), Balata, xerophilic coastal forest, on a dead corticated branch, 11 Aug. 2013, *leg.* J. Fournier, MJF 13130 (LIP); Le Prêcheur, Anse Couleuvre, coastal mesophilic rainforest, on a dead corticated branch, 18 Aug. 2005, *leg.* C. Lechat, CLL 5004 (LIP); *ibid.*, 2 Sept. 2007, *leg.* J. Fournier, MJF 07267 (LIP); *ibid.*, MJF 07271 (LIP); *ibid.*, MJF 07285 (LIP); Le Saint-Esprit, Bois La Charles, mesophilic rainforest, on dead corticated branch, 25 Aug. 2004, *leg.* C. Lechat, CLL 2085 (LIP); Les Trois-llets, Ravine Caverne, Piton Bellevue, coastal meso- to xerophilic forest, dead corticated twig, 3 Aug. 2016, *leg.* P.-A. Moreau, MJF 16112; Sainte-Luce, Montravail forest, relict hygrophilic rainforest, on a dead corticated branch, 23 Aug. 2008, *leg.* C. Lechat, CLL 8280 (LIP); Sainte-Marie, La Philippe, coastal mesophilic rainforest, on a dead corticated branch, 31 Aug. 2010, *leg.* J. Fournier, MJF 10298 (LIP); Schoelcher, Case Navire River, mesophilic rainforest, 28 Aug. 2010, *leg.* J. Fournier, MJF 10205 (LIP); *ibid.*, 5 Aug. 2013, MJF 13003 (LIP); Schoelcher, Fond Lahaye, banks of Fond Lahaye River, mesophilic rainforest, on a dead corticated branch, 12 Aug. 2013, *leg.* J. Fournier, MJF 13147 (LIP); *ibid.*, MJF 13153 (LIP); *ibid.*, MJF 13158–2 (LIP).

**Known distribution:** Pantropical (Ju *et al.*, 1998).

**Discussion:** All the collections cited above fit in the concept of *B. capnodes* as defined by Ju *et al.* (1998) in having thin to thick effused carbonaceous stromata, ovoid to tubular perithecia, punctate to slightly papillate ostioles and one-celled, dark brown, ellipsoid-equilateral ascospores 8.5–15 × 5–7.5 µm with a conspicuous straight germ slit spore-length. Plate 3 shows pulvinate stromata with tubular perithecia and thinly effused stromata with short-cylindrical to obovoid perithecia, two extremes on a continuum of morphological variations encountered in this species. Plate 4 (E-H) and Table 1 illustrate the variations in ascospore size and shape within the range accepted for this species and no clear correlation between stromatal and ascospore morphology can be assessed when a large number of collections is studied. As ostiole and ascospore morphology is likewise frequently variable within the same collection, they cannot be used as differential characters. These variations between collections were already noticed by previous authors and led to the description of manifold species and varieties listed by MILLER (1961). Miller regarded these subtropical to tropical taxa as varieties of *Hypoxyylon nummularium* Bull., the north temperate

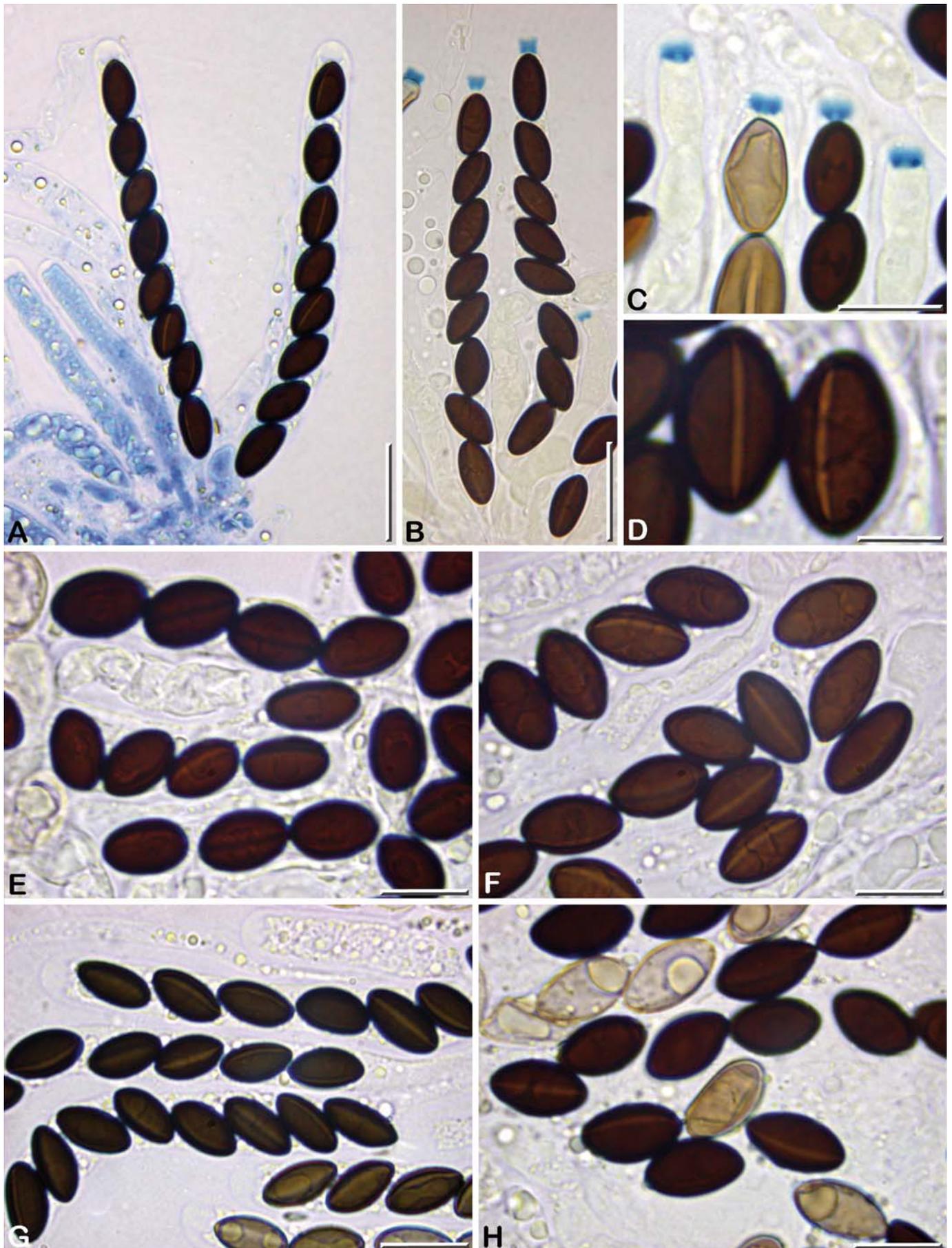
European species affiliated to *Fagus*, currently known as *Biscogniauxia nummularia* (Bull.) Kuntze. The varieties of *H. nummularium* recognized by MILLER (1961), viz.: var. *australe* (Cooke) J.H. Mill., var. *exutans* (Cooke) J.H. Mill., var. *merrillii* (Bres.) J.H. Mill., var. *pseudopachyloma* (Speg.) J.H. Mill., var. *rumpens* (Cooke) J.H. Mill. and var. *theissenii* (Syd. & P. Syd.) J.H. Mill. were distinguished based on differences in ascospore size and morphology. Owing to the absence of clear-cut differences in the morphology of cultures and ascospores within representatives of most of these varieties, Ju *et al.* (1998) revised the taxonomic status of these taxa and recognized *B. nummularia* as a European species different from its tropical counterparts and resurrected *Sphaeria capnodes* Berk., combining it in *B. cap-*

*nodes*. As a result of their revision, the varieties *merrillii* and *pseudopachyloma* were synonymized with *B. capnodes*, and the varieties *rumpens* (including var. *australe*) and *theissenii* were kept as varieties of *B. capnodes*. Furthermore, the new variety *limoniispora* Y.-M. Ju & J.D. Rogers was erected to accommodate a collection from Thailand with slightly larger and often lemon-shaped ascospores (Ju *et al.*, 1998; this paper). Although it would be tempting to further segregate taxa from *B. capnodes* in its wide current sense, our observations show that morphology alone is unable to subdivide *B. capnodes*, which must be seen as a widespread tropical species exhibiting a wide range of morphological variations, even within small islands like Guadeloupe and Martinique.



**Plate 3 – *Biscogniauxia capnodes***

A-D: MJF 15086; E-H: MJF 13153. A, C, E: Various shaped confluent stromata on host surface; B, F: Stromata in vertical section (broken) showing the carbonaceous tissue encasing the tubular to short-cylindrical perithecia; D, H: Stromatal surface in close-up showing the punctate to slightly papillate ostioles, plugged with greyish white substance in H; G: Stromatal margin with raised periderm and remnants of white substance. Scale bars: A, C, E = 10 mm; B, D, F, H = 0.5 mm; G = 2 mm.



**Plate 4 – *Biscogniauxia capnodes***

A, B, D, F: MJF 15086; C, E: MJF 07267; G: MJF 13153; H: MJF 13147. A, B: Mature asci in dilute blue Pelikan® ink and Melzer's reagent respectively; C: Ascospore apical apparatus, in Melzer's reagent; D: Two ascospores showing a germ slit, in 1% SDS; E-H: Ascospores of four different collections showing variations in size and shape, at same scale, in 1% SDS. Scale bars: A, B = 20 µm; C, E-H = 10 µm; D = 5 µm.

**Table 1** – Ascospore dimensions in nine collections of *B. capnodes* showing the range of intraspecific variations, compared with those recorded by Ju *et al.* (1998).

Collections number	Ascospore measurements with extreme values in parentheses	Q = quotient l/w N = number of measurements	Mean values
CLL 2085	(9–)9.7–11(–11.6) × (4.9–)5.4–6.1(–6.4) µm	Q = (1.5–)1.6–2(–2.1), N = 60	Me = 10.3 × 5.7 µm, Qe = 1.8
CLL 8280	(10–)10.5–12.4(–13) × (5.8–)6–6.7(–7.4) µm	Q = (1.5–)1.6–1.9(–2), N = 60	Me = 11.3 × 6.4 µm, Qe = 1.8
MJF 07267	(9.1–)9.6–11.6(–12.1) × (5.2–) 5.8–6.7(–7.4) µm	Q = (1.4–)1.5–1.9(–2.1), N = 60	Me = 10.6 × 6.3 µm, Qe = 1.7
MJF 07285	(8.1–)9.1–10.6(–11.4) × (4.2–) 4.7–6.1(–6.7) µm	Q = (1.4–)1.6–2.1(–2.4), N = 60	Me = 9.8 × 5.4 µm, Qe = 1.9
MJF 10205	(10.3–)11.4–13.3(–13.5) × (6.1–) 6.2–7.2(–7.5) µm	Q = (1.6–)1.7–2(–2.1), N = 60	Me = 12.4 × 6.7 µm, Qe = 1.8
MJF 13147	(9.8–)10.9–12.7(–13.5) × (5.3–) 5.7–6.7(–7.4) µm	Q = (1.6–)1.7–2.1(–2.2), N = 60	Me = 11.8 × 6.2 µm, Qe = 1.9
MJF 13153	(8.7–)9–10(–11.1) × (4.3–)4.6–5.3(–5.7) µm	Q = (1.6–)1.8–2.1(–2.2), N = 60	Me = 9.6 × 4.9 µm, Qe = 1.9
MJF 15086	(11.5–)11.8–13.1(–14.4) × (5.9–) 6.4–7.2(–7.6) µm	Q = (1.6–)1.7–2(–2.2), N = 60	Me = 12.5 × 6.7 µm, Qe = 1.9
MJF 16112	(10.1–)10.7–12.9(–13.3) × (6–) 6.7–7.8(–8.1) µm	Q = (1.4–)1.5–1.8(–2), N = 60	Me = 11.8 × 7.2 µm, Qe = 1.6
Cumulated values	(8.1–)9–13.3(–13.5) × (4.2–)4.6–7.8(–8.1) µm	Q = (1.4–)1.5–2.1(–2.2), N = 540	Me = 11.1 × 6.2 µm, Qe = 1.8
Ju <i>et al.</i> (1998)	8.5–15 × 5–7.5 µm		Me = 11.7 × 6.2 µm, Qe = 1.9

***Biscogniauxia capnodes*** (Berk.) Y.-M. Ju & J.D. Rogers **var. *limoniispora*** Y.-M. Ju & J.D. Rogers, *Mycotaxon*, 66: 26 (1998). Plate 5.

**Stromata** applanate, ellipsoid-lobed, 3–28 mm long × 3–14 mm wide × 0.4–0.7 mm thick, partly coalescent into elongate compound stromata, with slightly sloping margins showing no trace of the outer dehiscing layer; mature surface greyish black to dull black, matt, uneven and slightly roughened, carbonaceous beneath surface and between perithecia, tissue beneath perithecia 0.3–0.8 mm thick, dark brown, composed of blackened bark tissue, not carbonaceous. **Perithecia** tubular to short-cylindrical, frequently laterally and basally flattened, 0.3–0.5 mm high × 0.1–0.25 mm wide, opening centrally or laterally through individual ostioles, two adjacent perithecia at times sharing a common ostiole. **Ostioles** punctate, surrounded by a slightly raised rim, 25–70 µm diam, inconspicuous, evenly distributed, at times plugged with greyish to whitish substance.

**Asci** cylindrical, with (6–)8 obliquely uniseriate ascospores, subsessile, the spore-bearing parts 97–106 × 10–11 µm, the stipes 10–12 µm long, with apical apparatus 1.5–2.2 × 3.9–4.6 µm (Me = 2 × 4.3 µm; N = 20), discoid, trapezoid, bluing in Melzer's reagent. **Paraphyses** copious, hyphal, unbranched, thin-walled, septate, 2.5–4.5 µm wide at base, tapering above asci, filled with dense refractive material, evoking allophyses but not rendering the perithecial contents sticky. **Ascospores** (11.7–)12.8–14.5(–15) × (7.3–)7.7–8.9(–9.3) µm, Q = (1.4–)1.5–1.8(–1.9), N = 60 (Me = 13.5 × 8.3 µm; Qe = 1.6), one-celled, broadly ellipsoid almost equilateral, frequently lemon-shaped with narrowly rounded to slightly pinched ends, dark brown to blackish brown, smooth-walled, with a thin, unilateral, straight germ slit spore-length.

**Asexual morph** on the natural substrate not seen. Asexual morph in culture on OA like in the typical variety (Ju *et al.*, 1998).

**Specimen examined:** FRENCH WEST INDIES: MARTINIQUE: Prêchour, Anse-Couleuvre, coastal mesophilic rainforest, on a dead corticated log, 2 Sept. 2007, leg. C. Lécureu, MJF 07287 (LIP).

**Known distribution:** Martinique (this paper), Thailand (Ju *et al.*, 1998).

**Discussion:** The current concept of *B. capnodes* results from the segregation of three varieties from the typical variety based on ascospore morphology (Ju *et al.*, 1998). *Biscogniauxia capnodes* var. *limoniispora* is similar to *B. capnodes* in having entirely carbonaceous applanate stromata with perithecia opening separately through

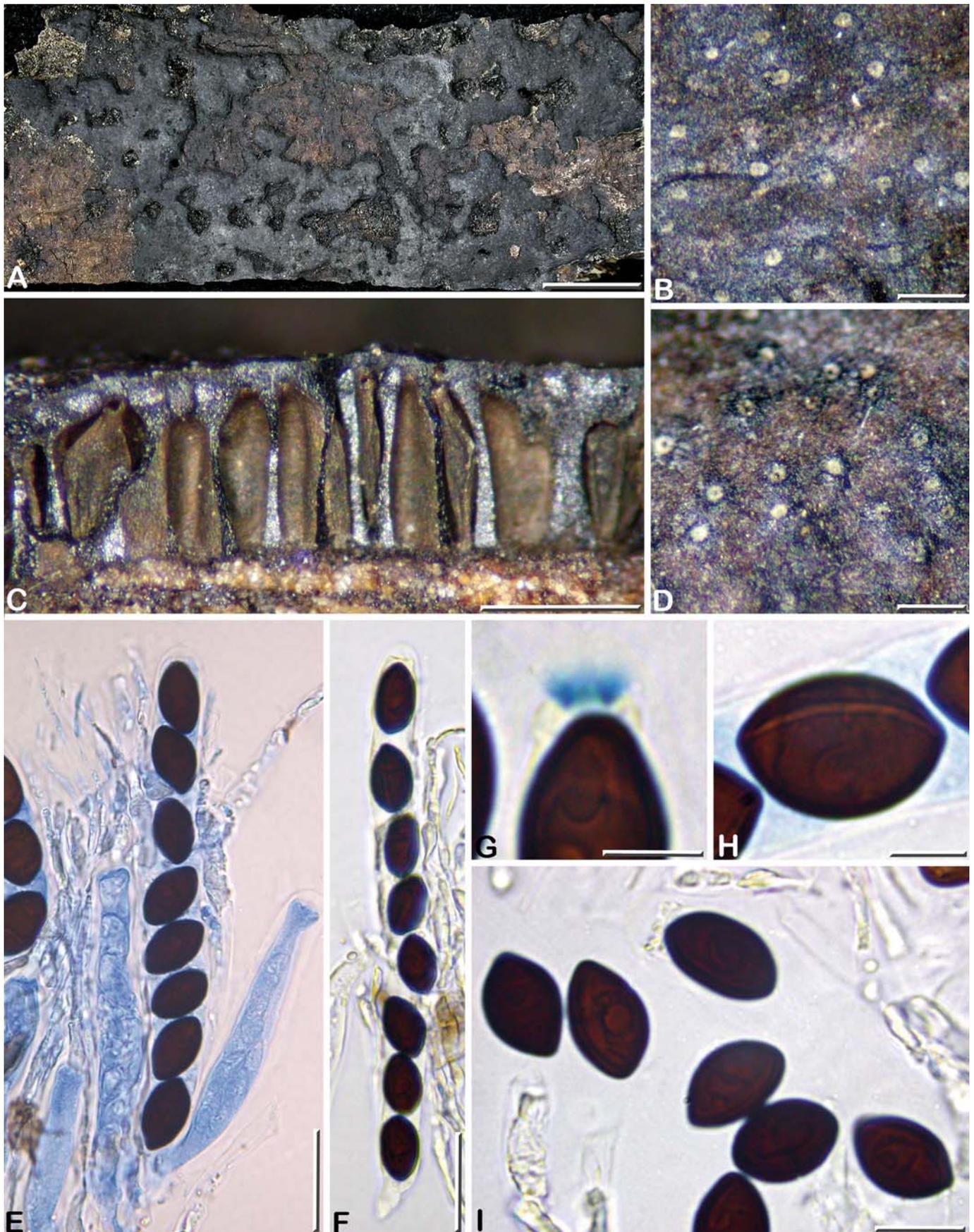
punctate ostioles and non-appendaged ellipsoid-equilateral ascospores. It was segregated from typical *B. capnodes* on account of its larger, often lemon-shaped ascospores. The holotype of *B. capnodes* var. *limoniispora* is a collection from Thailand, featuring ascospores 11.5–14 × 6–7.5 µm (Ju *et al.*, 1998). Our collection from Martinique conforms well to this taxon in most respects, especially the unusual ascospore shape and length, but deviates in its wider ascospores 7.7–8.9 µm wide. *B. capnodes* var. *limoniispora* was only known from the type collection, thus its intraspecific variations are unknown. Preferably to the erection of a further new variety based on the slightly deviating ascospore width encountered in the material from Martinique described here, it appears more appropriate to regard this collection as *B. capnodes* var. *limoniispora* until this taxon becomes better documented. This decision was supported by Dr. Y.-M. Ju (pers. comm.).

Both *B. citriformis* (Whalley, Hammelev & Talig.) Van der Gucht & Whalley and *B. citriformis* var. *macrospora* Van der Gucht & Whalley possess ascospores referred to as lemon-shaped. Both are present in Martinique (this paper) and primarily differ in having strongly inequilateral ascospores with pinched ends that cannot be confused with those of *B. capnodes* var. *limoniispora*.

***Biscogniauxia capnodes*** (Berk.) Y.-M. Ju & J.D. Rogers **var. *theisenii*** (Syd. & P. Syd.) Y.-M. Ju & J.D. Rogers, *Mycotaxon*, 66: 28 (1998). Plate 6.

**Stromata** applanate, ellipsoid-lobed, ellipsoid-elongate, often coalescent into elongate compound stromata, 5–88 mm long × 4–12 mm wide × 0.35–0.6 mm thick, with sterile sloping margins showing no trace of the outer dehiscing layer; mature surface dull black, overall matt, uneven and slightly roughened, in places reddish brown or olivaceous brown, carbonaceous beneath surface and between perithecia, tissue beneath perithecia 0.1–0.2 mm thick, composed of blackened bark tissue, not carbonaceous. **Perithecia** tubular to short-cylindrical, frequently laterally and basally flattened, 0.35–0.42 mm high × 0.12–0.35 mm wide, opening centrally or laterally through individual ostioles, two adjacent perithecia rarely sharing a common ostiole. **Ostioles** umbilicate to punctate, with or without a slightly raised black rim, 40–70 µm diam, often inconspicuous, evenly distributed, at times plugged with white substance.

**Asci** cylindrical, with (4–6–)8 uniseriate overlapping ascospores, subsessile, the spore-bearing parts 67–78 × 4.5–5 µm, fragile and easily ruptured at maturity, the stipes 8–14 µm long, with apical apparatus 1.3–1.9 × 2–2.4 µm (Me = 1.6 × 2.2 µm; N = 20), slightly tra-



**Plate 5 – *Biscogniauxia capnodes* var. *limoniispora***

MJF 07287. A: Confluent stromata on host surface; B, D: Stromatal surface in close-up showing the punctate ostioles plugged with white substance, in D with slightly raised rims; C: Stroma in vertical section (broken) showing the carbonaceous tissue encasing the tubular to flattened perithecia; E, F: Mature and immature asci interspersed with paraphyses with refractive content, in diluted blue Pelikan® ink and in 1% SDS respectively; G: Ascinal apical apparatus, in Melzer's reagent; H: Ascospore showing a faint germ slit spore-length, in diluted blue Pelikan® ink; I: Ascospores in 1% SDS, some typically lemon-shaped. Scale bars: A = 10 mm; B, D = 0.2 mm; C = 0.5 mm; E, F = 20 µm; G, H = 5 µm; I = 10 µm.

pezoid, bluing in Melzer's reagent. **Paraphyses** copious, hyphal, unbranched, thin-walled, septate, 4–6 µm wide at base, tapering above asci. **Ascospores** (8.4–)8.5–10.9(–11.8) × (3.7–)4–5.6(–6.7) µm, Q = (1.6–)1.8–2.3(–2.8), N = 120 (Me = 9.6 × 4.7 µm; Qe = 2), one-celled, ellipsoid almost equilateral with narrowly to broadly rounded ends, medium brown, smooth-walled, with a conspicuous, unilateral, straight germ slit spore-length.

**Asexual morph** on the natural substrate not seen.

**Specimens examined:** FRENCH WEST INDIES: MARTINIQUE: Case-Pilote, Morne Rose, mesophilic rainforest, on a dead corticated branch ca. 3 cm diam, 8 Aug. 2013, *leg.* J. Fournier, MJF 13086 (LIP); Les Anses-d'Arlet, track to Morne Salomon, coastal xerophilic forest, on a dead corticated branch ca. 4 cm diam, 5 Aug. 2016, *leg.* J. Fournier, MJF 16125 (LIP).

**Known distribution:** BRAZIL (Ju *et al.*, 1998), Martinique (this paper).

**Discussion:** The current concept of *Biscogniauxia capnodes* results from the segregation of three varieties from the typical variety based on ascospore morphology (Ju *et al.*, 1998). *B. capnodes* var. *theissenii* is similar to *B. capnodes* in having entirely carbonaceous appanate stromata with perithecia opening separately through punctate ostioles and non-appendaged ellipsoid-equilateral ascospores but was segregated from typical *B. capnodes* on account of its light brown and more narrowly ellipsoid ascospores. The holotype of *B. capnodes* var. *theissenii* is a collection from Brazil by THEISSEN (1907) — as *Nummularia theissenii* Syd. & P. Syd. —, featuring ascospores 9.5–13.5 × 4.5–5 µm, and no other material of this taxon is cited by Ju *et al.* (1998). Our collections from Martinique are referred to this taxon based on their overall similarity with *B. capnodes* coupled with deviating light brown ascospores averaging 9.6 × 4.7 µm, characterizing the variety *theissenii*. However, though they fit in the size range of 9.5–13.5 × 4.5–5 µm given by Ju *et al.* (1998), ascospore dimensions of the two studied specimens MJF 13086 and MJF 16125 appear fairly variable, respectively 8.5–9.8 × 4–4.6 µm and 9.5–10.9 × 4.6–5.6 µm. A better understanding of this taxon concept including its natural variations in ascospore dimensions should await a wider sampling.

Small light brown equilateral ascospores without a cellular appendage are unusual within *Biscogniauxia* and make a good differential character. Ascospores of the new species *B. nigropapillata* described in the present paper are similar to those of *B. capnodes* var. *theissenii* but they differ in having a shorter germ slit and in being more narrowly ellipsoid. The thicker stromata of *B. nigropapillata* and its shiny black papillate ostioles further distinguish the two taxa.

***Biscogniauxia citrifomis*** (Whalley, Hammelev & Talig.) Van der Gucht & Whalley, *Mycol. Res.*, 96: 895 (1992). Plates 7–8.

**Stromata** appanate-pulvinate, orbicular to irregularly ellipsoid-lobed, 7–48 mm long × 6–20 mm wide × 0.8–1.35 mm thick, often coalescent into elongate compound stromata to 100 mm long, with usually fairly abrupt margins; outer dehiscing layer dull blackish grey, present on immature stromata, occasionally persistent on mature stromata; mature surface grey to dark greyish brown or blackish, matt, slightly uneven, carbonaceous beneath surface and between perithecia, tissue beneath perithecia 0.04–0.2 mm thick, carbonaceous, underlying bark tissue dark brown. **Perithecia** tubular or short-cylindrical, frequently laterally and basally flattened, 0.5–0.85 mm high × 0.25–0.5 mm wide, opening centrally or laterally through individual ostioles, two adjacent perithecia rarely sharing a common ostiole. **Ostioles** usually deeply umbilicate, inconspicuous, 60–80 µm diam, mostly evenly distributed, often plugged with greyish substance.

**Asci** cylindrical, with 8 obliquely uniseriate ascospores, short-stipitate, the spore-bearing parts 81–87 × 8–9 µm, the stipes 16–30 µm long, with apical apparatus 1.7–2.3 × 3–3.5 µm (Me = 2 × 3.2 µm; N = 20), discoid, at times slightly attenuated at base, bluing in Melzer's reagent. **Paraphyses** sparse, hyphal, unbranched, thin-walled, septate, 1–2 µm wide, tapering above asci; allophyces abundant, non-septate, contorted, filled with refractive content not stained in blue Pelikan® ink, 2.5–3.5 µm wide at base, gradually tapering to 0.5–1.8 µm above asci, giving to the perithecial content a slightly sticky consistency. **Ascospores** (9.9–)10.3–11.9(–12.5) × (6.1–)6.5–7.7(–8.1) µm, Q = (1.3–)1.4–1.7(–1.8), N = 60 (Me = 11.1 × 7.2 µm; Qe = 1.6), one-celled, ellipsoid strongly inequilateral with unequally pinched ends, the lower end usually more strongly pinched than the upper one, dark brown to blackish brown, smooth-walled, with an inconspicuous, unilateral, straight germ slit spore-length or slightly less, on the most convex side.

**Asexual morph** on the natural substrate not seen. Asexual morph in culture on OA periconiella-like, based on material from Taiwan (Ju *et al.*, 1998).

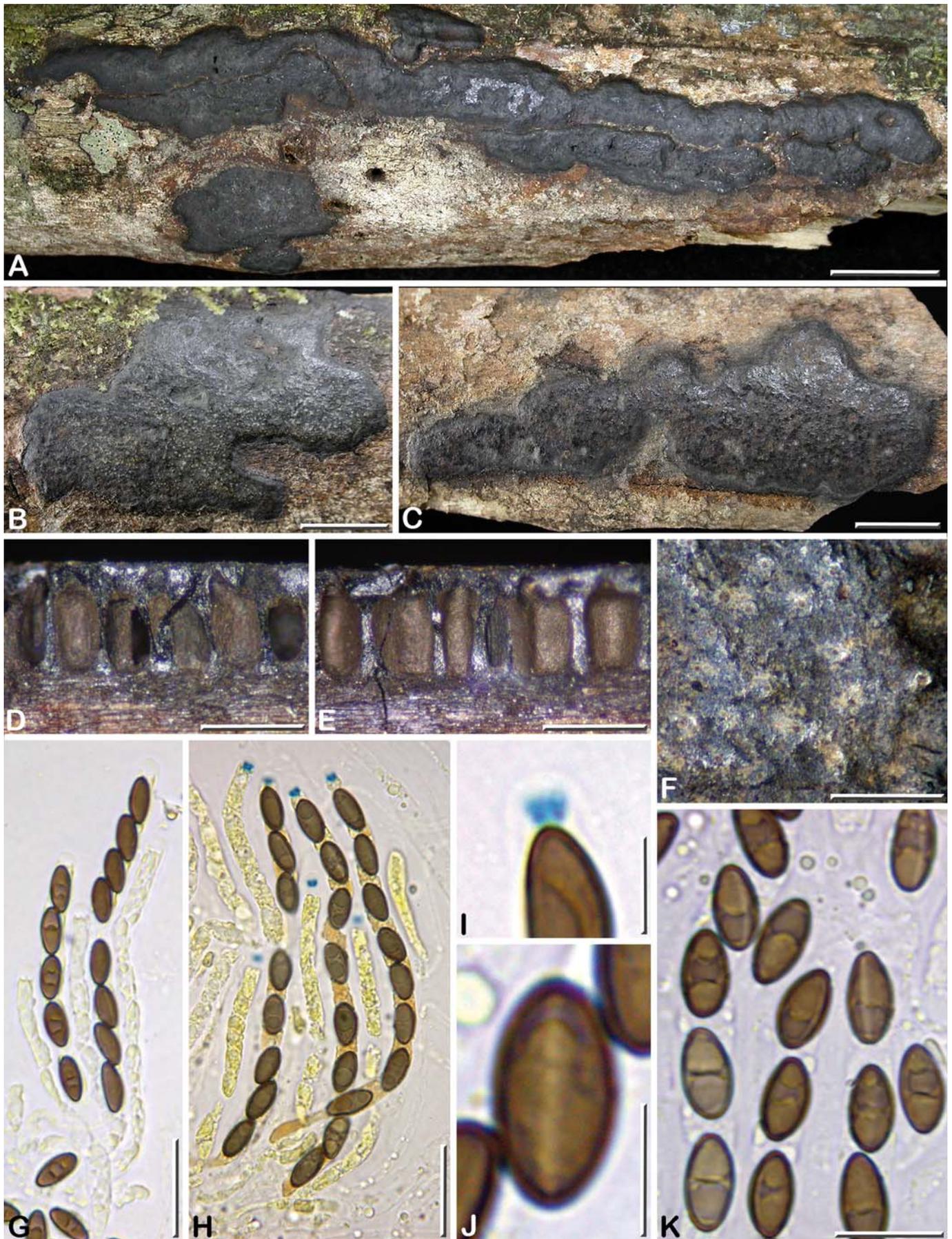
**Specimens examined:** FRENCH WEST INDIES: MARTINIQUE: Case-Pilote, Fond Boucher, xero- to mesophilic forest, on a dead corticated branch, 25 Aug. 2010, *leg.* J. Fournier, MJF 10104 (LIP); *ibid.*, 17 Aug. 2013, MJF 13271 (LIP); MJF 13276 (LIP); MJF 13298 (LIP); Case-Pilote, Morne Rose, mesophilic rainforest, on a dead corticated branch, 8 Aug. 2013, *leg.* J. Fournier, MJF 13065 (LIP); MJF 13066 (LIP); MJF 13075 (LIP); MJF 13077 (LIP); MJF 13079 (LIP); MJF 13080 (LIP); *ibid.*, 14 Jun. 2015, *leg.* J. Fournier, MJF 15065 (LIP); MJF 15067 (LIP); MJF 15073 (LIP); MJF 15076 (LIP); La Trinité, Pointe Rouge, xero- to mesophilic forest, on a dead corticated branch, 1 Aug. 2016, *leg.* J. Fournier, MJF 16028-2 (LIP); Schoelcher, Fond Lahaye, banks of Fond Lahaye River, mesophilic rainforest, on a dead corticated branch, 12 Aug. 2013, *leg.* J. Fournier, MJF 13155 (LIP); Schoelcher, Rivière Duclos, mesophilic rainforest, on a dead corticated branch, 4 Dec. 2005, *leg.* C. Lechat, CLL 5535 (LIP).

**Known distribution:** Pantropical: Cameroon (VAN DER GUCHT & WHALLEY, 1992), French Guiana (Ju *et al.*, 1998), Martinique (this paper), Nigeria (WHALLEY *et al.*, 1988), Papua New Guinea (VAN DER GUCHT, 1992), Taiwan, USA (Hawaiian Islands) (Ju *et al.*, 1998).

**Discussion:** As stated by Ju *et al.* (1998), *Biscogniauxia citrifomis* is a “highly distinctive taxon”, easily recognisable by its rather thick stromata with a grey to dark grey surface and umbilicate ostioles, strongly inequilateral blackish brown ascospores 10–12 × 6–8 µm with pinched ends and abundant allophyces. The two latter characters are diagnostic, though allophyces were not mentioned in the original description (WHALLEY *et al.*, 1988). The most resembling taxon is *B. citrifomis* var. *macrospora* which is distinguished by its significantly larger ascospores 17.7–19.5 × 8.3–9.8 µm (VAN DER GUCHT & WHALLEY, 1992; VAN DER GUCHT, 1992; Ju *et al.*, 1998; this paper).

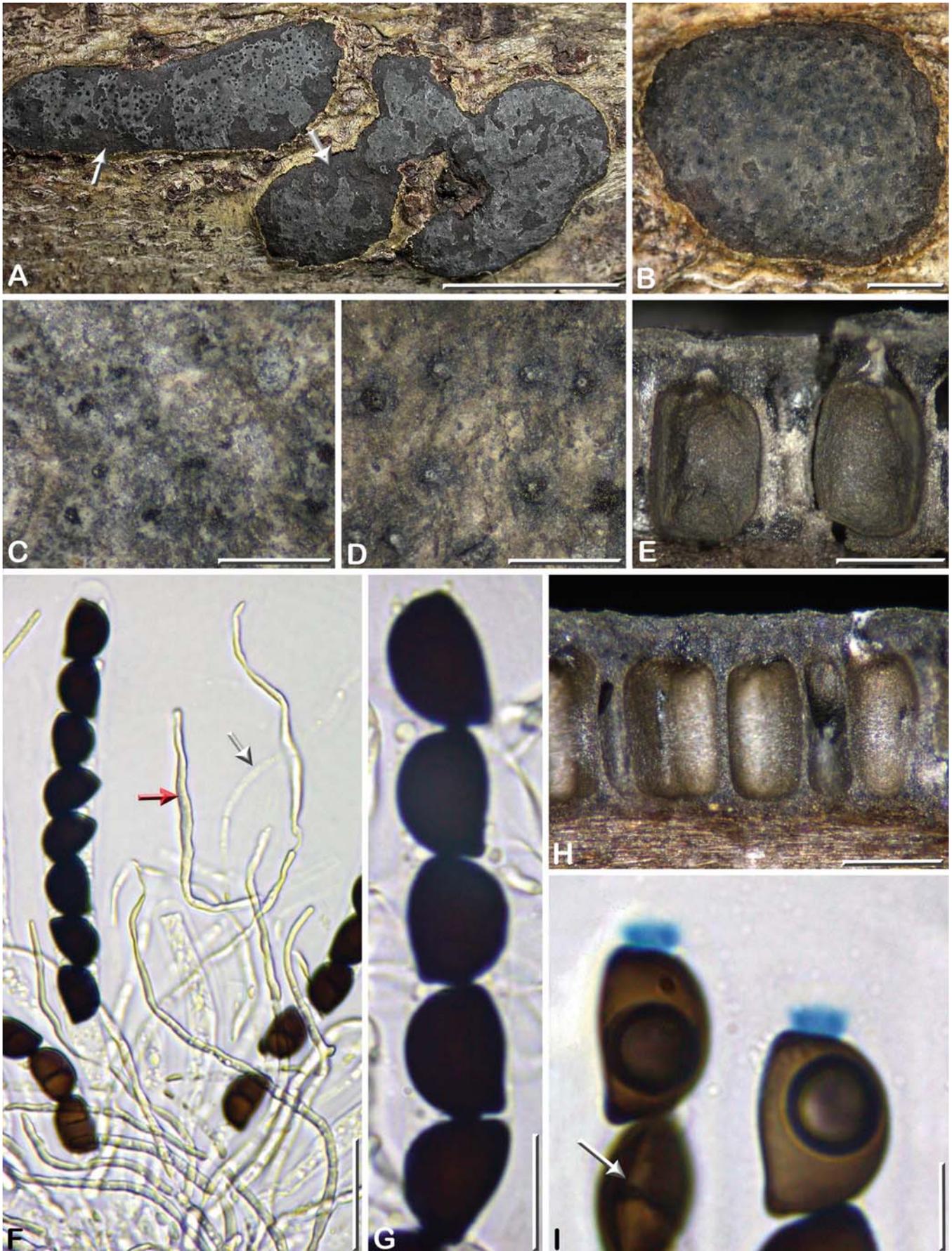
Two deviating collections (Plate 8) must be mentioned: in CLL 5535, the stromatal surface is white, and the stromata of MJF 13079 are distinctly erumpent from dead decorticated wood, whereas *Biscogniauxia* is typically a bark-inhabiting genus. As both collections show all the other typical features of *B. citrifomis*, they are referred to this taxon.

Based on its records in literature, *B. citrifomis* appears to be widespread in tropics and our 17 records of this species show that it is one of the most common species of *Biscogniauxia* in Martinique. However, it should be noted that most of the collections come from the same localities, suggesting a strong preference for sun-exposed places in mesophilic forests.



**Plate 6 – *Biscogniauxia capnodes* var. *theissenii***

MJF 13086. A-C: Various shaped stromata on host surface; D, E: Stromata in vertical section (broken) showing the carbonaceous tissue encasing the tubular to short-cylindrical perithecia; F: Stromatal surface in close-up showing the umbilicate to slightly punctate ostioles plugged with white substance; G, H: Mature and immature asci, in 1% SDS and Melzer's reagent respectively; I: Ascus apical apparatus, in Melzer's reagent; J: Ascospore showing a long germ slit, in 1% SDS; K: Ascospores in 1% SDS, some showing a long germ slit. Scale bars: A = 10 mm; B, C = 5 mm; D-F = 0.5 mm; G, H = 20  $\mu$ m; I, J = 5  $\mu$ m; K = 10  $\mu$ m.



**Plate 7 – *Biscogniauxia citriformis***

A, B, D: MJF 15076; C, E, H: MJF 15065; F, G, I: MJF 15067. A: Ellipsoid-lobed stromata on host surface, with remnants of the darker outer dehiscing layer on stromatal surface (arrows); B: Orbicular stroma devoid of outer layer; C, D: Stromatal surface in close-up showing more or less conspicuous umbilicate ostioles; E, H: Stromata in vertical section (broken) showing the carbonaceous tissue encasing the short-cylindrical to tubular perithecia; F: Mature asci in 1% SDS, associated with thin-walled paraphyses (white arrow) and allophyses with refractive content (red arrow); G: Ascospores in side view in the ascus, in 1% SDS; I: Ascal tips in Melzer's reagent, showing the amyloid apical apparatus and immature ascospores, one in dorsal view with the germ slit visible (arrow). Scale bars: A = 10 mm; B = 2 mm; C-E, H = 0.5 mm; F = 20  $\mu$ m; G = 10  $\mu$ m; I = 5  $\mu$ m.

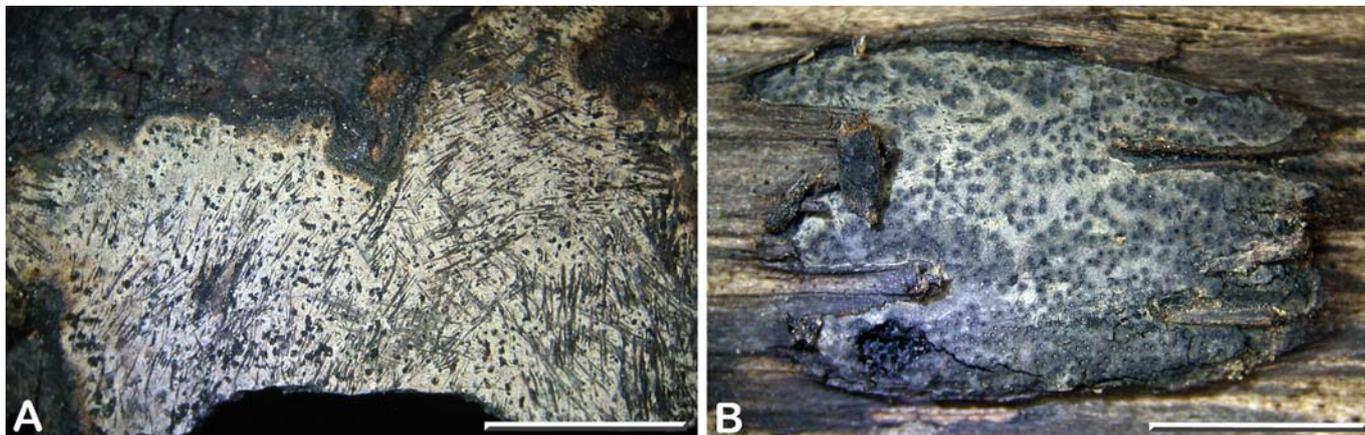


Plate 8 – *Biscogniauxia citriformis*, deviating stromata

A: CLL 5535; B: MJF 13079. A: White stromatal surface, appearing grey beneath the scratches; B: Stroma erumpent from wood. Scale bars: A, B = 5 mm.

***Biscogniauxia citriformis*** (Whalley, Hammelev & Talig.) Van der Gucht & Whalley var. ***macrospora*** Van der Gucht & Whalley, *Mycol. Res.*, 96: 896 (1992). Plate 9.

**Stromata** appanate, orbicular to irregularly ellipsoid-lobed, 3–12 mm long × 3–10 mm wide × 0.7–0.9 mm thick, separate or often coalescent into elongate compound stromata to 40 mm long × 15 mm wide, with sloping margins lacking remnants of the outer dehiscing layer; surface black, matt, even, carbonaceous beneath surface and between perithecia, tissue beneath perithecia 0.04–0.05 mm thick, carbonaceous, underlying bark tissue blackish brown. **Perithecia** tubular or short-cylindrical, frequently laterally and basally flattened, 0.5–0.7 mm high × 0.2–0.35 mm wide, opening centrally or laterally through individual ostioles, two adjacent perithecia rarely sharing a common ostiole. **Ostioles** punctate, 40–60 µm diam, evenly distributed, plugged with white substance.

**Asci** cylindrical, with (6–)8 overlapping uniseriate ascospores, short-stipitate to sessile, the spore-bearing parts 120–135 × 10–11 µm, the stipes 8–16 µm long, with apical apparatus 3.4–4.2 × 4.8–5.4 µm (Me = 3.8 × 5.1 µm; N = 16), short-cylindrical, apically flared, bluing in Melzer's reagent. **Paraphyses** hyphal, unbranched, thin-walled, septate, either 1–2 µm wide, sparsely guttulate, embedded in mucilage, or 4–9 µm wide, filled with granular refractive material, less homogeneous than in typical allophyses, giving to the perithecial content a slightly sticky consistency. **Ascospores** (17–)17.7–19.5(–20.4) × (8–)8.3–9.8(–10.4) µm, Q = (1.8–)1.9–2.3(–2.4), N = 60 (Me = 18.7 × 9 µm; Qe = 2.1), one-celled, ellipsoid strongly inequilateral with unequally pinched ends, dark brown to blackish brown, smooth-walled, with an inconspicuous, unilateral, straight germ slit spore-length or slightly less, on the most convex side.

**Asexual morph** on the natural substrate not seen.

**Specimen examined:** FRENCH WEST INDIES: MARTINIQUE: Case-Pilote, Morne-Rose, mesophilic rainforest, on a dead corticated branch, 8 Aug. 2013, leg. J. Fournier, MJF 13088 (LIP).

**Known distribution:** Pantropical: French Guiana, Gabon (Ju *et al.*, 1998), Martinique (this paper), Papua New Guinea (VAN DER GUCHT & WHALLEY, 1992), Thailand (WHALLEY *et al.*, 1995).

**Discussion:** This single collection conforms well to the description of *Biscogniauxia citriformis* var. *macrospora* first reported from Papua New Guinea, which was segregated from the typical variety by larger ascospores 15–19 × 7–11 µm (VAN DER GUCHT & WHALLEY, 1992). Ostiolar morphology and ascospore shape are strikingly similar to the illustrations provided by VAN DER GUCHT & WHALLEY (1992), but, unlike these authors, we observed the germ slit on the most

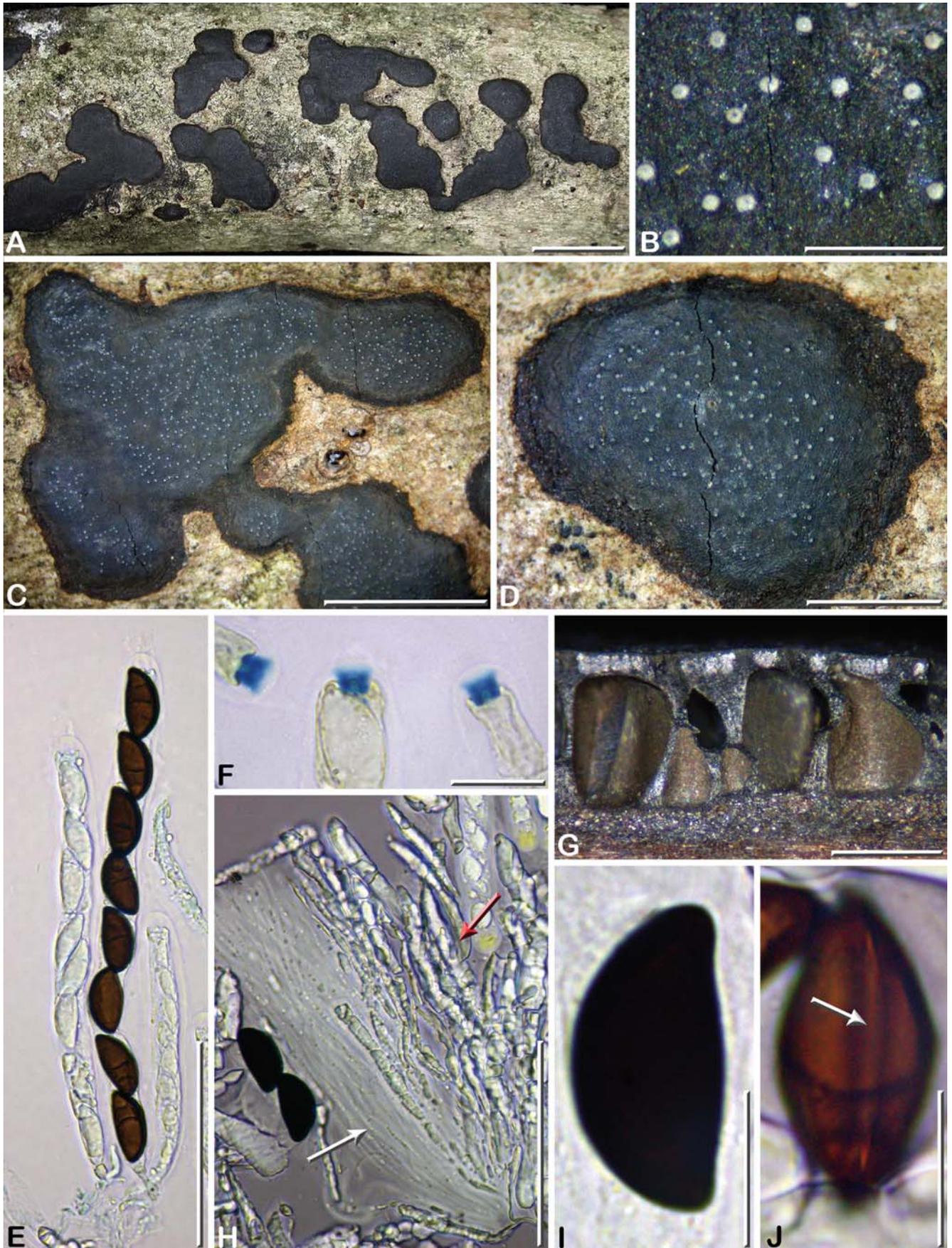
convex side of ascospores in the few cases where we could detect it. Other characters deviating from the typical variety are the slightly thinner stromata with a black vs. grey surface and punctate vs. deeply umbilicate ostioles. *B. citriformis* var. *macrospora* is apparently much rarer than *B. citriformis* in Martinique and its variability should be assessed based on a wider sampling.

***Biscogniauxia grenadensis*** (J.H. Mill.) Whalley & Læssøe, *Mycol. Res.*, 94: 239 (1990). Plate 10.

**Stromata** appanate-pulvinate, orbicular to irregularly ellipsoid-lobed, 4–32 mm long × 4–18 mm wide × 0.7–0.85 mm thick, somewhat coalescent into longer compound stromata, with sloping margins and usually lacking remnants of the outer dehiscing layer at maturity; mature surface olivaceous brown to dark grey with a faint brown tinge on young stromata, matt, slightly uneven, carbonaceous beneath surface and between perithecia, tissue beneath perithecia 0.04–0.2 mm thick, carbonaceous, underlying bark tissue weakly pigmented. **Perithecia** obovoid to tubular, frequently laterally and basally flattened, 0.6–0.65 mm high × 0.25–0.4 mm wide, opening centrally or laterally through individual ostioles, two adjacent perithecia rarely sharing a common ostiole. **Ostioles** slightly papillate, apically obtuse or truncate, black, slightly shiny, at times punctate with a low rim, 50–75 µm diam, evenly distributed, often plugged with greyish substance.

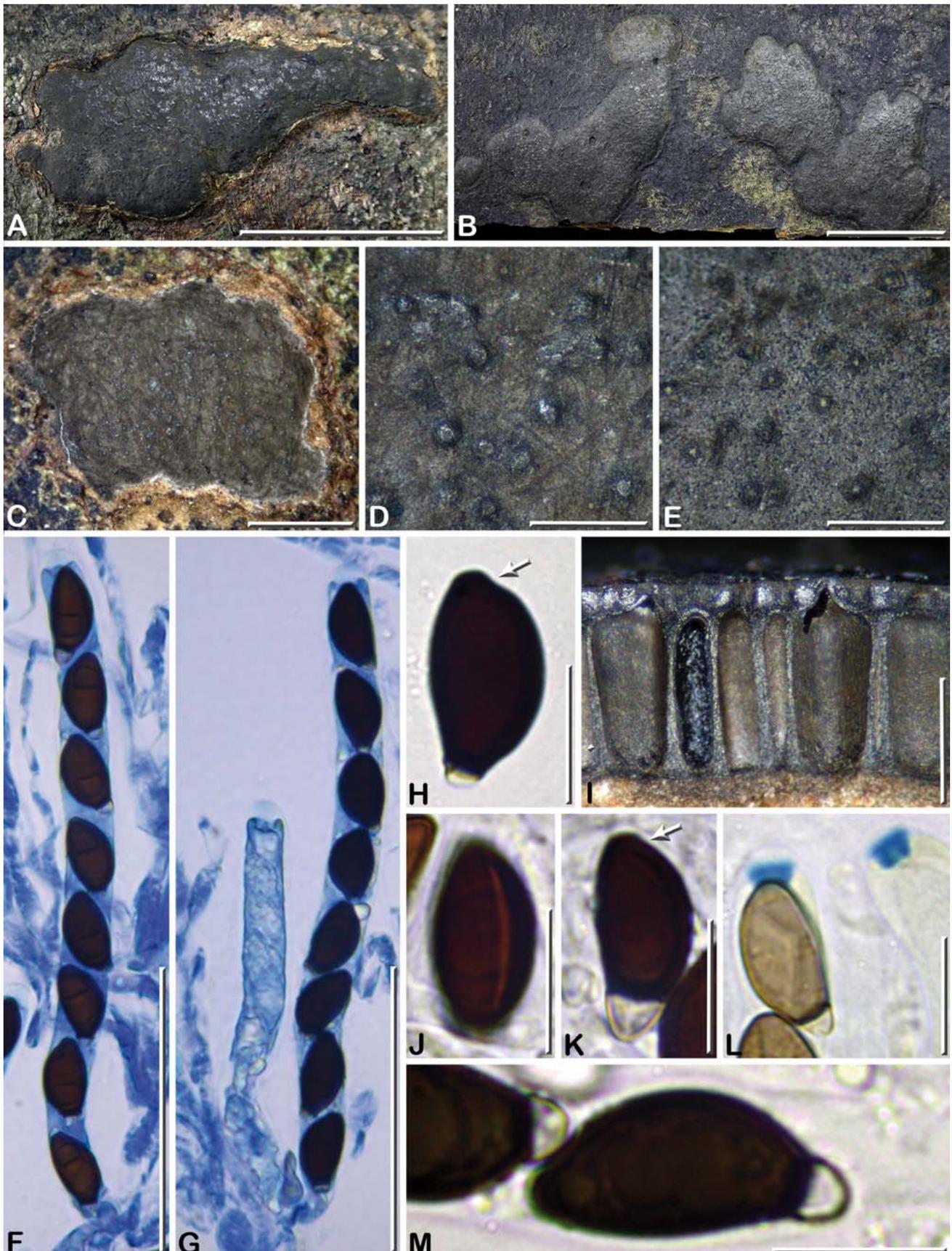
**Asci** cylindrical, with 8 obliquely uniseriate ascospores, short-stipitate to sessile, the spore-bearing parts 100–115 × 9–10 µm, the stipes 9–12 µm long, with apical apparatus 2.3–3.2 × 3.8–4.5 µm (Me = 2.7 × 4.1 µm; N = 20), short-cylindrical, slightly trapezoid, bluing in Melzer's reagent. **Paraphyses** sparse, hyphal, unbranched, thin-walled, septate, 4–6 µm wide, tapering above asci. **Ascospores** (12.2–)12.8–15.2(–17.5) × (5.7–)6.2–7.9(–8.2) µm, not including appendage, Q = (1.6–)1.7–2.3(–2.6), N = 120 (Me = 14 × 7.1 µm; Qe = 2), dark brown to blackish brown, ellipsoid-inequilateral, slightly laterally flattened, with broadly rounded and frequently slightly pinched upper end and an obliquely truncate lower end, bearing a hyaline, thick-walled broadly conical, obtusely-ended cellular appendage 2–3.5 µm long × 3–4.5 µm wide (Me = 2.6 × 3.9 µm, N = 25), collapsing over time, especially on discharged ascospores; smooth-walled, with a fairly conspicuous, unilateral, straight germ slit almost spore-length on the most convex side.

**Asexual morph** on the natural substrate not seen. Asexual morph in culture on OA sporothrix-like to nodulisporium-like, based on material from USA (ROGERS, 1966).



**Plate 9 – *Biscogniauxia citrifomis* var. *macrospora***

MJF 13088. A: Variously lobed confluent stromata on host surface; B: Stromatal surface in close-up showing punctate ostioles plugged with white substance; C, D: Lobed and orbicular stromata in close-up; E: Immature and mature asci in diluted blue Pelikan® ink; F: Ascus tips in Melzer's reagent, showing the amyloid apical apparatus; G: Stroma in vertical section (broken) showing the carbonaceous tissue encasing the short-cylindrical perithecia; H: Hamathecium composed of narrow thin-walled paraphyses embedded in mucilage (white arrow) and wide paraphyses containing granular refractive material (red arrow), in black Pelikan® ink; I: Mature ascospore in side view showing the pinched ends, in 1% SDS; J: Immature ascospore in dorsal view showing a germ slit (arrow), in black Pelikan® ink. Scale bars: A = 10 mm; B, G = 0.5 mm; C = 5 mm; D = 2 mm; E, H = 50 µm; F, I, J = 10 µm.



**Plate 10 – *Biscogniauxia grenadensis***

A, I-M: MJF 10213; B, E: MJF 10225; C, D, F-H: MJF 10230. A-B : Various shaped ellipsoid-lobed mature stromata on host surface; C: Young stroma with white substance lining the margins; D, E: Stromatal surface in close-up showing papillate truncate ostioles (D) or punctate ostioles (E); F, G: Mature and immature asci associated with thin-walled paraphyses, in diluted blue Pelikan® ink, showing several ascospores with upper end pinched; H: Ascospore in side view showing a pinched upper end (arrow) and a collapsed cellular appendage at lower end; I: Stroma in vertical section (broken) showing the carbonaceous tissue encasing the tubular perithecia; J: Ascospore in dorso-lateral view showing a germ slit, in 1% SDS; K, M: Ascospores in side view showing the obliquely truncate lower end bearing a cellular appendage and a pinched upper end (K), in 1% SDS; L: Ascical tips in Melzer's reagent, showing the amyloid apical apparatus and an immature ascospore. Scale bars: A, B = 10 mm; C = 2 mm; D, E, I = 0.5 mm; F, G = 50 µm; H, J-M = 10 µm.

**Specimens examined:** FRENCH WEST INDIES: MARTINIQUE: Case-Pilote, Crête Jean-Louis, Fond Bourlet, hygrophilic rainforest, on a dead corticated branch, 3 Sept. 2003, *leg.* C. Lechat, CLL 0819 (LIP); La Trinité, Pointe Rouge, xero- to mesophilic forest, on a dead corticated branch, 27 Aug. 2005, *leg.* C. Lechat, CCL 5215 (LIP); *ibid.*, 28 Aug. 2010, *leg.* J. Fournier, MJF 10213 (LIP); *ibid.*, 29 Aug. 2010, *leg.* J. Fournier, MJF 10225 (LIP); *ibid.*, 29 Aug. 2010, *leg.* J. Fournier, MJF 10230 (LIP).

**Known distribution:** Primarily Neotropical: Costa Rica (MILLER, 1961), Jamaica, Grenada (Ju *et al.*, 1998), Martinique (this paper), México (SAN MARTIN & ROGERS, 1993), USA (Washington state) (ROGERS, 1966).

**Discussion:** The collections presented above conform well to *Biscogniauxia grenadensis* in having inequilateral appendaged ascospores averaging  $14 \times 7.1 \mu\text{m}$ , with frequently pinched upper ends and a conspicuous germ slit spore-length. The three most resembling species with appendaged ascospores occurring in Martinique are *B. breviappendiculata* (this paper), *B. martinicensis* (this paper) and *B. philippinensis*. *B. grenadensis* primarily differs from the former by its larger and strongly inequilateral ascospores with a persistent and conspicuous cellular appendage; from *B. martinicensis* by larger ascospores with a ratio  $L/w = 2$  vs. 1.3; from *B. philippinensis* by smaller ascospores  $13.1\text{--}15.2 \times 6.2\text{--}7.9 \mu\text{m}$  vs.  $20\text{--}24.5 \times 10.6\text{--}13.6 \mu\text{m}$ . None of these species possesses ascospores with pinched upper end which might be seen as the “signature” of *B. grenadensis*.

We describe the ostioles of our collections as mostly papillate-truncate, which differs from the description as “plane, rarely with raised margin” by MILLER (1961) and “at the same level as or lower than stromatal surface, with openings punctate, usually surrounded by slightly raised rim” by Ju *et al.* (1998). As we also noticed the presence of punctate ostioles surrounded with a low rim in our collections, we assume the morphology of ostioles in this species is variable and cannot be regarded as discriminant.

Variety *macrospora* J.H. Mill. was described by MILLER (1961) for material from Jamaica based on slightly larger asci and ascospores, the latter  $13\text{--}18 \times 7\text{--}10 \mu\text{m}$ , a size range currently accepted for *B. grenadensis* by Ju *et al.* (1998) and Ju & ROGERS (2001) who did not recognize this variety. The wide ascospore size range recorded on the five examined collections from Martinique supports this decision.

***Biscogniauxia martinicensis*** J. Fourn. & Lechat, *sp. nov.* – MycoBank MB820803. Plates 11–12. Table 2.

**Diagnosis:** Differs from all *Biscogniauxia* taxa featuring appendaged blackish brown ascospores by smaller, broadly ellipsoid slightly inequilateral ascospores averaging  $11.2 \times 8.5 \mu\text{m}$ , with a conspicuous and persistent cellular appendage and a conspicuous straight germ slit almost spore-length.

**Holotype:** FRENCH WEST INDIES: MARTINIQUE: Fort-de-France, Fontaine Didier, hygrophilic rainforest, on a dead corticated branchlet 2 cm diam, 19 Aug. 2013, *leg.* J. Fournier, MJF 13323 (LIP).

**Etymology:** Derived from Martinique, the Caribbean island in which the species was repeatedly collected.

**Stromata** applanate, orbicular to irregularly lobed, 3–32 mm long  $\times$  2–10 mm wide  $\times$  0.35–0.5 mm thick, with sloping margins, frequently confluent; outer dehiscing layer present on immature stromata, reddish brown, brittle, remaining at margin but barely distinguished from the surrounding bark tissue; mature surface dull greyish brown to blackish grey, carbonaceous beneath surface and between perithecia, tissue beneath perithecia 0.3–0.4 mm thick, carbonaceous, underlying bark tissue blackened. **Perithecia** short-cylindrical to obovoid or flask-shaped, the base flattened, frequently laterally flattened, 0.2–0.35 mm high  $\times$  0.15–0.25 mm wide, opening

centrally or laterally through individual ostioles, two adjacent perithecia rarely sharing a common ostiole. **Ostioles** umbilicate or punctate with a slightly to conspicuously raised rim, plugged with white substance or 40–50  $\mu\text{m}$  diam, often surrounded by a darker halo, evenly distributed or in small clusters.

**Asci** cylindrical, with (6–)8 obliquely uniseriate ascospores, short-stipitate to sessile, the spore-bearing parts  $92\text{--}118 \times 9\text{--}10 \mu\text{m}$ , the stipes 7–22  $\mu\text{m}$  long, with apical apparatus  $2.9\text{--}3.9 \times 4.3\text{--}5.4 \mu\text{m}$  (Me =  $3.5 \times 4.9 \mu\text{m}$ ; N = 20), short-cylindrical to trapezoid, bluing in Melzer’s reagent. **Paraphyses** sparse, hyphal, unbranched, thin-walled, septate, 4–5  $\mu\text{m}$  wide at base, tapering above asci. **Ascospores** (9–)9.5–12.8(–13.3)  $\times$  (6.6–)7.4–9.8(–10.4)  $\mu\text{m}$ , not including appendage, Q = (1.1–)1.2–1.4(–1.6), N = 300 (Me =  $11.2 \times 8.5 \mu\text{m}$ ; Qe = 1.3), dark brown to blackish brown, broadly ellipsoid slightly inequilateral to almost equilateral, with broadly rounded upper end and obliquely truncate lower end bearing a hyaline, thick-walled hemispherical to conical cellular appendage 2–3.4  $\mu\text{m}$  long  $\times$  4–5.5  $\mu\text{m}$  wide (Me =  $2.6 \times 4.8 \mu\text{m}$ , N = 60), persistent at maturity, even on discharged ascospores; smooth-walled, with a conspicuous, unilateral, straight germ slit spore-length to almost spore-length on the most convex side.

**Asexual morph** on the natural substrate: Conidiophores arising in loose tufts, whitish, originating from the outer layer of immature stromata prior to dehiscence; conidiophores upright, with a straight, basally brown, septate axis, 120–160  $\mu\text{m}$  high  $\times$  4–6  $\mu\text{m}$  wide at base, roughened, apically yellowish to subhyaline, branching; conidiogenous structure virgariella-like to nodulisporium-like, with conidiogenous cells 10–18  $\times$  2.5–3.5  $\mu\text{m}$ , finely roughened; conidia 4.5–7.2  $\times$  2.5–2.8  $\mu\text{m}$ , subhyaline, smooth, narrowly ellipsoid to fusiform.

**Other specimens examined (paratypes):** FRENCH WEST INDIES: MARTINIQUE: Case-Pilote, Savane Saint-Cyr, track to Plateau Concorde, hygrophilic rainforest, on a dead corticated branch 2.5 cm diam, 25 Aug. 2007, *leg.* J. Fournier, MJF 07093 (LIP); Fort-de-France, Ab-salon, trail to Plateau Michel, ca. 350 m, hygrophilic rainforest, on a dead corticated branchlet 2 cm diam, 15 Aug. 2013, *leg.* J. Fournier, MJF 13246 (LIP); *ibid.*, on a dead corticated branchlet 1.5 cm diam, 5 Jun. 2014, *leg.* J. Fournier, MJF 14039 (LIP); *ibid.*, on a dead corticated branchlet 1.5 cm diam, 7 Aug. 2016, *leg.* J. Fournier, MJF 16162 (LIP).

**Known distribution:** Martinique.

**Discussion:** Based on the study of five collections from Martinique, *Biscogniauxia martinicensis* is characterized by thin, applanate, entirely carbonaceous stromata with dark grey surface and punctate ostioles, combined with two-celled, almost equilateral blackish brown ascospores averaging  $11.2 \times 8.5 \mu\text{m}$  with a conspicuous, thick-walled, basal cellular appendage and a conspicuous straight germ slit spore-length. This combination of characters distinguishes it from the most resembling species *B. breviappendiculata* and *B. grenadensis*. The former primarily differs from *B. martinicensis* by strictly equilateral and more narrowly ellipsoid ascospores (Qe = 1.7 vs. 1.3) bearing a much smaller, thin-walled and often collapsed cellular appendage. Ascospores of *B. grenadensis* differ from those of *B. martinicensis* in being larger and more narrowly ellipsoid on average (Me =  $14 \times 7.1 \mu\text{m}$ ,  $L/w = 2$  vs.  $11.2 \times 8.5 \mu\text{m}$ ,  $L/w = 1.3$ ) and in being more strongly inequilateral and frequently pinched at upper end.

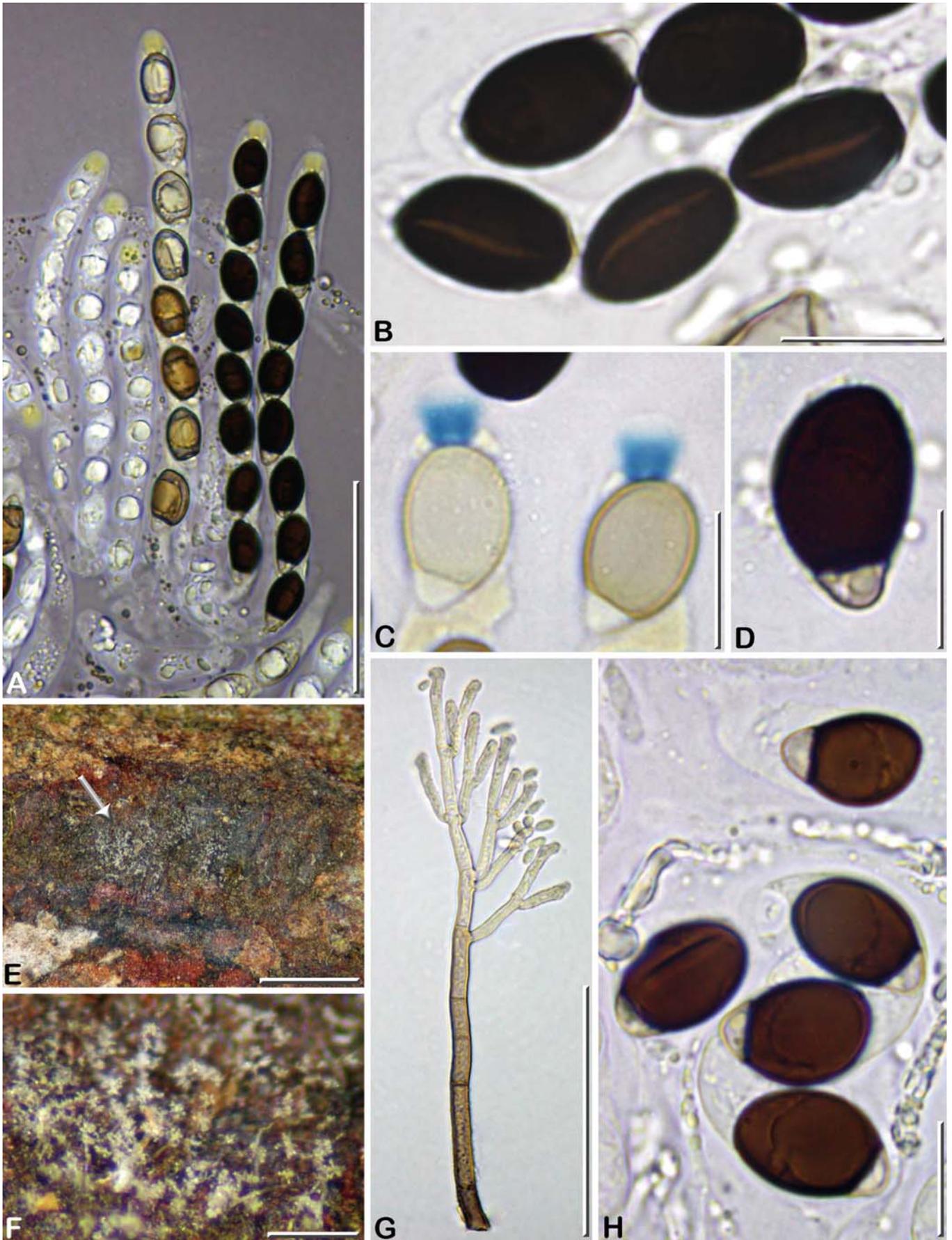
Ascospores of the widespread, pantropical *B. uniapiculata* strongly differ in being paler brown, more narrowly ellipsoid and frequently inequilateral and in having a germ slit on either side (Ju *et al.*, 1998; this paper). Moreover, their appendages are thin-walled and often collapsed (this paper).

A comparison with *B. uniapiculata* var. *indica* (Sacc.) Y.-M. Ju & J.D. Rogers, known from a single collection in Singapore (Ju *et al.*, 1998), might likewise be considered because of its appendaged



**Plate 11 – *Biscogniauxia martinicensis***

A, B, E, F, H, I: MJF 13323 holotype; C: MJF 13246; D: MJF 16162; G, J: MJF 14039. A: Immature stroma with ruptured dehiscent outer layer (arrows); B-F: Various shaped stromata erumpent from bark; G: Stroma in vertical section showing the thick carbonaceous subsurface and the carbonaceous tissue encasing the perithecia; H-J: Stromatal surface in close-up showing punctate ostioles without (H) or with (I) raised rims, or umbilicate ostioles (J). Scale bars: A, B, E = 2 mm; C, D, F = 10 mm; G-J = 0.5 mm.



**Plate 12 – *Biscogniauxia martinicensis***

A, D: MJF 13323, holotype; B: MJF 07093; C, H: MJF 14039; E-G: MJF 16162. A: Immature and mature asci, in black Pelikan® ink; B: Ascospores in 1 % SDS, three of them in dorsal view showing a germ slit; C: Ascical apical apparatus, in Melzer's reagent; D: Mature ascospore in side view; E: Outer layer of an immature stroma on bark surface prior to dehiscence, bearing white tufts of the asexual morph (arrow); F: Close-up of the asexual morph colony on immature stroma; G: Conidiophore of the asexual morph, bearing the apical virgariella- to nodulisporium-like branching of conidiogenous cells, with some detached conidia, in 1% SDS; H: Immature medium brown ascospores in side and dorsal views, in 1% SDS. Scale bars: A, G = 50 µm; B-D, H = 10 µm; E = 1 mm; F = 0.2 mm.

**Table 2** – Ascospore dimensions in five collections of *B. martinicensis* showing the range of intraspecific variations.

Collections number	Ascospore measurements with extreme values in parentheses	Q = quotient l/w N = number of measurements	Mean values
MJF 07093	(9–)9.5–11.2(–11.8) × (6.6–)7.4–8.7(–9.6) μm	Q = (1.1–)1.2–1.4(–1.6), N = 60	Me = 10.3 × 8 μm, Qe = 1.3
MJF 13246	(10.3–)11–12.8(–13.3) × (7.4–) 7.7–9.3(–9.8) μm	Q = (1.2–)1.3–1.5(–1.6), N = 60	Me = 11.9 × 8.7 μm, Qe = 1.4
MJF 13323	(9.1–)9.9–11.2(–12.1) × (7–)7.4–8.5(–8.8) μm	Q = (1.2–)1.25–1.4(–1.6), N = 60	Me = 10.5 × 7.9 μm, Qe = 1.3
MJF 14039	(10.1–)11.1–12.4(–13.1) × (7.8–) 8.5–9.8(–10.4) μm	Q = (1.1–)1.2–1.4(–1.5), N = 60	Me = 11.7 × 9.2 μm, Qe = 1.3
MJF 16162	(10.1–)10.6–12.5(–13) × (7.5–) 7.9–9.4(–9.9) μm	Q = (1.2–)1.21–1.4(–1.6), N = 60	Me = 11.5 × 8.7 μm, Qe = 1.3
Cumulated values	(9–)9.5–12.8(–13.3) × (6.6–)7.4–9.8(–10.4) μm	Q = (1.1–)1.2–1.4(–1.6), N = 300	Me = 11.2 × 8.5 μm, Qe = 1.3

ascospores of similar length 10–12 × 6–7.5 μm. Ascospores of *B. uniaiculata* var. *indica* differ from those of *B. martinicensis* in being more narrowly ellipsoid and in having a less than spore-length germ slit.

***Biscogniauxia nigropapillata*** J. Fourn. & Lechat, *sp. nov.* – MycoBank MB820804. Plate 13. Table 3.

**Diagnosis:** Differs from all *Biscogniauxia* taxa featuring papillate ostioles by medium brown, almost equilateral non-appendaged ascospores averaging 9 × 3.8 μm, with a germ slit most often much less than spore-length.

**Holotype:** FRENCH WEST INDIES: MARTINIQUE: Le Saint-Esprit, Bois La Charles, mesophilic rainforest, on a dead corticated branch, 29 Aug. 2005, *leg.* C. Lechat, CLL 5254 (LIP).

**Etymology:** From Latin *niger* = black and *papilla* = nipple, for the shiny black papillate ostioles contrasting against the dull olivaceous brown stromatal surface.

**Stromata** applanate, orbicular, ellipsoid-lobed, ellipsoid-elongate or widely effused, 3–110 mm long × 4–44 mm wide × 0.7–1.4 mm thick; remnants of the dark olivaceous brown to blackish outer dehiscent layer occasionally present at margins; mature surface dull olivaceous brown, carbonaceous beneath surface and between perithecia, tissue beneath perithecia 0.15–0.2 mm thick, composed of blackened bark tissue, not carbonaceous. **Perithecia** tubular to long-tubular, frequently laterally flattened, 0.6–1.2 mm high × 0.17–0.42 mm wide, opening centrally or laterally through individual ostioles, two adjacent perithecia rarely sharing a common ostiole. **Ostioles** papillate, shiny black, evenly distributed or in small clusters contrasting against the dull olivaceous brown stromatal surface.

**Asci** cylindrical with (4–6)–8 obliquely uniseriate ascospores, subsessile, the spore-bearing parts 60–77 × 5–6 μm, fragile and easily ruptured at maturity, the stipes 7–10 μm long, with apical apparatus 1.4–1.9 × 2–2.6 μm (Me = 1.7 × 2.2 μm; N = 20), trapezoid, bluing in Melzer's reagent. **Paraphyses** copious, hyphal, unbranched, thin-walled, septate, 4–5 μm wide at base, tapering above asci. **Ascospores** (7.3–)8.1–10.4(–11) × (3–)3.4–4.3(–4.8) μm, Q = (1.8–)2.1–2.6(–3), N = 300 (Me = 9.1 × 3.9 μm; Qe = 2.3), one-celled, narrowly ellipsoid almost equilateral with narrowly rounded ends, medium brown, smooth-walled, with a blurred unilateral straight germ slit most often much less than spore-length, best seen after incubation in PVA-lactophenol.

**Asexual morph** on the natural substrate not seen.

**Other specimens examined (paratypes):** FRENCH WEST INDIES: MARTINIQUE: Case-Pilote, Crête Jean-Louis, mesophilic rainforest, on a dead corticated branch, 29 Aug. 2005, *leg.* C. Lechat, CLL 5098 (LIP); *ibid.*, CLL 5100 (LIP); Fort-de-France, Absalon, trail to Plateau Michel, ca. 350 m, hygrophilic rainforest, on a dead corticated branch, 15 Aug. 2013, *leg.* R. Courtecuisse, MJF 13223 (LIP); *ibid.*, on a dead corticated branch 2–3 cm diam and twigs 1 cm diam, 7 Aug. 2016, *leg.* J. Fournier, MJF 16163 (LIP).

**Known distribution:** Martinique.

**Discussion:** This *Biscogniauxia* is characterized by applanate, entirely carbonaceous stromata with an olivaceous brown surface and conspicuous shiny black papillate ostioles. Its one-celled almost equilateral medium brown ascospores averaging less than 10 μm long with a blurred short germ slit distinguish it from known species with papillate ostioles (Ju *et al.*, 1998; Ju & ROGERS, 2001).

Three species with papillate ostioles and one-celled light brown almost equilateral ascospores ranging from 7.5 to 13 μm long must be compared with our new species.

*Biscogniauxia africana* Y.-M. Ju & J.D. Rogers, known from Uganda, is readily distinguished from *B. nigropapillata* by its raised-discooid stromata and larger ascospores 10–13 × 4.5–5.5 μm with a germ slit spore-length.

*Biscogniauxia arima* San Martín Y.-M. Ju & J.D. Rogers, known from México, features woody stromata with carbonaceous tissue restricted to the subsurface, obovoid perithecia 0.5–0.6 mm high and ascospores with broadly rounded ends 7.5–9 × 3–4 μm that lack a germ slit. This combination of characters clearly sets it apart from *B. nigropapillata*.

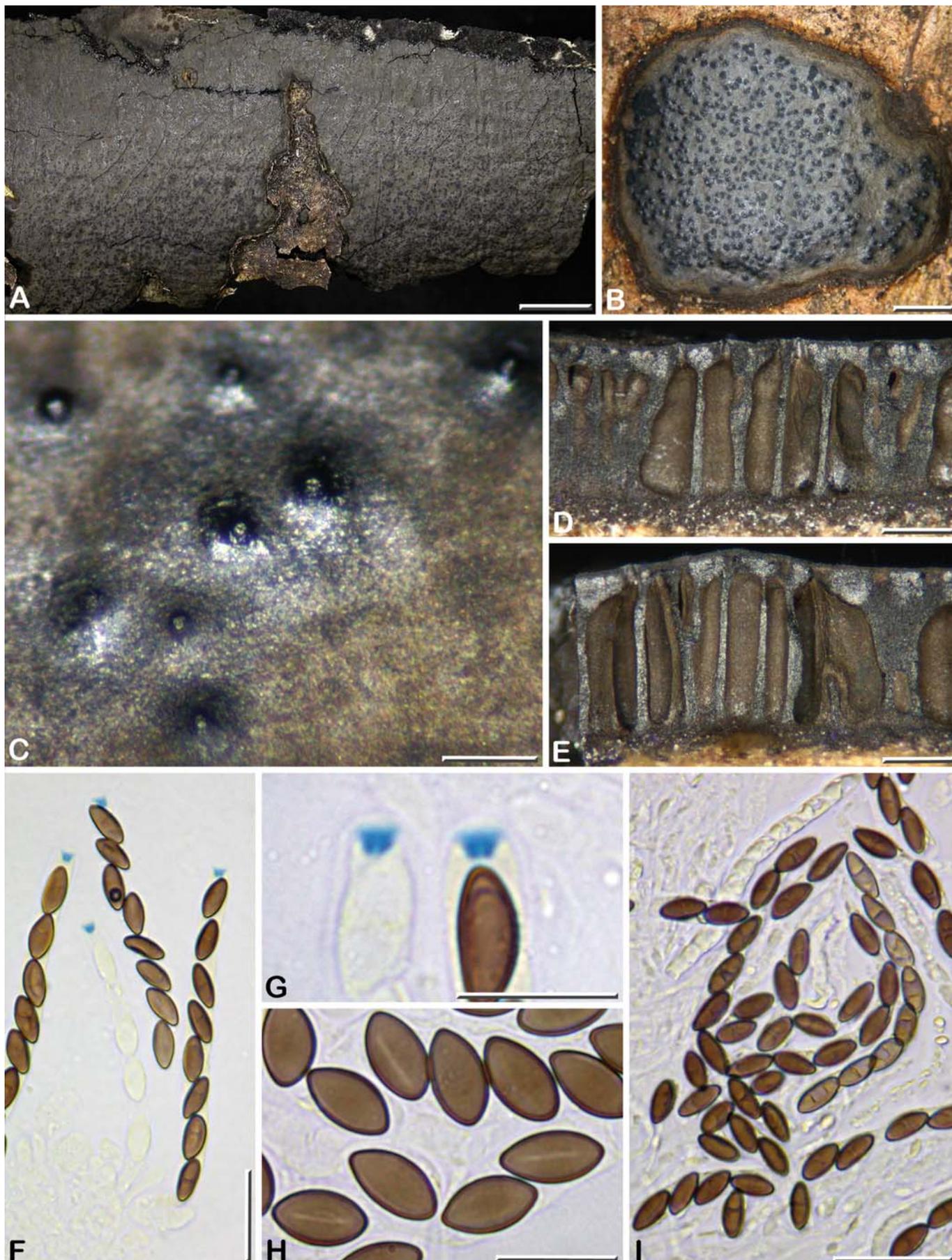
*Biscogniauxia communapertura* Y.-M. Ju & J.D. Rogers, known from Brazil, features ascospores 8–11.5 × 4.5–6 μm resembling those of *B. nigropapillata* in having a short germ slit but its stromata strongly differ in having perithecia arranged in rosettes sharing a common ostiolar opening, making ostiolar papillae widely spaced on stromatal surface. Its broadly ellipsoid ascospores with broadly rounded ends provide a further discriminant character from *B. nigropapillata*.

SAN MARTÍN & ROGERS (1993) reported an undescribed species from México (San Martín 725), featuring like *B. nigropapillata* papillate ostioles, a small and trapezoid apical apparatus and narrowly ellipsoid ascospores with a germ slit less than spore-length.

Besides these similarities, the Mexican *Biscogniauxia*, which was not mentioned in Ju *et al.* monograph (1998), differs in having significantly larger and inequilateral to navicular ascospores 13–16 × 5–5.5 μm with the germ slit on the flattened side. This latter character is most unusual amongst the *Biscogniauxia* taxa with inequilateral ascospores and sets this collection clearly apart from its relatives.

The most resembling species regarding ascospore morphology and dimensions is *B. capnodes* var. *theissenii* "with light brown, narrow ascospores 9.5–13.5 × 4.5–5 μm" (Ju *et al.*, 1998). However, ascospores of this species differ from those of *B. nigropapillata* in having a conspicuous germ slit spore-length. A further diagnostic difference is the presence of punctate ostioles vs. papillate in *B. nigropapillata* (also see *B. capnodes* var. *theissenii* in this paper).

The relatively narrow variation range of ascospore dimensions within five collections of *B. nigropapillata* is summarized in Table 3.



**Plate 13 – *Biscogniauxia nigropapillata***

A, C-I: CLL 5254 Holotype; B: MJF 13223. A: Widely effused confluent stromata on host surface; B: Small orbicular stroma; C: Cluster of shiny black papillate ostioles contrasting against the olivaceous brown stromatal surface; D, E: Stromata in vertical section (broken) showing the carbonaceous tissue encasing the long-tubular perithecia; F: Mature and immature asci in Melzer's reagent; G: Ascus apical apparatus in Melzer's reagent; H: Ascospores mounted in PVA-lactophenol (laterally swollen), three of them showing a short germ slit; I: Ascospores in 1% SDS. Scale bars: A = 10 mm; B = 2 mm; C = 0.2 mm; D, E = 0.5 mm; F, I = 20  $\mu$ m; G, H = 10  $\mu$ m.

**Table 3** – Ascospore dimensions in five collections of *B. nigropapillata* showing the intraspecific variations.

Collections number	Ascospore measurements with extreme values in parentheses	Q = quotient l/w N = number of measurements	Mean values
CLL 5098	(8.3–)8.8–10.4(–11) × (3–)3.6–4.3(–4.7) µm	Q = (1.9–)2.2–2.7(–3), N = 60	Me = 9.4 × 3.9 µm, Qe = 2.4
CLL 5100	(7.8–)8.5–9.8(–10.4) × (3.1–)3.5–4.1(–4.8) µm	Q = (1.9–)2.1–2.6(–2.9), N = 60	Me = 9.1 × 3.9 µm, Qe = 2.4
CLL 5254	(7.7)8.3–9.6(–10.2) × (3.1–)3.5–4.3(–4.4) µm	Q = (1.8–)2.1–2.6(–2.9), N = 60	Me = 9 × 3.9 µm, Qe = 2.3
MJF 13223	(7.3–)8.1–9.4(–10) × (3.2–)3.4–3.9(–4.2) µm	Q = (1.8–)2.1–2.6(–2.9), N = 60	Me = 8.7 × 3.7 µm, Qe = 2.4
MJF 16163	(8.2–)8.4–10(–10.4) × (3.6–)3.7–4.3(–4.8) µm	Q = (1.8–)2–2.6(–2.7), N = 60	Me = 9.1 × 4.1 µm, Qe = 2.3
Cumulated values	(7.3–)8.1–10.4(–11) × (3–)3.4–4.3(–4.8) µm	Q = (1.8–)2.1–2.6(–3), N = 300	Me = 9.1 × 3.9 µm, Qe = 2.3

***Biscogniauxia philippinensis*** (Ricker) Whalley & Læssøe, *Mycol. Res.*, 94: 239 (1990). Plate 14, Table 4.

**Stromata** applanate-pulvinate, orbicular to irregularly ellipsoid-lobed, 3–35 mm long × 3–22 mm wide × (0.9–)1.2–1.8 mm thick, coalescent into longer compound stromata to 70 mm long, with sloping margins and reddish brown remnants of the outer dehiscing layer occasionally present; mature surface dark grey to blackish grey, matt, smooth, carbonaceous beneath surface and between perithecia, tissue beneath perithecia inconspicuous, underlying bark tissue weakly pigmented. **Perithecia** long-tubular, laterally flattened, 0.85–1.5 mm high × 0.25–0.35 mm wide, opening centrally or laterally through individual ostioles. **Ostioles** umbilicate to finely punctate with a low rim, evenly distributed, plugged with white substance, appearing as whitish discs 60–80 µm diam.

**Asci** cylindrical, with 8 obliquely uniseriate ascospores, short-stipitate to subsessile, the spore-bearing parts 146–175 × 12.5–14 µm, the stipes 8–15 µm long, with apical apparatus 3.7–4.8 × 5–5.8 µm (Me = 4.4 × 5.4 µm; N = 25), short-cylindrical to trapezoid, bluing in Melzer's reagent. **Paraphyses** in bundles, hyphal, unbranched, thin-walled, septate, 4–6 µm wide, tapering to 2–2.5 µm above asci. **Ascospores** (18.3–)19.7–24.5(–26.7) × (10.1–)10.6–13.6(–14.1) µm, not including appendage, Q = (1.5–)1.6–2.1(–2.4), N = 420 (Me = 22 × 11.9 µm; Qe = 1.85), dark brown to blackish brown, ellipsoid-inequilateral with most often broadly rounded upper end and an obliquely truncate lower end, bearing a hyaline to yellowish, thick-walled, hemispherical to broadly conical, obtusely-ended cellular appendage 2.8–4 µm long × 5–6 µm wide (Me = 3.4 × 5.5 µm, N = 60), rarely collapsing over time, at times partially detached at periphery; smooth-walled, with either a thin inconspicuous, unilateral, straight germ slit almost spore-length or a pale, blurred band ca. 3 µm wide, both on the most convex side.

**Asexual morph** on the natural substrate not seen. Asexual morph in culture on OA periconiella-like, based on material from Taiwan (Ju *et al.*, 1998).

**Specimens examined:** FRENCH WEST INDIES: MARTINIQUE: Case-Pilote, Fond Boucher, xero- to mesophilic forest, dead corticated branch, 17 Aug. 2013, *leg.* J. Fournier, MJF 13280 (LIP); Le Diamant, Morne Blanc, trail from Ancinel to Morne du Riz through Morne Fournerey, meso- to xerophilic forest, dead corticated branch, 18 Aug. 2013, *leg.* J. Fournier, MJF 13305 (LIP); Le Morne-Vert, Trace de Caplet, mesophilic rainforest, dead corticated branch, 31 Aug. 2008, *leg.* C. Lechat, CLL 8391 (LIP); Le Prêcheur, Anse Couleuvre, mesophilic coastal rainforest, dead corticated branch, 28 Jul. 2016, *leg.* J. Fournier & C. Lechat, MJF 16007 (LIP); Le Saint-Esprit, Bois La Charles, mesophilic rainforest, dead corticated branch, 20 Aug. 2013, *leg.* J. Fournier, MJF 13329 (LIP); Le Saint-Esprit, Morne-David, mesophilic rainforest, dead corticated branch, 23 Aug. 2004, *leg.* C. Lechat, CLL 2034 (LIP); *ibid.*, CLL 2036 (LIP); Sainte-Marie, La Philippe, Trou Mulet, mesophilic coastal rainforest, dead corticated branch, 21 Aug. 2013, *leg.* J. Fournier, MJF 13351 (LIP); Schoelcher, Case Navire River, mesophi-

lic rainforest, dead corticated branch, 28 Aug. 2010, *leg.* J. Fournier, MJF 10187 (LIP); *ibid.*, MJF 10192 (LIP); *ibid.*, MJF 10199 (LIP); Schoelcher, Fond Lahaye, banks of Fond Lahaye River, mesophilic rainforest, dead corticated branch, 12 Aug. 2013, *leg.* J. Fournier, MJF 13144 (LIP); *ibid.*, MJF 13150 (LIP); *ibid.*, MJF 13158 (LIP); *ibid.*, MJF 13161 (LIP).

**Known distribution:** Pantropical: Guyana (Ju *et al.*, 1998), Martinique (this paper), México, Philippines, Taiwan (Ju *et al.*, 1998).

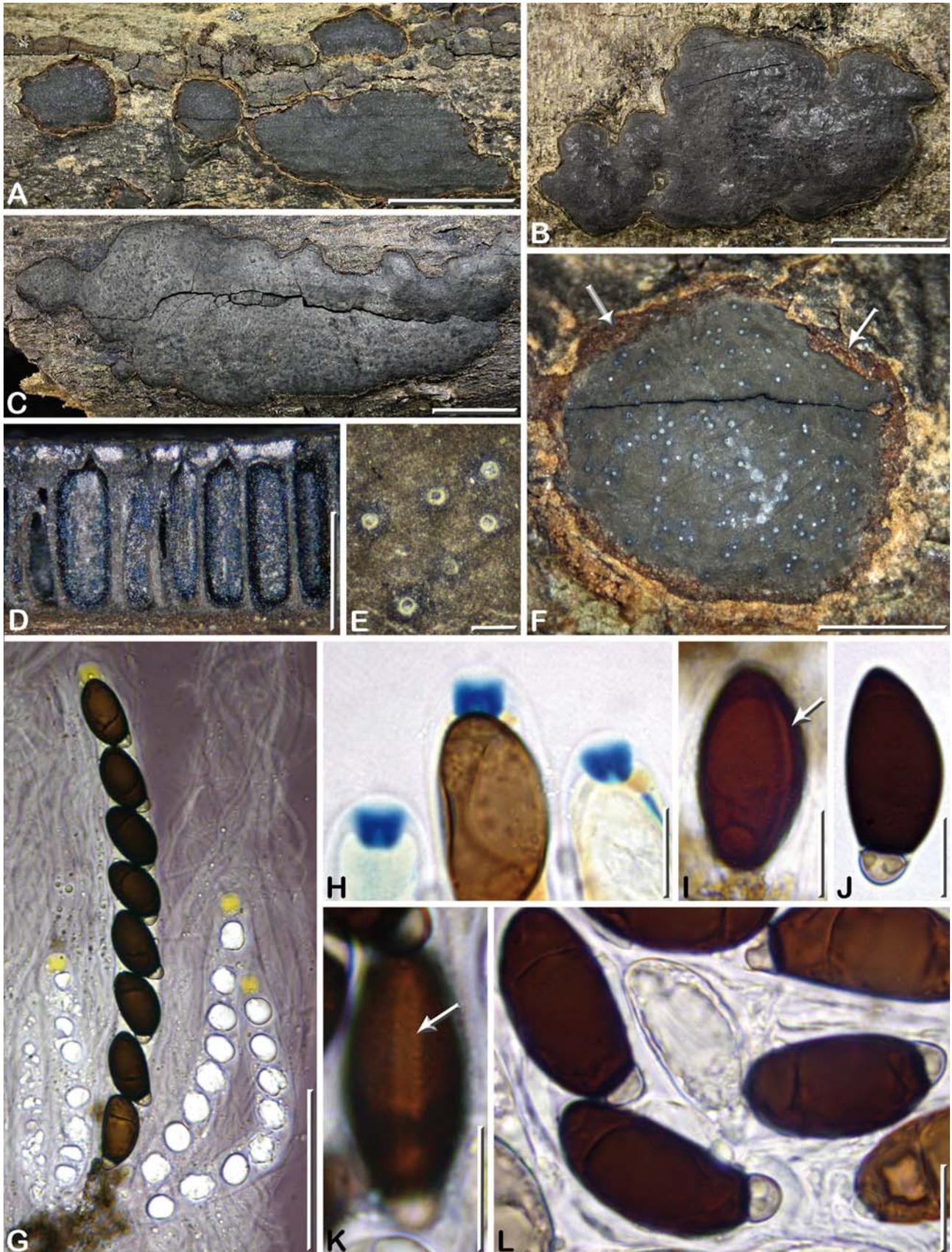
**Discussion:** *Biscogniauxia philippinensis* is well characterized by thick, usually slightly pulvinate stromata with long-tubular perithecia and finely punctate ostioles. Its ascospores average more than 20 µm long, being dark brown, inequilateral bearing a conspicuous and persistent cellular appendage, and, when observed in dorsal view, frequently showing a wide paler band extending spore-length (Ju *et al.*, 1998). Our numerous collections from Martinique conform well to *B. philippinensis* but they deviate from the concept of this species delimited by Ju *et al.* (1998) in featuring slightly shorter ascospores 20–24.5 × 10.6–13.6 µm vs. 22–27 × 11.5–13 µm, slightly shorter asci and smaller apical apparatus 2.8–4 × 5–6 µm vs. 6–7.5 × 5.5–6 µm. In their dichotomous keys to *Biscogniauxia*, Ju *et al.* (1998) and Ju & ROGERS (2001) regard as diagnostic the presence of the wide paler band on the dorsal side of ascospores in *B. philippinensis* and its variety *microspora* Y.-M. Ju & J.D. Rogers. Since this character could be observed in all the collections studied, we refer them to *B. philippinensis* and we assign these minor morphological deviations to intraspecific variations.

The wide paler band on ascospores is regarded as a germ slit by Ju *et al.* (1998), which is very likely, but we also observed less frequently the presence of a thin, inconspicuous but more typical germ slit, which suggests the occurrence of two different types of germ slits on ascospores of *B. philippinensis* which may vary with conditions of observations.

Other *Biscogniauxia* taxa from Martinique featuring appendaged ascospores are *B. breviappendiculata*, *B. grenadensis*, *B. martinicensis*, *B. uniapiculata* and *B. viscosicentra*; they all have significantly smaller ascospores and thus are easily distinguished from *B. philippinensis*.

Because of the slightly shorter ascospores of our material from Martinique, we considered a comparison with *B. philippinensis* var. *microspora*, which was segregated based on smaller ascospores 13.5–19 × 8–10 µm (Ju *et al.*, 1998). As there is no overlap between the size range of our collections (Table 4) and that of *B. philippinensis* var. *microspora*, we ruled out this possibility.

During this survey, *B. philippinensis*, as most of *Biscogniauxia* taxa that we collected, appeared to show a strong preference for rather dry or sun-exposed locations and had never been encountered in hygrophilic rainforests.



**Plate 14 – *Biscogniauxia philippinensis***

A, D-H, K: MJF 13144; B, I, J: MJF 10187; C, L: MJF 13161. A-C : Orbicular to variously ellipsoid-lobed mature stromata on host surface; D: Stroma in vertical section (broken) showing the carbonaceous tissue encasing the long-tubular perithecia; E: Stromatal surface in close-up showing the umbilicate to finely punctate ostioles plugged with white substance; F: Barely mature pulvinate stroma with reddish brown remnants of the outer dehiscing layer at margin (arrows); G: Mature and immature asci associated with bundles of thin-walled paraphyses, in black Pelikan® ink; H: Asc tips in Melzer's reagent, showing the amyloid apical apparatus and an immature ascospore; I: Ascospore in dorso-lateral view showing a thin germ slit (arrow), in 1% SDS; J: Ascospore in side view showing an unusually narrowly rounded upper end and a cellular appendage partly detached from the brown cell, in 1% SDS; K: Ascospore in dorsal view showing a germ slit as a wide paler band (arrow), in 1% SDS; L: Variously shaped mature ascospores, in 1% SDS. Scale bars: A-C = 10 mm; D = 1 mm; E = 0.2 mm; F = 2 mm; G = 50 µm; H-L = 10 µm.

**Table 4** – Ascospore dimensions in seven collections of *B. philippinensis* showing the range of intraspecific variations, compared with those recorded by Ju *et al.* (1998).

Collections number	Ascospore measurements with extreme values in parentheses	Q = quotient l/w N = number of measurements	Mean values
CLL 8391	(20.8–)21.8–23.9(–26.7) × (11.1–) 11.9–13.6(–14.1) μm	Q = (1.6–)1.7–2(–2.1), N = 60	Me = 22.8 × 12.7 μm, Qe = 1.8
MJF 10187	(19–)19.7–23.2(–24.5) × (10.4–) 10.9–12.6(–13.2) μm	Q = (1.5–)1.7–2(–2.1), N = 60	Me = 21.4 × 11.8 μm, Qe = 1.8
MJF 10192	(18.3–)19.7–21.9(–22.7) × (10.4–) 11.1–12.3(–12.9) μm	Q = (1.6–)1.62–1.9(–2.1), N = 60	Me = 20.8 × 11.8 μm, Qe = 1.8
MJF 13144	(21–)21.7–24.5(–25.1) × (10.6–) 11.8–13.3(–13.9) μm	Q = (1.6–)1.7–2(–2.2), N = 60	Me = 23.1 × 12.6 μm, Qe = 1.8
MJF 13161	(18.4–)20.5–23.6(–25.1) × (10.1–) 10.6–12.4(–12.7) μm	Q = (1.6–)1.7–2.1(–2.4), N = 60	Me = 22 × 11.5 μm, Qe = 1.9
MJF 13305	(19.2–)21.2–24(–25.1) × (10–) 10.8–12.5(–13.3) μm	Q = (1.7–)1.8–2.1(–2.4), N = 60	Me = 22.6 × 11.6 μm, Qe = 1.9
MJF 13329	(18.7–)20.3–22.8(–24.3) × (9.5–) 10.8–12.2(–12.5) μm	Q = (1.6–)1.7–2(–2.3), N = 60	Me = 21.4 × 11.6 μm, Qe = 1.9
Cumulated values	(18.3–)19.7–24.5(–26.7) × (10.1–) 10.6–13.6(–14.1) μm	Q = (1.5–)1.6–2.1(–2.4), N = 420	Me = 22 × 11.9 μm, Qe = 1.85
Ju <i>et al.</i> (1998)	22–27 × 11.5–13 μm		Me = 24.5 × 12.2 μm, Qe = 2

***Biscogniauxia sinuosa*** (Theiss.) Y.-M. Ju & J.D. Rogers **var. *macrospora*** J. Fourn. & Lechat, *var. nov.* – MycoBank MB820805. Plate 15.

**Diagnosis:** Differs from typical *B. sinuosa* by significantly larger ascospores averaging 38 × 12.8 μm vs. 28 × 8.8 μm.

**Holotype:** FRENCH WEST INDIES: MARTINIQUE: La Trinité, Tartane, Pointe Rouge, coastal meso- to xerophilic forest, on a recently dead corticated branch ca. 4 cm diam, 1 Aug. 2016, *leg.* J. Fournier, MJF 16072 (LIP).

**Etymology:** Prefix *macro-* from Greek μακρός = long, big, for the strikingly large ascospores.

**Stromata** applanate to slightly pulvinate, orbicular or ellipsoid-lobed, with sloping margins, 3–70 mm long × 2–40 mm wide × 0.8–1.1 mm thick, or coalescent into widely effused compound stromata to 160 mm long; remnants of the blackish grey outer dehiscing layer occasionally present at margins of young stromata; mature surface dull black, even, carbonaceous beneath surface and between perithecia, tissue beneath perithecia inconspicuous, bark tissue slightly blackened, not carbonaceous. **Perithecia** tubular, frequently laterally flattened, 0.7–0.9 mm high × 0.3–0.5 mm wide, opening centrally or laterally through individual ostioles. **Ostioles** punctate, 80–120 μm diam, plugged with white to yellowish substance, frequently surrounded by a low black rim, evenly distributed or in small clusters.

**Asci** cylindrical with (6–)8 obliquely uniseriate overlapping ascospores, short-stipitate, the spore-bearing parts 208–230 × 17–19.5 μm, the stipes 20–35 μm long, with apical apparatus 4–5.9 × 6.2–8 μm (Me = 4.9 × 7.1 μm, N = 40), slightly trapezoid, bluing in Melzer’s reagent, frequently paler blue at apex, the darker part only measured. **Paraphyses** copious, hyphal, unbranched, thin-walled, septate, 7–10 μm wide at base, tapering to 2 μm wide above asci. **Ascospores** (33.3–)34.5–40.8(–42) × (10.8–)11.5–14.1(–15.4) μm, Q = (2.4–)2.7–3.3(–3.6), N = 120 (Me = 38 × 12.8 μm; Qe = 3), one-celled, fusiform, slightly inequilateral with narrowly rounded to acute, frequently pinched ends, dark brown, ornamented with dark longitudinal ridges alternating with paler zones, best seen in PVA-lactophenol; germ slit not observed, possibly present but masked by the ridges.

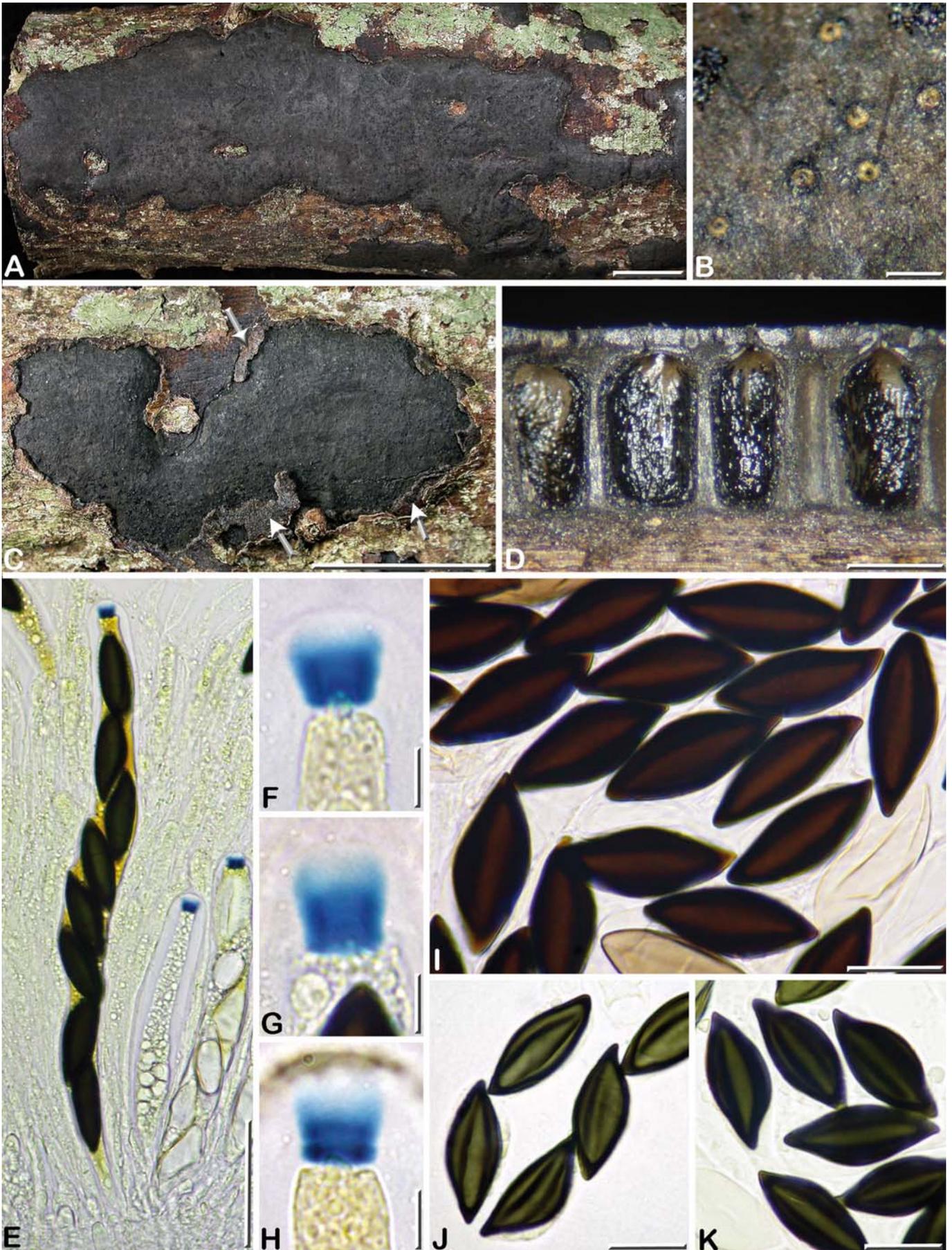
**Asexual morph** on the natural substrate not seen.

**Other specimens examined (paratypes):** FRENCH WEST INDIES: MARTINIQUE: Le Saint-Esprit, Bois La Charles, mesophilic rainforest, on dead corticated branch, 24 Aug. 2004, *leg.* C. Lechat, CLL 2074 (LIP); *ibid.*, 30 Aug. 2010, *leg.* J. Fournier, MJF 10240 (LIP); MJF 10245 (LIP); MJF 10249 (LIP).

**Known distribution:** Martinique.

**Discussion:** Conspicuously ornamented ascospores are most unusual within *Xylariaceae* and thus provide a helpful discriminant character, especially in *Biscogniauxia* where only four taxa are known to possess such ascospores and must be compared with the taxon described above. Ascospores of *B. weldenii* (J.D. Rogers) Whalley & Læssøe — known from Louisiana (USA) (ROGERS, 1977) — and its variety *microspora* (J.D. Rogers) Whalley & Læssøe — known from Honduras and Venezuela (ROGERS, 1980) — are longitudinally striate in a way resembling that of our collections from Martinique in showing “light-colored stripes”. However, they differ from our new taxon in bearing a cellular appendage or at least a basal truncate end and in being smaller, respectively 25–28 × 9.5–10.5 μm and 18–21 × 8–10 μm. *Biscogniauxia reticulospora* Y.-M. Ju & J.D. Rogers, known from Thailand, is distinctive in having large unicellular ascospores 27–34 × 14–15.5 μm with shallow reticulate ornamentation on epispore, recalling that of the closely related genus *Camillea* Fr. (Ju *et al.*, 1998). The coarsely, longitudinally ridged ascospores of the *Biscogniauxia* dealt with here cannot be confused with those of the above taxa but they strikingly resemble those of *B. sinuosa* (Theiss.) Y.-M. Ju & J.D. Rogers, based on material collected in Brazil by Rick and described by Theissen as *Nummularia sinuosa* (THEISSEN, 1908). This material was first revised by MILLER (1961), who assigned it to *Hypoxylon*, as *H. sinuosum* (Theiss.) J.H. Mill. Both gave similar ascospores dimensions, respectively 28–35 × 9–11 μm and 28–35 × 9–12 μm, and both did not mention the ornamentation which, indeed, may be overlooked when darkly pigmented mature ascospores are observed under a weak illumination. Upon their revision of *Biscogniauxia*, Ju *et al.* (1998) recorded the ascospore size range from the type material as 26–30 × 7.5–10 μm and reported the presence of coarse longitudinal ridges on the epispore, a unique character in the genus.

Ascospores of the collections from Martinique are strikingly similar to those of *B. sinuosa* regarding shape and ornamentation and it makes no doubt they are very closely related. However, their ascospores differ in being significantly larger, averaging 38 × 12.8 μm vs. 28 × 8.8 μm, thus we propose the new variety *macrospora* to accommodate the taxon from Martinique. Other characters deviating from the typical variety are the thicker stromata with tubular perithecia and the more acute and often pinched ends of ascospores and their apparent lack of a germ slit. The latter character is difficult to assess because of the alternating light and dark stripes on ascospore surface and we may have overlooked it despite a careful examination after incubation in PVA-lactophenol. The stromatal characters are less informative since their natural range of variation in typical *B. sinuosa* is unknown.



**Plate 15 – *Biscogniauxia sinuosa* var. *macrospora***

A-D, F-I: MJF 16072 Holotype; E, J, K: MJF 10245. A: Widely effused stroma on host surface; B: Close-up on stromatal surface showing the punctate ostioles; C: Mature stroma with remnants of the dehiscing outer layer at margins (arrows); D: Stroma in vertical section (broken) showing the carbonaceous tissue encasing the tubular perithecia; E: Mature and immature asci in Melzer's reagent; F-H: Various shaped ascial apical apparati in Melzer's reagent; I: Mature ascospores in 1% SDS; J: Immature ascospores in PVA-lactophenol, showing the longitudinal ridges; K: Mature ascospores in PVA-lactophenol showing less contrasted ridges. Scale bars: A, C = 10 mm; B = 0.2 mm; D = 0.5 mm; E = 50  $\mu$ m; F-H = 5  $\mu$ m; I-K = 20  $\mu$ m.

***Biscogniauxia uniapiculata*** (Penz. & Sacc.) Whalley & Læssøe, *Mycol. Res.*, 94: 239 (1990). Plates 16–17. Table 5.

**Stromata** applanate, orbicular to irregularly ellipsoid-lobed, 4–45 mm long × 1.5–18 mm wide × 0.4–0.6 mm thick, frequently coalescent into longer compound stromata, with sloping margins and usually lacking remnants of the outer dehiscing layer at maturity; mature surface brownish black to greyish black, matt, usually even, carbonaceous beneath surface and between perithecia, tissue beneath perithecia absent to 80 µm thick, black, slightly carbonaceous, underlying bark tissue weakly pigmented. **Perithecia** ovoid, short-cylindrical or oblong, frequently laterally and basally flattened, 0.3–0.42 mm high × 0.17–0.2 mm wide, opening centrally or laterally through individual ostioles. **Ostioles** punctate with a low rim to slightly papillate with obtuse to truncate top, rarely umbilicate, black, at times somewhat shiny, 50–80 µm diam, evenly distributed, often plugged with greyish substance when punctate.

**Asci** cylindrical, with 8 uniseriate ascospores, short-stipitate, the spore-bearing parts 67–82 × 5.5–6.5 µm, the stipes 6–15 µm long, with apical apparatus 1.4–3 × 2.2–3.5 µm (Me = 2.2 × 2.8 µm, N = 40), short-cylindrical to slightly trapezoid, bluing in Melzer's reagent. **Paraphyses** sparse, hyphal, unbranched, thin-walled, septate, 4–8.5 µm wide at base and constricted at basal septa, tapering above asci. **Ascospores** (7.2–)8.1–11.5(–12.1) µm × (3.7–)4.1–5.8(–6.4) µm, not including appendage, Q = (1.4–)1.7–2.5(–2.8), N = 780 (Me = 9.6 × 4.8 µm; Qe = 2), medium to dark reddish brown, ellipsoid-inequilateral to almost equilateral with broadly rounded or pinched upper end and abruptly truncate lower end bearing a hyaline, thin-walled, hemispherical cellular appendage, most often collapsed or absent; smooth-walled, with a conspicuous, unilateral, straight germ slit almost spore-length either on dorsal or ventral side when inequilateral.

**Asexual morph** on the natural substrate not seen. Asexual morph in culture on OA periconiella-like, based on material from Taiwan (Ju *et al.*, 1998).

**Specimens examined:** FRENCH WEST INDIES: GUADELOUPE: Basse-Terre, Capesterre-Belle-Eau, Grand-Etang, hygrophilic rainforest, on a dead corticated branch, 6 Sept. 2005, *leg.* C. Lechat, CLL 5381 (LIP); Basse-Terre, Capesterre-Belle-Eau, third Carbet waterfall, hygrophilic rainforest, on a dead corticated branch, 23 Nov. 2006, *leg.* C. Lechat, CLL 6041 (LIP); Basse-Terre, Petit-Bourg, Carrère, private garden of Félix Lurel, on a dead corticated branch, Nov. 2005, *leg.* C. Lechat, CLL 5404 (LIP); Basse-Terre, Saint-Claude, Matouba, Victor Hugues track, hygrophilic rainforest, on a dead corticated branchlet, 5 Sept. 2004, *leg.* C. Lechat, CLL 2348 (LIP). MARTINIQUE: Case-Pilote, Morne Rose, mesophilic rainforest, on a dead corticated branchlet, 1 Sept. 2010, *leg.* J. Fournier, MJF 10307 (LIP); *ibid.*, MJF 10319 (LIP); *ibid.*, MJF 10322 (LIP); *ibid.*, MJF 10328 (LIP); *ibid.*, 8 Aug. 2013, *leg.* J. Fournier, MJF 13071 (LIP); *ibid.*, 14 Jun. 2015, *leg.* J. Fournier, MJF 15063 (LIP); Fort-de-France, Absalon, track to Plateau Michel, hygrophilic rainforest, on a dead corticated branch, 7 Aug. 2016, *leg.* J. Fournier, MJF 16154 (LIP); Le Saint-Esprit, Bois La Charles, mesophilic rainforest, on a dead corticated branchlet, 24 Aug. 2004, *leg.* C. Lechat, CLL 2074-2 (LIP); *ibid.*, 30 Aug. 2010, *leg.* J. Fournier, MJF 10244 (LIP); *ibid.*, MJF 10253 (LIP); Macouba, Trou Navet, hygrophilic rainforest, on a dead corticated branch, 13 Aug. 2013, *leg.* J. Fournier, MJF 13191 (LIP). THAILAND: Surat-Thani Prov., Kho Panghan island, Baan Thai, ca. 2 km on road to Baan Thong Nai Pan, 9° 43' 16" N, 100° 2' 2" E, on a dead corticated standing small trunk, 20 Nov. 2012, *leg.* J. Fournier, KP-JF 029.

**Known distribution:** Pantropical (Ju *et al.*, 1998).

**Discussion:** The numerous collections studied above fit into the species concept of *Biscogniauxia uniapiculata* as defined by Ju *et al.* (1998) in having thin blackish stromata with punctate ostioles and appendaged, slightly inequilateral ascospores with a long straight

germ slit either on the convex or the flattened side. However, as shown in Table 5, they deviate in having consistently smaller ascospores 8.1–11.5 × 4.1–5.8 µm, at the lower limit of the size range (9–)10–14 × 5–7 µm accepted by Ju *et al.* (1998). Moreover, despite that they possess a widely truncate lower end, appendages are rarely observed, even on immature ascospores. Appendages when present appear shrivelled and inconspicuous, unlike those described and illustrated by MILLER (1961) from the type material of *B. uniapiculata* from Indonesia (as *Nummularia uniapiculata* Penz. & Sacc.). A case could be made to segregate a Caribbean taxon based on these smaller ascospores usually devoid of cellular appendage but we refrain to do so because of a collection from Thailand (KP-JF 029, Table 5) whose ascospores deviate in a very similar way. The collections CLL 2348 and MJF 13191 differ from all above collections in having larger ascospores averaging respectively 11.5 × 5.7 µm and 11.6 × 5.6 µm (Table 5), which fits well the ascospore size range of *B. uniapiculata*. The collection CLL 2348 is depauperate and its over-mature ascospores lack cellular appendages but those of MJF 13191 are in better condition and show conspicuous persistent appendages 2.1–3 × 2.4–3.3 µm (Me = 2.6 × 2.9 µm; N = 25), unlike all other examined collections from Guadeloupe and Martinique. The stromata of MJF 13191 are convex to pulvinate, 0.8–0.9 mm thick, thus thicker than in other collections, including CLL 2348, and greater than the range of 0.4–0.7 mm given by Ju *et al.* (1998) (Table 5). In parallel, its perithecia are tubular 0.6–0.7 mm high, which also deviates from the other material we studied and the data (0.3–0.6 mm high) recorded by Ju *et al.* (1998).

At the light of these discrepancies between collections of various origins, including the collection GUAD-213 dealt with further in this paper as *cf. uniapiculata*, *B. uniapiculata* can be suspected to represent a complex of related species in need of segregation. For the moment, we find more practical to accommodate our collections within the current wide concept of *B. uniapiculata* as defined by Ju *et al.* (1998) and to accept a high degree of intraspecific variations until the species is revised on a wider basis.

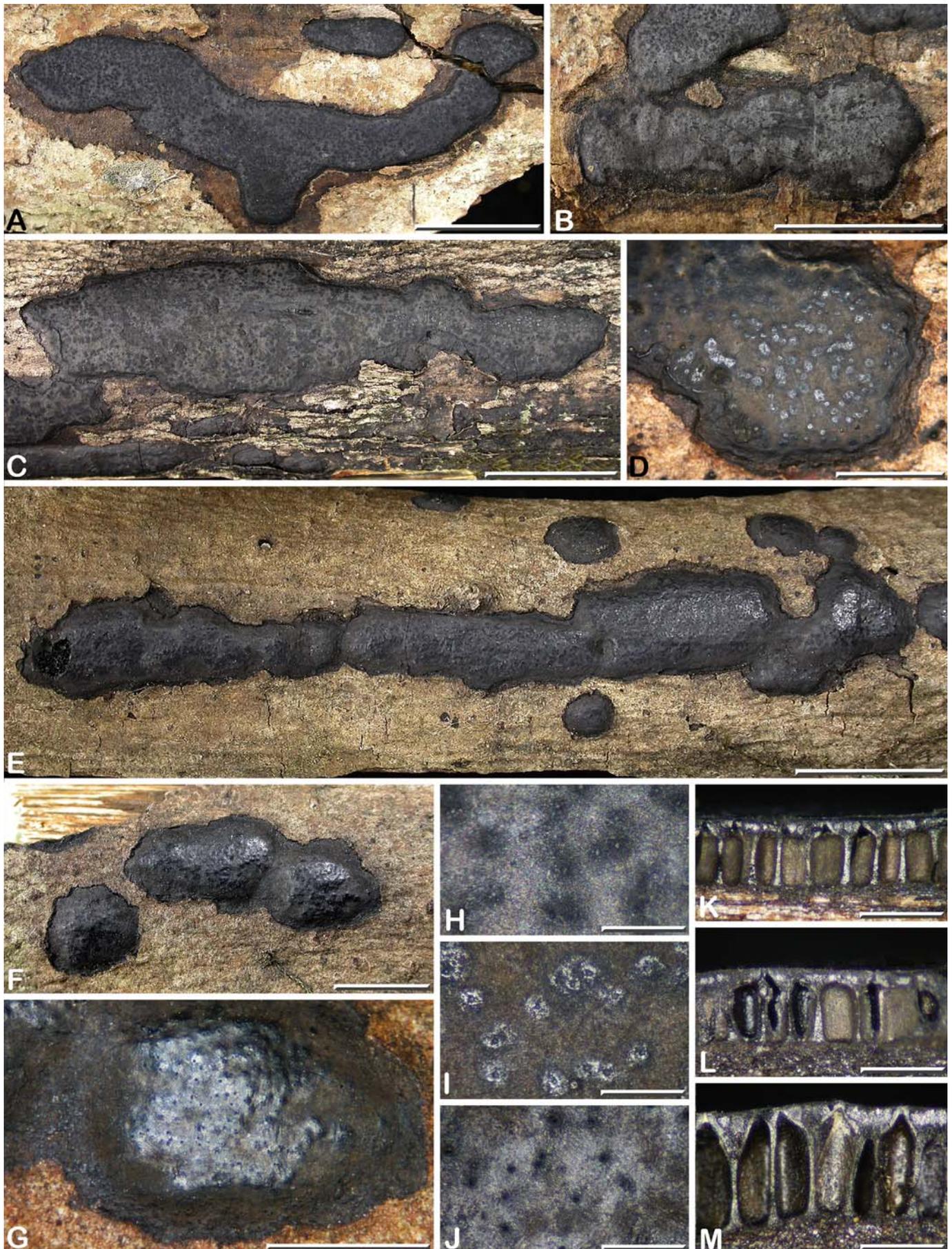
***Biscogniauxia cf. uniapiculata*** (Penz. & Sacc.) Whalley & Læssøe, *Mycol. Res.*, 94: 239 (1990). Plate 18.

**Stroma** fragmentary, applanate, irregularly ellipsoid-lobed, 12 mm long × 10 mm wide × 0.38–0.42 mm thick, with sloping margins bearing blackish remnants of the outer dehiscing layer; mature surface grey to blackish grey, matt, slightly uneven, carbonaceous beneath surface and between perithecia, tissue beneath perithecia inconspicuous, not carbonaceous, underlying bark tissue not pigmented. **Perithecia** ovoid, frequently laterally and basally flattened, 0.3–0.35 mm high × 0.17–0.3 mm wide, opening centrally or laterally through individual ostioles. **Ostioles** obscurely papillate, blackish, most often inconspicuous.

**Asci** fragmentary, not measured, with apical apparatus 1.4–2 × 2.8–3.5 µm (Me = 1.6 × 3.2 µm; N = 20), discoid slightly trapezoid, bluing in Melzer's reagent. **Paraphyses** not seen. **Ascospores** (10.8–)11.4–13.6(–14.7) × (5–)5.5–6.5(–6.9) µm, not including appendage when present, Q = (1.8–)1.9–2.3(–2.6), N = 60 (Me = 12.5 × 6 µm; Qe = 2.1), medium to dark reddish brown, ellipsoid-inequilateral to almost equilateral with broadly rounded or pinched upper end and a lower end either truncate and bearing a hyaline, thin-walled, hemispherical cellular appendage 1.3–1.7 µm long × 2.4–2.7 µm wide, most often collapsed or absent, or beaked to acutely apiculate, evenly pigmented; smooth-walled, with a conspicuous, unilateral, straight germ slit almost spore-length either on dorsal or ventral side when inequilateral.

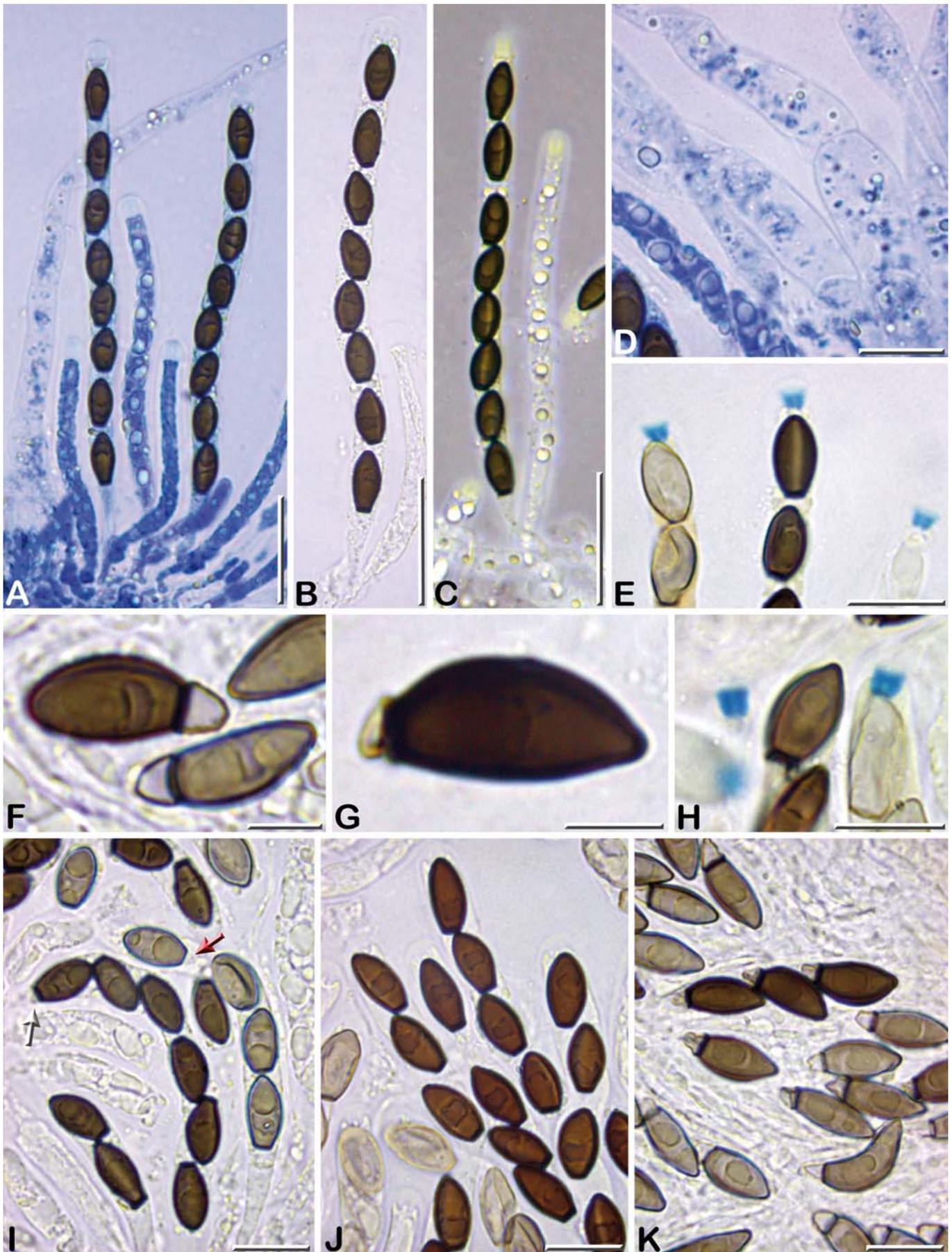
**Asexual morph** on the natural substrate not seen.

**Specimen examined:** FRENCH WEST INDIES: GUADELOUPE: Basse-Terre, Cabout, on dead corticated wood, Nov. 1987, *leg.* J. Vivant, GUAD-213, communicated by F. Candoussau.



**Plate 16 – *Biscogniauxia uniapiculata***

A, B, H, K: MJF 13071; C, D, I, L: MJF 16154; E-G, J, M: MJF 13191. A-D: Various shaped applanate stromata on host surface; E-G: Various shaped pulvinate stromata on host surface; H-J: Stromatal surface in close-up showing ostioles; K-M: Stromata in vertical section (broken) showing the carbonaceous tissue encasing the variously shaped perithecia. Scale bars: A-C, E = 10 mm; D, F, G = 5 mm; H-M = 0.5 mm.



**Plate 17 – *Biscogniauxia uniapiculata***

A, C-E, I: MJF 16154; B, J: MJF 10244; F-H, K: MJF 13191. A-C: Mature and immature asci, in diluted blue Pelikan® ink, 1% SDS and black Pelikan® ink respectively; D: Base of paraphyses, in diluted blue Pelikan® ink; E, H: Ascus tips in Melzer's reagent, showing the amyloid apical apparatus and the wide germ slit on a mature ascospore in E; F: Immature and mature appendaged ascospores in side view; G: Mature ascospore in side view with slightly pinched upper end and collapsed basal appendage; I-K: Ascospores in 1% SDS, with more or less collapsed appendages on an immature ascospore (red arrow) and on a mature ascospore (white arrow) (I). Scale bars: A-C = 20 µm; D, E, H, I-K = 10 µm; F, G = 5 µm.

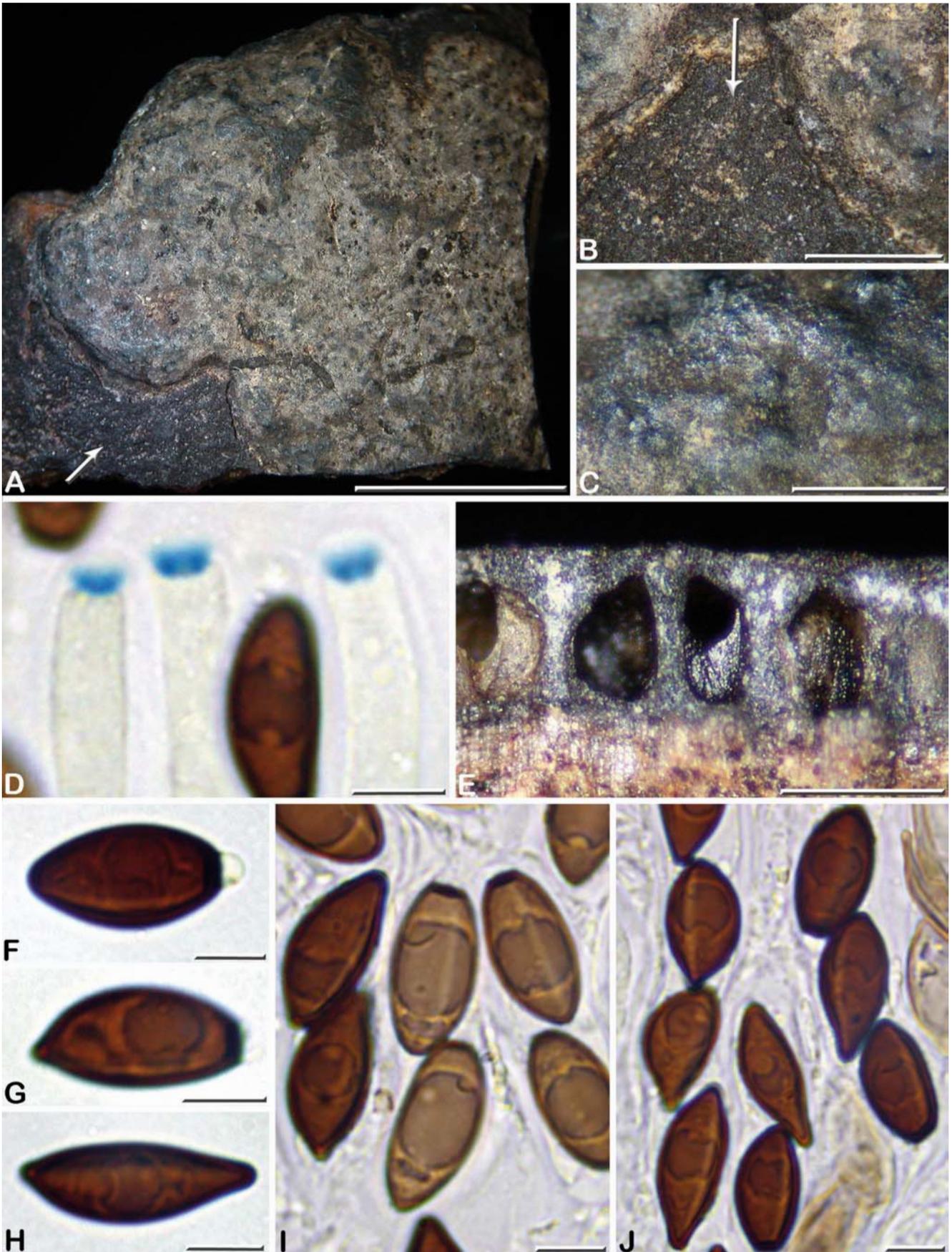
**Table 5** – Comparison of differential characters between various collections referable to *B. uniapiculata*, including those reported by Ju et al. (1998).

Collections numbers	Ostioles	e = stroma thickness (mm)	Ascospores dimensions, Q = quotient l/w, N = number of measurements	Mean values
<i>B. uniapiculata</i> CLL 2074-2	punctate	e = 0.4	(7.2-)8.1-9.5(-9.9) × (3.8-)4.1-5(-5.3) μm, Q = (1.6-)1.7-2.2(-2.4); N = 60	Me = 8.8 × 4.5 μm, Qe = 2
<i>B. uniapiculata</i> CLL 5404	papillate	e = 0.4	(9.1-)9.6-11.3(-11.7) × (4.9-)5.2-6.2(-6.4) μm, Q = (1.4-)1.7-2(-2.3); N = 60	Me = 10.4 × 5.7 μm, Qe = 1.8
<i>B. uniapiculata</i> CLL 5381	slightly papillate	e = 0.4	(9-)9.5-10.7(-11.5) × (4.5-)5-5.8(-6.4) μm, Q = (1.7-)1.74-2.1(-2.5); N = 60	Me = 10.1 × 5.4 μm, Qe = 1.9
<i>B. uniapiculata</i> CLL 6041	punctate	e = 0.6	(9-)9.2-10.5(-11) × (3.7-)4.1-4.8(-5.1) μm, Q = (1.8-)2.1-2.5(-2.8); N = 60	Me = 9.9 × 4.4 μm, Qe = 2.3
<i>B. uniapiculata</i> MJF 10244	punctate	e = 0.5	(8.8-)9.3-11(-11.6) × (4.4-)4.5-5.3(-5.7) μm, Q = (1.7-)1.9-2.3(-2.5); N = 60	Me = 10.1 × 4.9 μm, Qe = 2.1
<i>B. uniapiculata</i> MJF 10253	punctate	e = 0.4	(9.2-)9.6-11.5(-12.1) × (4.3-)4.7-5.5(-5.8) μm, Q = (1.7-)1.8-2.3(-2.5); N = 60	Me = 10.4 × 5.1 μm, Qe = 2
<i>B. uniapiculata</i> MJF 10307	punctate every inconspicuous	e = 0.55	(8.6-)9.2-10.5(-10.9) × (4.5-)4.6-5.2(-5.5) μm, Q = (1.7-)1.8-2.2(-2.4); N = 60	Me = 9.8 × 4.9 μm, Qe = 2
<i>B. uniapiculata</i> MJF 10319 twig	punctate	e = 0.5	(7.9-)8.4-9.9(-10.5) × (3.9-)4.1-4.7(-5.2) μm, Q = (1.7-)1.8-2.3(-2.6); N = 60	Me = 9.2 × 4.4 μm, Qe = 2.1
<i>B. uniapiculata</i> MJF 10322	punctate	e = 0.4	(7.7-)8.3-9.8(-10.4) × (4.2-)4.4-5(-5.2) μm, Q = (1.6-)1.8-2.1(-2.4); N = 60	Me = 9.1 × 4.6 μm, Qe = 2
<i>B. uniapiculata</i> MJF 10328	punctate to slightly papillate	e = 0.4	(7.7-)8.4-9.8(-10.5) × (4-)4.2-4.8(-5.1) μm, Q = (1.6-)1.8-2.3(-2.5); N = 60	Me = 9.1 × 4.5 μm, Qe = 2
<i>B. uniapiculata</i> MJF 13071	punctate	e = 0.5	(7.4-)8.6-10(-10.6) × (4.2-)4.5-5.1(-5.2) μm, Q = (1.6-)1.8-2.1(-2.2); N = 60	Me = 9.2 × 4.8 μm, Qe = 1.9
<i>B. uniapiculata</i> MJF 15063	punctate to slightly papillate	e = 0.4-0.5	(8-)8.8-10.6(-11.3) × (4.1-)4.5-5(-5.6) μm, Q = (1.7-)1.8-2.3(-2.5); N = 60	Me = 9.7 × 4.8 μm, Qe = 2
<i>B. uniapiculata</i> MJF 16154	umbilicate to finely punctate	e = 0.4-0.5	(8.5-)8.9-10.2(-10.6) × (3.9-)4.3-5(-5.4) μm, Q = (1.6-)1.8-2.3(-2.5); N = 60	Me = 9.5 × 4.7 μm, Qe = 2
Cumulated values from above collections			(7.2-)8.1-11.5(-12.1) × (3.7-)4.1-5.8(-6.4) μm, Q = (1.4-)1.7-2.5(-2.8); N = 780	Me = 9.6 × 4.8 μm, Qe = 2
<i>B. uniapiculata</i> Thailand KP-JF 029	punctate	e = 0.35-0.4	(8.8-)9.1-10.4(-11.4) × (4.6-)5.1-5.8(-6.4) μm, Q = (1.5-)1.7-2(-2.2); N = 60	Me = 9.8 × 5.4 μm, Qe = 1.8
<i>B. uniapiculata</i> Ju et al. (1998)	punctate with raised rim	e = 0.4-0.7	(9-)10-14 × 5-7 μm	Me = 12 × 6 μm, Qe = 2
<i>B. cf. uniapiculata</i> GUAD 213	punctate	e = 0.4	(10.8-)11.4-13.6(-14.7) × (5-)5.5-6.5(-6.9) μm, Q = (1.8-)1.9-2.3(-2.6); N = 60	Me = 12.5 × 6 μm, Qe = 2.1
<i>B. uniapiculata</i> CLL 2348 depauperate	papillate	e = 0.4	(9.6-)10.5-12.4(-15.6) × (4.8-)5.1-6.4(-7.4) μm, Q = (1.6-)1.8-2.2(-2.6); N = 60	Me = 11.5 × 5.7 μm, Qe = 2
<i>B. uniapiculata</i> MJF 13191	punctate	e = 0.9	(10-)10.5-12.5(-13.5) × (4.6-)5.1-6(-6.4) μm, Q = (1.8-)1.9-2.3(-2.4); N = 60	Me = 11.6 × 5.6 μm, Qe = 2.1

**Known distribution:** Guadeloupe.

**Discussion:** In absence of diagnostic stromatal characters for most taxa of *Biscogniauxia*, their identification is primarily based on ascospore morphology. Two main types of ascospores are distinguished, those with a cellular appendage or with a truncate base indicating the presence of a lost appendage, and those one-celled that lack a cellular appendage. This clear-cut distinction is usually discriminant but does not apply to the collection illustrated above, in

which appendaged ascospores are mixed in almost equal proportions with non-appendaged ones. This collection was mentioned by Ju et al. (1998: 6) who suggested it “appears to be transitional between those *Biscogniauxia* species with persistent appendages and those without”. An alternative to this interpretation would be to regard the appendaged ascospores as typical and the apiculate ones as atypical, resulting from developmental abnormalities recalling those observed in some species of *Nemania* S.F. Gray or *Xylaria* Hill ex Shrank in which “beaked” lower ends are sometimes encountered



**Plate 18 – *Biscogniauxia* cf. *uniapiculata***

GUAD-213. A: Fragmentary stroma on host surface with remnant of the outer dehiscent layer (arrow); B: Stromatal margin in close-up showing the remnant of the blackish outer dehiscent layer (arrow) lining the stroma; C: Stromatal surface in close-up showing blackish, obscurely papillate ostioles; D: Immature ascus tips in Melzer's reagent, showing the amyloid apical apparatus; E: Stroma in vertical section (broken) showing the carbonaceous tissue encasing the ovoid perithecia; F: Mature appendaged ascospore in dorso-lateral view showing a germ slit on the dorsal side; G: Mature appendaged ascospore in side view showing an apiculate upper end and a faint germ slit on the ventral side; H: Mature ascospore lacking appendage and apiculate at both ends; I, J: Various shaped and appendaged immature and mature ascospores (F-J in 1% SDS). Scale bars: A = 5 mm; B = 1 mm; C, E = 0.5 mm; D, F-J = 5  $\mu$ m.

and usually not given much taxonomic relevance. The wide range of variation in shape and dimensions observed amongst apiculate or beaked ascospores may support the hypothesis that they are abnormal, in contrast with the appendaged ones which show much less variations. If the abnormal ascospores are not taken into account, this collection appears to share most of the distinctive features of *B. uniapiculata*, including thin stromata with ovoid perithecia and ill-defined ostioles, asci with a small discoid apical apparatus and ascospores  $10\text{--}14 \times 5\text{--}7 \mu\text{m}$  (Table 5) with a frequently collapsed cellular appendage and a germ slit on either the most convex or the least convex side. Additional collections will be necessary to assess whether the peculiar ascospore morphology encountered in the specimen GUAD-213 warrants the segregation of a new taxon or merely reflects an extreme variation within *B. uniapiculata*, a species known to exhibit a high morphological variability (Ju *et al.*, 1998; this paper).

Ascospores of *B. fuscella* (Rehm) F. San Martín & J.D. Rogers likewise feature appendaged mature ascospores along with non-appendaged ones, but in a much smaller proportion (Ju *et al.*, 1998). Stromata of *B. fuscella* differ from those of GUAD-31 in being 1 mm thick and in having a white or buff-coloured outer dehiscing layer, and its ascospores differ in being  $13\text{--}16.5 \times 6.5\text{--}8 \mu\text{m}$  and ellipsoid, almost equilateral to fusoid; this rules out a possible conspecificity.

***Biscogniauxia viscosicentra*** J.D. Rogers, F. San Martín & Y.-M. Ju, *Nova Hedwigia*, 71: 432 (2000). Plate 19.

**Stromata** appanate to slightly convex, irregularly orbicular-lobed, 3–22 mm long  $\times$  4–12 mm wide  $\times$  1.7–2 mm thick, with abrupt margins lined at maturity by scattered remnants of the blackish outer dehiscing layer; mature surface dark brown, mottled with blackish patches in fertile areas, matt, even, carbonaceous beneath surface, woody-fibrous and greyish brown between perithecia, tissue beneath perithecia inconspicuous, underlying bark tissue slightly blackened. **Perithecia** long-tubular, frequently laterally flattened, 1.5–1.6 mm high  $\times$  0.2–0.4 mm wide, opening centrally or laterally through individual ostioles, with sticky contents stretching into whitish filaments when cut. **Ostioles** umbilicate, 40  $\mu\text{m}$  diam, unevenly distributed, surrounded by a blackish halo and plugged with greyish substance.

**Asci** cylindrical, with (6–)8 obliquely uniseriate ascospores, short-stipitate, the spore-bearing parts  $94\text{--}105 \times 6\text{--}7 \mu\text{m}$ , the stipes 12–20  $\mu\text{m}$  long, with apical apparatus  $1.7\text{--}2.2 \times 2.6\text{--}3.2 \mu\text{m}$  (Me =  $1.9 \times 2.9 \mu\text{m}$ , N = 20), short-cylindrical, slightly trapezoid, bluing in Melzer's reagent. **Paraphyses** hyphal, unbranched, thin-walled, 0.8–1.5  $\mu\text{m}$  wide, embedded in mucilage; abundant allophyses with refractive contents, non-septate, not stained by blue ink, sinuous, 1.8–3.5  $\mu\text{m}$  wide, with tips rounded or turning filiform upon stretching. **Ascospores** (9.4–)10.1–11.5(–12.4)  $\times$  (3.9–)4.6–5.7(–5.9)  $\mu\text{m}$ , Q = (1.7–)1.9–2.5(–2.7), N = 60 (Me =  $10.9 \times 5.1 \mu\text{m}$ ; Qe = 2.1), reddish brown, ellipsoid-inequilateral with broadly rounded upper end and abruptly truncate lower end bearing a hyaline to pale brown, thick-walled, persistent hemispherical cellular appendage  $1.8\text{--}2.3 \times 2.4\text{--}2.9 \mu\text{m}$  (Me =  $2.1 \times 2.7 \mu\text{m}$ , N = 20); smooth-walled, with a blurred, unilateral, straight germ slit almost spore-length on the dorsal side.

**Asexual morph** on the natural substrate not seen. Asexual morph in culture on OA periconiella-like (ROGERS *et al.*, 2000).

**Specimen examined:** FRENCH WEST INDIES: GUADELOUPE: Basse-Terre, Saint-Claude, Matouba, Victor Hugues track, hygrophilic rainforest, associated with depauperate stromata of *Biscogniauxia capnodes* on a dead corticated branch, 5 Sept. 2004, leg. C. Lechat, CLL 2346 (LIP).

**Known distribution:** Neotropical: Guadeloupe (this paper), Venezuela (ROGERS *et al.*, 2000).

**Discussion:** *Biscogniauxia viscosicentra*, formerly only known from the type collection from Venezuela (ROGERS *et al.*, 2000), is a highly distinctive taxon readily recognized by the combination of small and thick stromata with long-tubular perithecia encased in woody-fibrous, non-carbonaceous tissue, whose contents are sticky and form stretched whitish filaments when cut. Its ascospores are  $10\text{--}12 \times 4.5\text{--}6 \mu\text{m}$ , inequilateral with a blurred, long germ slit on the convex side and bear a persistent, thick-walled hemispherical appendage on the truncate lower end. The most distinctive character, on which the specific epithet is based, is the presence of abundant, thick refractive filaments interspersed amongst the true hyphal paraphyses, giving a sticky texture to the perithecial contents, even when dry. The authors coined the term allophyses to designate this peculiar type of hamathecial element, whose presence is highly diagnostic. Wide hamathecial elements with refractive contents are known in some species of *Biscogniauxia* and *Camillea* and in a single species of *Hypoxyton* Bull., viz. *H. rugulosporum* K. Van der Gucht, Y.-M. Ju & J. D. Rogers (FOURNIER & LECHAT, 2015), but do not involve the striking formation of such long whitish strands when the stroma is cut. *Biscogniauxia viscosicentra* var. *macrospora* J.D. Rogers & F.O. Hay was recently described from Hawaii and segregated from the typical variety based on larger ascospores  $12\text{--}15 \times 6\text{--}7 \mu\text{m}$  (ROGERS *et al.*, 2008; ROGERS & JU, 2012). The ascospore size range of  $10.1\text{--}11.5 \times 4.6\text{--}5.7 \mu\text{m}$  encountered in our collection clearly sets it in the typical variety.

The collection of *B. viscosicentra* from Guadeloupe presented above is the second record worldwide of this distinctive species which was not found in Martinique despite a much more extensive sampling, suggesting it might be a rare species.

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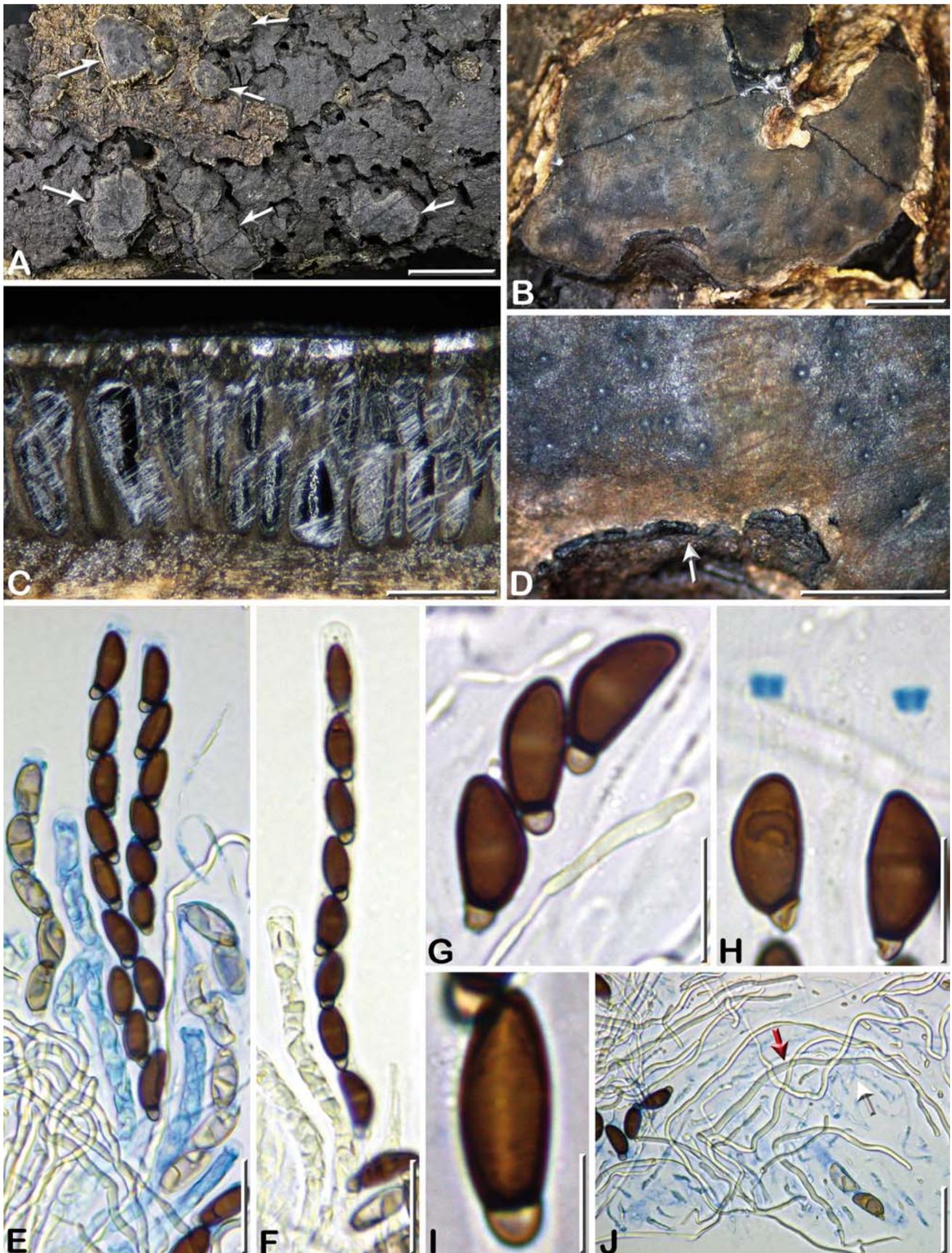


Plate 19 – *Biscogniauxia viscosicentra*

CLL 2346. A: Stromata on host surface (arrows) erumpent from bark or from depauperate stromata of *B. capnodes*; B: Stroma in top view showing the mottled surface; C: Stroma in vertical section (cut) showing the long-tubular perithecia embedded in brown woody-fibrous tissue and the long whitish sticky filaments resulting from the cutting of the perithecial contents; D: Stromatal surface next to the margin in close-up showing umbilicate ostioles and remnants of the blackish outer dehiscent layer (arrow); E, F: Mature and immature asci with allophyses, in diluted blue Pelikan® ink and 1% SDS respectively; G: Ascospores in side view, in 1% SDS; H: Ascus tips in Melzer's reagent, showing two amyloid apical apparatus; I: Ascospore in dorsal view showing a blurred germ slit, in black Pelikan® ink; J: Hamothecium in diluted blue Pelikan® ink, showing the paraphyses staining blue (white arrow) and the refractive unstained allophyses (red arrow). Scale bars: A = 10 mm; B = 2 mm; C, D = 1 mm; E, F, J = 20 µm; G, H = 10 µm; I = 5 µm.

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**Jacques Fournier**

Las Muros  
09420 Rimont  
France  
jacques.fournier@club-internet.fr



**Christian Lechat**

64 route de Chizé  
79360 Villiers-en-Bois  
France  
lechat@ascofrance.fr



**Régis Courtecuisse**

Université du Droit et de la Santé Lille 2  
Faculté des Sciences pharmaceutiques et biologiques  
3 rue du Professeur Laguesse, 59006 Lille Cédex, France  
regis.courtecuisse@univ-lille2.fr