

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

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Summary: This survey of the genus *Hypoxylon* in the French West Indies is based on the material collected during an ongoing mycological inventorial project initiated in 2003, including field trips usually carried out annually, between June and November. Previous records of *Hypoxylon* from these islands found in literature are analyzed and discussed, and only two species are retained as reliably identified in 1996, viz.: *H. musceum* and *H. ochraceum*. The thirty-seven additional taxa collected during these field trips bring up to thirty-nine the number of *Hypoxylon* taxa known from Guadeloupe and Martinique. These thirty-nine taxa are described, illustrated in colour and their taxonomic status is commented. They include seven taxa recently described as new in 2010, 2012 and 2015, viz.: *H. cypraeisporum*, *H. griseobrunneum*, *H. isabellinum*, *H. laminosum*, *H. lateripigmentum*, *H. pulicicidum* and *H. sclerophaeum* var. *parvisporum* and six new species described in this article, viz.: *H. arawakianum*, *H. dussii*, *H. ochraceoglobosum*, *H. sepiaceum*, *H. sofaiense* and *H. subtrugodes*. Seventeen known species are recorded for the first time from Guadeloupe or Martinique, viz.: *H. aeruginosum*, *H. brevisporum*, *H. erythrostroma*, *H. fendleri*, *H. haematostroma*, *H. hypomiltum*, *H. investiens*, *H. lenormandii*, *H. monticulosum*, *H. munkii*, *H. pelliculosum*, *H. rickii*, *H. rubellum*, *H. rugulosporum*, *H. samuelsii*, *H. subgilvum* and *H. tortisporum*. Finally seven collections that could not be unequivocally equated to known species are given the following provisional names referring to the most resembling known species viz.: *H. cf. cinnabarinum* sp1, *H. cf. cinnabarinum* sp2, *H. cf. duranii*, *H. cf. dieckmannii*, *H. cf. hypomiltum*, *H. cf. pilgerianum* sp1 and *H. cf. pilgerianum* sp2.

A dichotomous identification key to the *Hypoxylon* spp. known from the French West Indies is proposed.

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

Résumé : Cette étude du genre *Hypoxylon* dans les Antilles françaises a été réalisée à partir du matériel récolté au cours de missions sur le terrain effectuées en moyenne une fois par an, de juin à novembre, dans le cadre d'un projet d'inventaire mycologique en cours initié en 2003. Les récoltes de *Hypoxylon* dans ces îles qui ont été signalées auparavant dans la littérature sont analysées et commentées, et seulement deux espèces sont retenues, dont l'identification sans équivoque remonte à 1996, à savoir : *H. musceum* and *H. ochraceum*. Les trente-sept taxons supplémentaires récoltés au cours de ces missions font passer à trente-neuf le nombre de taxons de *Hypoxylon* connus de Guadeloupe ou de Martinique. Ces trente-neuf taxons sont décrits, illustrés en couleur et leur statut taxinomique est commenté. Ils comprennent sept taxons récemment décrits comme nouveaux en 2010, 2012 et 2015, à savoir : *H. cypraeisporum*, *H. griseobrunneum*, *H. isabellinum*, *H. laminosum*, *H. lateripigmentum*, *H. pulicicidum* et *H. sclerophaeum* var. *parvisporum*, et six espèces nouvelles décrites dans cet article, à savoir: *H. arawakianum*, *H. dussii*, *H. ochraceoglobosum*, *H. sepiaceum*, *H. sofaiense* et *H. subtrugodes*. Dix-sept espèces connues sont signalées pour la première fois de Guadeloupe ou de Martinique, à savoir : *H. aeruginosum*, *H. brevisporum*, *H. erythrostroma*, *H. fendleri*, *H. haematostroma*, *H. hypomiltum*, *H. investiens*, *H. lenormandii*, *H. monticulosum*, *H. munkii*, *H. pelliculosum*, *H. rickii*, *H. rubellum*, *H. rugulosporum*, *H. samuelsii*, *H. subgilvum* et *H. tortisporum*. Finalement, sept récoltes qui n'ont pu être identifiées avec certitude sont décrites sous les noms provisoires suivants, en référence aux espèces connues auxquelles elles ressemblent le plus : *H. cf. cinnabarinum* sp1, *H. cf. cinnabarinum* sp2, *H. cf. duranii*, *H. cf. dieckmannii*, *H. cf. hypomiltum*, *H. cf. pilgerianum* sp1 et *H. cf. pilgerianum* sp2. Une clé dichotomique d'identification des espèces de *Hypoxylon* connues des Antilles françaises est proposée.

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

Introduction

The genus *Hypoxylon* Bull. (Ascomycota, Sordariomycetes, Xylariales, Xylariaceae) is characterized by ascomata embedded in often colourful effused or pulvinate stromata containing secondary metabolites distributed in the outermost pruina and in waxy granules forming a subsurface crust and often encasing the ascomata, associated with usually poorly developed basal sterile fibrous to woody tissue and more rarely with carbonaceous tissue. The ascomata are perithecioid, monostichous and open separately through umbilicate, rarely slightly papillate ostioles. The asci are unitunicate, cylindrical, stipitate, 8-spored and provided with a typically amyloid apical apparatus, associated with a hamathecium of thin-walled, septate, filiform, rarely swollen paraphyses. The ascospores are unicellular, ellipsoid, brown, with a germ slit on the most convex side of inequilateral ascospores and often have a perispore dehiscent in 10% KOH. The asexual state of *Hypoxylon* is occasionally found on the natural substrate or more regularly obtained in culture on artificial media, it is hyphomycetous and referable to nodulisporium-like (JU & ROGERS, 1996).

Hypoxylon is a well studied genus monographed twice by MILLER (1961) and by JU & ROGERS (1996) and its concept has been considerably narrowed down since its original definition by the segregation of many genera currently accommodated in *Hypoxyloideae* and *Xylarioideae*. The two most closely related genera are *Annulohypoxylon* Y.-M. Ju, J.D. Rogers & H.-M. Hsieh and *Daldinia* Ces. & De Not. The former differs from *Hypoxylon* by usually strongly carbonaceous stromata, papillate ostioles surrounded by a discoid structure resulting from a dehiscence of stromatal tissue and ascospores with a smooth perispore dehiscent in 10% KOH, with a thickening at ca. 1/3 ascospore length. The segregation of *Annulohypoxylon* was supported by molecular data (HSIEH *et al.*, 2005) but in this study *Daldinia* was not clearly set apart from *Hypoxylon*, making it paraphyletic. *Daldinia* is primarily distinguished from *Hypoxylon* based on hemispherical to subglobose or clavate stromata with a thick internal sterile tissue composed of fibrous to gelatinous concentric rings (JU & ROGERS, 1996; STADLER *et al.*, 2014).

Hypoxylon has a worldwide distribution but it displays a higher diversity in the Tropics, especially in the Neotropics, as reported by JU & ROGERS (1996), but it is unknown whether this reflects a reality or just results from a less extensive sampling in other tropical areas

of the world. The usefulness of fieldwork coupled with detailed taxonomic studies was recently demonstrated by a sampling over only two weeks in French Guiana resulting in ten species of *Hypoxylon* new to the mycobiota of this French department, including six species new to science (FOURNIER & LECHAT, 2015b). Aside from scattered taxonomic papers describing new species since the 1996 monograph by JU & ROGERS or reporting known species (MEDEL & CHACÓN, 1997; SAN MARTÍN *et al.*, 1999a; JU *et al.*, 2004; JU *et al.*, 2005; CARMONA *et al.*, 2009; BILLS *et al.*, 2012; KUHNERT *et al.*, 2014; FOURNIER & LECHAT, 2015a) the neotropical species of *Hypoxylon* remain poorly documented. As to the *Hypoxylon* spp. encountered in Mexico, a comprehensive survey was provided by SAN MARTÍN *et al.* (1999b) based on the current taxonomic concepts delineated by JU & ROGERS (1996) but nothing similar was published about the Caribbean islands. Although dealing with geographically different regions, the contribution to the genera *Annulohypoxylon* and *Hypoxylon* in Argentina by HLADKI & ROMERO (2009) and the survey of the *Xylariaceae* from Hawaiian Islands (ROGERS & JU, 2012) were likewise consulted.

An ongoing inventorial project was launched in 2003 by Prof. Courtecuisse (Lille University), aiming at a thorough appraisal of the mycobiota of the Guadeloupe and Martinique islands, French West Indies (COURTECUISE, 2006; COURTECUISE & WELTI, 2013; LÉCURU & COURTECUISE, 2013). Aside from the aforementioned reports of *Hypoxylon*, the first published results of this project dealt with:

- *Camarops* (*Boliniales*) (ROGERS *et al.*, 2006; 2008);
- *Cercophora* (*Lasio-sphaeriaceae*) (DELPONT, 2011);
- *Clathrus* (*Phallales*) (LÉCURU *et al.*, 2013);
- *Cuphophyllus* (*Hygrophoraceae*) (COURTECUISE & FIARD, 2005);
- *Ganodermataceae* and *Trametes* (*Polyporales*) (WELTI & COURTECUISE, 2010; WELTI *et al.*, 2012);
- *Helicascus* (*Morosphaeriaceae*) (ZHANG *et al.*, 2015);
- *Hydropisphaera*, *Ijuhya*, *Lasioneotria*, *Verrucostoma* (*Hypocreales*) (LECHAT *et al.*, 2010; LECHAT & COURTECUISE, 2010; LECHAT & FOURNIER, 2012; LECHAT *et al.*, 2015);
- *Jahnula* (*Jahnulales*) (FOURNIER *et al.*, 2015);
- *Tulostoma* (*Agaricaceae*) (CHABROL *et al.*, 2008);
- *Valsaria* (*Valsariales*) (JAKLITSCH *et al.*, 2015);
- *Xylaria* (*Xylariaceae*) (JU *et al.*, 2012).

Most families of *Sordariomycetes* (Ascomycota) appeared well represented and *Xylariaceae* usually account for more than 50% of the Ascomycota collected during a fieldwork trip. As a first step to recording the species richness exhibited by the *Xylariaceae*, undertaking a survey of *Hypoxylon* seemed to be a relevant and challenging goal.

The first and also the last account on this genus in Guadeloupe and Martinique dates back to more than a century, in which DUSS (1903) listed twelve species. The name *Hypoxylon* was then used in a much broader sense than currently, accommodating taxa now placed in *Annulohypoxylon*, *Biscogniauxia* Kuntze, *Camarops* P. Karst., *Camillea* Fr., *Nemania* S.F. Gray, *Xylaria* Hill ex Schrank and several other related genera. The material listed by Duss was not critically revised but based on the epithets, most names likely refer to the aforementioned genera and not to *Hypoxylon*. Only *H. coccineum* Bull., *H. fragiforme* (Pers.: Fr.) Kickx, *H. fuscum* (Pers.: Fr.) Fr. and *H. rubiginosum* (Pers.: Fr.) Fr. correspond to taxa currently regarded as *Hypoxylon* s.s. These three taxa (*H. coccineum* is a synonym of *H. fragiforme*) are common north temperate species; the presence of *H. fragiforme* and *H. fuscum* in the Caribbean is highly dubious since they are respectively affiliated to *Fagus* (*Fagaceae*) and *Betula* (*Betulaceae*) that do not occur in the Neotropics and the name *H. rubiginosum* and its variety *tropica* Miller were used to be applied to most species with an orange to brown stromatal surface (MILLER, 1961) regardless of any of the morphological characters defining it in the current sense. While many *Hypoxylon* spp. encountered during this survey feature such orange to brown stromata, all appeared to clearly differ from *H. rubiginosum*. However, the two collections of *H. rubiginosum* cited by Duss (1903) were on *Bursera simaruba* (L.) Sarg. (*Burseraceae*), a distinctive tree of seasonally dry forests on

which we never encountered a *Hypoxylon*, which leaves a possibility that a specific, unnoticed *Hypoxylon* resembling *H. rubiginosum* occurs on this host. An earlier contribution was made by SACCARDO (1882) who listed a collection of *H. stygium* (Lév.) Sacc. from Guadeloupe, but this well-characterized species is currently placed in *Annulohypoxylon* (HSIEH *et al.*, 2005).

As a result, until recently, only *H. musceum* Rogers and *H. ochraceum* Henn. reported from Guadeloupe (Marie-Galante) by JU & ROGERS (1996) were known with certainty from these islands. Eight taxa were recently added viz.: *H. pulicidum* J. Fourn., Polishook & Bills (BILLS *et al.*, 2012), *H. griseobrunneum* (B.S. Mehrotra) J. Fourn., Kuhnert & M. Stadler, *H. isabellinum* J. Fourn., Kuhnert & M. Stadler, *H. laminosum* J. Fourn., Kuhnert & M. Stadler, *H. lateripigmentum* J. Fourn., Kuhnert & M. Stadler (KUHNERT *et al.*, 2014), *H. cypraeisporum* J. Fourn. & Lechat, *H. rugulosporum* K. Van der Gucht, Y.-M. Ju & J.D. Rogers and *H. sclerophaeum* var. *parvisporum* J. Fourn. & Lechat (FOURNIER & LECHAT, 2015a).

The present survey 1) resumes the information on the ten aforementioned taxa and in some cases adds further illustrations or data based on newly collected material, 2) describes six new species and 3) records and illustrates sixteen further known species and seven species of unsettled status, bringing up to thirty-nine the number of *Hypoxylon* spp. known from Guadeloupe and Martinique. A dichotomous identification key to the *Hypoxylon* spp. so far known from Guadeloupe and Martinique is provided.

The six new species viz.: *H. arawakianum* J. Fourn. & Lechat, *H. dus-sii* J. Fourn. & Lechat, *H. ochraceoglobosum* J. Fourn. & Lechat, *H. sepiaceum* J. Fourn. & Lechat, *H. sofaiense* J. Fourn. & Lechat and *H. subtrugodes* J. Fourn. & Lechat are diagnosed based on differential morphological characters as compared with related species. The seventeen known species range from widespread pantropical species like *H. haematostroma* Mont., *H. lenormandii* Berk. & M.A. Curtis or *H. monticulosum* Mont. to rarely recorded species like *H. aeruginosum* J.H. Mill., *H. munkii* Whalley, Hammelev & Talig., *H. pelliculosum* Petch or *H. rugulosporum*. The seven unsettled taxa are given a provisional name until the species complexes to which they are referred become more clearly understood.

Guadeloupe and Martinique are primarily mountainous islands, volcanic in origin, that respectively reach 1467 m and 1397 m at their highest point, with lower limestone parts in Guadeloupe (Grande-Terre, Marie-Galante). They enjoy a tropical maritime climate moderated by the warm and moist trade winds consistently blowing from the east, creating a strong contrast between the rainforests exposed to high rainfall on the east coasts of mountainous islands and the more xerophilic vegetation on west coasts or lower lands, with all intermediate types of vegetation. We distinguish here two types of rainforests based on their annual rainfall: those with annual rainfall less than 2500 mm, mostly in lowlands, are termed mesophilic; those with annual rainfall often much over 2500 mm, in highlands over 300–500 m elevation are termed hygrophilic. This combination of unevenly distributed rainfall and high variations in elevation with narrow crests and deep valleys hemmed in by steep slopes leads to the presence of plentiful and various microhabitats on a relatively small area. This pattern of microhabitats is known to account for the high diversity and the high rate of endemism of plants in Martinique (FIARD, 1994) and it can be expected that this applies to other groups like Fungi. The present survey, reporting 39 different taxa of the genus *Hypoxylon*, strongly supports this view.

Material and methods

Material and methods, including colour charts, follow FOURNIER & LECHAT (2015b).

Dichotomous key to *Hypoxylon* spp. known from French West Indies

1	Stromata on bamboo.....	2
1	Stromata on dicot wood.....	7
2	KOH-extractable pigments orange.....	3
2	KOH-extractable pigments purple.....	6
3	Stromata glomerate; ascospores 18–21 × 7.5–8.5 µm, with perispore indehiscent in 10% KOH and episporium with reticulate rims.....	<i>H. rubellum</i>
3	Stromata effused to effused-pulvinate, perispores dehiscent in 10% KOH.....	4
4	Stromata vivid orange, 1.3–2.5 mm thick, with lanceolate perithecia; ascospores 12.5–17 × 6.1–8.4 µm (lignicolous but incidentally occurring on bamboo).....	<i>H. haematostroma</i>
4	Stromata brown vinaceous to dark vinaceous, 0.3–0.4 mm thick, with spherical perithecia; ascospores smaller.....	5
5	Perithecia 0.13–0.17 mm diam; ascospores 7.9–9.1 × 3.7–4.3 µm.....	<i>H. cf. pilgerianum</i> sp 1
5	Perithecia 0.3–0.35 mm diam; ascospores 10.9–12.5 × 5.2–6.1 µm.....	<i>H. cf. pilgerianum</i> sp 2
6	Stromata daldinioid, 4–9 mm thick; ascospores 11.8–12.3 × 4.3–4.5 µm.....	<i>H. laminosum</i>
6	Stromata effused-pulvinate, 0.16–2.2 mm thick; ascospores 13.2–15.2 × 5.9–7.0 µm.....	<i>H. rugulosporum</i>
7	Ascospores with perispore dehiscent in 10% KOH.....	8
7	Ascospores with perispore not dehiscent in 10% KOH.....	33*
*Species with perispore rarely dehiscent in KOH or dehiscent with difficulty are dealt with in both parts of the key.		
8	Ascospores equilateral in side view or nearly so.....	9
8	Ascospores inequilateral in side view.....	15
9	Stromata perithecioid, black, KOH-extractable pigments purple; ascospores 15.9–17.6 × 7.6–8.5 µm with conspicuously pitted episporium.....	<i>H. cypraeisporum</i>
9	Stromata effused-pulvinate to hemispherical, coloured, KOH-extractable pigments other than purple, episporium smooth.....	10
10	Ascospores fusoid with a short, often oblique germ slit, 6.7–8.5 × 3.1–4.1 µm.....	11
10	Ascospores ellipsoid, with a straight germ slit spore-length.....	12
11	Stromata reddish brown, KOH-extractable pigments cinnamon.....	<i>H. hypomiltum</i>
11	Stromata vinaceous brown, KOH-extractable pigments olivaceous.....	<i>H. cf. hypomiltum</i>
12	Ascospores 5.6–6.3 × 2.5–2.9 µm.....	<i>H. brevisporum</i>
12	Ascospores larger.....	13
13	Stromata hemispherical, ochreous, with orange red KOH-extractable pigments; ascospores 8.3–9.7 × 4.6–5.2 µm with broadly rounded ends.....	<i>H. ochraceotuberosum</i> sp. nov.
13	Stromata effused-applanate.....	14
14	Stromata dark vinaceous, with reddish brown KOH-extractable pigments; ascospores 8.1–8.5 × 4–4.2 µm.....	<i>H. lateripigmentum</i>
14	Stromata rust, with orange to scarlet KOH-extractable pigments; ascospores 10–12.2 × 5.4–6.3 µm, with rarely dehiscent perispores.....	<i>H. cf. cinnabarinum</i> sp. 2
15	Stromata lacking KOH-extractable pigments at maturity.....	16
15	Stromata with KOH-extractable pigments at maturity.....	17
16	Stromata carbonaceous, black at maturity, with finely papillate ostioles; ascospores 7.2–8.5 × 3–3.5 µm with a sigmoid germ slit on the convex side.....	<i>H. monticulolum</i>
16	Stromata lacking carbonaceous tissue, white to vinaceous brown, with umbilicate ostioles; ascospores 6.1–7 × 3.3–3.7 µm with a straight germ slit on the flattened side.....	<i>H. munkii</i>
17	KOH-extractable pigments luteous, orange or reddish brown.....	18
17	KOH-extractable pigments fawn, sepia, grey olivaceous or pale green.....	30
18	Ascospores with a sigmoid germ slit spore-length.....	19
18	Ascospores with a straight germ slit, parallel to the sides or slightly oblique, spore-length or less than spore-length.....	21
19	Stromata perithecioid to glomerate, greyish sepia, with KOH-extractable pigments reddish brown; ascospores 11–13 × 4.8–5.8 µm.....	<i>H. lenormandii</i>
19	Stromata effused to effused pulvinate; KOH-extractable pigments orange.....	20
20	Stromatal surface greyish sepia to fawn; ascospores 7.5–8.5 × 3.2–3.8 µm with conspicuously striated perispore.....	<i>H. erythrostroma</i>
20	Stromatal surface vinaceous with orange tone; ascospores 9.3–10.5 × 4–5 µm with smooth to faintly striated perispore.....	<i>H. fendleri</i>
21	Ascospores germ slit much less than spore-length.....	22
21	Ascospores germ slit spore-length or nearly so.....	24
22	Stromata glomerate, few-peritheciate, surface olivaceous; ascospores 9.4–10.9 × 4.4–5.1 µm.....	<i>H. musceum</i>
22	Stromata effused-pulvinate, surface orange or dull brown.....	23
23	Stromata vivid orange, 1.3–2.5 mm thick, with lanceolate perithecia; ascospores 12.5–17 × 6.1–8.4 µm.....	<i>H. haematostroma</i>

23	Stromata dull brown, 0.5–0.9 mm thick, with obovoid to tubular perithecia; ascospores 7.6–9.6 × 3.5–4.3 µm	<i>H. sepiaceum</i> sp. nov.
24	Perispore smooth to faintly striated	25
24	Perispore conspicuously striated	26
25	Ascospores 9.5–10.7 × 4.7–5.1 µm	<i>H. subgilvum</i>
25	Ascospores 12.5–17 × 6.1–8.4 µm	<i>H. haematostroma</i>
26	Stromata glomerate, few-peritheciate; ascospores 9.8–11.0 × 5.3–5.9 µm	<i>H. pelliculosum</i>
26	Stromata effused-pulvinate	27
27	Stromatal granules bright orange; ascospores 6.8–7.4 × 3.2–3.7 µm	<i>H. rickii</i>
27	Stromatal granules yellow, yellowish grey or ochreous; ascospores larger	28
28	Ascospores 14.2–16.7 × 6.3–7.3 µm.....	<i>H. subtrugodes</i> sp. nov.
28	Ascospores less than 11 µm long	29
29	Stromatal granules sulphur yellow; ascospores 7.6–9 × 3.8–4.5 µm	<i>H. sofaiense</i> sp. nov.
29	Stromatal granules yellowish grey; ascospores 9.7–11.2 × 4.7–5.6 µm	<i>H. arawakianum</i> sp. nov.
30	Ascospores 5.6–6.3 × 2.5–2.9 µm	<i>H. brevisporum</i>
30	Ascospores larger, over 9 µm long	31
31	Stromata glomerate, few-peritheciate, olivaceous, with pale greenish KOH-extractable pigments; ascospores 10.4–10.7 × 5.2–5.4 µm	<i>H. isabellinum</i>
31	Stromata effused-pulvinate; KOH-extractable olivaceous brown	32
32	Stromatal surface sepia to brown vinaceous; KOH-extractable pigments sepia, becoming mouse grey after 30 min incubation; ascospores 9.4–10.5 × 4.1–4.6 µm	<i>H. cf. duranii</i>
32	Stromata surface dark vinaceous to livid vinaceous, KOH-extractable fawn becoming livid vinaceous after 30 min incubation; ascospores 9.6–11.2 × 4.2–4.9 µm	<i>H. griseobrunneum</i>
33	KOH-extractable pigments orange to orange brown	34
33	KOH-extractable pigments greyish sepia, pale olivaceous, olivaceous or dull green	38
33	KOH-extractable pigments absent, vinaceous or purple.....	43
34	Ascospores averaging less than 9 µm long.....	35
34	Ascospores averaging over 9 µm long.....	36
35	Stromatal surface dark vinaceous; ascospores 7.3–9 × 2.8–3.3 µm, narrowly ellipsoid to oblong with narrowly to broadly rounded ends	<i>H. samuelsii</i>
35	Stromatal surface dark brick; ascospores 6.7–8.5 × 3.1–4.1 µm long, short-fusoid with narrowly rounded to acute ends	<i>H. hypomiltum</i>
36	Stromata glomerate; ascospores 13.6–15.3 × 6.8–7.6 µm, pale brown, with a short germ slit.....	<i>H. ochraceum</i>
36	Stromata effused-pulvinate; ascospores dark brown with a conspicuous germ slit spore-length	37
37	Stromatal surface ochreous; stromata 1.5–2.5 mm thick with lanceolate perithecia; ascospores 11–13.1 × 5.6–7 µm	<i>H. cf. cinnabarinum</i> sp. 1
37	Stromatal surface rust; stromata 0.45–0.8 mm thick with spherical to obovoid perithecia; ascospores 10–12.2 × 5.4–6.3 µm	<i>H. cf. cinnabarinum</i> sp. 2
38	KOH-extractable pigments olivaceous; perithecia spherical to obovoid.....	39
38	KOH-extractable pigments greyish sepia, pale olivaceous or dull green; perithecia long tubular to lanceolate	40
39	Stromata 0.4–0.6 mm thick, carbonaceous; ascospores 6.9–8.1 × 3.3–3.8 µm with broadly rounded ends.....	<i>H. cf. dieckmannii</i>
39	Stromata 0.7–1.0 mm thick, not carbonaceous; ascospores 7.1–8.4 × 3.3–3.9 µm with narrowly rounded to acute ends ..	<i>H. cf. hypomiltum</i>
40	Stromata peltate, 8–10 mm thick; KOH-extractable pigments greyish sepia; ascospores 8.7–10.6 × 3.7–4.3 µm, brown, frequently irregularly shaped	<i>H. tortisporum</i>
40	Stromata effused-pulvinate; KOH-extractable pigments pale olivaceous or dull green	41
41	Ascospores 9.1–10.1 × 4.2–4.8 µm, ellipsoid, reddish brown, with conspicuous germ slit	<i>H. dussii</i> sp. nov.
41	Ascospores not over 8.5 µm long, narrowly ellipsoid, pale olivaceous brown, with fairly inconspicuous germ slit.....	42
42	Stromata with carbonaceous tissue encasing the long tubular perithecia; KOH-extractable pigments dull green; ascospores 7–8 × 3.3–4.1 µm.....	<i>H. investiens</i>
42	Stromata with carbonaceous tissue restricted to the subsurface, perithecia lanceolate; KOH-extractable pigments dilute olivaceous; ascospores 6.7–8.3 × 2.9–3.7 µm	<i>H. pulicidum</i>
43	Stromata black and carbonaceous at maturity, without KOH-extractable pigments (but immature stromata with purple extractable pigments); ostioles papillate; ascospores 7.2–8.5 × 3–3.5 µm with a sigmoid germ slit spore-length	<i>H. monticulosum</i>
43	Stromata not or weakly carbonaceous, usually with KOH-extractable pigments; ostioles umbilicate; ascospores with a short, variously shaped germ slit	44
44	Stromatal surface cyan blue; KOH-extractable pigments pale vinaceous upon 5–10 min incubation; ascospores 7.8–9.1 × 4–4.7 µm	<i>H. aeruginosum</i>
44	Stromatal surface dark brick to dark vinaceous; KOH-extractable pigments livid violet; ascospores 9.7–11.2 × 4.3–5.1 µm	<i>H. sclerophaeum</i> var. <i>parvisporum</i>

Taxonomy

Hypoxyton aeruginosum J.H. Mill., *Mycologia*, 25 (4): 321 (1933). Plate 1

Stromata effused-pulvinate, broadly ellipsoid to elongate, often coalescent, 5–34 mm long × 3–11 mm wide × 0.5–1.2 mm thick, with inconspicuous to conspicuous perithecial contours; surface dark cyan blue (27, oac278 to oac293), the periphery of young stromata dark green with a yellowish villose margin consisting of sterile contorted or diverticulate hyphae 2.5–3 µm wide, smooth to encrusted, possibly the remnants of the asexual morph; mature stromata with a persistent white or pale blue pruina on surface; blue and green granules present beneath surface and interspersed in the black slightly carbonaceous interperithecial tissue, yielding pale vinaceous (85, oac515) KOH-extractable pigments after several minutes incubation, fading upon prolonged incubation; subperithecial tissue 0.2–0.9 mm thick, black, homogeneous. **Perithecia** tubular, 0.3–0.35 × 0.15–0.18 mm. **Ostioles** umbilicate, appearing as black or yellowish dots on stromatal surface.

Asci cylindrical to slightly clavate, with eight obliquely uniseriate ascospores, 80–100 µm total length, the spore-bearing parts 52–58 × 5.5–6.5 µm, the stipes 25–45 µm long, with a discoid apical apparatus 0.6–0.8 × 2–2.2 µm, bluing in Melzer's reagent. **Paraphyses** 10–12 µm wide at base, slightly moniliform, apically tapering to 3.5–4.5 µm wide. **Ascospores** (7.4–) 7.8–9.1 (–9.9) × (3.5–) 4–4.7 (–5) µm, Q = (1.6–) 1.7–2.1 (–2.5); N = 60 (Me = 8.4 × 4.4 µm; Qe = 1.9), ellipsoid-equilateral with broadly rounded ends, pale to medium brown, with a straight germ slit ca. ½ spore-length; perispore indehiscent in 10% KOH; epispore smooth or obliquely folded, that of immature ascospores turning bluish grey in 10% KOH.

Asexual morph on the natural substrate not seen.

Specimen examined: FRENCH WEST INDIES: GUADELOUPE: Basse Terre, Petit-Bourg, forest track of Jules, rainforest, on a dead corticated branch ca. 2 cm diam, associated with *H. musceum*, 1 Sept. 2004, *leg.* C. Lechat, CLL 2262 (LIP).

Known distribution: Ecuador, French Guiana, Guadeloupe, Guyana, Mexico, Russia, Uganda.

Discussion: This rarely recorded species is remarkable by its most unusual blue stromatal colour. A comparison of this Caribbean material with a collection from French Guiana described in FOURNIER & LECHAT (2015b) reveals several minor differences illustrating the morphological variability within this taxon. While the stromata from French Guiana were bluish green with obovoid perithecia those from Guadeloupe are more typically blue, are thicker with tubular perithecia and lack the pale bluish green layer lining the base of the stroma. Moreover, wide submoniliform paraphyses and ascospores with oblique ornamentations were observed in CLL 2262 that were not detected in GYJY 12236. The ascospores of the Guianese specimen were observed shortly after the collection whereas those of the specimen from Guadeloupe were observed 11 years after the collection. It is likely that the oblique lines resembling additional germ slits on epispores found in CLL 2262 and illustrated here are a fold-like artifact resulting from the desiccation.

The presence in CLL 2262 of some stromata of *H. aeruginosum* spreading over old stromata of *H. musceum* reinforces the suspicion of a fungicolous lifestyle already noted in LÆSSØE *et al.* (2010) and FOURNIER & LECHAT (2015b).

Hypoxyton arawakianum J. Fourn. & Lechat *sp. nov.* — MycoBank MB 813520. Plate 2

Diagnosis: Differs from other *Hypoxyton* spp. by the combination of effused dark brick stromata with greyish yellow stromatal granules yielding luteous to dark sienna KOH-extractable pigments and strongly inequilateral ascospores averaging 10.4 × 5.2 µm with a

striated perispore dehiscent in 10% KOH and a straight germ slit spore-length.

Holotype: FRENCH WEST INDIES: MARTINIQUE: Le Carbet, Anse Turin, path to Etinof lodge, on dead stems of *Ricinus communis* (Euphorbiaceae), 6 Aug. 2013, *leg.* J. Fournier, MJF 13020 (LIP).

Etymology: From "Arawak", in reference to the pre-hispanic inhabitants of the Caribbean islands, as the colour of the stromata recalls their fine pottery.

Stromata effused-pulvinate, irregularly elongate, 12–70 mm long × 4–30 mm wide × 0.5–0.8 mm thick, with barely to slightly exposed perithecial contours; surface bay (6, oac636), pruinose, even to faintly nodulose, with subsurface layer yellowish brown, appearing black where the pruina is worn off, composed of amorphous waxy granules that appear yellowish to yellowish grey when observed in water and encase the perithecia downwards, yielding fugacious amber (47, oac852) shortly luteous (12, oac810) pigments in 10% KOH, turning dark sienna (8, oac664 to oac663) after 20–30 min incubation; subperithecial tissue 0.1–0.5 mm thick, greyish brown to blackish brown, woody. **Perithecia** spherical 0.3–0.35 mm diam, or obovoid to tubular, 0.45–0.5 × 0.3–0.35 mm. **Ostioles** umbilicate, appearing as small black dots.

Asci cylindrical, with (6–) 8 obliquely uniseriate ascospores, arising in bundles from short sinuous ascogenous hyphae, 100–110 µm total length, the spore-bearing parts 67–78 × 7.5–8.5 µm, the stipes 27–40 µm long, with apical apparatus discoid, 1–1.5 × 2.4–2.9 µm, bluing in Melzer's reagent. **Paraphyses** sparse, 4–5 µm wide at base, tapering above asci, minutely guttulate. **Ascospores** (9.1–) 9.7–11.2 (–11.6) × (4.2–) 4.7–5.6 (–5.8) µm, Q = (1.7–) 1.9–2.2 (–2.5); N = 120 (Me = 10.4 × 5.2 µm; Qe = 2.0), ellipsoid strongly inequilateral, often slightly crescentic, slightly laterally flattened, with broadly rounded ends, dark to blackish brown, with a straight germ slit spore-length, parallel to the sides; perispore dehiscent in 10% KOH, thick, transversely striated; epispore smooth.

Asexual morph on the natural substrate not observed.

Other specimens examined: FRENCH WEST INDIES: GUADELOUPE: Sainte-Rose, Sofaïa, path to Saut des Trois Cornes, mesophilic forest, dead corticated wood, 12 Sept. 2003, *leg.* C. Lechat, CLL 1039 (LIP, paratype). THAILAND: Saraburi, dry forest on calcareous hill vic. the Botanical Garden, dead decorticated wood, 4 Dec. 1979, *leg.* V. Demoulin, 5413 (NY), as *H. rubiginosum*. U.S. VIRGIN ISLANDS: Saint-John, Reef Bay Tr., 100 m, decorticated wood, 4 Jan. 1994, *leg.* D.J. Lodge, St. J. 118 (NY), as *H. cf. anthochroum* by J.D. Rogers; Fredriksdal, old Danish road, dead wood, 4 Jan. 1995, *leg.* D.J. Lodge, St. J. 223 (NY), as *Hypoxyton* sp.

Known distribution: Guadeloupe, Martinique (Papua New Guinea?, Thailand?, U.S. Virgin Islands?).

Discussion: The most salient feature of *H. arawakianum* is the layer of yellowish grey waxy stromatal granules yielding fugacious yellow, then luteous pigments in 10% KOH, turning dark sienna upon prolonged incubation; microscopically it is characterized by ellipsoid strongly inequilateral, often crescentic dark brown ascospores with a striated perispore dehiscent in 10% KOH. All known tropical species with such dark brown crescentic ascospores with striated perispore differ from *H. arawakianum* by their stromatal granules and their KOH-extractable pigments. *Hypoxyton trugodes* Berk. & Broome and *H. subtrugodes* J. Fourn. & Lechat (this paper) resemble *H. arawakianum* in having pale yellow to ochraceous stromatal granules yielding luteous pigments in 10% KOH. Both differ by a vinaceous stromatal surface and the former differs by long tubular perithecia and smaller ascospores 7–8 × 3–3.5 µm while the latter primarily differs by much larger ascospores 14.2–16.7 × 6.3–7.3 µm.

The temperate *H. fuscum* (Pers.: Fr.) Fr. and *H. perforatum* (Schwein.: Fr.) Fr. have similar pale coloured stromatal granules and KOH-extractable pigments in shades of yellow but in the former the stromata have a purplish surface, the KOH-extractable pigments are olivaceous and the ascospores are larger and have a sigmoid germ

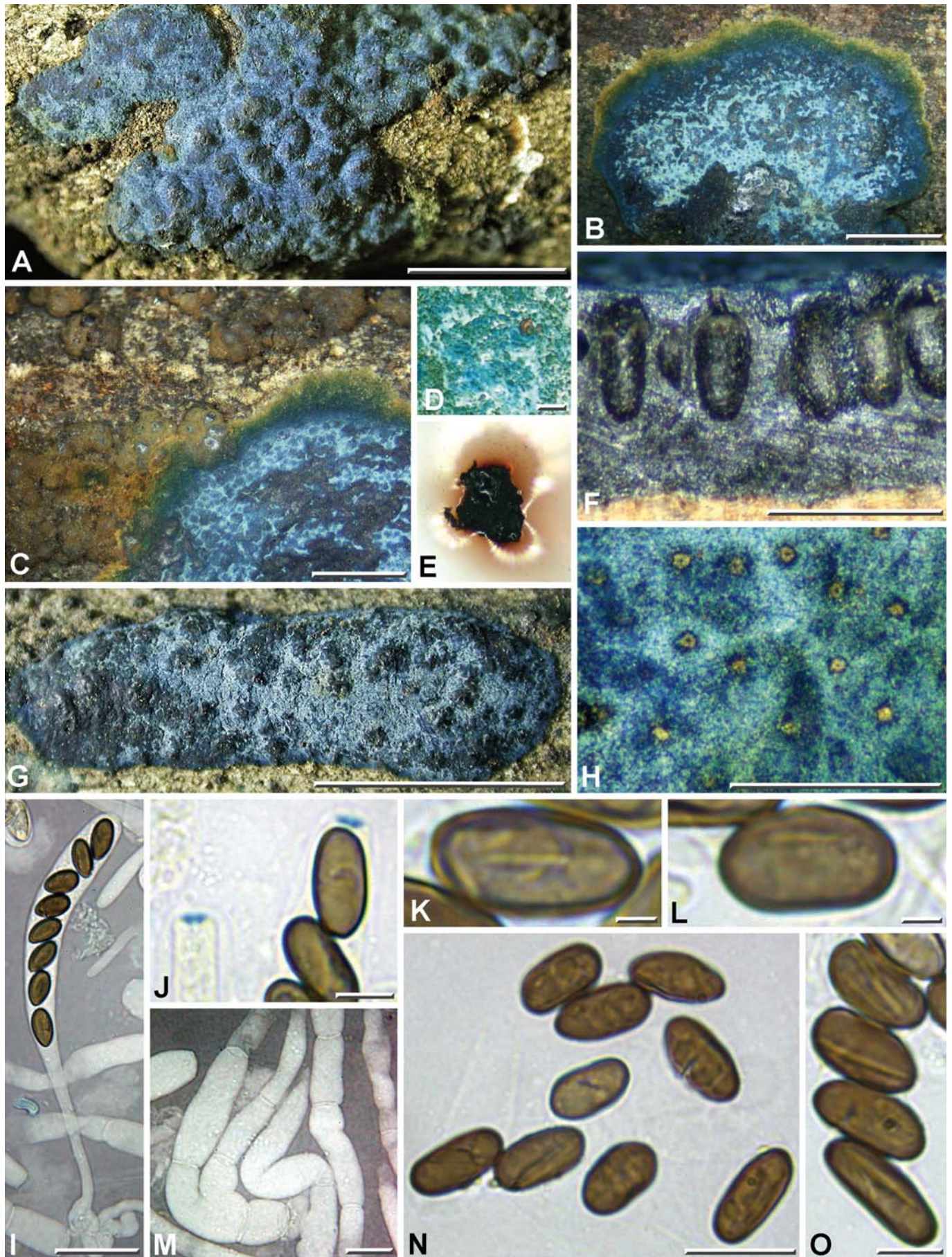


Plate 1 — *Hypoxylon aeruginosum*

CLL 2262. A, G: Mature stromata; B, C: Young stromata with a yellowish and green margin, in contact with old stromata of *H. musceum* in fig. C; D: Waxy stromatal granules observed in water under the microscope; E: KOH-extractable pigments after 5 min incubation; F: Stroma in vertical section; I: Mature ascus in black Pelikan ink; J: Ascial apical apparatus in Melzer's reagent; K, L: Ascospores in PVA-lactophenol showing the germ slit; M: Base of paraphyses in black Pelikan ink; N: Ascospores in water; O: Ascospores in PVA-lactophenol showing the obliquely folded episporium. Scale bars: A, G = 10 mm; B, C = 2 mm; D, M, N = 10 μ m; F, H = 0.5 mm; I = 20 μ m; J, O = 5 μ m; K, L = 2 μ m.

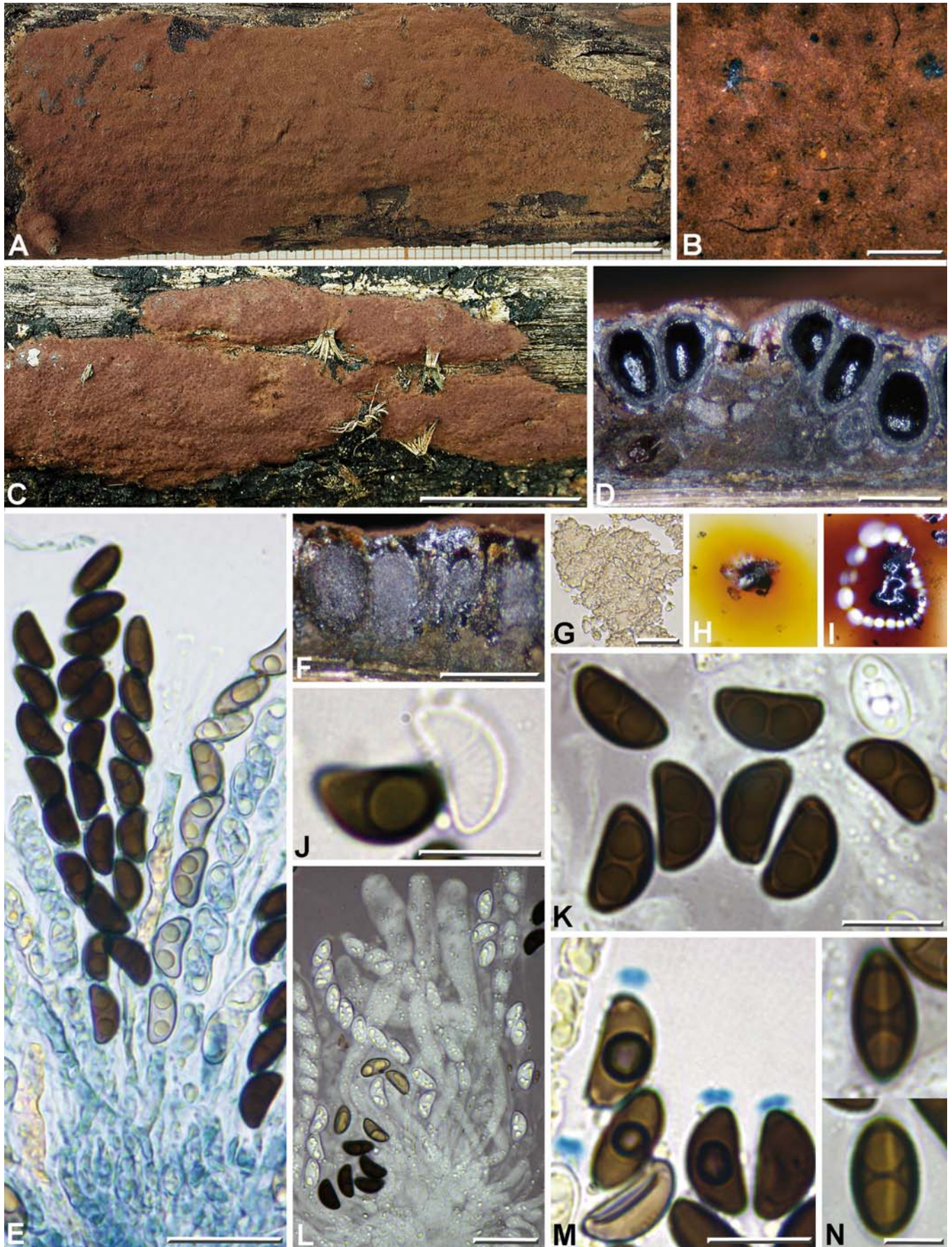


Plate 2 — *Hypoxylon arawakianum*

Holotype MJF 13020. A, C: Stromata in surface view; B: Stromatal surface in close-up showing the ostioles and the pruinose surface; D: Stroma in vertical section showing the perithecia, the yellowish subsurface granules and the subperithecial tissue; E: Mature asci in blue Waterman ink with 1% SDS; F: Stroma in vertical section (broken) showing the crust composed of waxy granules above and around the perithecia; G: Stromatal granules observed in water; H, I: KOH-extractable pigments after 1 min and 30 min incubation respectively; J: Ascospore in 10% KOH showing a dehiscent striated perispore; K: Ascospores in side view in black Pelikan ink; L: Immature asci arising in bundles, in black Pelikan ink; M: Ascinal apical apparatus in Melzer's reagent; N: Ascospores in dorsal view showing the germ slits, in black Pelikan ink. Scale bars: A, C = 10 mm; B, D, F = 0.5 mm; E, L = 20 μ m; G, J, K, M = 10 μ m; N = 5 μ m.

slit. In the latter, the KOH-extractable pigments have a greenish tone and do not turn orange brown with time, the perithecia are 0.1–0.3 mm diam, the ostioles are typically overlain by a white disc and the ascospores are more narrowly ellipsoid, with a smooth or faintly striated perispore.

Hypoxyylon arawakianum might be accommodated in the wide concept of *H. anthochroum* Berk. & Broome as defined by Ju & ROGERS (1996). They indeed have a similar ascospore morphology but as revealed by the examination of the isolectotype of *H. anthochroum* from Sri Lanka (NY) (JF, unpublished data) this species has dark reddish brown stromatal granules that yield greenish grey (110, oac85) pigments in 10% KOH and therefore cannot be confused with *H. arawakianum*.

Of interest, two specimens from U.S. Virgin Islands listed above share high similarity with *H. arawakianum*, let alone their Caribbean origin. They feature the same KOH-extractable pigments and the same ascospore morphology but we refrain to include them in *H. arawakianum* because of their dark reddish brown stromatal granules.

Finally, a specimen from Thailand (Demoulin 5413, NY) is very similar to *H. arawakianum* and was found to be much like a collection from Papua New Guinea by VAN DER GUCHT *et al.* (1997) they referred to *Hypoxyylon aff. trugodes*. This would give *H. arawakianum* a much wider distribution than the Caribbean but further studies are needed to soundly assess the conspecificity of these collections with *H. arawakianum*.

Hypoxyylon brevisporum Y.-M. Ju & J.D. Rogers, *Mycologia Memoirs*, 20: 92 (1996). Plate 3

Stromata effused-pulvinate, ellipsoid-elongate, confluent, 7–38 mm long × 4–22 mm wide × 0.7–0.85 mm thick, with slightly exposed perithecial contours; surface chestnut (40, dark oac635), pruinose, slightly nodulose, shiny black where the pruina is bruised; subsurface composed of dull orange brown granules interspersed within the carbonaceous tissue, with grey olivaceous (107, oac867) KOH-extractable pigments turning pale smoke grey (105, oac906) upon prolonged incubation; interperithecial tissue thin, black, carbonaceous; subperithecial tissue black, woody, 0.2–0.3 mm thick, the underlying substrate blackened. **Perithecia** long tubular to lanceolate, 0.5–0.6 × 0.2–0.3 mm. **Ostioles** umbilicate, inconspicuous.

Asci cylindrical, with eight obliquely uniseriate ascospores, 72–105 µm total length, the spore-bearing parts 41–48 × 4.5–5.5 µm, the stipes 27–60 µm long, arising in spicate arrangement from ascogenous hyphae (arrows), with a discoid apical apparatus 0.4–0.6 × 1.2–1.5 µm, bluing in Melzer's reagent. **Ascospores** (5.4–) 5.6–6.3 (–6.8) × (2.5–) 2.54–2.9 (–3) µm, Q = (1.9–) 2.1–2.4 (–2.5); N = 60 (Me = 6 × 2.7 µm; Qe = 2.2), ellipsoid slightly inequilateral with narrowly to broadly rounded ends, brown, with a faint straight germ slit spore-length on the most convex side; perispore dehiscent in 10% KOH, smooth; epispore smooth.

Asexual morph on the natural substrate not seen. Asexual morph in culture on OA nodulisporium-like (Ju & ROGERS, 1996).

Known distribution: Brazil, Guadeloupe, Hawaiian Islands, Taiwan.

Specimen examined: FRENCH WEST INDIES: GUADELOUPE: Sainte-Anne, Liard, meso- to xerophilic forest, on rotten blackened wood, 13 Sept. 2003, *leg.* C. Lechat, CLL 1086 (LIP).

Discussion: *H. brevisporum* is well-characterized by effused-pulvinate stromata with dark brown surface, long-tubular perithecia and grey olivaceous pigments in 10% KOH, combined with very small ascospores with a dehiscent perispore and a long germ slit. As the shape of ascospores varies from inequilateral to almost equilateral, the species is listed in two different part of the key. *Hypoxyylon moellerianum* (Henn.) Y.-M. Ju & J.D. Rogers has similar small ascospores and olivaceous pigments, but it differs in having a whi-

tish to pale grey stromatal surface and spherical perithecia 0.1–0.2 mm diam. *Hypoxyylon brevisporum* should be likewise compared to *H. dieckmannii* Theiss. because of similar external appearance and KOH-extractable pigments but the latter has slightly larger and more equilateral ascospores with perispore indehiscent in 10% KOH.

This species was so far known only from Brazil and Taiwan (Ju & ROGERS, 1996) and can be suspected to be rare since we collected it only once in Guadeloupe.

***Hypoxyylon cf. H. cinnabarinum* sp.1** (Henn.) Y.-M. Ju & J.D. Rogers, *Mycologia Memoirs*, 20: 99 (1996). Plate 4

Stromata irregularly orbicular 15–23 mm diam to effused-pulvinate, 23–70 mm long × 11–35 mm wide × 1.5–2.5 mm thick, with sloping margins often lined by a narrow, light ochreous to whitish villose fringe composed of sterile hyphae; surface pruinose, ochreous (44, oac756) to cinnamon (62, oac715), exposing the dark brick (60, oac637) subsurface layer when bruised, uneven but perithecial contours not to barely exposed; subsurface granules yellow and orange when observed in water, forming a conspicuous orange red crust above the perithecia, yielding dense orange (7, oac629) pigments in 10% KOH, not notably changing colour upon prolonged incubation; subperithecial tissue massive, 0.8–1.8 mm thick, woody, whitish to light grey around and beneath the base of perithecia, blackish grey below, in places interspersed with light grey and orange vertically oriented streaks. **Perithecia** lanceolate, 0.6–0.7 × 0.22–0.25 mm. **Ostioles** umbilicate, fringed with white material forming small discs 80–90 µm diam.

Asci cylindrical, originating from long ascogenous hyphae in unilateral spicate arrangement, with 6–8 obliquely uniseriate ascospores, mature asci fragmentary in herbarium material, 180–190 µm total length, the spore-bearing parts 80–90 × 8.5–12 µm, the stipes 95–105 µm long, with a discoid, slightly wedge-shaped apical apparatus 0.8–1 × 2.5–3 µm, bluing in Melzer's reagent.

Ascospores (10.5–)11–13.1 (–14.7) × (4.7–) 5.6–7 (–7.4) µm, Q = (1.6–) 1.7–2.1 (–2.5); N = 100 (Me = 12 × 6.3 µm; Qe = 1.9), ellipsoid nearly equilateral to piriform, oblong or citriform, with narrowly rounded to acute or slightly apiculate, less frequently broadly rounded ends, dark brown to blackish brown, with a conspicuous straight germ slit spore-length, at times much shorter and originating from one end, or slightly sigmoid; perispore indehiscent and immature ascospores turning greenish in 10% KOH; epispore smooth.

Asexual morph on the natural substrate not seen.

Specimens examined: BENIN: Atlantic Province, forêt classée de Lama, semideciduous forest, on bark, 8 Jul. 2006, *leg.* S. Gardt, SYN 636 (JF). FRENCH WEST INDIES: GUADELOUPE: Saint-Louis de Marie-Galante, Les Sources, corticated dead branch, 2 Dec. 2005, *leg.* C. Lechat, CLL 5502–2 (LIP). MARTINIQUE: Prêcheur, Anse Coulevre, coastal mesophilic rainforest, on standing dead decorticated trunk, 5 Sept. 2007, *leg.* C. Lechat & J. Fournier, MJF 07318 (LIP); SRI LANKA: Central Province, Sigiriya, on dead bark and wood, 16 Jan. 2013, *leg.* W. Jaklitsch, JF 13038.

Known distribution: Benin (?), French Guiana, Guadeloupe (Marie-Galante), Martinique, Sri Lanka (?).

Discussion: These collections are strikingly similar to a collection from French Guiana (CLL 8081), illustrated in FOURNIER & LECHAT (2015b), in having thick stromata with an ochreous pruinose surface and a dark brick subsurface, orange KOH-extractable pigments, long tubular perithecia and similar equilateral ascospores with narrowly rounded to acute ends and a perispore indehiscent in 10% KOH. The collections from Martinique slightly differ from the Guianese material in having stromata not over 2.5 mm thick and more variously shaped ascospores; their hymenium also contains granular to stellate crystals that were not detected in CLL 8081.

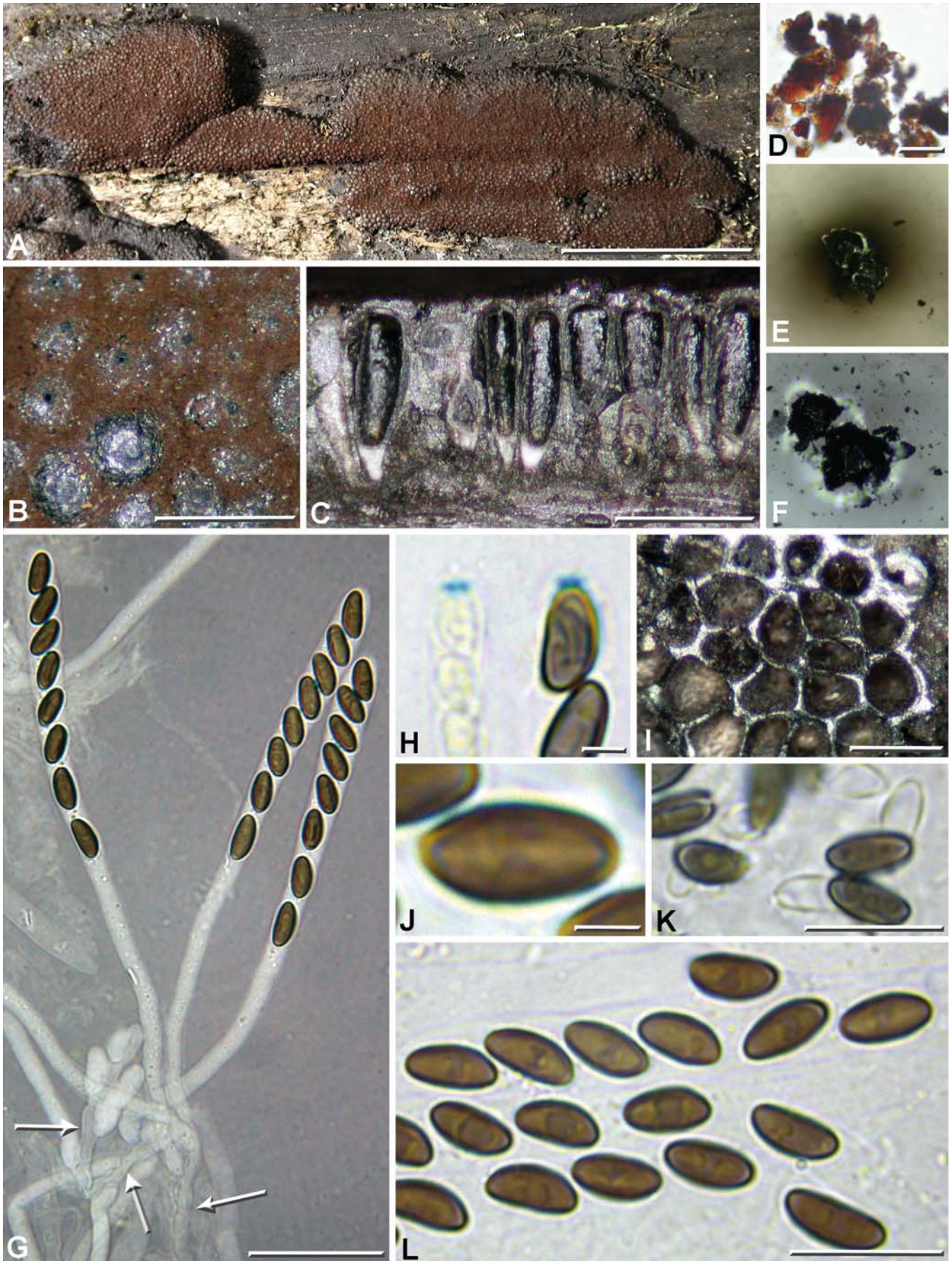


Plate 3 — *Hypoxylon brevisporum*

CLL 1086. A: Effused-pulvinate confluent stromata; B: Stromatal surface in close-up showing the perithecial contours and the ostioles; C: Stroma in vertical section showing the perithecia and the black subperithecial tissue; D: Stromatal orange brown granules mixed with carbonaceous fragments, in water; E, F: KOH-extractable pigments after 1 min and 30 min incubation respectively; G: Asci originating from ascogenous hyphae (arrows), in black Pelikan ink; H: Ascal apical apparatus in Melzer's reagent; I: Overmature stroma in horizontal section showing the thin carbonaceous tissue delimiting the perithecia; J: Ascospore germ slit, in Melzer's reagent; K: Ascospores with perispores dehiscent in 10% KOH; L: Ascospores in water. Scale bars: A = 10 mm; B, C, I = 0.5 mm; D, K, L = 10 μ m; G = 20 μ m; H, J = 2 μ m.

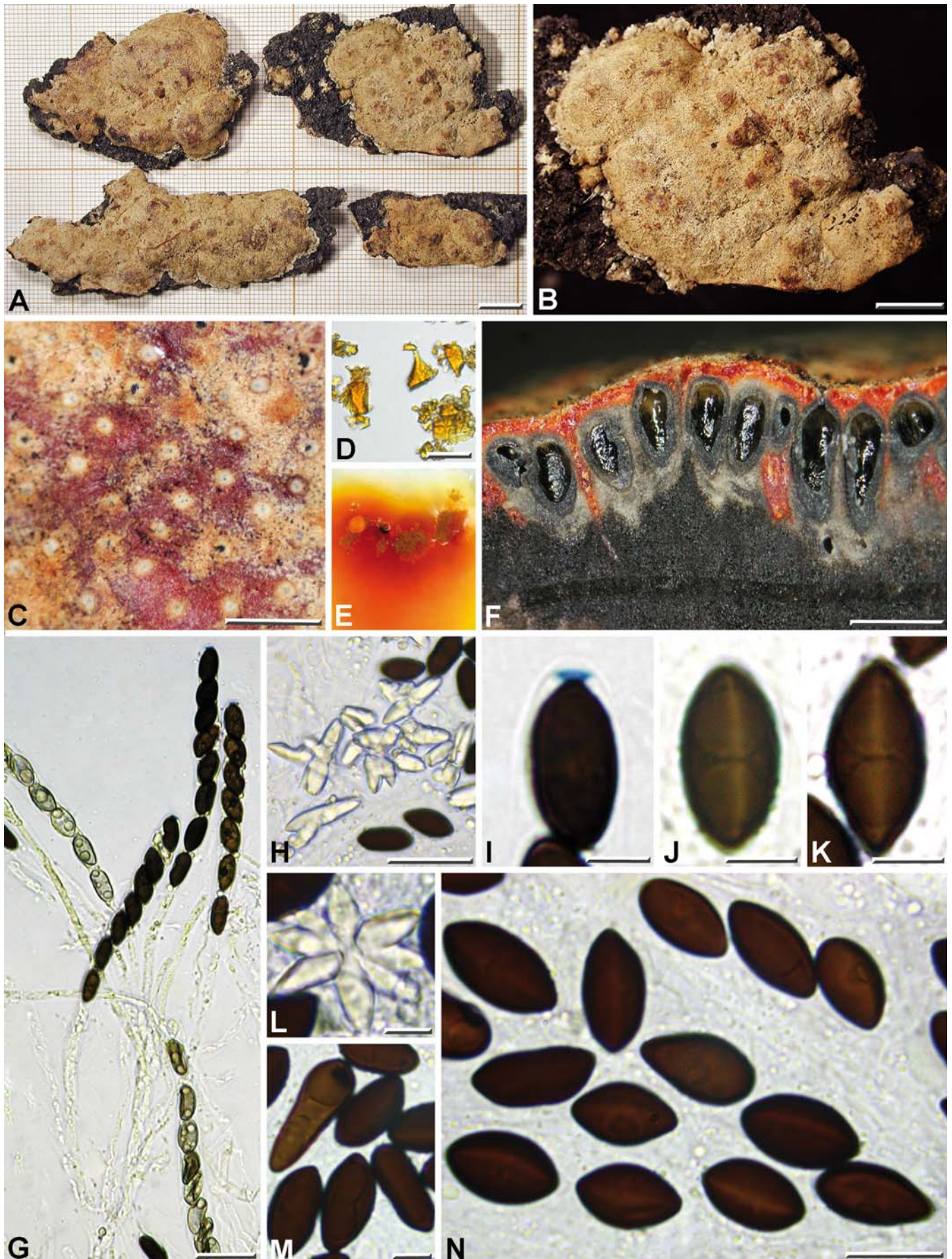


Plate 4 — *Hypoxylon* cf. *H. cinnabarinum* sp. 1

MJF 07318. A, B: Stromata in surface view; C: Stromatal surface in close-up showing the ostioles, the pruinose surface and the reddish subsurface; D: Stromatal granules observed in water; E: KOH-extractable pigments (1 min incubation); F: Stroma in vertical section showing the perithecia, the subsurface orange granules and the thick subperithecial tissue; G: Asci arising from long ascogenous hyphae, in Melzer's reagent; H, L: Hymenial stellate granules, in water; I: Ascinal apical apparatus in Melzer's reagent; J, K: Ascospores showing the germ slit, in 10% KOH and water respectively; M, N: Variously shaped ascospores, in water. Scale bars: A, B = 10 mm; C, F = 0.5 mm; D, G = 20 μ m; I-M = 5 μ m; N = 10 μ m.

Two further collections assignable to *H. cinnabarinum* according to Ju & Rogers' concept (JU & ROGERS, 1996) resembling the material from French Guiana and Martinique in having thick stromata with tubular to lanceolate perithecia were examined. One from Benin (SYN 636) has more rusty stromata and ascospores (10.3–) 10.8–12.2 (–12.5) × (4.9–) 5.8–6.6 (–6.9) μm, Q = (1.7–) 1.72–2 (–2.3); N = 60 (Me = 11.4 × 6.1 μm; Qe = 1.9) and one from Sri Lanka (JF 13038) has rust (39, oac643) stromata and slightly smaller ascospores (9.7–) 10.2–11.7 (–12.3) × (4.9–) 5.8–6.5 (–6.9) μm, Q = (1.6–) 1.7–1.9 (–2.5); N = 60 (Me = 10.9 × 6.1 μm; Qe = 1.8). Hymenial crystals were not detected in both collections.

The strong morphological affinities of these four collections with thick stromata featuring a continuum in stromatal surface colour and ascospores dimensions suggest that a case could be made to segregate them from *H. cinnabarinum* as currently conceived but this should await a revision of all the species referred to *H. cinnabarinum* by JU & ROGERS (1996) and a stricter definition of the species. Also see discussions under *Hypoxyton* cf. *cinnabarinum* sp. 2 (this paper) and *Hypoxyton* cf. *cinnabarinum* in FOURNIER & LECHAT (2015b).

***Hypoxyton* cf. *H. cinnabarinum* sp. 2** (Henn.) Y.-M. Ju & J.D. Rogers, *Mycologia Memoirs*, 20: 99 (1996). Plates 5–6

Stromata effused-pulvinate, discoid to irregularly elongate, crust-like and easily detached from the bark, 12–70 mm long × 12–20 mm wide × 0.45–0.8 mm thick, with slightly exposed perithecial contours; surface rust (39, oac643), pruinose, with subsurface layer orange red, composed of amorphous waxy granules that appear orange when observed in water and extend downwards between the perithecial walls, yielding orange (7, oac629) to scarlet (5, oac628) pigments in 10% KOH, not notably changing colour after 30 min incubation; subperithecial tissue 0.1–0.5 mm thick black, leathery. **Perithecia** spherical 0.25–0.35 mm diam to obovoid 0.4–0.45 × 0.25 mm. **Ostioles** umbilicate, black at the centre, encircled by a greyish ring 80–90 μm diam externally lined by a black line.

Asci cylindrical, originating from long ascogenous hyphae in unilateral spicate arrangement, with 6–8 obliquely uniseriate ascospores, 98–135 μm total length, the spore-bearing parts 72–78 × 8–9 μm, the stipes 22–65 μm long, with a discoid, slightly wedge-shaped apical apparatus 1–1.2 × 2.5–2.7 μm, bluing in Melzer's reagent. **Paraphyses** filiform, minutely guttulate. **Ascospores** (9.5–) 10–12.2 (–12.9) × (4.6–) 5.4–6.3 (–6.4) μm, Q = (1.7–) 1.73–2.1 (–2.3); N = 60 (Me = 10.9 × 5.8 μm; Qe = 1.9), ellipsoid-equilateral with broadly to narrowly rounded ends, at times piriform or oblong, dark brown, with a conspicuous germ slit spore-length, straight, parallel to the sides; perispore indehiscent in 10% KOH, rarely dehiscent after 10–15 min incubation, very thin and inconspicuous, smooth; epispore smooth.

Asexual morph on the natural substrate (Plate 6) present in places at margins of mature stromata as fawn (87, oac645) loose tufts of conidiophores. Conidiophores 4–4.5 μm wide, pale brown, roughened, with nodulisporium-like to periconiella-like branching pattern. Conidiogenous cells pale brown to hyaline, roughened, 11–19 × 2.5–4.5 μm; conidia ellipsoid, hyaline, 5.5–6.5 × 3.5–4.5 μm, smooth.

Specimen examined: FRENCH WEST INDIES: MARTINIQUE: Case-Pilote, Morne Rose, mesophilic rainforest, dead corticated branch, 8 Aug. 2013, *leg.* J. Fournier, MJF 13078 (LIP).

Known distribution: Martinique.

Discussion: Owing to its rust-coloured stromata with orange red pigments in 10% KOH and dark brown equilateral ascospores with a mostly indehiscent perispore averaging over 10 μm long, this collection conforms to *H. cinnabarinum* as circumscribed by JU & ROGERS (1996). A collection from Brazil (BPI 11328) cited by these authors, appeared similar in most respects except for significantly larger ascospores averaging 14.8 × 7.4 μm (FOURNIER & LECHAT, 2015b). On the other hand the protologue of *H. cinnabarinum* (HENNING, 1897)

reports subglobose perithecia and ascospores 8–10 × 4–5 μm, while JU & ROGERS (1996) reported tubular to long tubular perithecia and ascospores 9.5–14 × 5–7.5 μm. Long tubular perithecia associated with thick stromata and ascospores in this size range are well represented by the specimens of *H. cf. cinnabarinum* sp. 1 dealt with in this paper and in FOURNIER & LECHAT (2015b). It should be noted that in all the collections examined ascospores are highly variable in shape and dimensions, which makes these criteria of limited differential value. The segregation of subtaxa within *H. cinnabarinum* as currently conceived should involve further cultural, molecular and chemotaxonomic differential characters to support the morphological differences suspected to be significant. In the meantime it seems more appropriate to keep the current broad concept of *H. cinnabarinum*.

Hypoxyton cypraeisporum J. Fourn. & Lechat, *Ascomycete.org*, 7 (1): 2 (2015). Plate 7

Stromata perithecioid, superficial, separate to coalescent, globose, 0.6–0.85 mm diam; surface dull black, finely roughened, ridged when overmature, consisting of a thin blackish layer of waxy granules that appear dull orange brown when observed in water, yielding vinaceous purple (101, oac440) pigments in KOH, not changing colour after prolonged incubation; subsurface black, carbonaceous, brittle, ca. 40 μm thick. **Perithecia** spherical, 0.5–0.6 mm diam. **Ostioles** finely papillate, opening slightly higher than the stromatal surface or obscurely umbilicate, at the centre of a smooth darker halo or in a shallow greyish discoid area 150–200 μm diam, surrounded by a low, ill-defined rim.

Asci cylindrical, with eight obliquely uniseriate ascospores, 140–190 μm total length, the spore-bearing parts 95–127 × 10.5–12 μm, the stipes 35–70 μm long, with apical apparatus flattened slightly wedge-shaped, 1.8–2.2 × 3.5–4.5 μm, bluing in Melzer's reagent. **Ascospores** (15.0–) 15.9–17.6 (–17.8) × (6.9–) 7.6–8.5 (–8.6) μm, Q = (1.8–) 1.9–2.2 (–2.3); N = 60 (Me = 16.5 × 8.3 μm; Qe = 2.1), ellipsoid nearly equilateral with narrowly rounded to acute ends, frequently amygdaliform or citriform, blackish brown, with a germ slit spore-length exhibiting a zigzag pattern turning sinuous in fully mature darker brown ascospores; perispore dehiscent in 10% KOH, very thin, smooth; epispore turning blackish olivaceous in 10% KOH, conspicuously areolate with evenly distributed paler rounded pits ca. 2.5 μm diam that gradually become less conspicuous as ascospores ripen and turn darker.

Asexual morph on the natural substrate not seen.

Specimens examined: FRENCH WEST INDIES: GUADELOUPE: *sine loco*, on a corticated twig, associated with *Xylaria boergesenii* (Ferd. & Winge) Cannon, Aug. 2004, *leg.* C. Lechat, CLL 2239 (LIP); Sainte-Rose, Trace de Sofaïa, path to Saut des Trois Cornes, rainforest, corticated branch, Nov. 2005, *leg.* C. Lechat, CLL 5425 (Holotype, LIP); Sainte-Rose, Rivière Janikeste, on bark, associated with *Xylaria boergesenii*, 15 Aug. 2008, *leg.* C. Lechat, CLL 8227 (LIP).

Known distribution: Guadeloupe.

Discussion: *Hypoxyton cypraeisporum* is mostly distinctive by its ascospores with conspicuously pitted epispore resembling those encountered in the sordariaceous genus *Gelasinospora* Dowd. (LUNDQVIST, 1972). In the genus *Hypoxyton*, ascospores with pitted perispore are only encountered in *H. rubellum* Penz. & Sacc. (ROGERS *et al.*, 1987; JU & ROGERS, 1996), a monocot-inhabiting species with reddish brown glomerate stromata and orange KOH-extractable pigments. The ascospores of *H. rubellum* have roughly the same shape and size range as those of *H. cypraeisporum* but they differ in having shallow irregular pits that are not circular and rather give a hammered appearance, they have a straight germ slit vs. zigzagging in *H. cypraeisporum* and their perispore is not dehiscent in 10% KOH. The two other species of *Hypoxyton* known to feature ascospores with ornamented epispore are *H. californicum* Ellis & Everh. (JU & RO-

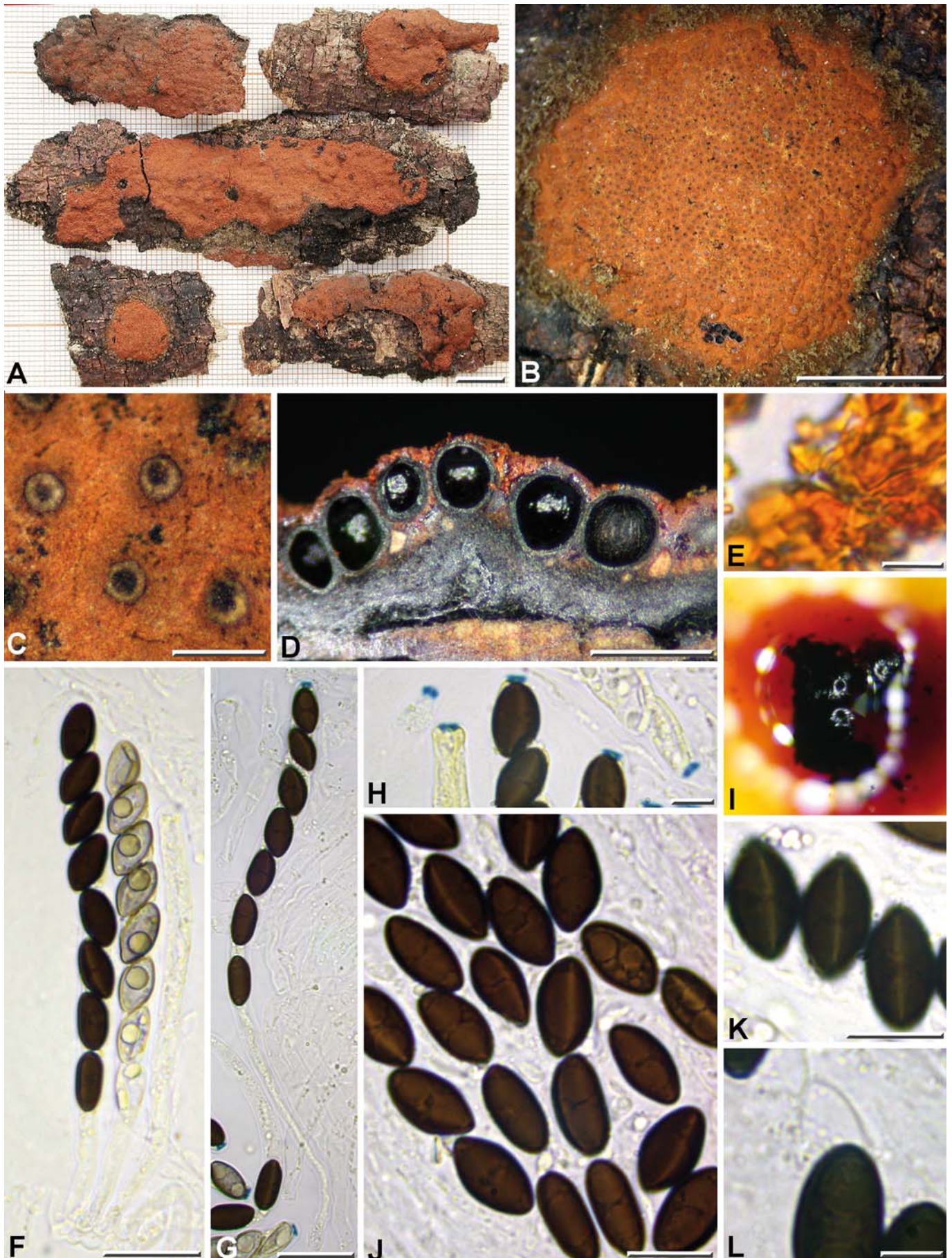


Plate 5 — *Hypoxylon* cf. *H. cinnabarinum* sp. 2

MJF 13078. A, B: Stromata in surface view; C: Stromatal surface in close-up showing the ostioles; D: Stroma in vertical section showing the perithecia, the subsurface orange red granules and the black subperithecial tissue; E: Stromatal granules observed in water; F: Short-stipitate mature and immature asci arising from an ascogenous hypha, in 1% SDS; G: Long-stipitate ascus in Melzer's reagent; H: Ascinal apical apparatus in Melzer's reagent; I: KOH-extractable pigments (1 min incubation); J: Various shaped ascospores, in water; K: Ascospores showing the germ slits, in 10% KOH; L: Ascospore with a thin perispore dehiscence in 10% KOH. Scale bars: A = 10 mm; B = 5 mm; C = 0.2 mm; D = 0.5 mm; E, J, K = 10 μ m; F, G = 20 μ m; H, L = 5 μ m.

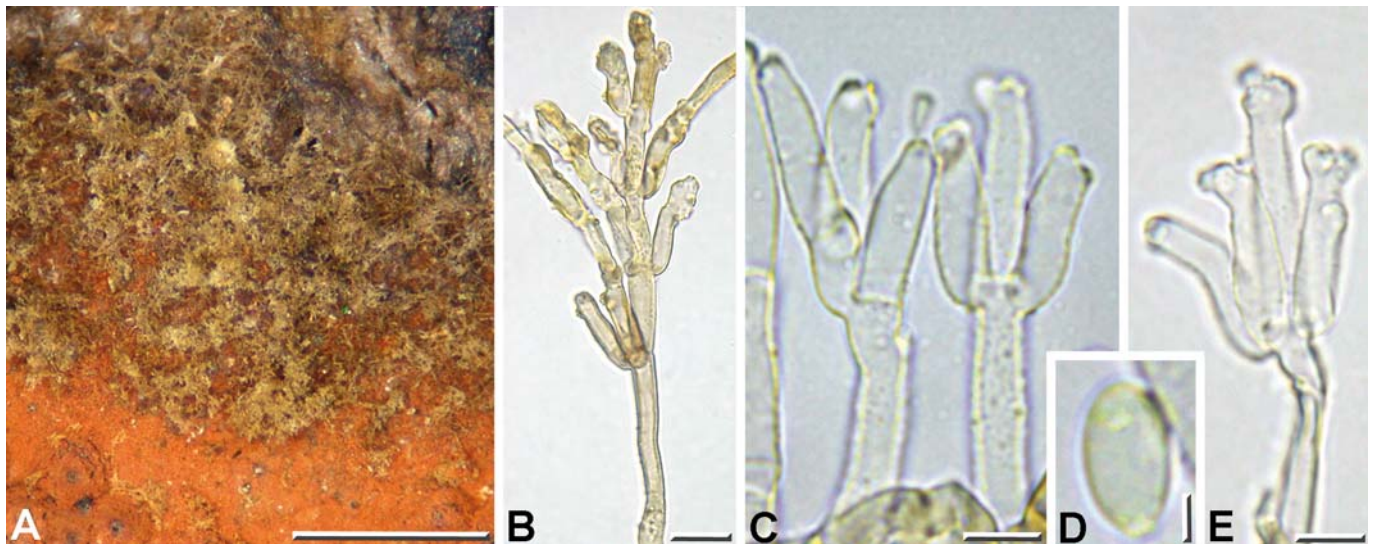


Plate 6 — *Hypoxylon* cf. *H. cinnabarinum* sp. 2 asexual morph

MJF 13078. A: Tufts of conidiophores at the margin of a mature stroma; B: Tip of a pigmented conidiophore in 1% SDS; C: Nodulisporium-like conidiogenous structure in 1% SDS; D: Conidium; E: Periconiella-like conidiogenous structure in 1% SDS. Scale bars: A = 1 mm; B = 10 μ m; C, E = 5 μ m; D = 2 μ m.

gers, 1996), *H. rectangulosporum* Y.-M. Ju, J.D. Rogers & Samuels (Rogers *et al.*, 1992; Fournier & Lechat, 2015b) and *H. rhombisporum* J. Fourn. & Lechat (Fournier & Lechat, 2015b). They differ from *H. cypraeisporum* in featuring pulvinate to effused-pulvinate stromata and differ as to the ornamentation in having respectively a striated episporium for the former and a longitudinally ridged episporium for the latter two. *Hypoxylon californicum* also differs in having amber stromatal pigments and fusoid ascospores 17–20.5 \times 6.5–7.5 μ m while *H. rectangulosporum* and *H. rhombisporum* have pale ochreous stromatal pigments and respectively rectangular to doliiform ascospores 5–7 \times 2.5–3.5 μ m and rectangular to rhomboid ascospores 6.3–7.4 \times 3.2–3.8 μ m.

The zigzag pattern of the germ slit observed on the ascospores of *H. cypraeisporum* is likewise a unique character in *Hypoxylon*. It is remarkable in featuring regular intervals in relation with the constant diameter of the pits and in turning rather sinuous when the diameter of the pits decreases as ascospores ripen.

It is noteworthy that the three collections of *H. cypraeisporum* come from Guadeloupe while it has not been found in Martinique, despite more field work has been carried out in the latter island.

Hypoxylon* cf. *H. dieckmannii Theiss., *Ann. Mycol.*, 6: 346 (1908). Plate 8

Stromata irregularly effused-pulvinate with most often inconspicuous perithecial contours, 10–33 mm long \times 6–20 mm wide \times 0.4–0.6 mm thick; surface dark brick (60, oac635) pruinose; subsurface dark brown, consisting of a thin layer of waxy granules that appear yellowish and dull orange brown in water, seated on a layer of carbonaceous tissue, yielding greenish grey (110, oac141) KOH-extractable pigments turning dilute greyish sepia (106, oac648) after a prolonged incubation over 20 min; interperithecial tissue shiny black, carbonaceous, subperithecial tissue woody, black, 0.1–0.3 mm thick, often ill-differentiated from the blackened underlying wood. **Perithecia** spherical to obovoid, 0.25–0.3 \times 0.2–0.25 mm. **Ostioles** umbilicate, at times surrounded by a narrow disc of white powdery substance ca. 40 μ m diam.

Asci cylindrical with (6–)8 obliquely uniseriate ascospores, 90–110 μ m total length, the spore-bearing parts 48–54 \times 6–6.5 μ m, the stipes 40–62 μ m long, originating in spicate arrangement from short contorted ascogenous hyphae, with a discoid to wedge-shaped apical apparatus 0.5–0.8 \times 1.5–1.8 μ m, bluing in Melzer's reagent. **Paraphyses** sparse, filiform. **Ascospores** (5.8–) 6.9–8.1 (–8.6) \times (3–)

3.3–3.8 (–4.1) μ m, Q = (1.5–) 1.9–2.4 (–2.8); N = 60 (Me = 7.5 \times 3.6 μ m; Qe = 2.1), ellipsoid-equilateral with broadly rounded ends, medium brown, with a straight germ slit slightly less than spore-length to almost spore-length; perispore indehiscent in 10% KOH; episporium smooth.

Asexual morph on the natural substrate not seen. Asexual morph of *H. dieckmannii* sporothrix-like in a culture on OA from material collected in Mexico (Ju & Rogers, 1996).

Specimen examined: FRENCH WEST INDIES: MARTINIQUE: Schoelcher, Duclos River up to Fontaine Didier, hygrophilic rainforest, dead corticated wood, partly colonized by *Immotthia atrogana* (Cooke & Ellis) M.E. Barr, 4 Dec. 2005, leg. C. Lechat, CLL 5531 (LIP).

Known distribution: Martinique.

Discussion: This collection was referred to *H. dieckmannii* by Dr. Yu-Ming Ju (pers. comm., 2006) and further sequencing of ITS revealed high similarity with a collection from Taiwan (HAST 90112602) and a recent collection from French Guiana (CLL 5531, Fournier & Lechat, 2015b). While the collection from French Guiana only deviates from that from Martinique by a more yellowish brown stromatal surface and yellow brown KOH-extractable pigments, the collection from Taiwan kindly communicated by Dr. Yu-Ming Ju deviates more strongly in having a greyish sepia (106, oac641) stromatal surface, orange brown stromatal granules yielding dilute violaceous grey (113, oac401) pigments in 10% KOH, in lacking carbonaceous tissue around the perithecia and in having larger ascospores averaging 8.9 \times 3.9 μ m.

As pointed out by Fournier & Lechat (2015b) the status of *H. dieckmannii* as currently conceived appears questionable and would require further information, thus we refer our collection from Martinique, like that from French Guiana, to *H. dieckmannii* with reservations.

Hypoxylon* cf. *H. duranii J.D. Rogers, *Mycotaxon*, 23: 429 (1985). Plate 9

Stromata effused-pulvinate, with inconspicuous to exposed perithecial contours, 0.5–35 mm long \times 0.4–20 mm wide \times 0.9–1.2 mm thick, confluent into bumpy, irregular compound stromata over several cm long, margin often sloping and lined by a sterile pruinose tissue; surface sepia (63, oac636) to brown vinaceous (84, oac523), pruinose, shiny black on top of exposed perithecial contours where the pruina is worn off; pale reddish brown granules forming a thick

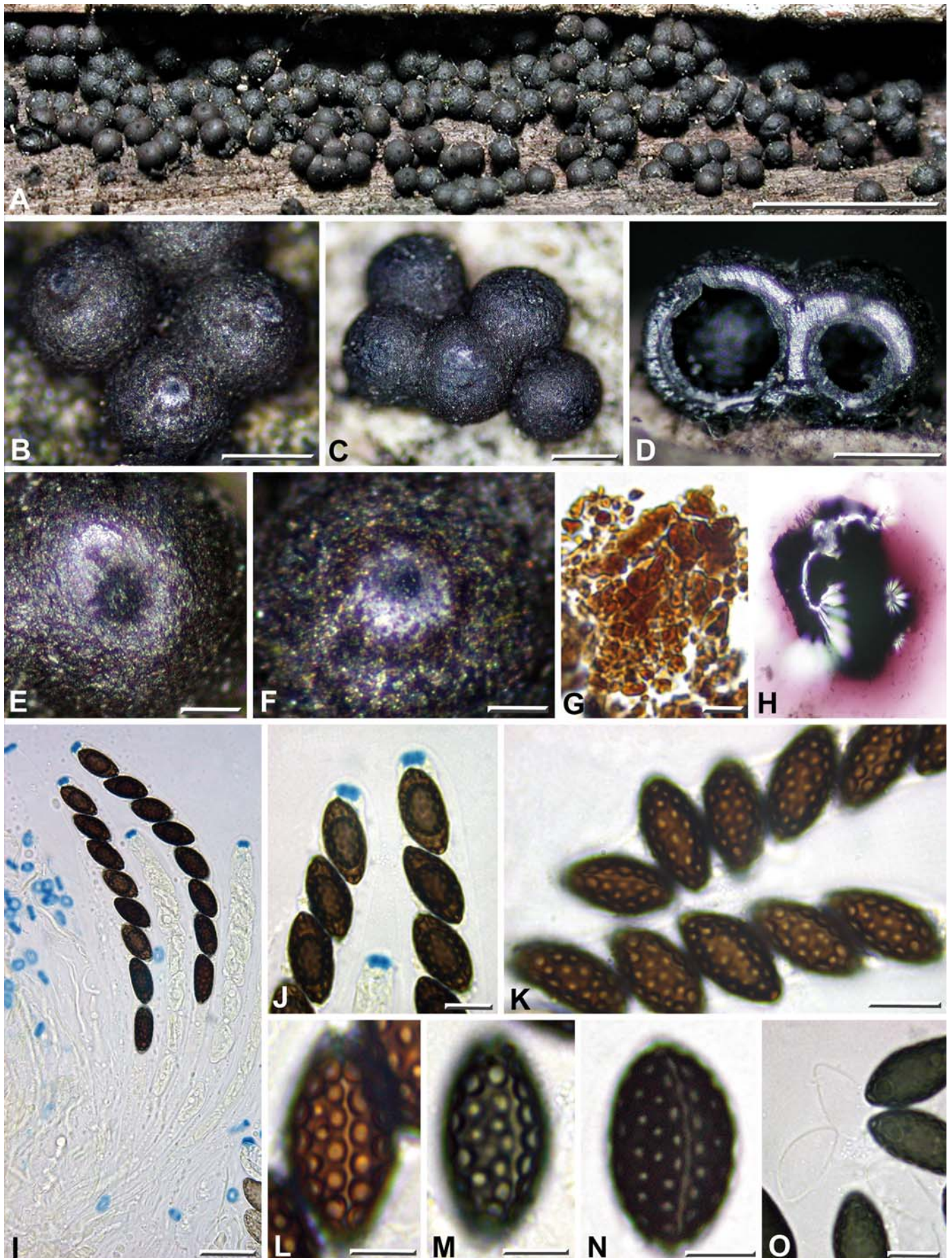


Plate 7 — *Hypoxylon cypraeisporum*

A, C-E, G-O: Holotype CLL 5425; B, F: Paratype CLL 8227. A-C: Mature stromata; D: Two adjacent mature stromata in vertical section; E, F: Ostiolar area in close-up; G: Stromatal waxy granules in water; H: Purple pigments released in 10% KOH after 1 min incubation; I: Asci in Melzer's reagent showing the stipes and apical apparatus; J: Ascinal apical apparatus in Melzer's reagent; K, L, N: Ascospores in water showing pitted episporium and germ slit; M: Ascospore changing colour in 10% KOH; O: Ascospores with dehiscent perispores in 10% KOH. Scale bars: A = 5 mm; B-D = 0,5 mm; E, F = 100 µm; G = 10 µm; I = 20 µm; J, K, S = 10 µm; L-N = 5 µm.

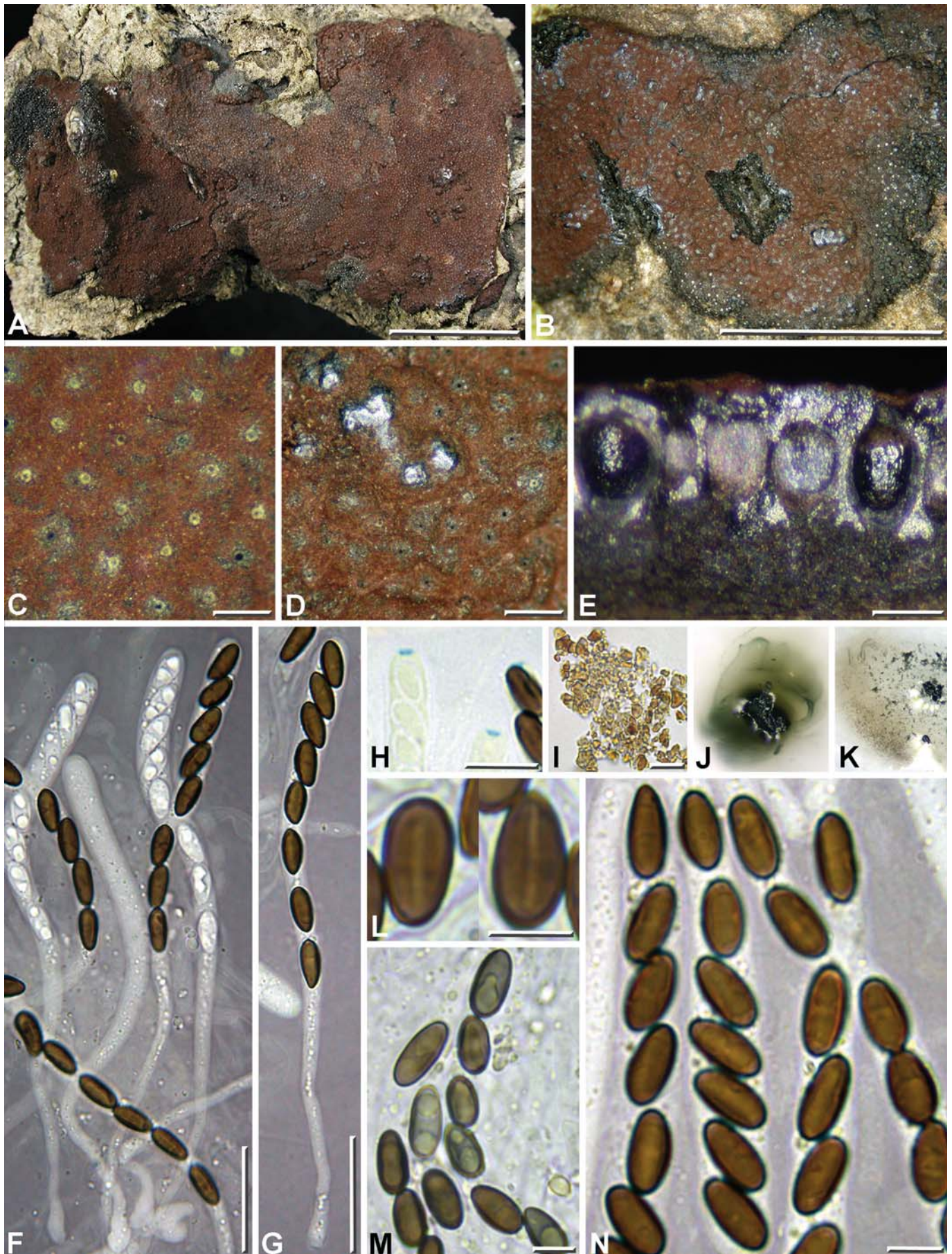


Plate 8 — *Hypoxylon* cf. *H. dieckmannii*

CLL 5531. A, B: Stromata effused on bark; C, D: Close-up on stromatal surface showing the ostioles and the variously exposed perithecial contours; E: Stroma in vertical section showing the perithecia encased in carbonaceous tissue; F, G: Mature and immature asci in black Pelikan ink; H: Ascular apparatus in Melzer's reagent; I: Waxy stromatal granules in water; J, K: KOH-extractable pigments, respectively after 1 min and 20 min incubation; L: Ascospores germ slits, in PVA-lactophenol; M: Ascospores in 10% KOH showing the absence of dehiscent perispores; N: Ascospores in black Pelikan ink. Scale bars: A = 10 mm; B = 5 mm; C-E = 0.2 mm; F, G = 20 μ m; H, I = 10 μ m; L-N = 5 μ m.

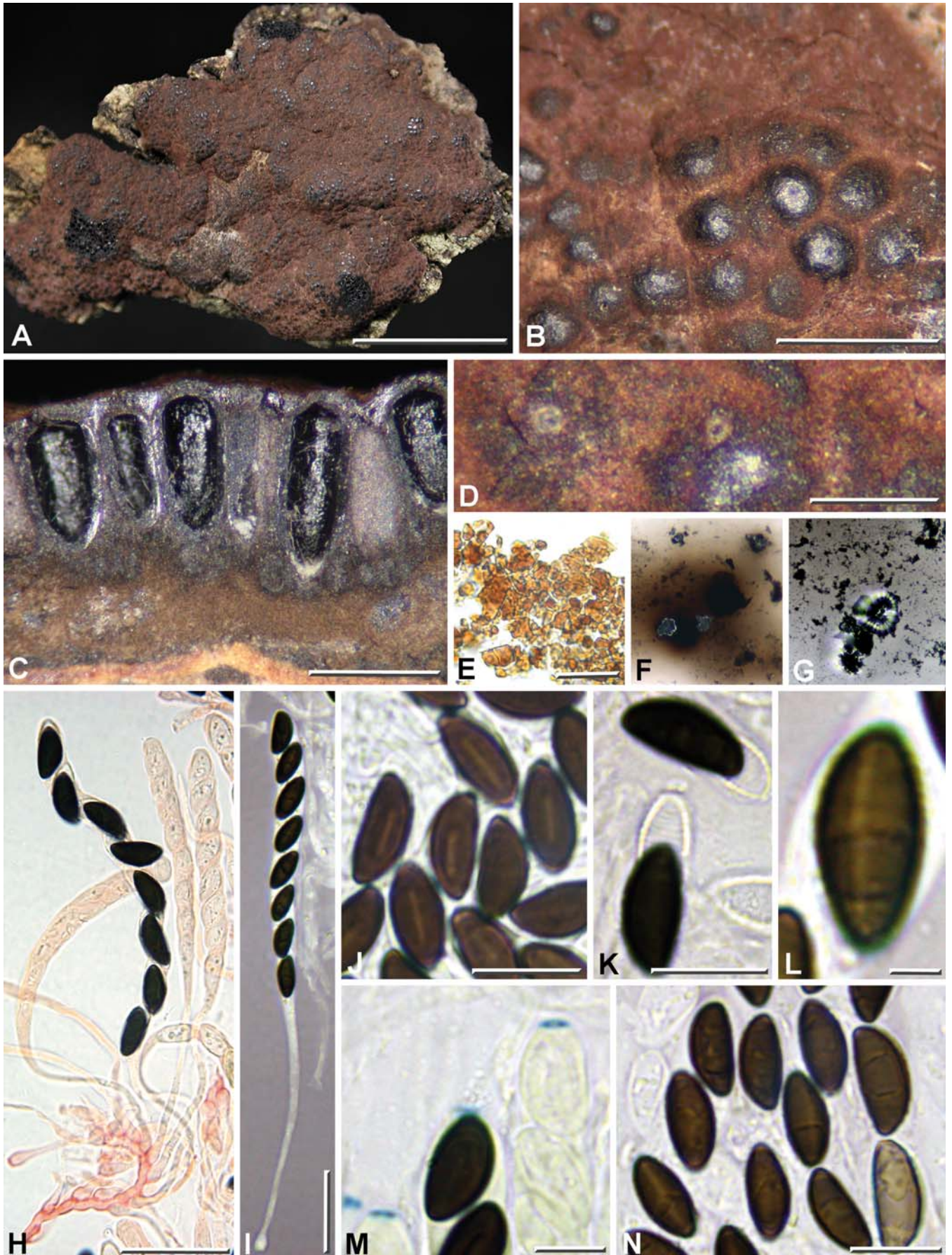


Plate 9 — *Hypoxylon* cf. *H. duranii*

CLL 0703. A: Confluent stromata on bark; B: Stromatal surface showing the perithecial contours and the effused margin; C: Stroma in vertical section showing the perithecia and the brown subperithecial tissue; D: Close-up on stromatal surface showing two ostioles; E: Stromatal waxy granules observed in water; F, G: KOH-extractable pigments, respectively after 1 min and 20 min incubation; H: Mature and immature asci arising from a long ascogenous hypha, in Congo red and 10% KOH; I: Mature ascus in black Pelikan ink; J: Ascospores in PVA-lactophenol showing the short germ slits; K: Ascospores in 10% KOH showing a striated dehiscence perispore; L, N: Ascospores in water, showing the long germ slits; M: Ascical apical apparatus in Melzer's reagent. Scale bars: A = 10 mm; B = 1 mm; C = 0.5 mm; D = 0.2 mm; E, J, K, N = 10 μ m; H, I = 20 μ m; M = 5 μ m; L = 2 μ m.

waxy layer above perithecia, with sepia (63, oac636) KOH-extractable pigments, turning mouse grey (118, oac903) after 20 min incubation; subperithecial tissue 0.4–0.5 mm thick, blackish just beneath the perithecial layer, brown below. **Perithecia** tubular to long-tubular, 0.5–0.75 × 0.2–0.25 mm. **Ostioles** umbilicate, inconspicuous, at times fringed with white material.

Asci cylindrical, with eight obliquely uniseriate ascospores, originating from long ascogenous hyphae, 120–145 µm total length, the spore-bearing parts 65–72 × 5.5–6.5 µm, the stipes 60–82 µm long, with a discoid apical apparatus 0.5–0.7 × 2.2–2.5 µm bluing in Melzer's reagent. **Paraphyses** filiform, abundant, embedded in mucilage. **Ascospores** (9–) 9.4–10.5 (–11.1) × (3.9–) 4.1–4.6 (–4.8) µm, Q = (2–) 2.1–2.4 (–2.6); N = 60 (Me = 10 × 4.3 µm; Qe = 2.3), ellipsoid-inequilateral with narrowly rounded ends, dark brown, with a straight germ slit spore-length on the most convex side, at times much shorter ca. ½ spore-length; perispore dehiscent in 10% KOH, faintly to conspicuously striated; epispore smooth.

Asexual morph on the natural substrate not seen.

Known distribution: Martinique.

Specimen examined: FRENCH WEST INDIES: MARTINIQUE: Prêcheur, Anse Lévrier, coastal mesophilic forest, on dead corticated wood, Sept. 2003, *leg.* C. Lechat, CLL0703 (LIP).

Discussion: This *Hypoxylon* is strongly reminiscent of *H. duranii* J.D. Rogers owing to its brown effused-pulvinate stromata with dark brown KOH-extractable pigments and ellipsoid-inequilateral dark brown ascospores with narrowly rounded ends and a conspicuously striated perispore dehiscent in 10% KOH. Examination of the holotype of *H. duranii* was carried out for comparison with the new taxon *H. paracouense* J. Fourn. & Lechat (FOURNIER & LECHAT, 2015b), which confirmed that the stromatal granules and the KOH-extractable pigments of the specimen CLL 0703 and *H. duranii* are very similar. However the specimen CLL 0703 differs from the holotype of *H. duranii* in having thicker stromata with tubular to long tubular perithecia and smaller ascospores 9.4–10.5 × 4.1–4.6 µm vs. 10.5–12.3 × 4.9–5.8 µm that barely overlap and at times have a short germ slit. The presence of mixed ascospores with long and short germ slits is most unusual and troublesome and suggests this collection might be atypical. We therefore refer it to *H. duranii* with reservations until more material is collected and chemotaxonomic and cultural data help assess its status.

According to Ju & Rogers' concepts, *H. anthochroum* should be considered too since it is said to differ mainly from *H. duranii* by less ornamented perispore and larger conidia (Ju & ROGERS, 1996). However, examination of the isolectotype of *H. anthochroum* (NY) (unpublished data) showed that it differs from *H. duranii* and CLL 0703 by greenish grey (110, oac85) KOH-extractable pigments and more crescentic ascospores 10–12 × 5–5.5 µm.

Material referable to *H. anthochroum*, which is regarded as pan-tropical, was not collected in Guadeloupe or Martinique during this survey.

Hypoxylon dussii J. Fourn. & Lechat *sp. nov.* — MycoBank MB 813521. Plate 10

Diagnosis: Differs from the most resembling species *Hypoxylon investiens* by olivaceous KOH-extractable pigments vs. greenish grey or dull green, less carbonaceous stromata and larger and more broadly ellipsoid reddish brown ascospores 9–10 × 4.2–4.8 vs. 7–8 × 3.3–4.1 µm.

Holotype: FRENCH WEST INDIES: GUADELOUPE: Sainte-Rose, Sofaïa, path to Saut des Trois Cornes, mesophilic rainforest, dead corticated branch, Nov. 2005, *leg.* C. Lechat, CLL 5439 (LIP).

Etymology: After R.P.A. Duss (1840–1924), for his botanical and mycological studies in Guadeloupe and Martinique.

Stromata effused-pulvinate, orbicular to elongate, confluent, 5–48 mm long × 3–26 mm wide × 0.7–0.85 mm thick, with abrupt margins; surface dark purple (36, dark oac446) to dark vinaceous (82, oac523), pruinose, with slightly exposed perithecial contours; perithecia encased on top and at sides by a brittle crust that appears shiny black in section, subsurface and perithecial sides carbonaceous, interspersed with dull orange brown granules, carbonaceous tissue gradually replaced by waxy granules towards the base, with KOH-extractable pigments greenish-olivaceous (90, oac860), not notably changing upon prolonged incubation; the tissue below the perithecial layer dark greyish brown, 100–210 µm thick, fibrous. **Perithecia** obovoid to long tubular, 0.6–0.7 × 0.3–0.45 mm, subglobose 0.6 mm diam at periphery. **Ostioles** umbilicate.

Asci cylindrical, originating from long ascogenous hyphae in unilateral spicate arrangement, with eight obliquely uniseriate ascospores, 110–135 µm total length, the spore-bearing parts 72–81 × 6–7 µm, the stipes 35–50 (–60) µm long, with a discoid apical apparatus 1.8–2 × 2.5–2.8 µm bluing in Melzer's reagent. **Paraphyses** filiform, abundant. **Ascospores** (8.9–) 9.1–10.1 (–10.5) × (3.9–) 4.2–4.8 (–5.0) µm, Q = (1.8–) 2.0–2.4 (–2.6); N = 110 (Me = 9.6 × 4.5 µm; Qe = 2.2), ellipsoid-equilateral with broadly rounded ends, reddish brown, with a conspicuous straight germ slit spore-length or slightly less; perispore indehiscent in 10% KOH; epispore smooth, olivaceous brown in KOH.

Asexual morph on the natural substrate not seen.

Other specimen examined: FRENCH WEST INDIES: GUADELOUPE: Sainte-Rose, Sofaïa, path to Saut des Trois Cornes, mesophilic forest, dead corticated branch, Nov. 2005, *leg.* C. Lechat, CLL 5433 (LIP).

Known distribution: Guadeloupe.

Discussion: *Hypoxylon dussii* is externally similar to *H. investiens* but a first difference was noticed in the field: it grows on bark of a dead branch while, in our experience, *H. investiens* occurs almost exclusively on dead blackened wood, usually in contact with the soil. A closer examination revealed further morphological differences. The KOH-extractable pigments appear more olivaceous than green as in *H. investiens* and preliminary HPLC results showed that *H. dussii* lacks Daldinone A, the typical chemotaxonomic marker of *H. investiens* but instead features unknown derivatives of BNT absent in *H. investiens* (STADLER, unpublished data, pers. comm. 2006). In both *H. investiens* and *H. dussii* the perithecia are encased in a brittle, shiny black crust except at base. While in the former the crust is entirely carbonaceous, in the latter the carbonaceous tissue present above the perithecia is gradually replaced downwards by dark orange brown waxy granules mixed with carbonaceous rods and the compacted waxy granules surround the base of perithecia where carbonaceous tissue is absent. This configuration appears unique in the genus *Hypoxylon* where the presence of carbonaceous tissue in the stromata occurs rarely. Finally, *H. dussii* consistently differs from typical *H. investiens* in having slightly larger but also differently shaped ascospores, i. e. broadly ellipsoid vs. narrowly ellipsoid to oblong. *Hypoxylon dussii* is primarily distinguished from *H. pulicicidum* based on the presence of a brittle crust around the perithecia and larger and more broadly ellipsoid ascospores (BILLS *et al.*, 2012; this paper).

HLADKI & ROMERO (2009) described *H. investiens* var. *magnisporum* Hladki & A.I. Romero for a *Hypoxylon* from Argentina, resembling *H. investiens* but deviating in ascospores 9–11 × 4–5 µm. Based on its original description, this *Hypoxylon* deviates from typical *H. investiens* by larger but also differently shaped ascospores and more olivaceous KOH-extractable pigments, which should have warranted, in our opinion, the creation of a new species instead of a variety. As the olivaceous KOH-extractable pigments and the ascospores shape and dimensions fit well what we recorded in *H. dussii*, a case can be made that they are conspecific. However, they appear to differ in their internal stromatal anatomy. While *H. dussii* has a carbonaceous crust just beneath surface, gradually mixed with orange

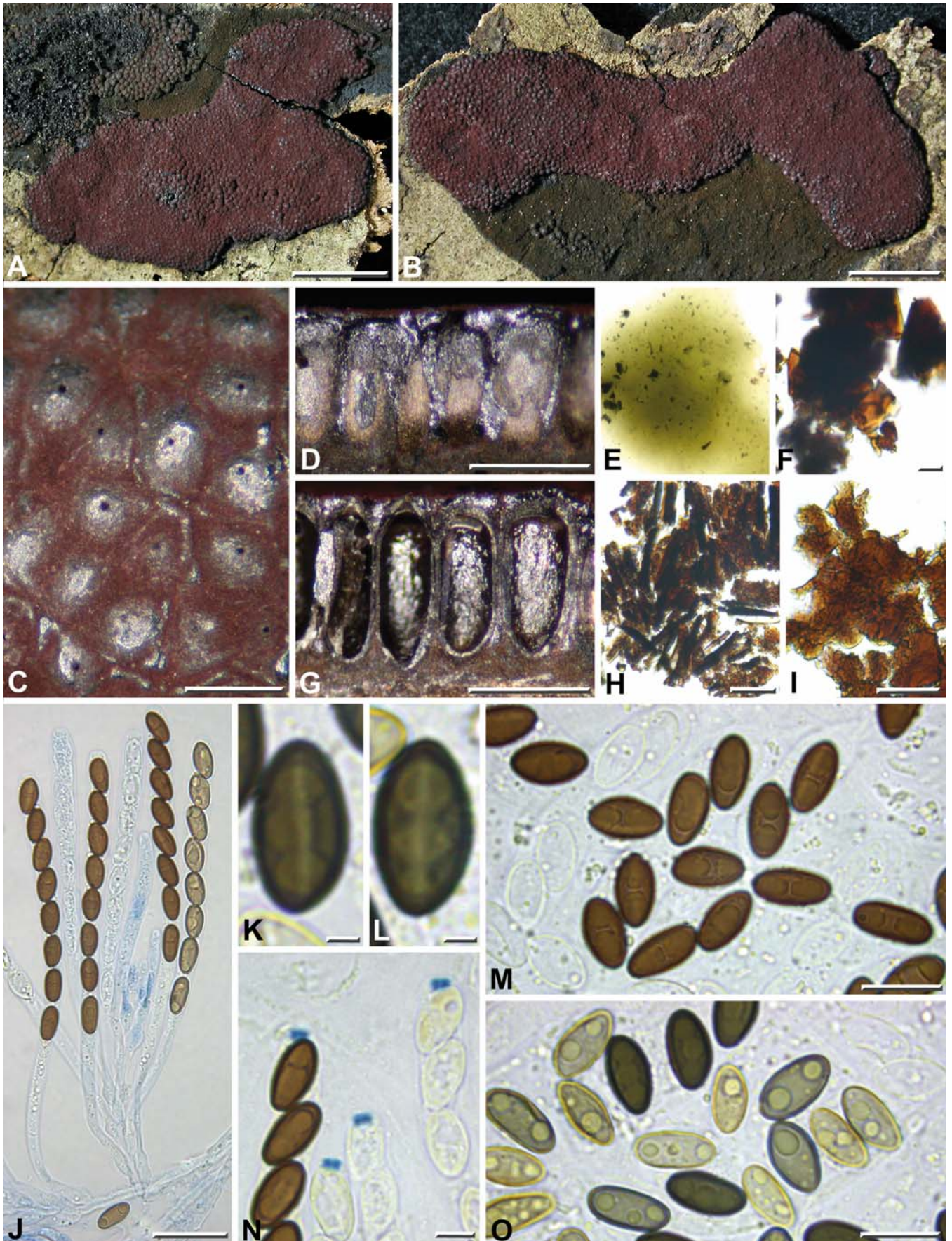


Plate 10 — *Hypoxylon dussii*

Holotype CLL 5439. A, B: Effused stromata in surface view; C: Stromatal surface in close-up showing the perithecial contours and the ostioles; D: Stroma in vertical section (broken) showing the perithecia encased in a shiny black crust; E: KOH-extractable pigments after 1 min incubation; F: Waxy granules and carbonaceous tissue from subsurface, in water; G: Stroma in vertical section showing the tubular perithecia; H: Waxy granules mixed with carbonaceous rods from lateral crust, in water; I: Waxy granules from the crust lining the perithecial base, in water; J: Asci originating from a long ascogenous hypha, in blue Waterman ink diluted in 1% SDS; K, L: Ascospores in 10% KOH, showing the germ slit; M: Ascospores in water; N: Ascospores showing the apical apparatus in Melzer's reagent; O: Immature and mature ascospores in 10% KOH showing the absence of dehiscent perispores. Scale bars: A, B = 5 mm; C, D, G = 0.5 mm; E, F, M, O = 10 µm; H, I, J = 20 µm; K, L = 2 µm; N = 5 µm.

brown waxy granules at sides of perithecia that entirely replace the carbonaceous tissue at the base of perithecia and a dark greyish brown fibrous basal tissue, *H. investiens* var. *magnisporum* is said to have the subsurface composed of black granules and the subperithecial tissue black and waxy (HLADKI & ROMERO, 2009). As the internal stromatal anatomy involving the distribution of carbonaceous tissue and waxy granules around the perithecia appears to be one of the most reliable morphological character to discriminate *H. investiens* from its relatives, we tentatively regard *H. dussii* as different from *H. investiens* var. *magnisporum* until the latter is reexamined as to its internal anatomy and more material of both species becomes available for comparison.

Hypoxylon erythrostroma J.H. Mill., *Mycologia*, 25: 323 (1933). Plate 11

Stromata effused to effused-pulvinate, suborbicular, 3–9 mm diam × 0.4–0.7 (–1) mm thick, separate or confluent into elongate or lobed stromata up to 24 mm long × 6 mm wide, with inconspicuous to conspicuous perithecial contours; surface greyish sepia (106, oac640) to fawn (87, oac645), pruinose, often slightly wrinkled; waxy granules forming a thick reddish orange layer above perithecia and extending towards the base, appearing orange yellow in water, with orange (7, oac629) KOH-extractable pigments, becoming sienna (8, oac630) after 30 min incubation; subperithecial tissue blackish, inconspicuous to 0.5 mm thick. **Perithecia** spherical 0.3–0.4 mm diam to obovoid or tubular, 0.35–0.45 × 0.2–0.4 mm. **Ostioles** umbilicate to faintly papillate or raised-discoid, black.

Asci cylindrical, with eight obliquely uniseriate ascospores, 90–165 µm total length, the spore-bearing parts 59–71 × 5.5–6.5 µm, the stipes 35–100 µm long, arising in spicate arrangement from long ascogenous hyphae, with a discoid apical apparatus 0.4–0.5 × 1.5–2 µm, bluing in Melzer's reagent. The apical apparatus is very inconspicuous in mature asci. **Ascospores** (7.1–) 7.5–8.5 (–8.8) × (3.1–) 3.2–3.8 (–4.1) µm, Q = (1.9–) 2.1–2.6 (–2.8); N = 120 (Me = 7.9 × 3.5 µm; Qe = 2.3), ellipsoid-inequilateral with narrowly rounded ends to fusoid, at times somewhat crescentic, brown, with a faint sigmoid germ slit spore-length on the most convex side; perispore dehiscent in 10% KOH, conspicuously striated; epispore smooth.

Asexual morph on the natural substrate not seen.

Specimens examined: FRENCH WEST INDIES: GUADELOUPE: Sainte-Rose, Sofaïa, on bark and decorticated wood, Nov. 2005, leg. C. Lechat, CLL5449 (LIP); Vieux-Fort, Ravine Blondeau, on corticated branchlet, 12 Aug. 2010, leg. C. Lechat, CLL GUAD 013 (LIP). MARTINIQUE: Saint-Joseph, Forêt Coeur Bouliki, hygrophilic rainforest, on corticated branch, associated with stromata of *H. monticulosum* and *Annulohypoxylon stygium*, 26 Aug. 2007, leg. J. Fournier, MJF 07110 (LIP); Prêchur, Anse Couleuvre, coastal rainforest, on dead wood, 1 Sept. 2007, leg. J. Fournier, MJF 07250 (LIP); Fort-de-France, Absalon, trail to Plateau Michel, hygrophilic rainforest, on corticated branch, 15 Aug. 2013, leg. J. Fournier, MJF 13235 (LIP).

Known distribution: Pantropical.

Discussion: *Hypoxylon erythrostroma* is a widespread pantropical species, but easily overlooked because of its small, dull-coloured stromata. It is distinctive in having a bright orange red waxy layer beneath surface, yielding orange red pigments in KOH and microscopically, its small ascospores with narrowly rounded ends, sigmoid germ slit and conspicuously striated dehiscent perispore make a typical combination of characters.

Based on personal observations in West Indies, *H. erythrostroma* is frequently found in good condition on recently fallen dead branches, often associated with *H. monticulosum* and *Annulohypoxylon stygium*, which strongly suggests that these species preferably occur in the canopy. When found in terrestrial situation, the stromata of *H. erythrostroma* are frequently parasitized by *Immotthia atrograna* (Cooke & Ellis) Barr.

Hypoxylon fendleri Berk. ex Cooke, *Grevillea*, 11: 132 (1883). Plate 12

Stromata effused-pulvinate, elongate-ellipsoid, at times confluent, 20–67 mm long × 5–18 mm wide × 0.6–0.7 mm thick, plane, with perithecial contours not or slightly exposed, margin steep or sloping; stromatal surface dark vinaceous (82, oac523), pruinose, rust (39, oac643) when the outermost layer of pruina is worn off; bright orange waxy granules beneath the surface and between the perithecia, appearing yellow when observed in water, with KOH-extractable pigments sienna (8, oac630) within 1 min incubation, slightly fading after 30 min incubation; subperithecial tissue greyish brown, 0.1–0.2 mm thick. **Perithecia** obovoid, 0.5–0.6 × 0.3–0.4 mm, subglobose at periphery. **Ostioles** umbilicate, inconspicuous.

Asci cylindrical, with eight obliquely uniseriate ascospores, 110–155 µm total length, the spore-bearing parts 76–82 × 6.5–7.5 µm, the stipes 35–76 µm long, originating from long ascogenous hyphae in spicate arrangement, with apical apparatus discoid, slightly cuneate, 0.8–1 × 2–2.5 µm, bluing in Melzer's reagent. **Paraphyses** filiform, 2.5–4 µm wide, copious, slightly embedded in mucilage. **Ascospores** (8.7–) 9.3–10.4 (–11.2) × (4–) 4.1–4.9 (–5) µm, Q = (1.9–) 2–2.4 (–2.6); N = 120 (Me = 9.8 × 4.5 µm; Qe = 2.2), ellipsoid-inequilateral with narrowly rounded ends, brown to dark brown, smooth, with a faintly sigmoid germ slit spore-length; perispore dehiscent in 10% KOH, faintly striated, epispore smooth.

Asexual morph on the natural substrate not seen. Asexual morph in culture on OA nodulisporium-like, based on material from Mexico and Taiwan (JU & ROGERS, 1996).

Specimens examined: FRENCH WEST INDIES: GUADELOUPE: Saint-Louis de Marie-Galante, Saint-Louis River, dead decorticated wood, 10 Jan. 1991, leg. J. Vivant, communicated by F. Candoussau, JF 98108; *ibid.*, Les Sources, on dead decorticated wood, 2 Dec. 2005, leg. C. Lechat, CLL 5503 (LIP).

Known distribution: Pantropical.

Discussion: *Hypoxylon fendleri* is distinctive in having a dark vinaceous stromatal surface with an orange brown tone and ascospores averaging 10 × 4.5 µm with a sigmoid germ slit and a perispore dehiscent in 10% KOH. A careful examination of the stromatal surface shows that the outermost layer of the pruina is vinaceous and reveals the rust underlying tissue when it is worn off, usually on the most prominent elevations around the ostioles. Other *Hypoxylon* spp. in which a purplish stromatal surface is associated with an orange brown tone and orange KOH-extractable pigments are few, including *H. retpela* Van der Gucht & Van der Veken and *H. samuelsii* Y.-M. Ju & J.D. Rogers. The former differs from *H. fendleri* in having a pale vinaceous surface and slightly larger ascospores 9.5–12 × 4.5–5 µm with a straight germ slit and a very conspicuously ornamented perispore; the latter differs from *H. fendleri* in having thicker stromata 1–1.7 mm thick, tubular perithecia and smaller equilateral ascospores 7.6–8 × 3–3.5 µm with a short germ slit and a perispore indehiscent in 10% KOH.

Hypoxylon fendleri is a common species with a worldwide tropical distribution but was not collected in the main island of Guadeloupe nor in Martinique. Interestingly, the two collections recorded during this survey come from the same locality in the small island of Marie-Galante, south of Guadeloupe.

Hypoxylon griseobrunneum (B.S. Mehrotra) J. Fourn., Kuhnert & M. Stadler, *Fungal Divers.*, 64: 194 (2014). Plates 13–14

Stromata effused-applanate on wood, effused-pulvinate to pulvinate on bark, elongated into coalescent strips or orbicular, 15–90 mm long × 5–23 mm wide × 0.6–0.85 mm thick; surface dark vinaceous (82, oac523) to livid vinaceous (82, oac525), pruinose, with slightly exposed perithecial contours to even; dull olivaceous yellow granules beneath the surface, with KOH-extractable pig-

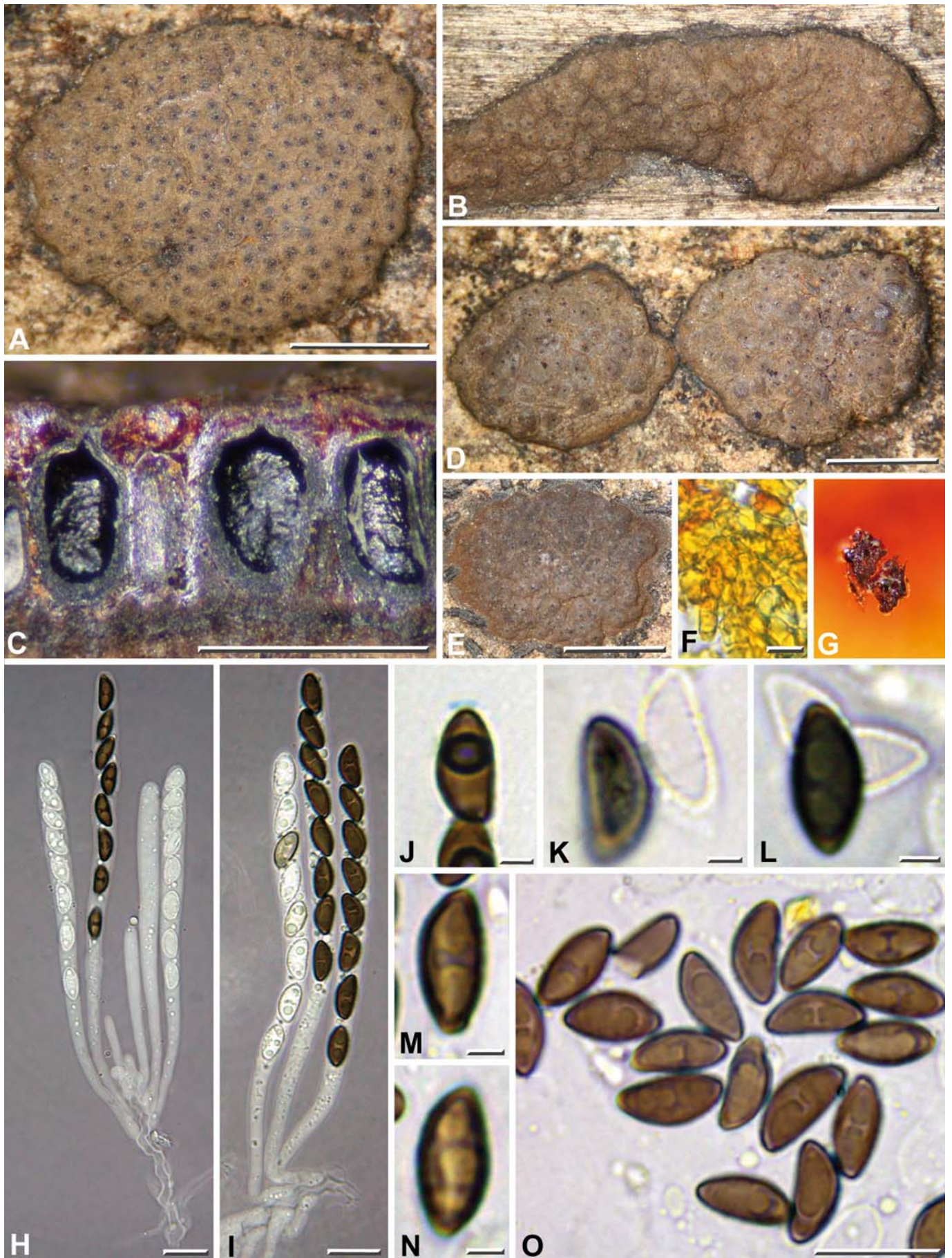


Plate 11 — *Hypoxylon erythrostroma*

A-D, F-O: MJF 07110; E: MJF 13235. A-D, E: Effused-pulvinate stromata in surface view; C: Stroma in vertical section showing the perithecia and the red subsurface; F: Waxy granules from subsurface, in water; G: KOH-extractable pigments after 1 min incubation; H, I: Asci originating from a long ascogenous hypha, in black Pelikan ink; J: Ascical apical apparati in Melzer's reagent; K, L: Ascospores in 10% KOH, showing the dehiscence striated perispores; M, N: Ascospores in dorsal view showing the sigmoid germ slit; O: Ascospores in water. Scale bars: A, B, D, E = 2 mm; C = 0.5 mm; F = 5 μm; H, I, O = 10 μm; J-N = 2 μm.

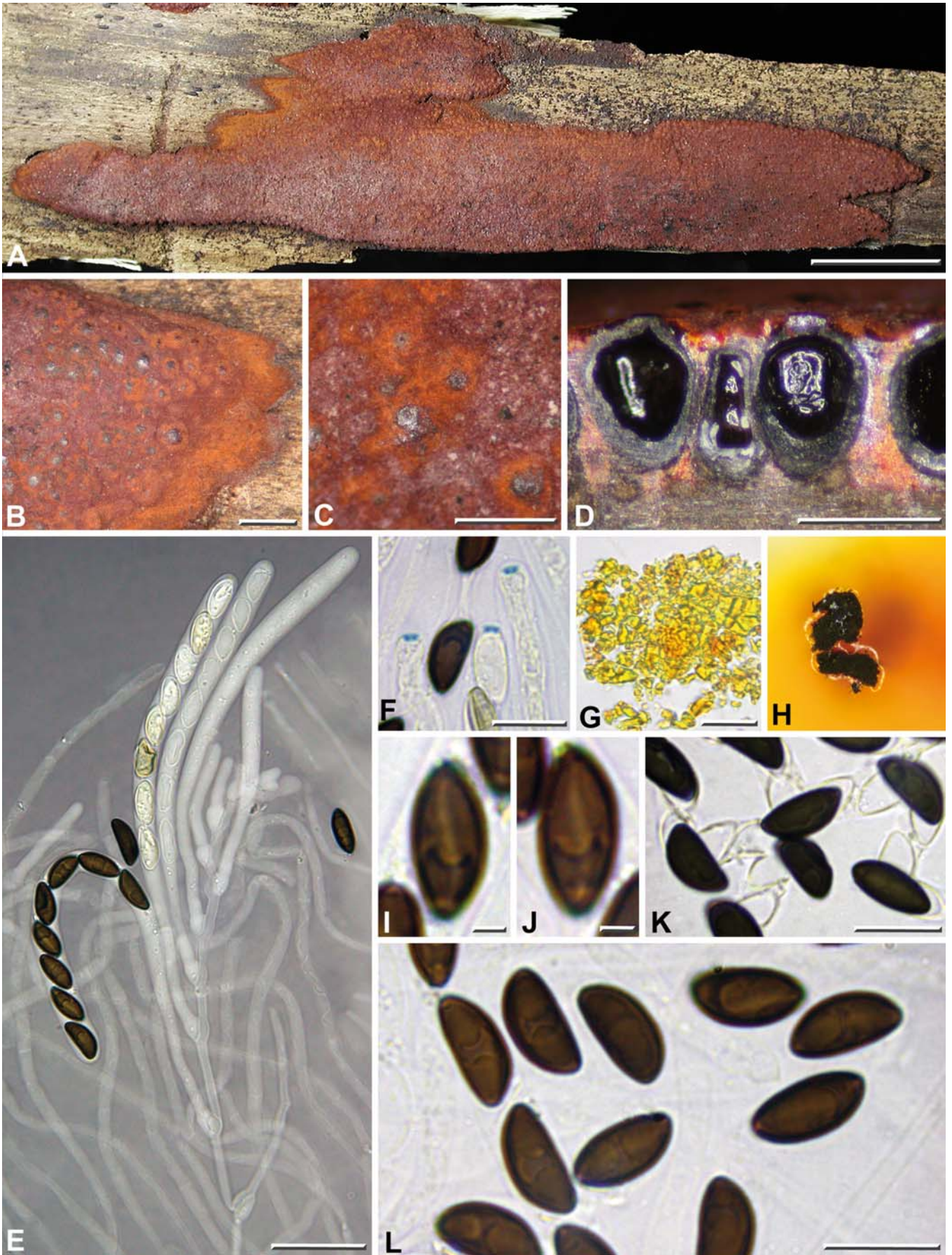


Plate 12 — *Hypoxylon fendleri*

CLL 5503. A: Confluent stromata in surface view; B: Stromatal surface in close-up showing the perithecial contours and the effused margin; C: Stromatal surface in close-up showing the rust surface where the outermost vinaceous layer is worn off around the ostioles; D: Stroma in vertical section showing the perithecia surrounded by bright orange waxy granules; E: Immature and mature asci arising from a long ascogenous hypha, with paraphyses, in black Pelikan ink; F: Ascical apical apparatus in Melzer's reagent; G: Stromatal waxy granules in water; H: KOH-extractable pigments after 1 min incubation; I, J: Ascospores in dorsal view showing the germ slit; K: Ascospores perispores dehiscing in 10% KOH; L: Ascospores in water. Scale bars: A = 10 mm; B = 1 mm; C, D = 0.5 mm; E = 20 μ m; F, G, K, L = 10 μ m; I, J = 2 μ m.

ments fawn (87, oac645) with a faint olivaceous tinge, becoming livid vinaceous (82, oac525) after 20 min incubation; the tissue below the perithecial layer blackish brown, 0.1–0.3 mm thick. **Perithecia** tubular to long tubular, 0.5–0.65 × 0.2–0.25 mm. **Ostioles** umbilicate, inconspicuous.

Asci cylindrical, long-stipitate, with eight obliquely uniseriate ascospores, 140–160 µm total length, the spore-bearing parts 55–76 × 5.5–6.5 µm, the stipes 76–86 µm long, originating from long ascogenous hyphae, with apical apparatus discoid, 0.8–1 × 2.5 µm, bluing in Melzer's reagent. **Paraphyses** filiform, copious. **Ascospores** (8.8–) 9.6–11.2 (–12) × (3.7–) 4.2–4.9 (–5.3) µm, Q = (2.1–) 2.2–2.4 (–2.5); N = 65; (M = 10.2 × 4.5 µm, Qe = 2.3), ellipsoid-inequilateral with narrowly rounded ends, dark brown, with a faint straight germ slit spore-length; perispore dehiscent in KOH, thick and yellowish, conspicuously striated; epispore smooth.

Asexual morph on the natural substrate: Colonies present at the margins of young stromata, fluffy, fawn (87, oac647), with a nodulisporium-like conidiogenous structure; conidiogenous cells subhyaline, smooth, 7–12 × 2–3 µm, conidia ovoid with narrowly rounded ends, smooth, 2.5–4 × 2.5–2.7 µm. (Plate 14). Asexual morph in culture on OA virgariella-like (KUHNER *et al.*, 2014).

Specimens examined: FRENCH WEST INDIES: GUADELOUPE: Vieux-Habitants, Beausoleil, Maison Forestière, on bark, 7 Aug. 2011, *leg.* C. Lechat, CLLGUAD 11010 (LIP); MARTINIQUE: Case-Pilote, Fond Boucher, trail to Morne Venté, mesophilic to xerophilic forest, on wood and bark of a dead branch, associated with *H. monticulosum*, 25 Aug. 2010, *leg.* J. Fournier, MJF10120 (LIP); *ibid.*, on dead corticated branches, 17 Aug. 2013, *leg.* J. Fournier, MJF 13273 (LIP); Prêcheur, Anse Couleuvre, coastal rain forest, on bark, 18 Aug. 2005, *leg.* C. Lécuru, CL 5000 (LIP); Trinité (Caravelle peninsula), Pointe Rouge, xerophilic coastal forest, on bark, 31 Aug. 2007, *leg.* J. Fournier, MJF 07238 (LIP).

Known distribution: Central and South America including the Caribbean, India.

Discussion: *Hypoxylon griseobrunneum* is characterized by vinaceous brown stromata with tubular perithecia, olivaceous yellow stromatal granules that yield yellow brown pigments in 10% KOH turning livid vinaceous upon prolonged incubation and inequilateral brown to dark brown ascospores averaging 10.2 × 4.5 µm with a faint straight germ slit spore-length and a striated perispore dehiscent in 10% KOH. *Hypoxylon griseobrunneum* has similarities with *H. anthochroum* and *H. duranii* as defined by JU & ROGERS (1996) because of its effused-pulvinate stromata with vinaceous brown surface, yellow to olivaceous KOH-extractable pigments and inequilateral ascospores with conspicuously striated perispore dehiscent in 10% KOH. The best way to distinguish them is to observe the stromatal pigments in KOH. In *H. duranii*, based on the type collection (FOURNIER & LECHAT, 2015b), the pigments are sepia (63, oac833) and do not notably change upon prolonged incubation and in *H. anthochroum*, based on the type collection (JF, unpublished results), the pigments are greenish grey (110, oac85) and just slightly fade with time; conversely, in *H. griseobrunneum*, they are first yellow brown (fawn, 87, oac645) and turn livid vinaceous (82, oac525) within 20 min incubation. The same unusual change of colour of KOH-extractable pigments can be likewise observed in *H. paracouense* J. Fourn. & Lechat, a species recently described from French Guiana (FOURNIER & LECHAT, 2015b) that was segregated from typical *H. duranii* based on this peculiar chemical reaction in combination with smaller ascospores averaging 7.9 × 3.8 µm with a sigmoid germ slit. The two latter features help distinguish *H. griseobrunneum* from *H. paracouense*.

The ITS sequences generated from the cultures originating from the stromata collected in Martinique, submitted to a BLAST search (KUHNER *et al.*, 2014) demonstrated that this fungus was already known from a soil sample collected in India that yielded a nodulisporium-like asexual morph in culture called "*Nodulisporium griseobrunneum*" (MEHROTRA, 1965). The sexual morph of *H. griseobrunneum*

is apparently widespread in Central and South America but has apparently not been reported so far from India or other parts of the world.

Hypoxylon haematostroma Mont., *Ann. Sci. nat., Bot., sér. II*, 17: 124 (1842). Plate 15. Table 1

Stromata widely effused-pulvinate on wood, frequently with a widely effused concolourous sterile margin, pulvinate on bark, 3–70 mm long × 2–18 mm wide × 1.3–2.5 mm thick, with inconspicuous to slightly exposed perithecial contours; surface vivid orange (7, oac629) to rust (39, oac643), pruinose; subsurface reddish orange, composed of amorphous waxy granules that appear orange and yellow when observed in water and extend downwards around the base of perithecia, with dense orange (7, oac629) KOH-extractable pigments, fading upon prolonged incubation; subperithecial tissue pale brown, poorly developed. **Perithecia** lanceolate, 1.2–1.8 × 0.25–0.35 mm. **Ostioles** umbilicate, inconspicuous, appearing papillate when the thick subsurface layer is removed.

Asci cylindrical, with eight obliquely uniseriate ascospores, 160–220 µm total length, the spore-bearing parts 80–92 × 10–11.5 µm, the stipes 74–135 µm long, arising in spicate arrangement from long ascogenous hyphae, with a discoid apical apparatus 1–1.5 × 2.5–3 µm, bluing in Melzer's reagent. **Paraphyses** thin-walled, septate, 1.5–2.5 µm wide, embedded in mucilage. **Ascospores** (11.4–) 12.5–17 (–18.4) × (5.7–) 6.1–8.4 (–8.8) µm, Q = (1.7–) 1.8–2.3 (–2.5); N = 180 (Me = 14.7 × 7.2 µm; Qe = 2.0), ellipsoid-inequilateral with most often broadly rounded ends, dark brown, with a straight germ slit 2/3 to less frequently almost spore-length, on the most convex side; perispore dehiscent in 10% KOH, thin, smooth; epispore smooth.

Asexual morph on the natural substrate not observed. Asexual morph in culture on OA periconiella-like, based on material from Mexico and Taiwan (JU & ROGERS, 1996).

Specimens examined: FRENCH GUIANA: Macouria, on dead decorticated wood, 6 May 2008, *leg.* C. Lechat, CLL 8100 (LIP); Matoury (Réserve naturelle du mont Grand Matoury), La Mirande path, on bark, 11 May 2008, *leg.* C. Lechat, CLL 8150 (LIP). FRENCH WEST INDIES: GUADELOUPE: Les Saintes, Terre de Bas, on bark, 30 Oct. 1993, *leg.* J. Vivant, communicated by F. Candoussau, FC 5237–2 (JF). MARTINIQUE: Prêcheur, Anse Couleuvre, coastal mesophilic rainforest, on dead decorticated wood, 3 Sept. 2003, *leg.* C. Lechat, CLL 0773 (LIP); *ibid.*, on dead decorticated wood of *Cecropia schreberiana* (Moraceae), 2 Sept. 2007, *leg.* J. Fournier, MJF 07262 (LIP); *ibid.*, on dead culm of bamboo, 21 Aug. 2010, *leg.* J. Fournier, MJF 10033 (LIP) (barely mature); Schoelcher, Case Navire River, mesophilic rainforest, on bark, 28 Aug. 2010, *leg.* J. Fournier, MJF 10206 (LIP, epitype); Le Carbet, Anse Turin, path to Etinof lodge, on dead stems of *Ricinus communis* (Euphorbiaceae), 6 Aug. 2013, *leg.* J. Fournier, MJF 13019 (LIP). MAYOTTE: Coconi, road to Ongojou, S 12° 50' 15.73" E 45° 09' 02.69", on dead decorticated wood, 25 Jun. 2011, *leg.* M. Pélissier, MP 2011–61 (LIP). SRI LANKA: Central Province, Sigirya, on dead decorticated wood, 16 Jan. 2013, *leg.* W. Jaklitsch, JF 13030 (LIP).

Known distribution: Pantropical.

Discussion: *Hypoxylon haematostroma* is one of the most easily recognized tropical species of *Hypoxylon* owing to its often widespread, vivid reddish orange stromata with lanceolate perithecia and relatively large dark brown inequilateral ascospores with a smooth perispore dehiscent in 10% KOH. The ascospore germ slit is given as spore-length by JU & ROGERS (1996) but in all collections we examined the germ slit is more frequently less than spore-length. According to JU (pers. comm.) the germ slit is spore-length or nearly so, with the prominent part less than spore length.

As we noticed a wide variation range of ascospore dimensions in the material from Guadeloupe and Martinique, we compared it to measurements from material from French Guiana, Mayotte and Sri Lanka. The results, summarized in Table 1, indeed show a fairly great

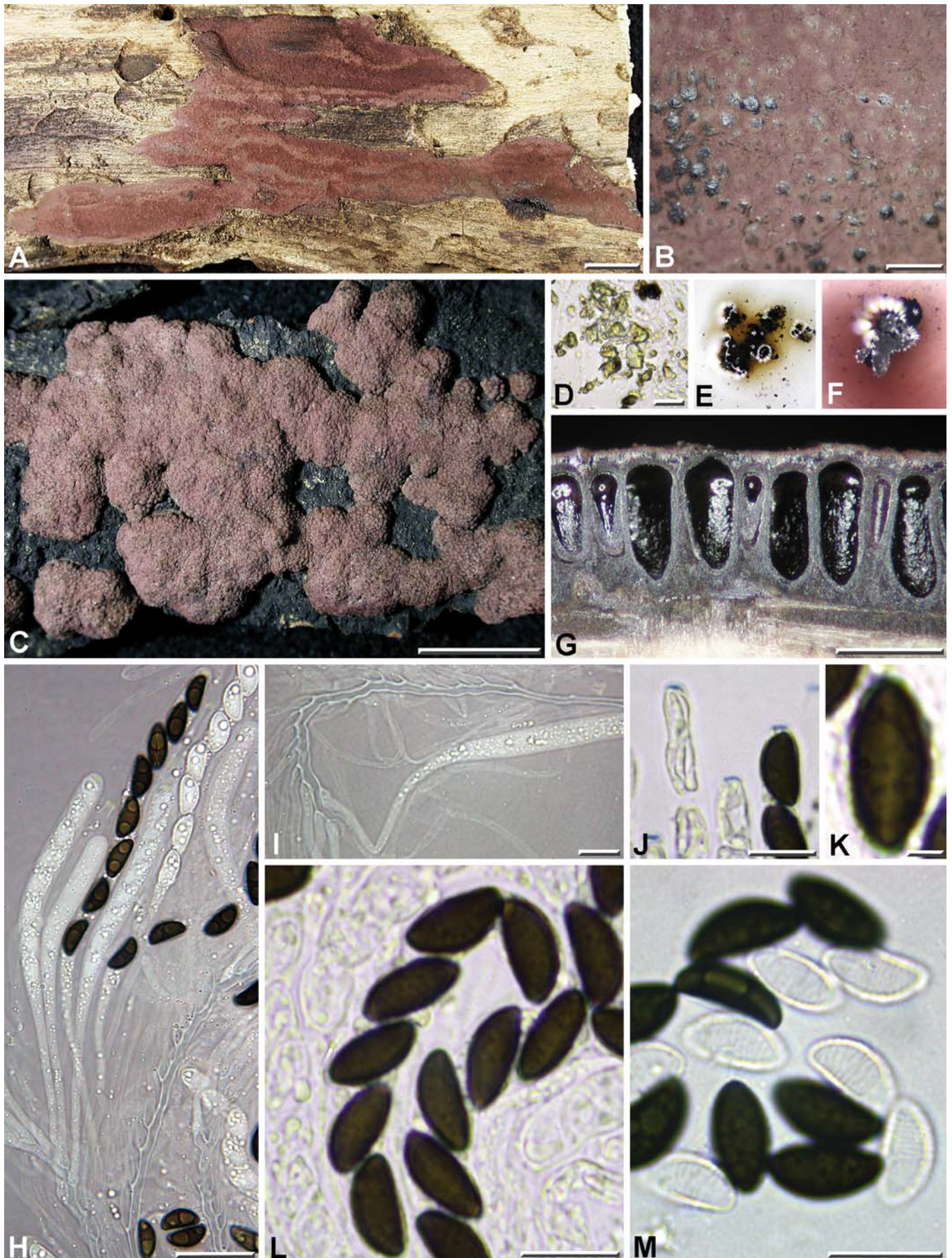


Plate 13 — *Hypoxylon griseobrunneum*

A, B, D-M: MJF 10120; C: MJF 13273. A: Effused stromata on wood; B: Stromatal surface in close-up showing the perithecial contours; C: Pulvinate confluent stromata on bark; D: Stromatal granules in water; E, F: KOH-extractable pigments after 1 min and 20 min incubation respectively; G: Stroma in vertical section showing the perithecia; H: Asci arising from an ascogenous hypha, in black Pelikan ink; I: Ascogenous hypha with ascial stipes arising in spicate arrangement; J: Ascical apical apparatus in Melzer's reagent; K: Ascospore in dorsal view showing the faint germ slit (in water); L: Ascospores in water; M: Ascospores in 10% KOH with a striated dehiscent perispore. Scale bars: A, C = 10 mm; B = 1 mm; D, I, J, L, M = 10 μ m; G = 0.5 mm; H = 20 μ m; K = 2 μ m.

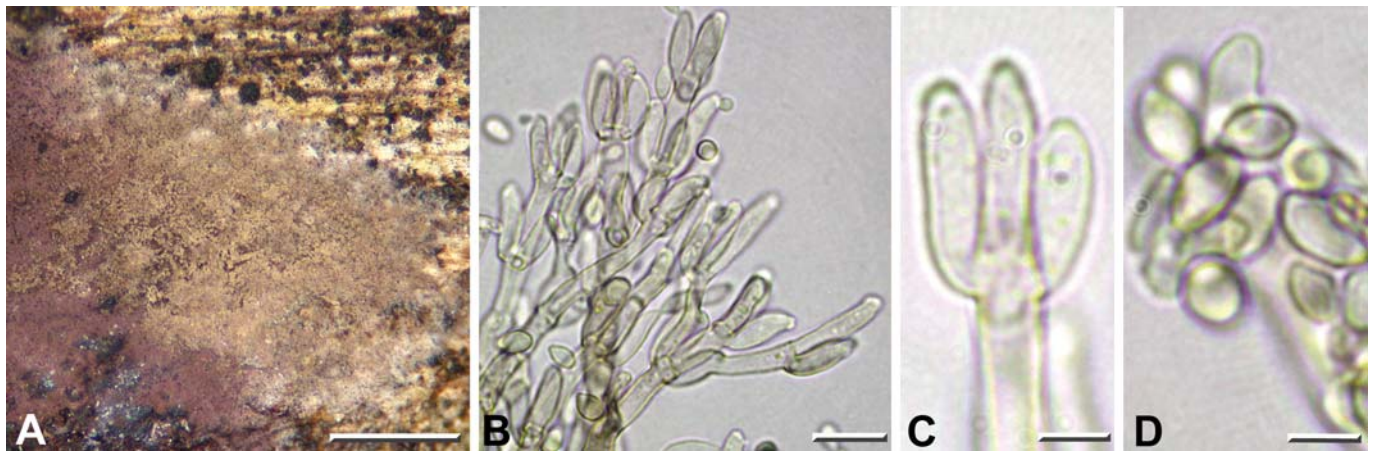


Plate 14 — *Hypoxylon griseobrunneum* asexual morph

MJF 10120. A: Colony of asexual morph at the margin of a young stroma; B, C: Nodulisporium-like conidiogenous structure, in 1 % SDS; D: Conidia in 1 % SDS. Scale bars: A = 1 mm; B = 10 μm ; C, D = 0.25 μm .

range of variation, regardless of the geographic origin. As these variations could not be correlated with other deviating morphological characters, we regard *H. haematostroma* as morphologically well-defined taxon in which a wide range of variation occurs in ascospore dimensions.

Hypoxylon haematostroma is a wide-spread pantropical species but infrequently encountered during this survey. Interestingly the three collections from Martinique come from the same station, including one on bamboo, a most unusual host so far not recorded.

The collection MJF 10206 was cultured and sequenced and designated as epitype of *H. haematostroma* (KUHNER *et al.*, 2014).

Hypoxylon hypomiltum Mont., *Ann. Sci. nat., Bot., sér. II*, 13: 356 (1840). Plate 16

Stromata effused-pulvinate, irregularly ellipsoid-elongate, with barely exposed to more rarely conspicuous perithecial contours, 7–75 mm long \times 3–26 mm wide \times 0.75–1 mm thick; surface dark brick (60, oac635), slightly uneven, pruinose, with darker outer pruina revealing an underlying more rusty pruina, frequently giving a mottled appearance, or overlain by a white or isabelline pruinose layer; dull olivaceous yellow granules interspersed in a matrix of dark brown hyphal rods 2–4 μm wide, forming a thick brittle layer above and between perithecia, shiny black in section, with fugacious amber (47, oac852) then cinnamon (62, oac 715) KOH-extractable pigments, turning sepia (63, oac636) upon prolonged incubation;

subperithecial tissue blackish or dark olivaceous brown, 0.1–0.3 mm thick. **Perithecia** subglobose 0.5–0.7 mm diam or obovoid to tubular 0.7–0.85 \times 0.25–0.45 μm . **Ostioles** deeply umbilicate, inconspicuous, often surrounded by a narrow white powdery disc.

Asci cylindrical, with eight obliquely uniseriate ascospores, 120–200 μm total length, the spore-bearing parts 48–56 \times 5–6.5 μm , the stipes 65–155 μm long, originating from short to long, often inconspicuous ascogenous hyphae, with a discoid apical apparatus 0.5–0.8 \times 1.5–2 μm , bluing in Melzer's reagent or not bluing. **Paraphyses** filiform, copious, with small oily guttules. **Ascospores** (6.0–) 6.7–8.5 (–8.9) \times (2.9–) 3.1–4.1 (–4.3) μm , Q = (1.7–) 1.85–2.3 (–2.6); N = 242 (Me = 7.6 \times 3.6 μm ; Qe = 2.1), ellipsoid-equilateral with narrowly rounded to acute ends, often fusiform, brown, with a straight to slightly oblique germ slit most often much less than spore length; perispore rarely dehiscent in 10% KOH, smooth to faintly striated; episporium smooth.

Asexual morph on the natural substrate not seen. Asexual morph in culture on OA nodulisporium-like, based on material from Mexico and Taiwan (JU & ROGERS, 1996).

Specimens examined: FRENCH WEST INDIES: GUADELOUPE: Petit-Bourg, Trace Merwart, dead corticated branch, 12 Aug. 2008, *leg.* C. Lechat, CLL 8207 (LIP); Petit-Bourg, Tambour, secteur Déjeuner, dead corticated branch, 17 Aug. 2008, *leg.* C. Lechat, CLL 8244 (LIP); Sainte-Rose, Sofaïa, path to Saut des Trois Cornes, mesophilic forest, dead corticated branch, Nov. 2005, *leg.* C. Lechat, CLL 5419 (LIP). MARTINIQUE: *sine loco*, corticated branchlet, Sept. 2004, *leg.* C. Lechat, CLL 2253 (LIP); Prêchur, Anse des Galets, coastal meso-

Table 1 — Ascospore dimensions in seven collections of *H. haematostroma* from various tropical origins, compared with the values reported by MILLER (1961) and JU & ROGERS (1996).

	Extreme values	Q = quotient l/w N = number of measurements	Mean values
FC 5237–2 Guadeloupe	(12–) 12.5–14.1 (–15.2) \times (5.9–) 6.3–7.1 (–7.7) μm	Q = (1.7–) 1.8–2.1 (–2.4); N = 60	Me = 13.3 \times 6.7 μm ; Qe = 2
MJF 07262 Martinique	(13.7–) 14.3–17 (–18.4) \times (6.6–) 7.2–8.4 (–8.8) μm	Q = (1.8–) 1.9–2.2 (–2.3); N = 60	Me = 15.8 \times 7.7 μm ; Qe = 2
CLL 0773 Martinique	(11.4–) 12.7–14.5 (–15.5) \times (5.7–) 6.1–7 (–7.4) μm	Q = (1.8–) 1.9–2.3 (–2.5); N = 60	Me = 13.6 \times 6.5 μm ; Qe = 2.1
CLL 8150 French Guiana	(12.6–) 13–15.1 (–15.4) \times (6.1–) 6.3–7 (–7.4) μm	Q = (1.8–) 2–2.3 (–2.5); N = 65	Me = 14.1 \times 6.7 μm ; Qe = 2.1
CLL 8100 French Guiana	(14.1–) 14.8–16.6 (–17.5) \times (6.7–) 6.9–7.5 (–8.4) μm	Q = (2–) 2.1–2.28 (–2.3); N = 60	Me = 15.7 \times 7.3 μm ; Qe = 2.2
MP 2011–61 Mayotte	(12.6–) 13.4–15 (–15.5) \times (6.6–) 6.7–7.5 (–8) μm	Q = (1.8–) 1.9–2.2 (–2.3); N = 60	Me = 14.2 \times 7.1 μm ; Qe = 2
JF 13030 Sri Lanka	(13.4–) 14.1–15.8 (–16.5) \times (5.5–) 5.9–6.8 (–7.2) μm	Q = (2–) 2.2–2.6 (–2.9); N = 60	Me = 15 \times 6.4 μm ; Qe = 2.4
MILLER 1961	14–18 \times 7–9 μm	–	Me = 16 \times 8 μm ; Qe = 2
JU & ROGERS 1996	13.5–18 (–19) \times 7–8 (–8.5) μm	–	Me = 15.8 \times 7.5 μm ; Qe = 2.1

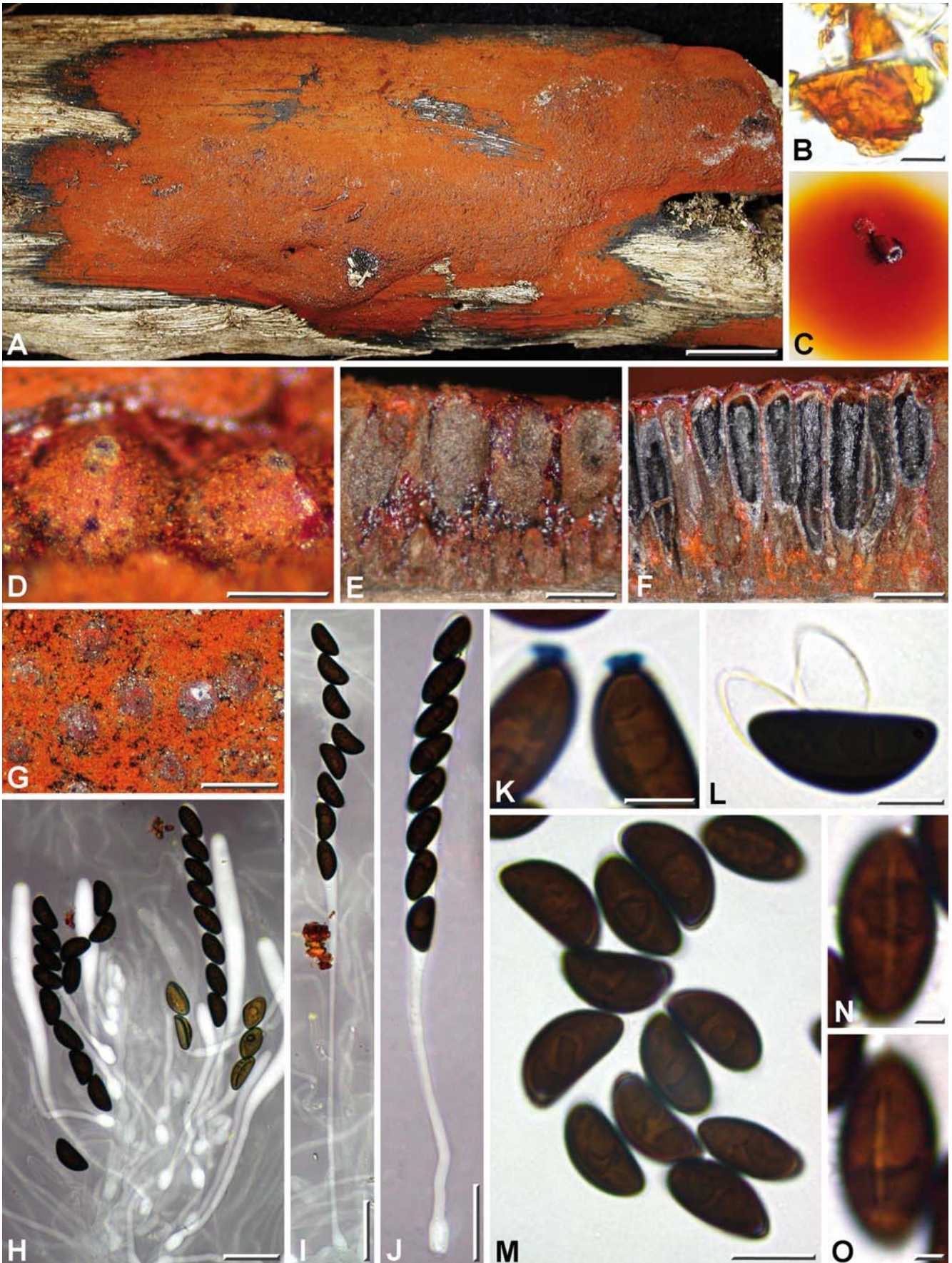


Plate 15 — *Hypoxylon haematostroma*

A-E, G: MJF 07262; F, H-O: CLL 0773. A: Effused-pulvinate stromata with sterile effused margins; B: Stromatal granules in water; C: KOH-extractable pigments after 1 min incubation; D: Close-up on two perithecial apices showing the papillate ostioles after removal of the waxy subsurface layer; E: Stroma in vertical section (broken) showing the perithecia and the abundant waxy granules at the base; F: Stroma in vertical section showing the perithecia, the waxy granules and the basal tissue; G: Close-up on stromatal surface showing the faint perithecial contours; H: Immature and mature asci in black Pelikan ink, arising from ascogenous hyphae, with paraphyses; I, J: Mature asci in black Pelikan ink; K: Ascical apical apparatus in Melzer's reagent; L: Ascospore in 10% KOH with a dehiscent perispore; M: Ascospores in water; N, O: Ascospores in dorsal view showing the variable length of the germ slit, in water. Scale bars: A = 10 mm; B, M = 10 μ m; D = 0.2 mm; E-G = 0.5 mm; H-J = 20 μ m; K, L = 5 μ m; N, O = 2 μ m.

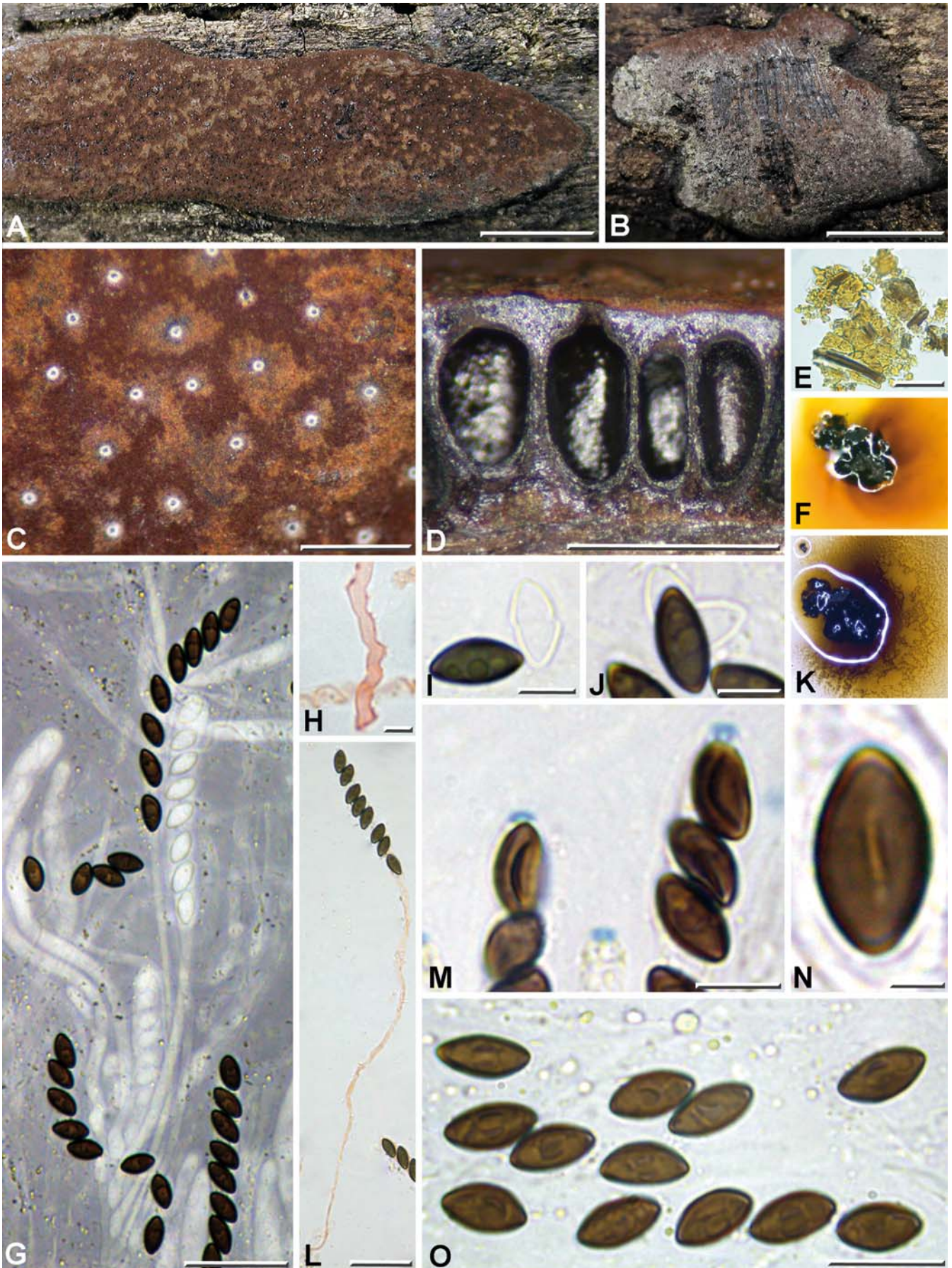


Plate 16 — *Hypoxylon hypomiltum*

MJF 07309. A: Typical stromata on bark; B: Stroma with surface overlain by whitish pruina; C: Close-up on stromatal surface showing the white discs around the ostioles and the mottled pattern of the outer pruina; D: Stroma in vertical section showing the perithecia; E: Waxy stromatal granules mixed with dark brown hyphal rods, in water; F, K: KOH-extractable pigments after 1 min and 30 min incubation respectively; G: Immature and mature asci arising from an ascogenous hypha, in black Pelikan ink; H: Ascogenous hypha, in Congo red and 10% KOH; I, J: Ascospores in 10% KOH showing a dehiscent perispore; L: Long stiptate mature ascus in Congo red followed by 3% KOH; M: Ascal apical apparatus in Melzer's reagent; N: Ascospore in PVA-lactophenol showing a short oblique germ slit; O: Ascospores in water. Scale bars: A, B = 5 mm; C, D = 0.5 mm; E, G, L = 20 μ m; H-J, M = 5 μ m; N = 2 μ m; O = 10 μ m.

philic forest, dead trunk of *Cocos nucifera* (*Arecaceae*), 30 Aug. 2007, *leg.* J. Fournier, MJF 07218 (LIP); Prêcheur, Anse Couleuvre, coastal mesophilic forest, dead wood, 5 Sept. 2007, *leg.* J. Fournier, MJF 07309 (LIP); Trinité (Caravelle peninsula), Pointe Rouge, meso-xerophilic forest, corticated trunk, 29 Aug. 2010, *leg.* J. Fournier, MJF 10223 (LIP); Sainte-Marie, La Philippe forest, coastal mesophilic forest, log of Mahogany (*Swietenia macrophylla* King, *Meliaceae*), 31 Aug. 2010, *leg.* J. Fournier, MJF 10291 (LIP); *ibid.*, corticated branch of Mahogany (*Swietenia macrophylla*), 31 Aug. 2010, *leg.* J. Fournier, MJF 10300 (LIP); Saint-Esprit, Bois La Charles, mesophilic rainforest, corticated log of Mahogany (*Swietenia macrophylla*), 20 Aug. 2013, *leg.* J. Fournier, MJF 13342 (LIP).

Known distribution: Pantropical.

Discussion: The stromata of *H. hypomiltum* are typically reddish brown but their surface is sometimes overlain by a whitish or isabelline pruinose layer. The specimen MJF 07309 was chosen to illustrate *H. hypomiltum* because brown and whitish stromata were coexisting on the same branch.

This species is more reliably characterized by its olivaceous yellow stromatal granules yielding yellow to cinnamon pigments in 10% KOH, combined with small equilateral ascospores with narrowly rounded to acute ends, with a perispore dehiscent in 10% KOH and a short, often oblique or slightly sigmoid germ slit. Collections microscopically conforming to *H. hypomiltum* but featuring a purplish stromatal surface and olivaceous to greenish KOH-extractable pigments are regarded as a possible different species and are dealt with as *H. cf. hypomiltum* in this paper.

A peculiar structure consisting of a matrix of dark brown thick-walled hyphae interspersed within the waxy granules of the subsurface and interperithecial tissue in the stromata of *H. hypomiltum* was consistently encountered in all collections referable to this taxon, regardless of other variable characters. As this configuration is unknown in other *Hypoxylo* spp. and easily observed, it is proposed as a taxonomic marker of *H. hypomiltum* s. l.

Hypoxylo* cf. *H. hypomiltum Mont., *Ann. Sci. nat., Bot., sér. II*, 13: 356 (1840). Plate 17

Stromata effused-pulvinate, suborbicular 10–20 mm diam or irregularly ellipsoid-elongate, to 78 mm long × 32 mm wide × 0.75–1.1 mm thick, with inconspicuous perithecial contours; surface dark vinaceous (82, oac523) to dark livid (80, oac397), pruinose, slightly uneven and mottled; dull olivaceous yellow granules interspersed in a matrix of dark brown hyphal rods 2–4 µm wide, forming a thick brittle layer above and between perithecia, shiny black in section, with greenish olivaceous (90, oac 859) KOH-extractable pigments, turning isabelline (65, oac838) upon prolonged incubation; subperithecial tissue blackish, 0.2–0.3 mm thick. **Perithecia** subglobose 0.6–0.65 mm diam to obovoid 0.65–0.85 × 0.55–0.6 mm. **Ostioles** deeply umbilicate, inconspicuous, often surrounded by a narrow whitish powdery ring.

Asci cylindrical, with eight obliquely uniseriate ascospores, 115–190 µm total length, the spore-bearing parts 52–65 × 5–6 µm, the stipes 60–135 µm long, originating from short to long ascogenous hyphae, with apical apparatus apparently lacking, not bluing in Melzer's reagent or present and bluing. **Paraphyses** filiform, copious, with small oily guttules. **Ascospores** (6.8–) 7.1–8.4 (–8.7) × (3.2–) 3.3–3.9 (–4.2) µm, Q = (1.8–) 2.0–2.2 (–2.4); N = 160 (Me = 7.7 × 3.6 µm; Qe = 2.1), ellipsoid-equilateral with narrowly rounded to acute ends, often fusiform, brown, with a straight to slightly oblique germ slit most often much less than spore length; perispore rarely dehiscent in 10% KOH, smooth to faintly striated; episporium smooth.

Asexual morph on the natural substrate not seen.

Specimens examined: FRENCH WEST INDIES: GUADELOUPE: Petit-Bourg, Tambour, Desbordes forest, rainforest, dead corticated branch, 17 Aug. 2010, *leg.* C. Lechat, CLL GUAD040 (LIP). MARTI-

NIQUE: Le Lorrain, Pirogue river, lowland rainforest, dead corticated branchlet, 6 Dec. 2005, *leg.* C. Lechat, CLL 5576 (LIP); Sainte-Marie, La Philippe forest, coastal mesophilic forest, log of Mahogany (*Swietenia macrophylla* King, *Meliaceae*), 31 Aug. 2010, *leg.* J. Fournier, MJF 10290 (LIP); Le Lorrain, Pirogue river, lowland rainforest, dead corticated trunk and branches, 4 Jun. 2014, *leg.* C. Lechat, MJF 14030 (LIP, culture CBS 138640); Marigot, habitation Denel, Pérou forest, 350–400 m, rainforest, dead corticated branch, 7 Jun. 2014, *leg.* J. Fournier, MJF 14081 (LIP); Marigot, right bank of Lorrain river, rainforest, dead corticated trunk, 8 Jun. 2014, *leg.* J. Fournier, MJF 14089 (LIP).

Known distribution: French Guiana, Guadeloupe, Martinique.

Discussion: The aforementioned collections have in common to be microscopically identical to the typical *H. hypomiltum* but they deviate in having a more or less purple stromatal surface and greenish to olivaceous KOH-extractable pigments. Owing to the variability of many morphological characters of *H. hypomiltum* as currently conceived, it appears premature to assess whether these collections represent a distinct taxon or not. A detailed discussion is given in FOURNIER & LECHAT (2015b).

Hypoxylo investiens (Schwein.) M.A. Curtis., *Geol. Nat. Hist. Surv. North Carolina*, III: 140 (1867). Plate 18

Stromata irregularly effused-applanate, frequently elongate, confluent, 10–90 mm long × 7–47 mm wide × 0.75–0.95 mm thick, often growing beside old black depauperate previous stromata, with faintly to conspicuously exposed discoid perithecial contours; surface pruinose, dark vinaceous (82, oac523) to brown vinaceous (84, oac525), subsurface blackish, a carbonaceous crust containing dark reddish brown granules interspersed within the carbonaceous tissue encasing entirely each perithecium except at base, yielding dull green (70, oac38) pigments in 10% KOH, becoming grey olivaceous (107, oac867) after 20 min incubation; subperithecial tissue greyish brown to blackish, 0.05–0.1 mm thick. **Perithecia** long tubular, 0.6–0.8 × 0.25–0.4 mm, obovoid towards margins. **Ostioles** umbilicate, in old black stromata as well.

Asci cylindrical, with eight obliquely uniseriate ascospores, 90–135 µm total length, the spore-bearing parts 60–70 × 4.5–5 µm, the stipes 22–70 µm long, originating in unilateral spicate arrangement from long ascogenous hyphae, with amyloid apical apparatus discoid, 0.8–1 × 1.5–1.7 µm. **Ascospores** (6.8–) 7–8 (–8.6) × (3.1–) 3.3–4.1 (–4.5) µm, Q = (1.7–) 1.9–2.3 (–2.4); N = 116; (Me = 7.5 × 3.7 µm; Qe = 2.1), narrowly ellipsoid-equilateral with broadly rounded ends to oblong, olivaceous brown, uniseriate in the ascus, with a fairly conspicuous germ slit spore-length to slightly less than spore-length. Perispore indehiscent in 10% KOH; episporium smooth, green in 10% KOH.

Asexual morph on the natural substrate periconiella-like. Asexual morph in culture on OA periconiella-like, based on material from Mexico and Taiwan (JU & ROGERS, 1996).

Specimens examined: FRENCH WEST INDIES: GUADELOUPE: Pointe-Noire, Maison de la Forêt, on rotten blackened wood, 8 Sept. 2003, *leg.* C. Lechat, CLL 0957 (LIP); Vieux-Fort, Ravine Blondeau, on rotten blackened wood, 4 Sept. 2005, *leg.* C. Lechat, CLL 5346 (LIP); Sainte-Anne, Liard, on rotten blackened wood, 26 Nov. 2006, *leg.* C. Lechat, CLL 6068 (LIP). MARTINIQUE: Prêcheur, Anse Couleuvre, coastal mesophilic forest, on rotten blackened wood, 24 Aug. 2010, *leg.* J. Fournier, MJF 10075 (LIP); same location and date, on dead rotten wood of *Cecropia schreberiana* (*Cecropiaceae*), *leg.* J. Fournier, MJF 10083 (LIP); Le Robert, Pointe Bateau, coastal mesophilic forest, on rotten blackened wood, 26 Aug. 2010, *leg.* J. Fournier, MJF 10128 (LIP); Saint-Esprit, Bois La Charles, mesophilic forest, corticated dead trunk, 30 Aug. 2010, *leg.* J. Fournier, MJF 10263 (LIP) (immature); Schoelcher, Case Navire River, mesophilic forest, on rotten blackened wood, 5 Aug. 2013, *leg.* J. Fournier, MJF 13008 (LIP); Prêcheur, Anse Couleuvre, coastal mesophilic forest, on rotten blackened

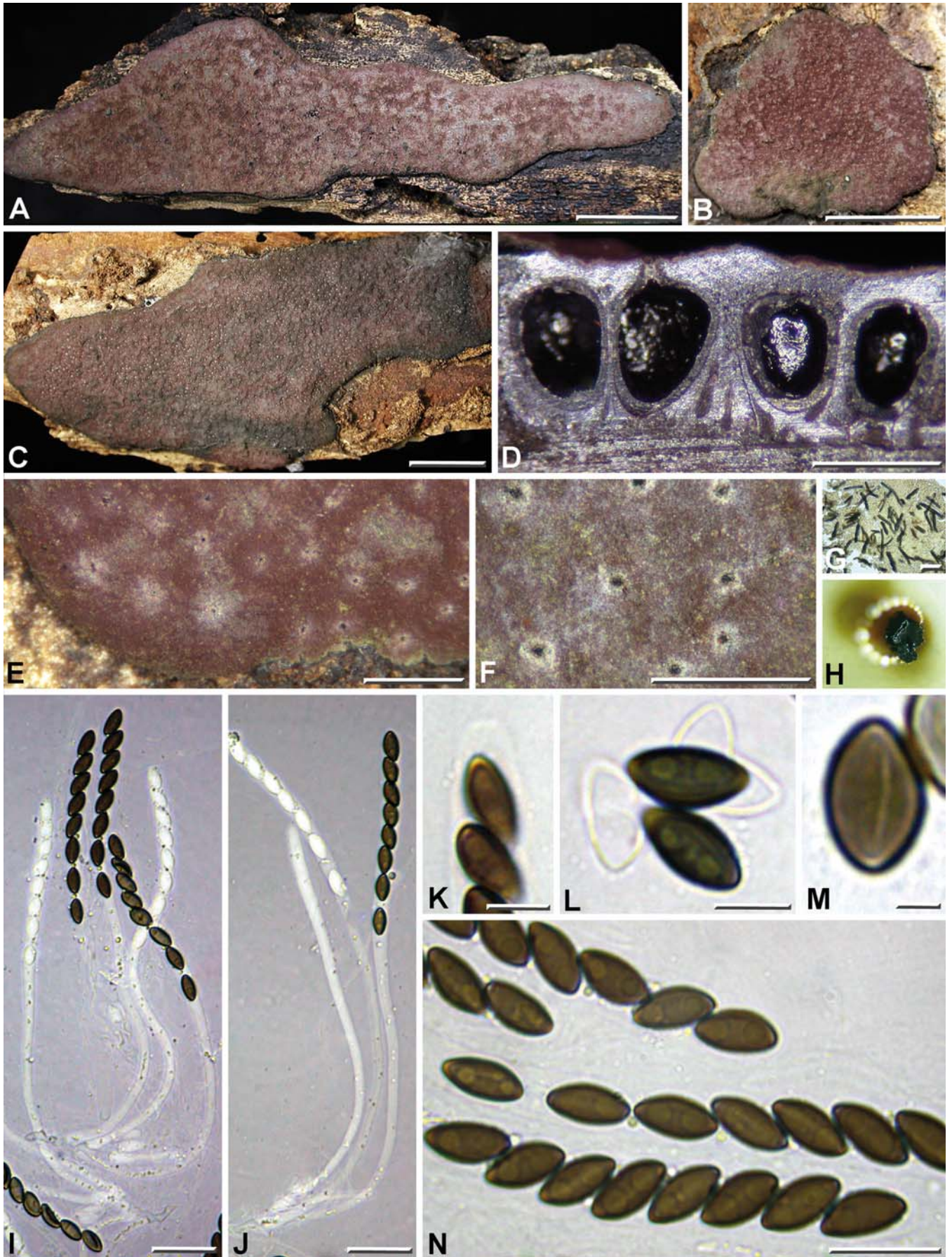


Plate 17 — *Hypoxylon* cf. *H. hypomiltum*

A: MJF 10290; B-N: MJF 14030. A-C: Stromata in surface view; D: Stroma in vertical section showing the perithecia encased in shiny black tissue; E: Margin of a stroma showing the mottled surface; F: Close-up on stromatal surface showing the ostioles; G: Waxy stromatal granules mixed with dark brown hyphal rods in water; H: KOH-extractable pigments after 1 min incubation; I, J: Mature and immature asci arising from ascogenous hyphae, in black Pelikan ink; K: Ascical apex in Melzer's reagent, showing the lack of apical apparatus and amyloid reaction; L: Ascospores in 10% KOH showing the dehiscent perispore; M: Ascospore in PVA-lactophenol, showing the germ slit; N: Ascospores in water. Scale bars: A-C = 10 mm; D, F = 0.5 mm; E = 1 mm; G, I, J = 20 μ m; K, L = 5 μ m; M = 2 μ m; N = 10 μ m.

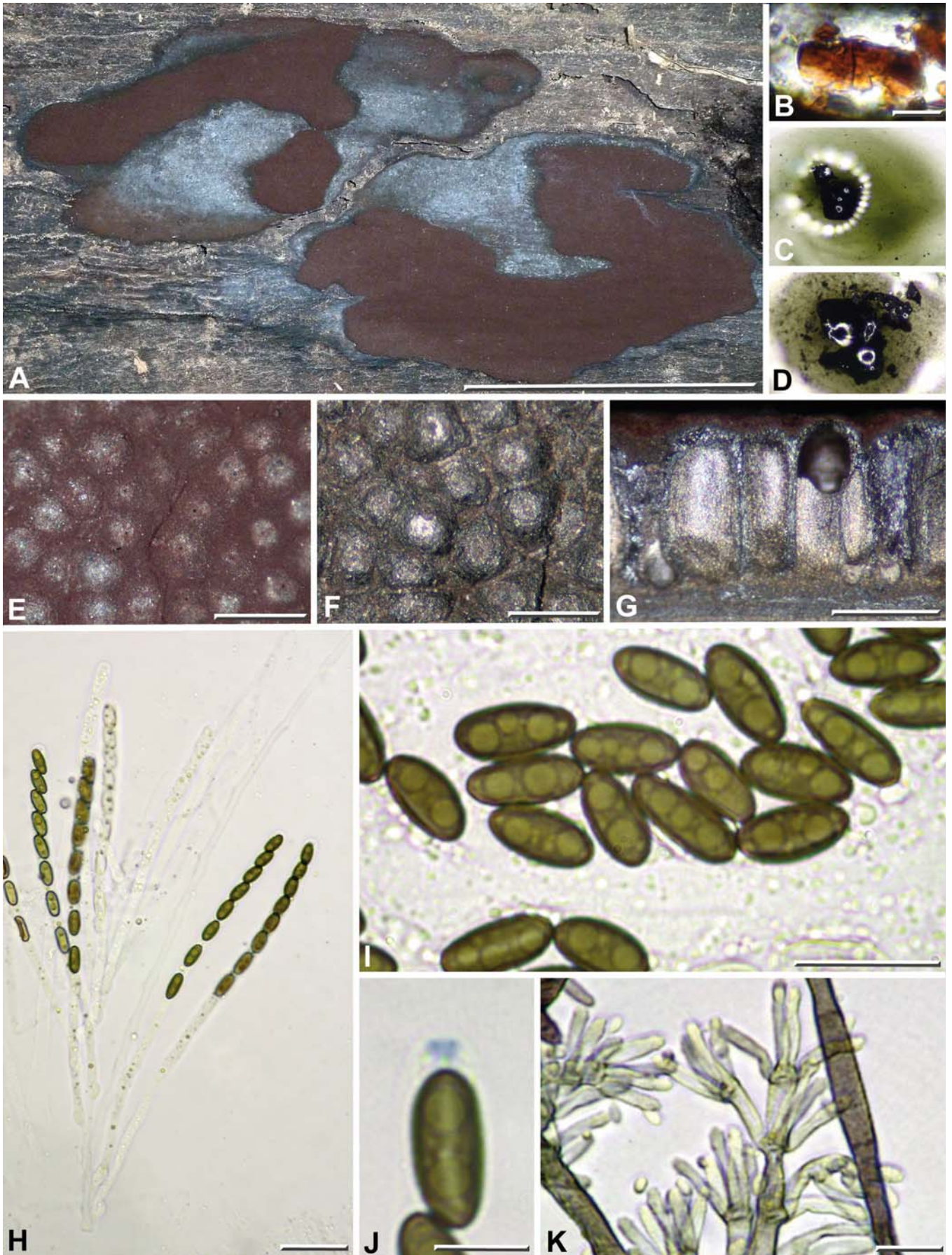


Plate 18 — *Hypoxylon investiens*

A: MJF 14107; B-E, G-K: MJF 10128. F: MJF 10075; A: Effused stromata in surface view; B: Stromatal dark brown granules mixed with carbonaceous fragments, in water; C, D: KOH-extractable pigments after 1 min and 20 min incubation respectively; E: Stromatal surface in close-up showing the perithecial contours and the ostioles; F: Stromatal surface of an overmature black stroma in close-up showing the umbilicate ostioles; G: Stroma in vertical section (broken) showing the perithecia encased in a carbonaceous crust; H: Asci originating from a long ascogenous hypha, in 1% SDS; I: Ascospores in water; J: Ascal apical apparatus in Melzer's reagent and long germ slit of an ascospore; K: Periconiella-like asexual morph, in 3% KOH. Scale bars: A = 50 mm; B, I, K = 10 μ m; E-G = 0.5 mm; H = 20 μ m; J = 5 μ m.

wood, 6 Aug. 2013, *leg.* J. Fournier, MJF 13025 (LIP); Trinité (Caravelle peninsula), Pointe Rouge, coastal xero-mesophilic forest, on rotten blackened wood, 11 Aug. 2013, *leg.* J. Fournier, MJF 13137 (LIP); Prêcheur, Anse Couleuvre, coastal mesophilic forest, on rotten blackened wood, 16 Aug. 2013, *leg.* J. Fournier, MJF 13259 (LIP); *ibid.*, same substrate, 9 Jun. 2014, *leg.* J. Fournier, MJF 14107 (LIP).

Known distribution: Pantropical.

Discussion: *Hypoxylon investiens* is delimited here in a narrower sense than in JU & ROGERS (1996), after segregation of *H. pulicicidum* (BILLS *et al.*, 2012; this paper) and *H. dussii* (this paper). It is characterized by widely effused-applanate stromata with purplish brown surface, occurring most often on dead blackened wood; internally the long tubular perithecia lie beneath a thin carbonaceous crust and are entirely encased in carbonaceous tissue that contains scattered dark reddish brown granules yielding dull green pigments in 10% KOH; its ascospores average $7.5 \times 3.7 \mu\text{m}$, they are narrowly ellipsoid-equiangular with broadly rounded ends, olivaceous brown to yellowish brown, with a straight germ slit almost spore-length and a perispore indehiscent in 10% KOH. The most resembling species is *H. pulicicidum* which mainly differs by olivaceous yellow brown KOH-extractable pigments and lacks carbonaceous tissue around the perithecia. *Hypoxylon dussii* is corticolous, it has olivaceous KOH-extractable pigments, the subsurface carbonaceous crust is gradually replaced by waxy granules around the perithecia and at base and its ascospores are larger ($9.1\text{--}10.1 \times 4.2\text{--}4.8 \mu\text{m}$) and more broadly ellipsoid (this paper).

Even in the restricted sense considered here, *H. investiens* exhibits slight intraspecific variations in stromatal pigments, ascospores dimensions and germ slit morphology that suggest the possible segregation of further new taxa with help of molecular, cultural and chemotaxonomic data.

Hypoxylon isabellinum J. Fourn., Kuhnert & M. Stadler, *Fungal Divers.*, 64: 184 (2014). Plate 19

Stromata glomerate, 1–2 mm diam \times 0.5–0.6 mm thick, coalescent into larger pulvinate stromata up to 9 mm long; surface hazel (88, oac786), pruinose, with usually exposed perithecial contours, shiny black where the pruina is worn off; dull yellowish granules beneath the surface and between the perithecia, with KOH-extractable pigments pale isabelline (65, oac862), not notably changing colour after prolonged incubation; the tissue below the perithecial layer dark brown, 0.1–0.2 mm thick. **Perithecia** subglobose, 0.3–0.4 mm diam. **Ostioles** umbilicate, at times at the centre of a shallow depression.

Asci cylindrical, with eight obliquely uniseriate ascospores, 110–130 (–160) μm total length, the spore-bearing parts 70–80 \times 8–8.5 μm , the stipes 38–55 (–85) μm long, with apical apparatus discoid, 1–1.2 \times 3–3.5 μm , bluing in Melzer's reagent. **Paraphyses** filiform, copious. **Ascospores** (9.8–)10.4– 10.7 (–11.3) \times (4.8–) 5.2–5.4 (–5.8) μm , $Q = (1.8\text{--})2(–2.2)$; $N = 30$ ($Me = 10.6 \times 5.3 \mu\text{m}$; $Qe = 2$), ellipsoid strongly inequilateral with narrowly rounded ends, often crescentic, dark brown, with a faint straight germ slit spore-length; perispore dehiscent in 10% KOH, thick, conspicuously striated; epispore smooth.

Asexual morph on the natural substrate not observed; asexual morph in culture on OA virgariella-like (KUHNER *et al.*, 2014).

Specimen examined: FRENCH WEST INDIES: MARTINIQUE: Sainte-Marie, La Philippe forest, mesophilic to xerophilic forest, 50 m, on bark of a dead branch of Mahogany (*Swietenia macrophylla* King, *Meliaceae*), 31 Aug. 2010, *leg.* J. Fournier, MJF10299 (LIP, holotype).

Known distribution: Martinique.

Discussion: *Hypoxylon isabellinum* is diagnosed based on its few-peritheciate glomerate stromata with an olivaceous tan surface and

pale isabelline KOH-extractable pigments, combined with strongly inequilateral ascospores averaging $10.6 \times 5.3 \mu\text{m}$ with a coarsely striated perispore dehiscent in 10% KOH. It is likewise highly distinctive in having unknown stromatal metabolites except carneic acids (KUHNER *et al.*, 2014), so far only known from *H. carneum* Petch, a species from which it can be easily distinguished by stromatal surface colour and ascospore morphology (JU & ROGERS, 1996; FOURNIER & MAGNI, 2002). The most resembling tropical species is *H. musceum* Rogers, which differs in having orange KOH-extractable pigments and less inequilateral ascospores with a germ slit less than spore-length and often slightly sigmoid or oblique (JU & ROGERS, 1996; FOURNIER & LECHAT, 2015b; this paper).

Hypoxylon laminosum J. Fourn., Kuhnert & M. Stadler, *Fungal Divers.*, 64: 189 (2014). Plate 20.

Stromata peltate to hemispherical with a short and broadly attached central base, the margin almost in contact with the host surface, separate to coalescent, 6–20 mm diam \times 4–9 mm thick; surface livid vinaceous (83, oac506) to dark vinaceous (82, oac523), pruinose, with slightly exposed perithecial contours to even; outer crust 30 μm thick, dark brown, brittle, composed of waxy granules appearing olivaceous brown when observed in water, yielding livid violet (79, oac400) KOH-extractable pigments, not notably changing colour after prolonged incubation; the tissue between perithecia greyish, soft-textured, with a blackish line separating the perithecial layer from the sterile internal tissue; interior blackish brown, soft-textured, solid, with a lamellate structure consisting of densely intricate small black and golden brown lines. Primordia of immature stromata present at base of some mature stromata, club-shaped to irregularly flattened, upright on a narrow stipe. **Perithecia** long tubular, 0.75–0.9 \times 0.3–0.35 mm. **Ostioles** umbilicate, black to inconspicuous.

Asci cylindrical, very long-stipitate, with eight obliquely uniseriate ascospores, 200–240 μm total length, the spore-bearing parts 72–85 \times 5.5–6 μm , the stipes over 120–160 μm long, fragile and most often broken, with apical apparatus discoid to cuneate, 1–1.2 \times 2.5 μm , bluing in Melzer's reagent. **Paraphyses** filiform, copious. **Ascospores** (10.7–)11.8–12.3 (–13.3) \times (3.8–) 4.3–4.5 (–5.1) μm , $Q = (2.4\text{--}) 2.7\text{--}2.8$ (–3); $N = 30$; ($Me = 12 \times 4.4 \mu\text{m}$; $Qe = 2.7$), ellipsoid-inequilateral with narrowly rounded ends, olive to medium brown, with a straight spore-length germ slit on the most convex side; perispore indehiscent in 10% KOH, epispore smooth.

Asexual morph on the natural substrate not observed. Asexual morph on OA not obtained (KUHNER *et al.*, 2014).

Specimens examined: FRENCH WEST INDIES: MARTINIQUE: Prêcheur, Anse Couleuvre, coastal rainforest, at base of a dead culm of bamboo, 27 Aug. 2007, *leg.* J. Fournier, MJF 07130 (LIP); Schoelcher, Case Navire River, mesophilic forest, ca. 50 m, at base of dead standing culms of bamboo, 28 Aug. 2010, *leg.* J. Fournier, MJF10181 (LIP, Holotype); Fond Saint-Denis, Morne Gaubert, trail in mesophilic forest, charred bamboo, 16 Aug. 2011, *leg.* C. Lechat, CLLMAR 11010 (LIP). NICARAGUA: Castillo Viejo, Feb.–Mar.1893, Central American Fungi 26, *leg.* C.L. Smith, firewood (BPI 590953, isolectotype of *H. nicaraguense*).

Known distribution: Martinique.

Discussion: *Hypoxylon laminosum* is well-characterized by daldinoid stromata with violet KOH-extractable pigments, medium brown ascospores with a spore-length germ slit and perispores indehiscent in 10% KOH, and occurrence on bamboo. Amongst *Hypoxylon* spp. featuring peltate stromata and violet KOH-extractable pigments, *H. nicaraguense* Ellis & Everh., a wood-inhabiting species, is the most resembling in having ascospores with a germ slit almost spore-length. Examination of the type of *H. nicaraguense*, which is in fairly good condition, revealed a striking similarity in the lamellate structure of the internal tissue of the stroma. However it differs in

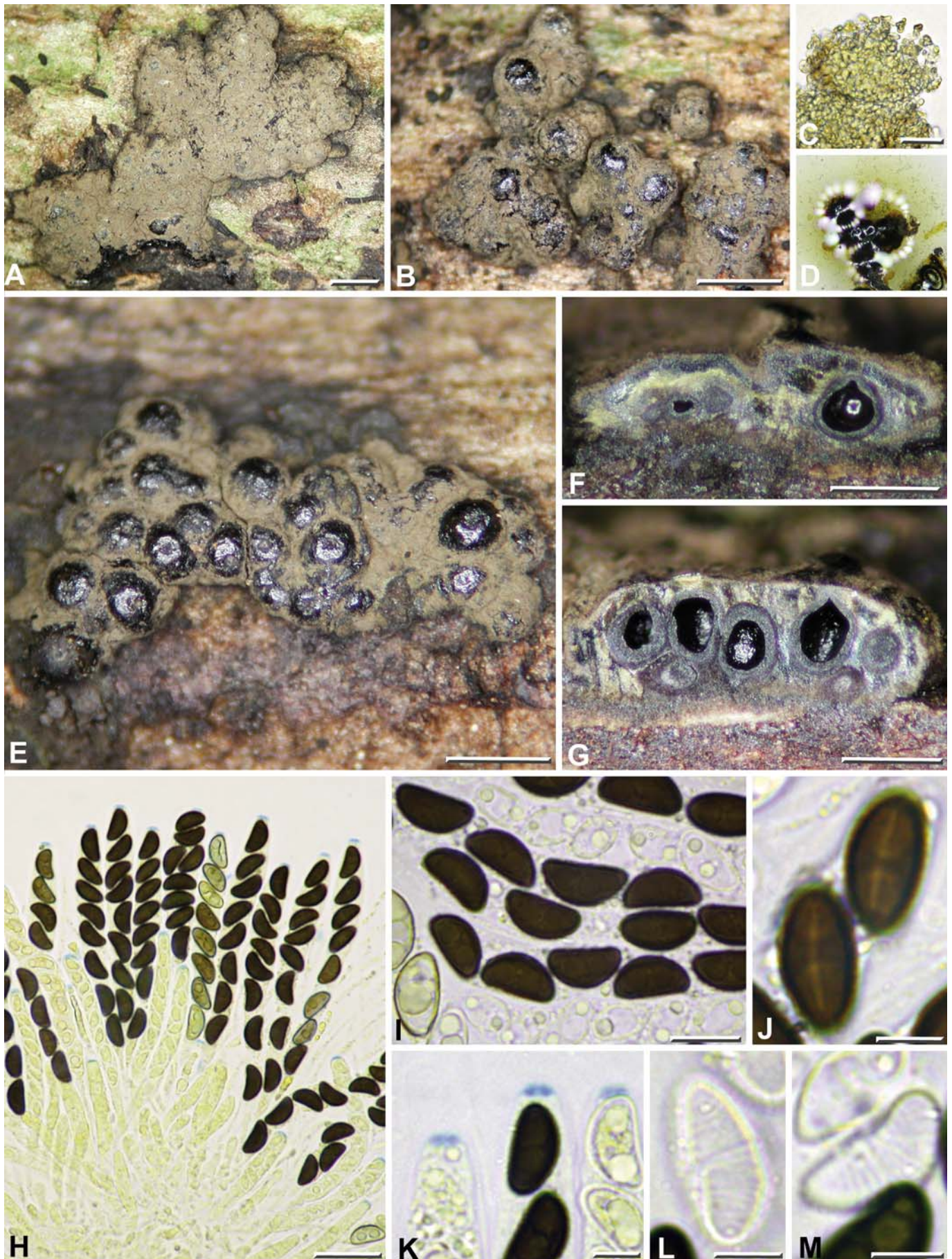


Plate 19 — *Hypoxylon isabellinum*

Holotype MJF 10299. A, B, E: Stromata in surface view; C: Stromatal granules in water; D: KOH-extractable pigments after 1 min incubation; F, G: Stromata in vertical section showing the perithecia and the yellowish waxy granules; H: Asci in Melzer's reagent; I: Ascospores in side view in water; J: Ascospores in dorsal view showing the germ slit; K: Ascical apical apparatus in Melzer's reagent; L, M: Ascospores perispores dehiscing in 10% KOH showing the striated ornamentation. Scale bars: A, B, E = 1 mm; C, H = 20 μ m; F, G = 0.5 mm; I = 10 μ m; J, K-M = 5 μ m.

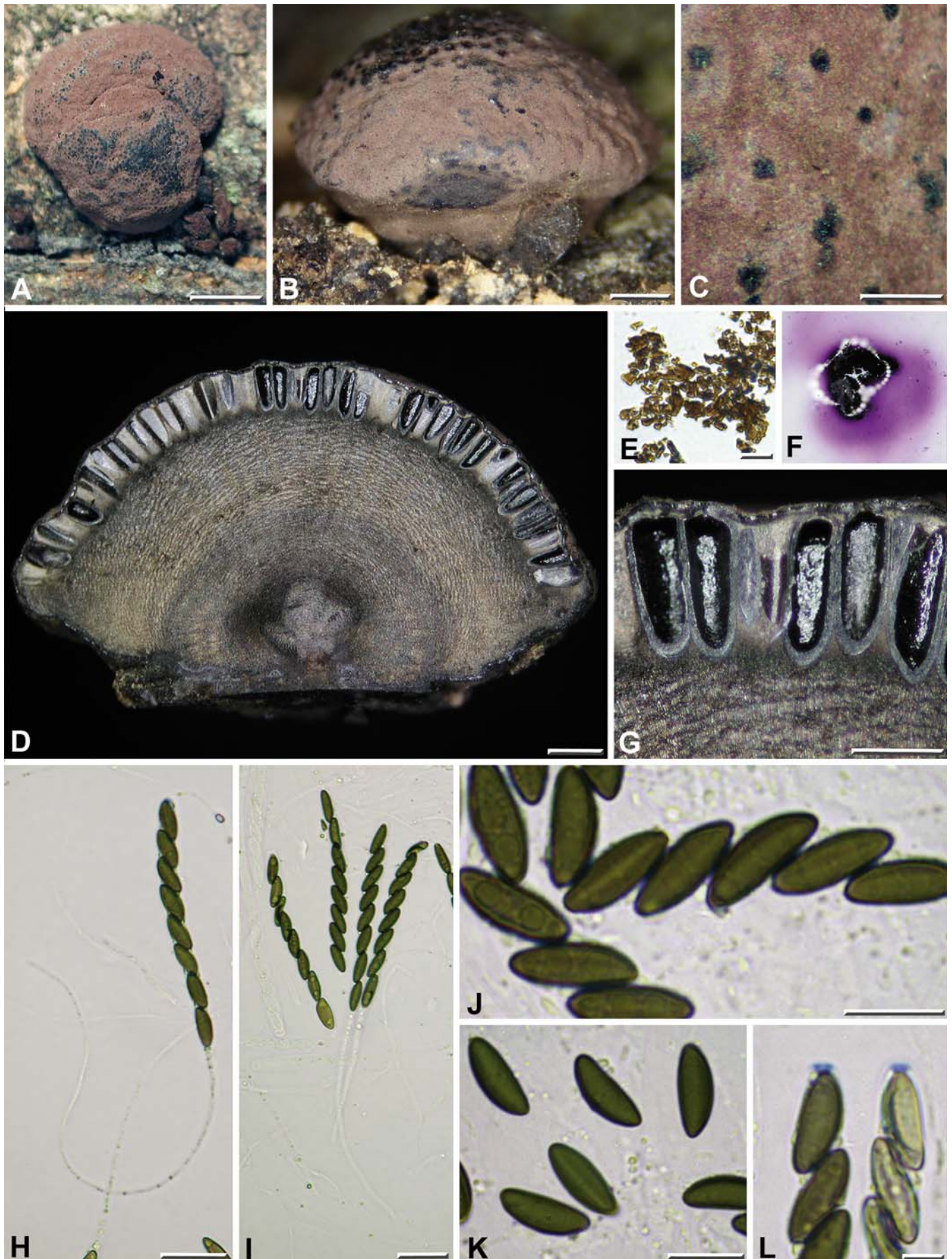


Plate 20 — *Hypoxylon laminosum*

Holotype MJF 10181. A: Stroma in surface view, with small primordia next to the base; B: Stroma in side view; C: Stromatal surface in close-up showing the ostioles; D, G: Stroma in vertical section showing the perithecia and the lamellate interior; E: Stromatal granules in water; F: KOH-extractable pigments after 1 min incubation; H, I: Asci in 1% SDS, showing the long stipes; J: Ascospores in water, one with the germ slit visible; K: Ascospores in 10% KOH lacking a dehiscent perispore; L: Ascospores in Melzer's reagent. Scale bars: A = 5 mm; B, D = 1 mm; C = 0.2 mm; E, J, K = 10 μ m; G = 0.5 mm; H, I = 20 μ m; L = 5 μ m.

having raised-discoïd ostioles and more broadly ellipsoid ascospores $12.5\text{--}14.5 \times 5.5\text{--}6 \mu\text{m}$ and KUHNERT *et al.* (2014) assessed that both species also differ by their HPLC profile.

Since its discovery, the affiliation of *H. laminosum* to dead culms of *Bambuseae* (*Poaceae*) was confirmed by several further collections and the few species of *Hypoxylon* known to occur on bamboo all show the same strict host specificity.

Hypoxylon lateripigmentum J. Fourn., Kuhnert & M. Stadler, *Fungal Divers.*, 64: 192 (2014). Plate 21

Stromata effused-applanate, elongated in coalescent strips, 5–90 mm long \times 3–16 mm wide \times 0.9–1.1 mm thick; surface dark vinaceous (82, oac523), pruinose, with slightly exposed to conspicuous perithecial contours; olivaceous yellow granules beneath the surface and between the perithecia, with fugacious KOH-extractable pigments sienna (8, oac630), turning bay (6, oac622) within 1 min incubation, evolving to dark isabelline (65, oac866) upon prolonged incubation; the tissue below the perithecial layer grey brown with white streaks to blackish, 0.2–0.4 mm thick. **Perithecia** obovoid to short tubular, 0.6–0.7 \times 0.35–0.5 mm. **Ostioles** umbilicate, inconspicuous.

Asci cylindrical, short- to long-stipitate, with eight obliquely uniseriate ascospores, 85–155 μm total length, the spore-bearing parts 57–72 \times 5–6 μm , the stipes 22–90 μm long, originating from long ascogenous hyphae in spicate arrangement, with apical apparatus discoïd, 1–1.2 \times 2–2.5 μm , bluing in Melzer's reagent. **Paraphyses** filiform, copious, minutely guttulate. **Ascospores** (7.3–) 8.1–8.5 (–9.4) \times (3.6–) 4–4.2 (–4.6) μm , $Q = (1.7\text{--}) 2\text{--}2.1 (–2.3)$; $N = 30$; ($Me = 8.3 \times 4.1 \mu\text{m}$; $Qe = 2$), ellipsoid nearly equilateral with narrowly rounded ends, dark brown, with a faint straight germ slit spore-length; perispore dehiscent in 10% KOH, thin, smooth in bright-field microscopy; epispore smooth.

Asexual morph on the natural substrate not observed; asexual morph in culture on OA nodulisporium- to periconiella-like (KUHNERT *et al.*, 2014).

Specimens examined: FRENCH WEST INDIES: MARTINIQUE: Trinité (Caravelle peninsula), Pointe Rouge, mesophilic to xerophilic forest, on dead decorticated trunk, 22 Aug. 2010, *leg.* C. Lechat & J. Fournier, MJF10046 (LIP, Holotype); Case-Pilote, Fond Boucher, trail to Morne Venté, mesophilic to xerophilic forest, on blackened wood, 17 Aug. 2013, *leg.* J. Fournier, MJF 13282 (LIP, paratype); *ibid.*, same date, *leg.* J. Fournier, MJF 13301 (LIP, paratype); Schoelcher, Case Navire River, mesophilic forest, on blackened wood, 5 Aug. 2013, *leg.* J. Fournier, MJF 13007 (LIP, paratype).

Known distribution: Martinique.

Discussion: *Hypoxylon lateripigmentum* can be easily confused in the field with the widespread *H. investiens* and the more rarely recorded *H. pulicidum* with which it shares largely effused stromata with a purplish brown surface, equilateral ascospores and frequent occurrence on blackened wood. It is readily distinguished from the above species by its dark reddish brown KOH-extractable pigments that in contrast are dull green in *H. investiens* and pale olivaceous in *H. pulicidum*; it likewise clearly differs from both species in having darker brown ascospores with narrowly rounded ends and a perispore dehiscent in 10% KOH.

Moreover, *H. lateripigmentum* was shown to have mostly unknown stromatal metabolites and to lack the typical compounds encountered in *H. investiens* and *H. pulicidum* (KUHNERT *et al.*, 2014).

Hypoxylon lenormandii Berk. & M.A. Curtis, *J. Linn. Soc., Bot.*, 10: 385 (1869). Plates 22–23

Stromata glomerate to effused, sometimes pulvinate when erumpent from the periderm, most often perithecioid with very

conspicuous perithecial contours, individual stromata 0.6–0.7 mm diam \times 0.6–1 mm thick, seated on a more or less conspicuous stromatal cushion; surface buff (45, oac800) to greyish sepia (106, oac639–640), pruinose; olivaceous yellow-brown waxy granules forming a thin continuous waxy layer around perithecia, yielding bay (6, oac622) KOH-extractable pigments within 1 min incubation, becoming hazel (88, oac818) upon prolonged incubation; subperithecial tissue greyish brown to blackish, to 0.4 mm thick. **Perithecia** spherical 0.4–0.5 mm diam. **Ostioles** umbilicate to slightly papillate, sometimes in a shallow discoïd depression.

Asci cylindrical, with eight obliquely uniseriate ascospores, 150–190 μm total length, the spore-bearing parts 85–94 \times 7–8.5 μm , the stipes 60–100 μm long, with a discoïd apical apparatus 1–1.7 \times 2–2.5 μm , bluing in Melzer's reagent. **Ascospores** (10.6–) 11.1–12.9 (–13.5) \times (4.6–) 4.8–5.8 (–6) μm , $Q = (2\text{--}) 2.1\text{--}2.6 (–2.8)$; $N = 120$ ($Me = 12 \times 5.3 \mu\text{m}$; $Qe = 2.3$), ellipsoid-inequilateral with narrowly rounded ends, at times slightly ventrally concave, dark brown, with a sigmoid germ slit spore-length on the most convex side; perispore dehiscent in 10% KOH, transversely striated; epispore smooth.

Asexual morph on the natural substrate (Plate 23) synnematos, among or at periphery of mature stromata; synnemata 250–750 μm high, pale buff (45, oac662), concolourous or dark brown at base, consisting of aggregated dark brown encrusted hyphae 3.5–4 μm diam; conidiogenous structure virgariella- to nodulisporium-like; conidiophores pale brown, warted, conidiogenous cells 10–14.5 μm long \times 3–3.5 μm , warted; conidia ellipsoid, 3.6–4.5 \times 2.7–3.2 μm , subhyaline, smooth. Asexual morph in culture on OA nodulisporium-like, based on material from Mexico and Taiwan (JU & ROGERS, 1996).

Specimens examined: FRENCH WEST INDIES: GUADELOUPE: Les Saintes, Terre de Bas, Ravine Caraïbe, on bark, 15 Jan. 1993, *leg.* J. Vivant, JF 02147 (overmature). MARTINIQUE: Prêcheur, Anse Couleuvre, coastal rainforest, Sept. 2003, on bark and rotten wood, *leg.* C. Lechat, CLL 720 (LIP); *ibid.*, on bark, 18 Aug. 2005, *leg.* C. Lechat, CLL 5014 (LIP); Trinité (Caravelle peninsula), Pointe Rouge, coastal mesophilic forest, on bark, 27 Aug. 2008, *leg.* C. Lechat, CLL 5204 (LIP); Prêcheur, Anse Couleuvre, coastal rainforest, on bark, 27 Aug. 2007, *leg.* J. Fournier, MJF 07128 (LIP); Le Marin, coastal mesophilic forest, on bark, 1 Dec. 2006, *leg.* C. Lechat, CLL 6126 (LIP); Prêcheur, Anse Couleuvre, coastal rainforest, 21 Aug. 2010, on bark, *leg.* J. Fournier, MJF 10016 (LIP).

Known distribution: Pantropical.

Discussion: *Hypoxylon lenormandii* is distinctive in having typically greyish brown perithecioid stromata, spherical perithecia and olivaceous brown granules yielding reddish brown pigments in KOH, combined with ascospores with a sigmoid germ slit and a perispore dehiscent in 10% KOH. It is commonly encountered in Martinique, most often in coastal forests. *Hypoxylon sublenormandii* Suwannasai, Rodtong, Thienhirun & Whalley was segregated from *H. lenormandii* based on reddish brown stromata, smaller ascospores 8.9–11.3 \times 3.8–5 μm with a straight germ slit and occurrence on bamboo (SUWANNASAI *et al.*, 2005). This taxon is so far known from Thailand and Sri Lanka only and not reported from the Neotropics. *Hypoxylon jaklitschii* Sir & Kuhnert, described from from Sri Lanka, was recently segregated from *H. lenormandii* based on a darker brown stromatal surface, slightly smaller perithecia, slightly smaller ascospores 9.5–11.5 (–12) \times 4–5.5 μm and a different HPLC profile (KUHNERT *et al.*, 2015). As noticed by JU & ROGERS (1996), the wide ascospore size range 9.5–15 (–16) \times 4–6.5 (–7) μm they accepted for *H. lenormandii* implies that several different taxa might be involved. The ascospores of *H. jaklitschii* are indeed in the lower range of the dimensions of *H. lenormandii* but owing to the immature and sterile state of the isotype in K that lacks ascospores for comparison (KUHNERT *et al.*, 2015), the delimitation of *H. jaklitschii* from *H. lenormandii* cannot be unequivocally based on differences in ascospores dimensions. We agree with these authors about the

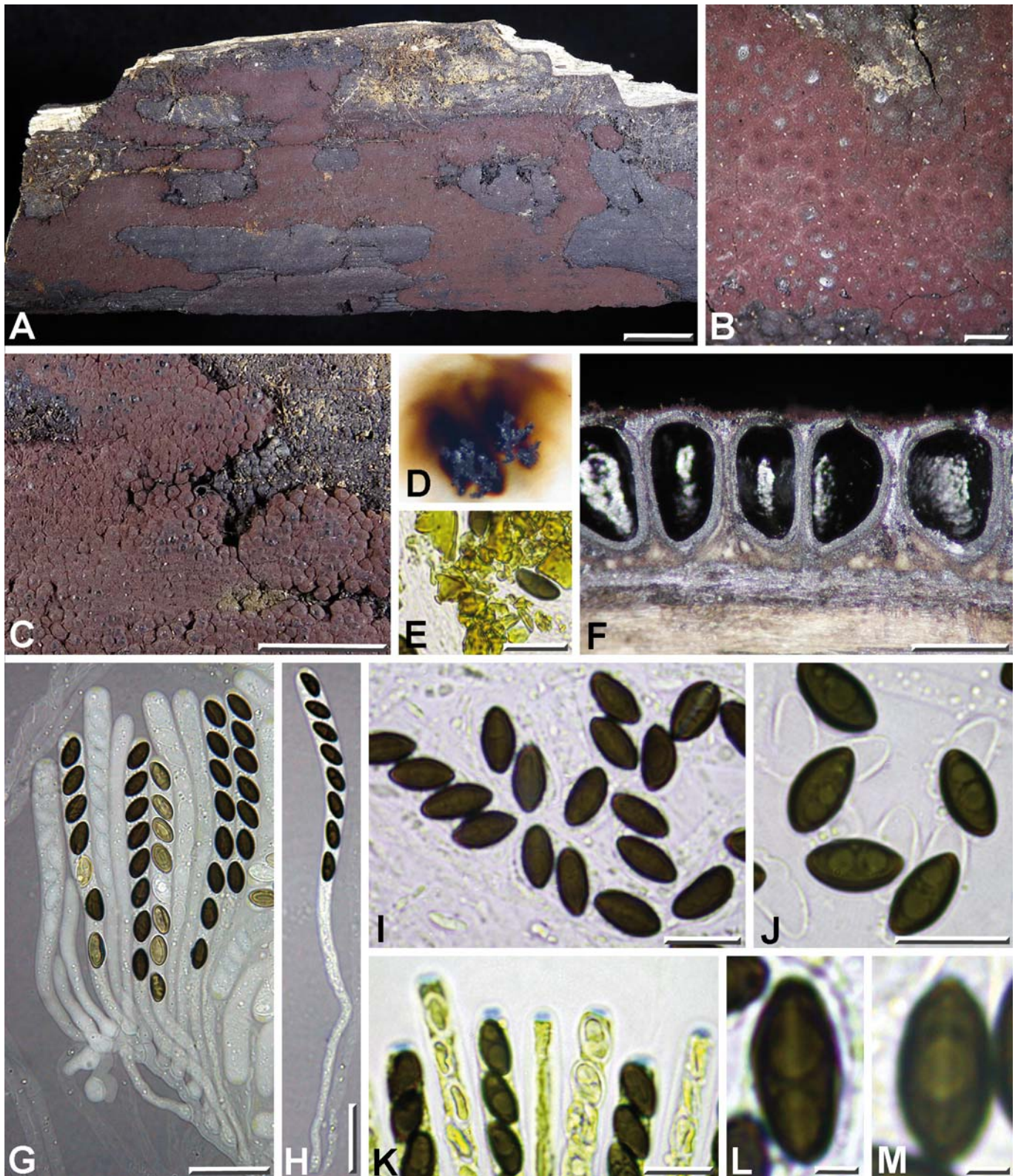


Plate 21 — *Hypoxylon lateripigmentum*

Holotype MJF 10046. A: Effused confluent stromata in surface view; B, C: Stromatal surface in close-up showing the variable exposition of perithecial contours; D: KOH-extractable pigments after 1 min incubation; E: Stromatal granules in water; F: Stroma in vertical section showing the perithecia; G: Short-stipitate asci arising from an ascogenous hypha, in black Pelikan ink; H: Long-stipitate ascus in black Pelikan ink; I: Ascospores in water; J: Ascospores perispores dehiscent in 10% KOH; K: Ascical apical apparatus in Melzer's reagent; L, M: Ascospores in dorsal view showing the germ slit, in water and 10% KOH respectively. Scale bars: A = 10 mm; B = 1 mm; C = 5 mm; E, I-K = 10 μ m; F = 0.5 mm; G, H = 20 μ m; L, M = 2 μ m.

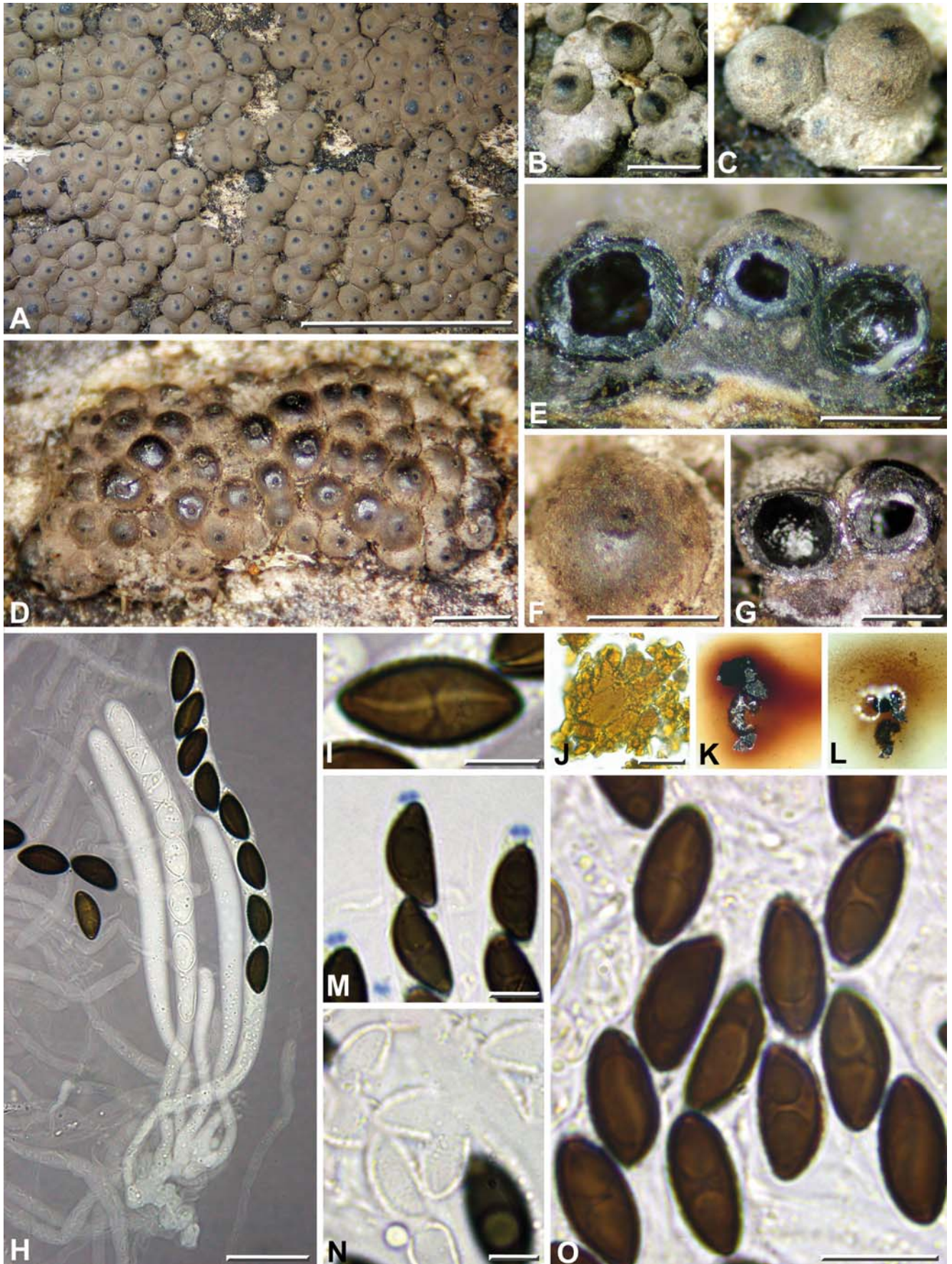


Plate 22 — *Hypoxylon lenormandii*

A-E, H-O: CLL 720; D-G: CLL 6126. A: Perithecioid stromata in surface view; B, C: Perithecioid stromata in close-up showing the basal stromatal cushion; D: Pulvinate stroma; E, G: Stromata in vertical section showing the shiny crust of waxy granules surrounding the perithecia and the basal stromatal tissue; F: Close-up on the ostiolar area showing the slightly papillate ostiole in a shallow depression; H: Bundle of immature and mature asci arising from a short ascogenous hypha, surrounded by paraphysis, in black Pelikan ink; I: Ascospore in dorsal view showing the sigmoid germ slit, in black Pelikan ink; J: Stromatal waxy granules in water; K, L: KOH-extractable pigments after 1 min and 30 min incubation respectively; M: Ascical apical apparatus in Melzer's reagent; N: Ascospores in 10% KOH showing a dehiscent perispore with striated ornamentation; O: Ascospores in water. Scale bars: A = 5 mm; B, D = 1 mm; C, E-G = 0.5 mm; H, J = 20 μ m; I, M, N = 5 μ m; O = 10 μ m.

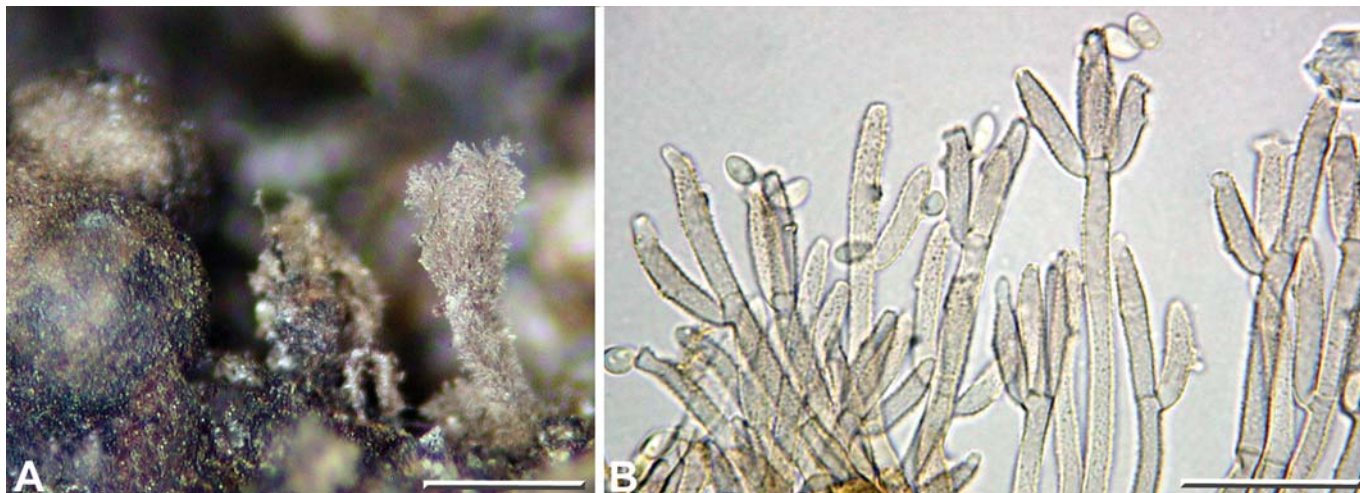


Plate 23 — *Hypoxylon lenormandii* asexual morph

CLL 5204. A: Synnema on host surface, next to stromata; B: Virgariella- to nodulisporium-like conidiogenous structure and conidia, in 1% SDS. Scale bars: A = 0.5 mm; B = 20 μ m.

necessity of designating an epitype based on fresh fertile material collected in Cuba where the type collection comes from.

Hypoxylon monticulosum Mont., *Syll. Gen. Sp. Crypt.*: 214 (1856). Plates 24–25

Stromata effused-pulvinate, separate to confluent, with inconspicuous to conspicuous perithecial contours, at times almost perithecioid, 6–30 mm long \times 4–11 mm wide \times 0.4–0.7 mm thick; surface rust (39, oac643) and pruinose when young, pruina gradually fading upon maturation, eventually dull brownish black to black and smooth at maturity; texture hard, brittle, with carbonaceous tissue above and around perithecia, lacking colored granules and without KOH-extractable pigments; in contrast, immature rust-colored stromata yield livid vinaceous (83, oac506) to livid red (56, oac509) pigments in KOH due to granules encrusting the contorted hyphae composing the pruina; subperithecial tissue blackish brown, 60–250 μ m thick, sometimes associated with a faint blackening of the underlying wood. **Perithecia** subglobose to obovoid, 0.35–0.45 \times 0.2–0.35 mm. **Ostioles** finely conic-papillate, shiny black.

Asci cylindrical, with eight obliquely uniseriate ascospores, 90–110 μ m total length, the spore-bearing parts 52–66 \times 5–6 μ m, the stipes 30–45 (–68 μ m) long, with a discoid apical apparatus 0.7–1 \times 1.6–1.8 μ m, bluing in Melzer's reagent. **Ascospores** (6.9–) 7.2–8.5 (–8.7) \times (2.8–) 3–3.5 (–3.8) μ m, Q = (2–) 2.2–2.6 (–3.2); N = 175 (Me = 7.8 \times 3.2 μ m; Qe = 2.4), narrowly ellipsoid-inequilateral with narrowly rounded ends, often slightly twisted, brown to dark brown, with a conspicuously sigmoid germ slit spore-length on the most convex side; perispore usually dehiscent in 10% KOH, faintly striated; epispore smooth.

Asexual morph on the natural substrate (Plate 25) synnematos, among old stromata, on and around rust-coloured primordia; synnemata 150–560 μ m high, honey (64, oac847), dark brown at base, consisting of aggregated dark brown encrusted hyphae 2.5–3 μ m diam; conidiogenous structure virgariella-like, rarely tending to be nodulisporium-like in places; conidiophores pale brown, encrusted, conidiogenous cells 13–24 \times 1.8–2.2 μ m, smooth; conidia ellipsoid, 3.4–3.8 \times 2.2–2.7 μ m, subhyaline, smooth. Asexual morph in culture on OA virgariella-like, based on material from Mexico and Taiwan (JU & ROGERS, 1996).

Specimens examined: FRENCH WEST INDIES: GUADELOUPE: Saint-Claude, Beausoleil, trail to Plateau Dimba, mesophilic rainforest, on rotten wood, 9 Sept. 2003, leg. C. Lechat, CLL 0982 (LIP). MARTINIQUE: *sine loco*, corticated branchlet, Sept. 2004, leg. C. Le-

chat, CLL 2185 (LIP) (immature); Prêcheur, Anse Coulevre, coastal mesophilic rainforest, on rotten wood, 3 Sept. 2003, leg. C. Lechat, CLL 07089 (LIP); Saint-Esprit, Bois La Charles, mesophilic rainforest, on bark, 8 Dec. 2005, leg. C. Lechat, CLL 5607 (LIP); Trinité (Caravelle peninsula), Pointe Rouge, xerophilic coastal forest, dead corticated branch, 31 Aug. 2007, leg. J. Fournier, MJF 07226 (LIP); Case-Pilote, Morne Rose, mesophilic rainforest, dead corticated trunk, 1 Sept. 2010, leg. J. Fournier, MJF 10317 (LIP); Prêcheur, Anse Coulevre, coastal mesophilic rainforest, on rotten wood, 3 Jun. 2014, leg. J. Fournier, MJF 14009 (LIP) (asexual morph).

Known distribution: pantropical and subtropical.

Discussion: Countless collections of *H. monticulosum* showed this taxon is widespread in tropical forests, occurring on branchlets just fallen from the canopy or on strongly rotten wood lying on the soil as well; they also showed it is a deceiving species until microscopic observation is carried out: In the field its immature rusty stromata resemble many *Hypoxylon* spp. with orange surface and its mature black and carbonaceous stromata are easily confused with those of *Nemania* or *Biscogniauxia*. However, *H. monticulosum* can be clearly set apart from other *Hypoxylon* spp. and related xylariaceous genera based on the combination of strongly carbonaceous stromata with conic-papillate ostioles and narrowly ellipsoid inequilateral ascospores with a conspicuous germ slit on the convex side and a perispore dehiscent in 10% KOH. Based on morphology only, the placement of *H. monticulosum* in *Hypoxylon* may appear arguable but its affinities with this genus are supported by its virgariella-like asexual morph obtained in culture (JU & ROGERS, 1996) or found associated with old or young stromata on natural substrates, and molecular results that show strong affinities with *Hypoxylon* (HSIEH *et al.*, 2005) or suggest possible affinities with the very closely related genus *Annulohypoxylon* (KUHNERT *et al.*, 2014).

Hypoxylon munkii Whalley, Hammelev & Talig., *Trans. Brit. Mycol. Soc.*, 90: 139 (1988). Plate 26

Stromata effused to effused-pulvinate, irregularly elongate-lobed, 22–36 mm long \times 8–16 mm wide \times 0.6–0.8 mm thick, with inconspicuous perithecial contours; surface whitish to pale vinaceous grey (115, oac569), turning dark vinaceous (82, oac525), with a vinaceous superficial pruina revealing the white subsurface where it is worn off; waxy granules forming a thick white layer above perithecia and extending towards the base, appearing colourless in water, not dissolved in 10% KOH and yielding no pigments, while

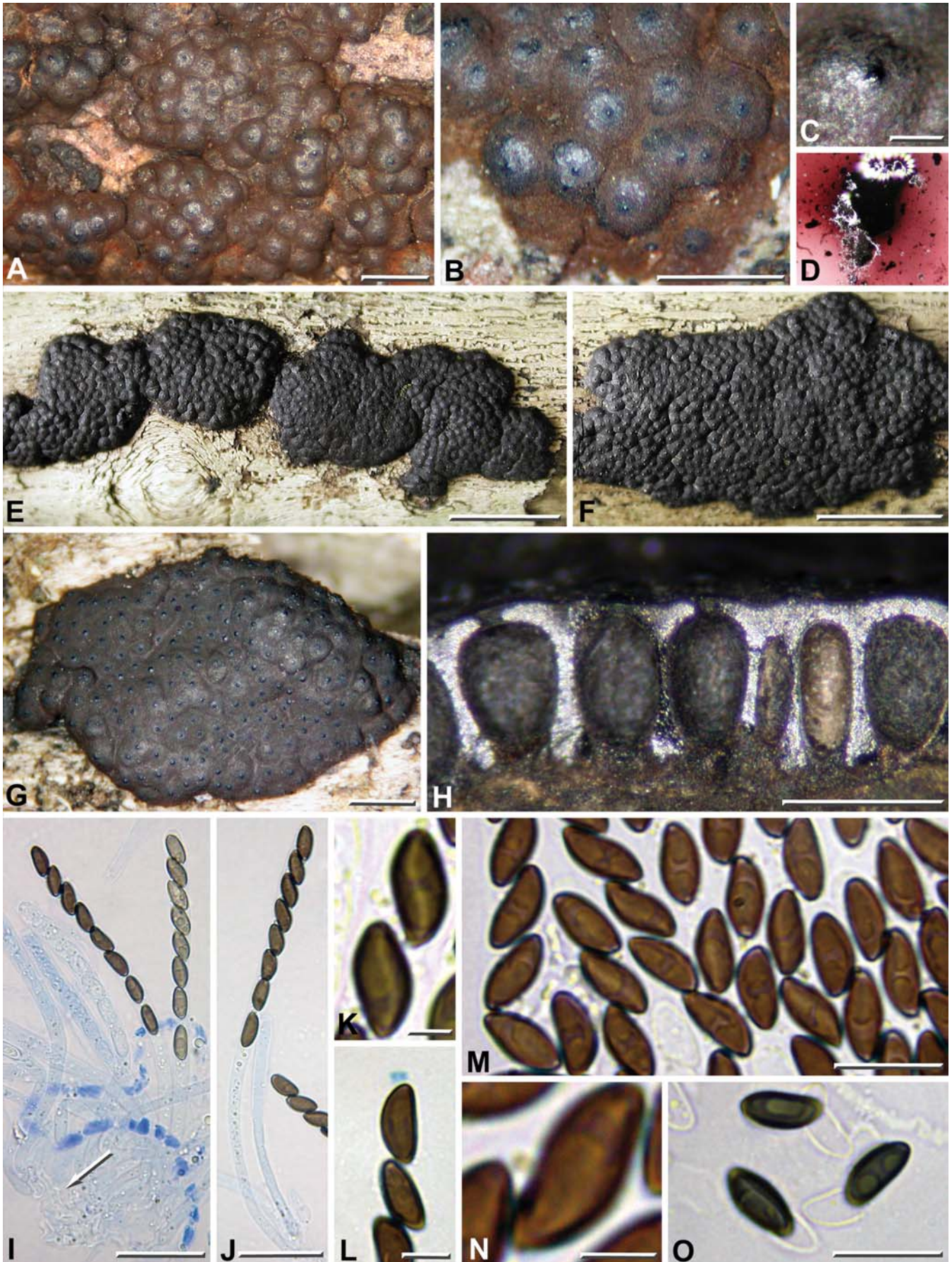


Plate 24 — *Hypoxylon monticulosum*

A-D: MJF 07226; E, F, H-O: CLL 5607; G: CLL 0982. A, B: Young stromata with rust surface; C: Stromatal surface in close-up showing a shiny black papillate ostiole; D: KOH-extractable pigments from an immature stroma; E-G: Effused-pulvinate stromata at maturity; H: Stroma in vertical section showing the carbonaceous tissue encasing the perithecia except at the base; I, J: Mature and immature asci in dilute blue Waterman ink in 1% SDS, originating from denticulate ascogenous hyphae (arrow); K: Ascospores in dorsal view showing the sigmoid germ slits; L: Ascocal apical apparatus in Melzer's reagent; M: Ascospores in water; N: Twisted ascospore, in water; O: Ascospores with a perispore dehiscent in 10% KOH. Scale bars: A, B, G = 1 mm; C = 0.1 mm; E, F = 5 mm; H = 0.5 mm; I, J = 20 µm; K, N = 3 µm; L = 5 µm; M, O = 10 µm.



Plate 25 — *Hypoxylon monticulosum* asexual morph

MJF 14009. A: Synnemata on host surface, next to a primordium; B: Synnema in 1% SDS; C, D: Virgariella-like conidiogenous structure and conidia, in 1% SDS. Scale bars: A = 0.5 mm; B = 100 μ m; C = 20 μ m; D = 5 μ m.

the superficial pruina turns bluish to dark green in this medium; subperithecial tissue blackish, inconspicuous, the underlying wood stained blackish. **Perithecia** long tubular, 0.45–0.7 \times 0.13–0.17 mm. **Ostioles** umbilicate, inconspicuous.

Asci cylindrical, with eight obliquely uniseriate ascospores, 95–130 μ m total length, the spore-bearing parts 40–45 \times 5.5–6.5 μ m, the stipes 50–90 μ m long, arising in spicate arrangement from long ascogenous hyphae, with a discoid apical apparatus 0.7–1 \times 1.7–2.2 μ m, bluing in Melzer's reagent. **Ascospores** (5.8–) 6.1–7 (–7.4) \times (3–) 3.3–3.7 (–4) μ m, Q = (1.6–) 1.7–2.1 (–2.2); N = 60 (Me = 6.6 \times 3.5 μ m; Qe = 1.9), ellipsoid-inequilateral with narrowly to broadly rounded ends, dark brown, with a straight germ slit spore-length on the flattened side; perispore dehiscent in 10% KOH, smooth; episore smooth.

Asexual morph on the natural substrate not seen.

Specimens examined: FRENCH WEST INDIES: MARTINIQUE: Case-Pilote, Morne Rose, mesophilic rainforest, dead decorticated wood, 1 Sept. 2010, *leg.* J. Fournier, MJF 10321 (LIP); Fort-de-France, Absalon, trail to Plateau Michel, ca. 350 m elev., hygrophilic rainforest, on corticated branch, 5 Jun. 2014, *leg.* J. Fournier, MJF 14041 (LIP); Rivière-Pilote, Lépinay Forest, mesophilic forest, dead decorticated wood, 10 Aug. 2013, *leg.* J. Fournier, MJF 13109 (LIP). TAIWAN: Taipei Co., San-hsia, Man-yueh-yuan forest recreation area, on dead wood, 4 Aug. 2001, *leg.* Y.-M. Ju, Y.-M. Ju 90080403.

Known distribution: French Guiana, Martinique, Nigeria, USA (Georgia), Taiwan.

Discussion: *Hypoxylon munkii* is distinctive in several respects and thus easily recognizable. Its stromata vary from whitish to dark vinaceous because of a purple pruina more or less densely distributed over a subsurface composed of colourless waxy granules that do not dissolve in 10% KOH and do not yield pigments. The pruina turns bluish to dark green in this medium but the reaction is only visible under the microscope. Moreover the combination of long tubular perithecia and small dark brown inequilateral ascospores with a thin perispore dehiscent in 10% KOH and a long straight germ slit on the ventral side set this species apart from all *Hypoxylon* spp. *Hypoxylon moellerianum* (Henn.) Y.-M. Ju & J.D. Rogers resembles *H. munkii* in having pale mouse grey stromata and small ascospores 5.5–7 \times 3–3.5 μ m but mainly differs in having rusty brown stromatal granules with isabelline KOH-extractable pigments, spherical perithecia and pale brown ascospores with the germ slit on the convex side.

Hypoxylon munkii was first described from Nigeria (WHALLEY *et al.*, 1988) and its few records suggest a pantropical distribution. It is no-

teworthy that all known collections of this rarely recorded species except one (MJF 14041) were made on dead decorticated wood.

Hypoxylon musceum J.D. Rogers, *Can. J. Bot.*, 59:1363 (1981). Plate 27

Stromata glomerate, few-peritheciate, with conspicuous perithecial contours, 0.7–1 mm diam \times 0.4–0.6 mm thick, separate to coalescent into larger pulvinate stromata to 1.7 μ m long \times 1.4 μ m wide; surface isabelline (65, oac838) to fawn (87, oac831), pruinose, shiny black where the pruina is worn off; dull orange brown and yellowish granules forming a waxy layer beneath surface and around perithecia, yielding sienna (8, oac630) KOH-extractable pigments fading to ochreous (44, oac757) after 20–30 min incubation; subperithecial tissue blackish brown, inconspicuous. **Perithecia** spherical, 0.25–0.35 mm diam. **Ostioles** umbilicate, surrounded by a disc of white substance 50–70 μ m diam.

Asci cylindrical, short-stipitate, with (6–) 8 obliquely uniseriate ascospores, 75–85 μ m total length, the spore-bearing parts 62–70 \times 7–8.5 μ m, the stipes 10–17 μ m long, with a discoid apical apparatus 0.8–1 \times 2.2–2.6 μ m, bluing in Melzer's reagent. **Paraphyses** copious, ribbon-like, 3–4.5 μ m wide. **Ascospores** (9–) 9.4–10.9 (–11.5) \times (4.2–) 4.4–5.1 (–5.2) μ m, Q = (1.8–) 2–2.3 (–2.5); N = 60 (Me = 10.1 \times 4.8 μ m; Qe = 2.1), ellipsoid-inequilateral with mostly narrowly rounded ends, dark brown, with a straight to slightly oblique or slightly sigmoid germ slit less than spore-length, fairly conspicuous; perispore dehiscent in 10% KOH, faintly striated; episore smooth.

Asexual morph on the natural substrate not seen. Asexual morph in culture on OA nodulisporium-like, based on material from Guadeloupe and Venezuela (JU & ROGERS, 1996).

Specimens examined: FRENCH WEST INDIES: GUADELOUPE: Basse Terre, Petit-Bourg, forest trail of Jules, rainforest, corticated branch, 1 Sept. 2004, *leg.* C. Lechat, CLL 2251 (LIP); *ibid.*, corticated branch, associated with *H. aeruginosum*, 1 Sept. 2004, *leg.* C. Lechat, CLL 2262–2 (LIP); Sainte-Rose, Trace de Sofaïa, path to Saut des Trois Cornes, rainforest, corticated branch, Nov. 2005, *leg.* C. Lechat, CLL 5418 (LIP).

Known distribution: Gabon, Neotropics, Taiwan.

Discussion: *Hypoxylon musceum* is a rarely reported taxon but was one of the two *Hypoxylon* spp. already known from Guadeloupe (JU & ROGERS, 1996). It is diagnosed based on small glomerate stromata with an olivaceous surface and yellow to orange KOH-extractable pigments, combined with ellipsoid-inequilateral ascospores

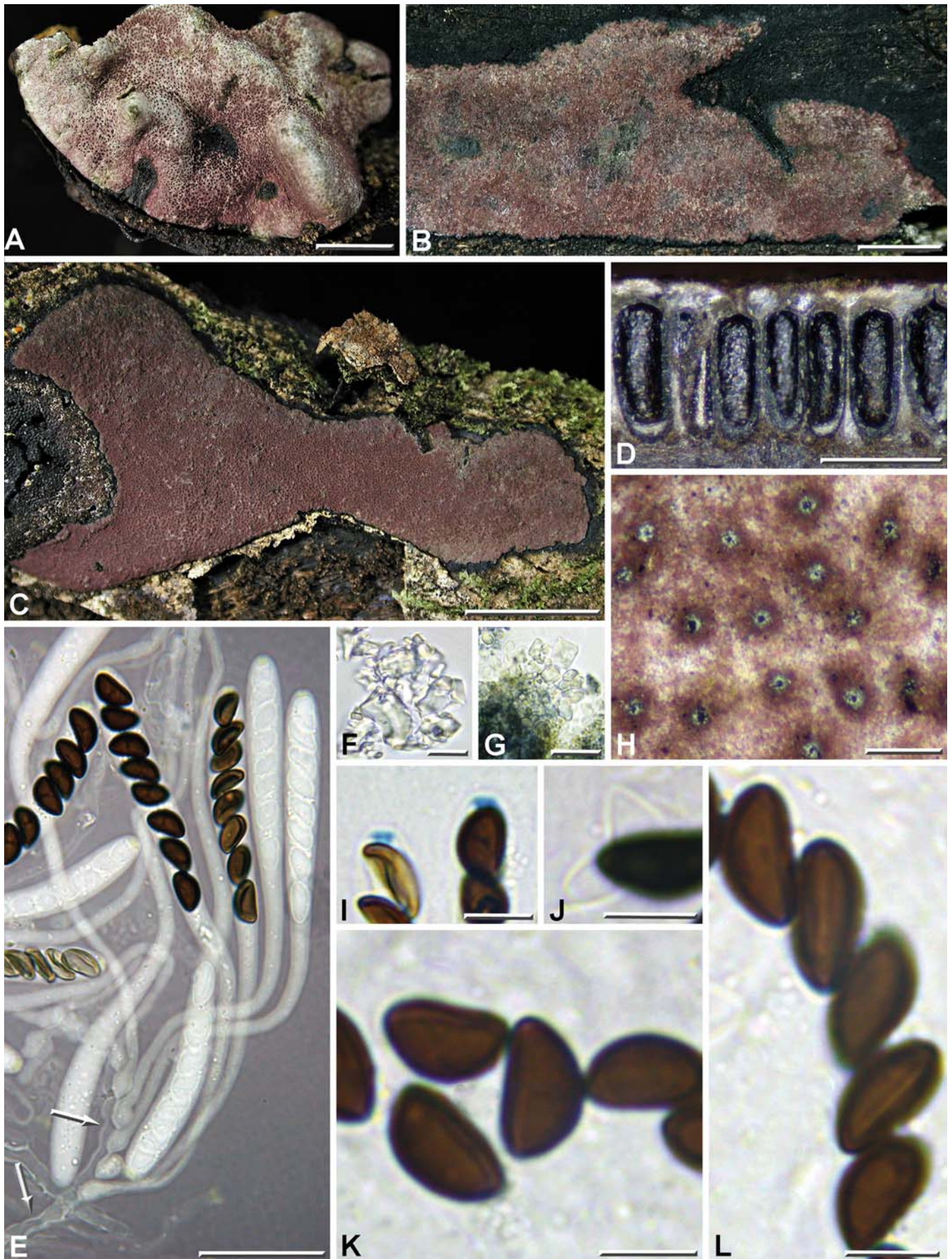


Plate 26 — *Hypoxylon munkii*

A: MJF 14041; B, D-L: MJF 10321; C: MJF 13109. A, B: Stromata on wood; C: Stroma on bark; D: Stroma in vertical section showing the perithecia and the white subsurface; E: Asci arising from ascogenous hyphae (arrows), in black Pelikan ink; F: Waxy granules from subsurface, in water; G: Waxy granules and pruina, in 10% KOH; H: Stromatal surface with ostioles; I: Ascospore in 10% KOH, showing a dehiscent perispore; J, L: Ascospores in water, with germ slit on the ventral side. Scale bars: A, B = 5 mm; C = 10 mm; D = 0.5 mm; E = 20 μ m; F-G = 10 μ m; H = 0.2 mm; I-L = 5 μ m.

9–13 × 4.5–6 µm with a short slightly sigmoid to oblique germ slit and a perispore dehiscent in 10% KOH (ROGERS, 1981; JU & ROGERS, 1996).

A collection of *H. musceum* from French Guiana has been illustrated and compared with the type specimen from Gabon and a detailed discussion about their slight differences was given in FOURNIER & LECHAT (2015b). As to ascospores shape, dimensions and ornamentation of the perispore, the material from Guadeloupe appears intermediate between the above specimens, suggesting that *H. musceum* can be regarded as a widespread species with some subtle morphological differences in relation to geographic distribution.

Hypoxylon ochraceotuberosum J. Fourn. & Lechat *sp. nov.* — MycoBank MB 813522. Plate 28

Diagnosis: Differs from other *Hypoxylon* spp. by small hemispherical stromata with pale orange brown surface and slightly exposed perithecial contours, dense orange KOH-extractable pigments and subperithecial tissue to 4.5 mm thick, combined with ellipsoid-equilateral ascospores averaging 8.9 × 4.9 µm with a smooth perispore dehiscent in 10% KOH and a straight germ slit almost spore-length.

Holotype: FRENCH WEST INDIES: MARTINIQUE: Case-Pilote, Fond Boucher, xero- to mesophilic forest, dead corticated branch, 17 Aug. 2013, *leg.* J. Fournier, MJF 13275 (LIP).

Etymology: From Latin *ochra* = natural yellow brown earth pigment, for the superficial colour of the stromata, and from Latin *tuberosus* = with prominent contours, in reference to the hemispherical stromata.

Stromata hemispherical to depressed-spherical, the base broadly attached to the substrate, coalescent into small groups, 6–9 mm diam × 2–5 mm thick, with slightly exposed perithecial contours; surface fawn (87, oac768) with orange tone, pruinose, with subsurface layer orange red, composed of amorphous waxy granules that appear yellow to pale orange when observed in water, yielding orange (7, oac629) to scarlet (5, oac628) pigments in 10% KOH, not notably changing colour after 30 min incubation; subperithecial tissue 1.5–4.5 mm thick, blackish, slightly lamellate, extending upwards between the perithecia. **Perithecia** spherical to obovoid, 0.3–0.35 mm high × 0.25–0.3 mm diam. **Ostioles** umbilicate, surrounded by a fugacious raised disc 150–170 µm diam, powdery, cream-coloured.

Asci cylindrical, with eight obliquely uniseriate ascospores, 95–110 µm total length, the spore-bearing parts 58–65 × 6.5–7.5 µm, the stipes 32–54 µm long, with apical apparatus discoid to slightly wedge-shaped, 0.6–0.8 × 2–2.5 µm, bluing in Melzer's reagent. Paraphyses copious, 3–6 (–7.5) µm wide, minutely guttulate. Cuboid crystals 4.5–9 µm on a side with pyramidal upper face, appearing translucent white, often aggregated in large clusters to 22 µm diam are interspersed in the subhymenium, not dissolving in 10% KOH nor in lactic acid. **Ascospores** (7.5–) 8.3–9.7 (–10.1) × (4.2–) 4.6–5.2 (–5.6) µm, $Q = (1.5–) 1.7–2.0 (–2.1)$; $N = 60$; (Me = 8.9 × 4.9 µm; Qe = 1.8), ellipsoid-equilateral with broadly rounded ends, brown to dark brown, with a faint germ slit almost spore-length, straight, parallel to the sides; perispore dehiscent in 10% KOH, also in water, but very thin and inconspicuous, smooth; epispore smooth.

Asexual morph on the natural substrate present in places on immature stromata, depauperate, composed of short geniculate conidiophores with vague virgariella-like branching pattern, yielding hyaline ellipsoid conidia 7.3–8 × 4–4.5 µm.

Known distribution: Martinique.

Discussion: This *Hypoxylon* is most unusual amongst tropical species in featuring hemispherical stromata with a pale orange brown surface with barely prominent perithecia and a thick subperithecial tissue to 4.5 mm thick. *Hypoxylon ochraceum* is somewhat similar,

but its stromata are glomerate with strongly exposed perithecial contours and their thickness is rarely over 1 mm; moreover, its ascospores are larger and their perispores are not dehiscent in 10% KOH (JU & ROGERS, 1996; this paper). The stromatal configuration of this *Hypoxylon* is strikingly reminiscent of that of *H. fragiforme* (Pers.) J. Kickx f. and *H. howeanum* Peck, two common north temperate species that mainly differ in having inequilateral ascospores with more narrowly rounded ends. In *Hypoxylon* spp., equilateral ascospores rarely feature a perispore dehiscent in 10% KOH and when it occurs ascospores do not have broadly rounded ends like in *H. ochraceotuberosum*.

A collection from Mexico recalling *H. ochraceotuberosum* was reported by SAN MARTÍN *et al.* (1999b) as *Hypoxylon* sp. San Martin 23 but was not described as new owing to the scanty material. Based on the description given by the authors, the collection from Mexico mainly differs from *H. ochraceotuberosum* by luteous vs. orange to scarlet KOH-extractable pigments and ascospores with perispore indehiscent in 10% KOH. As the dehiscent perispores of *H. ochraceotuberosum* are very thin they may have been overlooked and thus it cannot be ruled out that *Hypoxylon* sp. San Martin 23 would turn out to be conspecific with *H. ochraceotuberosum* when more specimens of both taxa become available for further comparison.

The presence of subhymenial crystals, already recorded in *H. nudum* J. Fourn. & Lechat, *H. rhombisporum* J. Fourn. & Lechat (FOURNIER & LECHAT, 2015b) and *H. cf. cinnabarinum* sp.1 (this paper) is likewise distinctive. It is unknown whether this character is taxonomically and/or functionally relevant but it seems to occur in tropical species only. They should be routinely searched for, preferably with the help of stains that provide a good contrast like black Pelikan ink.

Hypoxylon ochraceum Henn., *Hedwigia*, 36: 228 (1897). Plate 29

Stromata glomerate, few-peritheciate, 0.8–2 mm diam × 0.5–0.8 mm thick, frequently confluent into larger effused-pulvinate stromata to 6 mm long × 3 mm wide, with conspicuous perithecial contours; surface fulvous (43, oac706), pruinose, bay (6, oac622) where the pruina is worn off; subsurface orange brown in section, composed of waxy granules that appear yellow in water, yielding Orange (7, oac629) pigments in 10% KOH, fading after prolonged incubation; subperithecial tissue blackish, soft-textured, 0.2–0.5 mm thick. **Perithecia** spherical 0.2–0.3 mm diam to obovoid 0.30–0.35 × 0.2–0.25 mm. **Ostioles** umbilicate, inconspicuous.

Asci cylindrical, with eight obliquely uniseriate ascospores, 120–140 µm total length, the spore-bearing parts 80–100 × 9–10 µm, the stipes 15–30 µm long, with a thick apical apparatus 1.2–1.8 × 3.8–4.2 µm with a rounded apex and a sharp lateral rim, bluing in Melzer's reagent. **Ascospores** (12.6–) 13.6–15.3 (–15.9) × (6.2–) 6.8–7.6 (–8.4) µm, $Q = (1.7–) 1.8–2.2 (–2.5)$; $N = 60$ (Me = 14.5 × 7.2 µm; Qe = 2), ellipsoid-equilateral with narrowly to broadly rounded ends, brown, with a conspicuous, straight or slightly sigmoid, parallel to the sides or oblique germ slit 1/3 to almost spore-length; secondary germ slits or folds straight to undulate, most often less than spore length, variously distributed; perispore indehiscent in 10% KOH; epispore smooth.

Asexual morph on the natural substrate not observed. Asexual morph in culture on OA virgariella-like, based on material from Brazil, Guadeloupe and Taiwan (ROGERS & SAMUELS, 1985, as *H. dumontii*; JU & ROGERS, 1996).

Specimen examined: FRENCH WEST INDIES: MARTINIQUE: Trinité (Caravelle peninsula), Pointe Rouge, mesophilic rainforest, on a dead corticated branchlet, 20 Aug. 2011, *leg.* C. Lechat, CLLMAR 11045 (LIP).

Known distribution: Pantropical.

Discussion: *Hypoxylon ochraceum* is well-characterized by small pulvinate to glomerate stromata with dull orange nodulose surface and equilateral ascospores with a perispore indehiscent in KOH. The

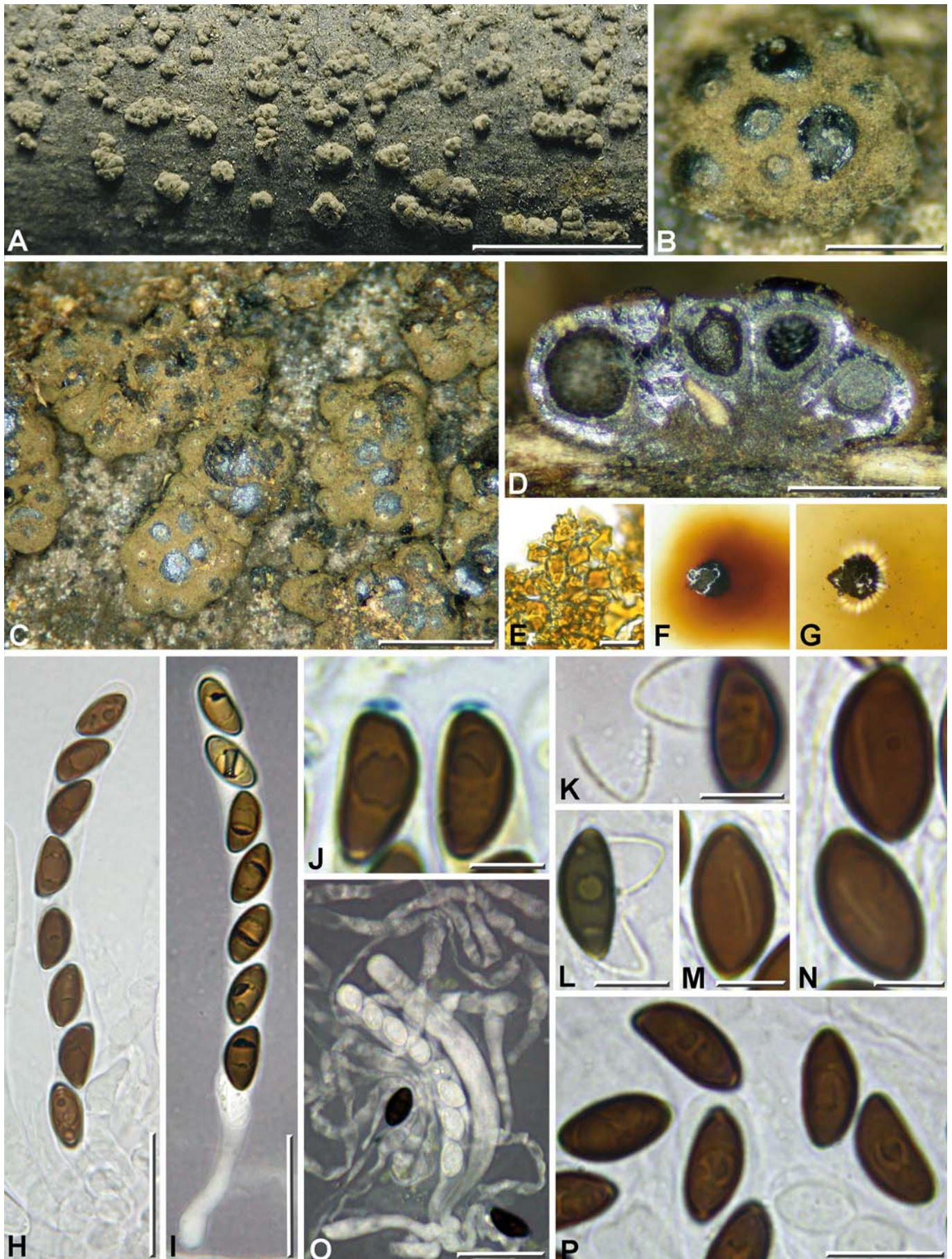


Plate 27 — *Hypoxylon muscenum*

A: CLL 5418; B-P: CLL 2251. A, C: Glomerate stromata on bark; B: Stroma in close-up showing the ostioles, the olivaceous pruina and the black subsurface; D: Stroma in vertical section showing the perithecia; E: Stromatal granules in water; F, G: KOH-extractable pigments after 1 min and 30 min incubation respectively; H, I: Mature asci in 1% SDS and black Pelikan ink respectively; J: Ascinal apical apparatus in Melzer's reagent; K: Ascospore with faintly striated perispore dehiscent in black Pelikan ink; L: Ascospore in 10% KOH showing the dehiscent perispore; M, N: Ascospores in dorsal view showing the short oblique germ slits, in PVA-lactophenol; P: Ascospores in water. Scale bars: A = 5 mm; B, D = 0.5 mm; C = 1 mm; E, P = 10 µm; H, I, O = 20 µm; J-N = 5 µm.

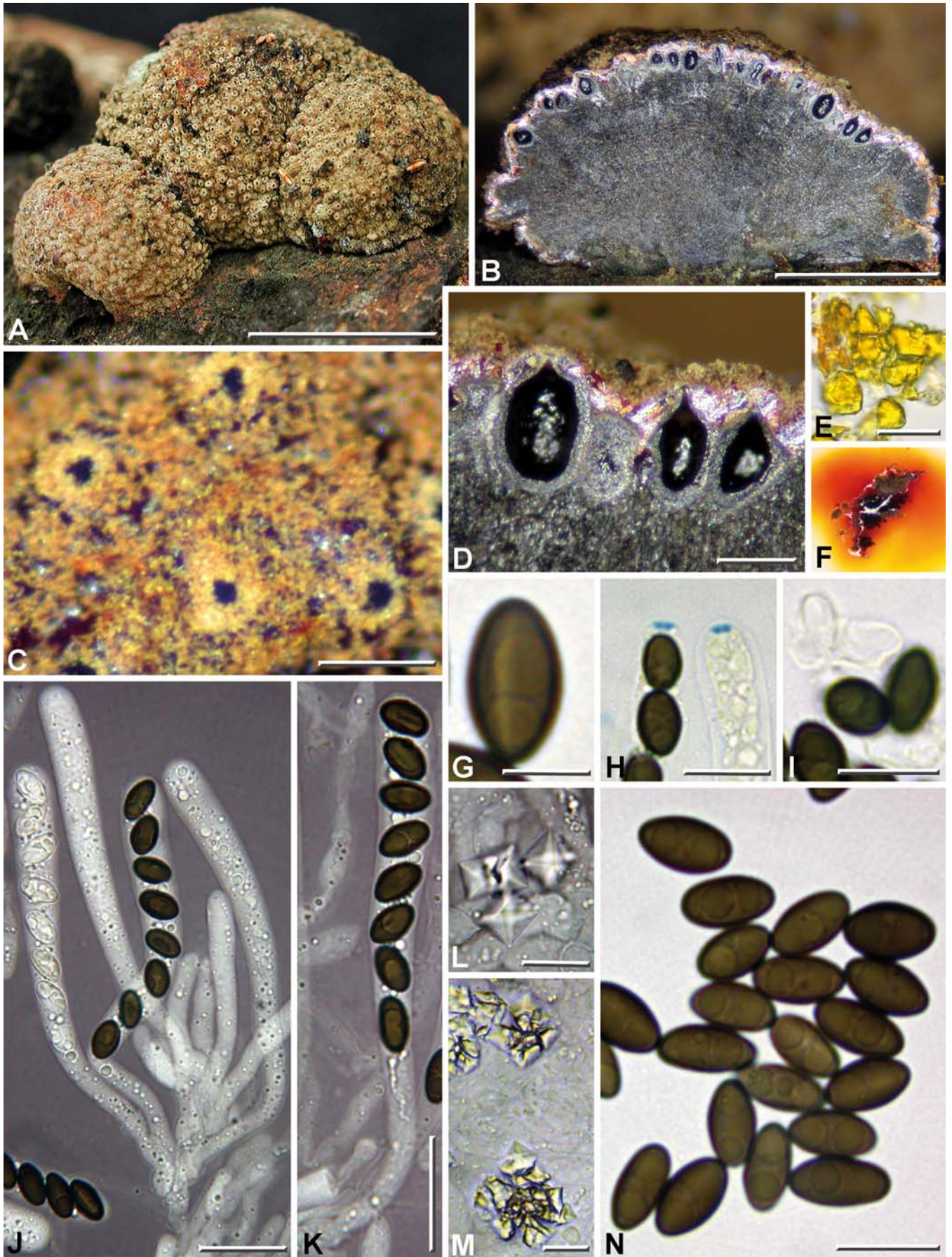


Plate 28 — *Hypoxylon ochraceotuberosum*

Holotype MJF 13275. A: Coalescent stromata in side view; B: Stroma in vertical section showing the perithecial layer and the thick black basal tissue; C: Stromatal surface in close-up showing the ostioles fringed with raised powdery discs; D: Close-up on the stromatal surface in vertical section showing the perithecia and the reddish orange waxy layer; E: Subsurface granules in water; F: KOH-extractable pigments after 1 min incubation; G: Ascospore germ slit, in water; H: Ascus apical apparatus in Melzer's reagent; I: Ascospores in 10% KOH showing the dehiscent perispores; J: Mature and immature asci arising from a short ascogenous hypha, in black Pelikan ink; K: Mature ascus with paraphyses, in black Pelikan ink; L, M: Subhymenial crystals, in black Pelikan ink; N: Ascospores in water. Scale bars: A = 5 mm; B = 2 mm; C, D: = 0.2 mm; E, H, I, L-N = 10 μ m; G = 5 μ m; J, K = 20 μ m.

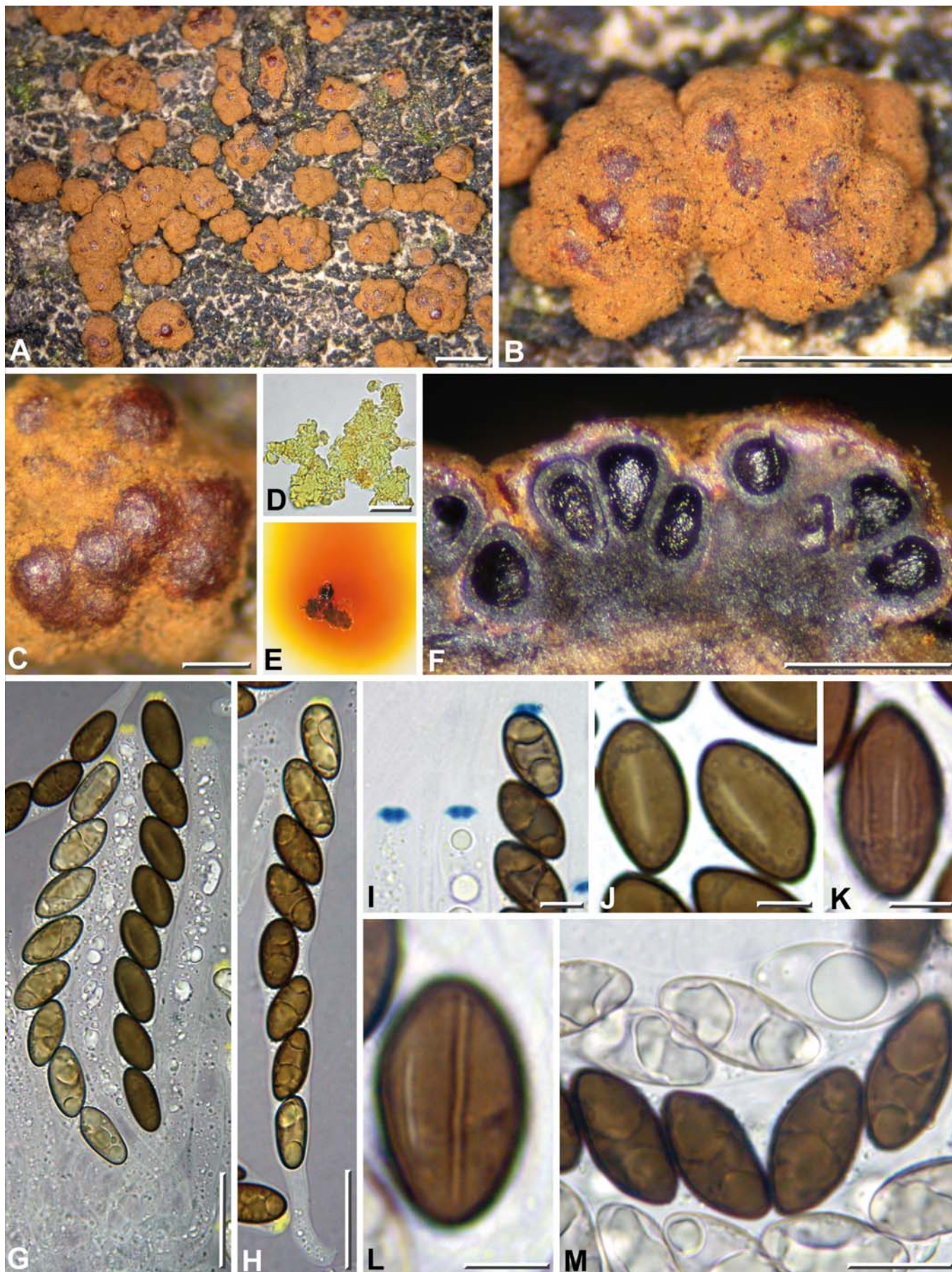


Plate 29 — *Hypoxylon ochraceum*

CLLMAR 11045. A: Glomerate stromata on host surface; B: Close-up on two adjacent stromata showing the perithecial contours; C: Close-up on the stromatal surface showing the reddish brown subsurface and the ostioles; D: Stromatal granules in water; E: KOH-extractable pigments after 1 min incubation; F: Stroma in vertical section showing the perithecia, the waxy granules and the subperithecial tissue; G, H: Asci in black Pelikan ink; I: Ascical apical apparatus in Melzer's reagent; J-L: Ascospores in PVA-lactophenol showing the germ slits (J) and the multiple secondary germs slits or folds (K, L); M: Ascospores in water. Scale bars: A, B = 1 mm; C = 0.2 mm; D, M = 10 μ m; F = 0.5 mm; G, H = 20 μ m; I-L = 5 μ m.

highly variable germ slit morphology and the presence of secondary germ slits reported by JU & ROGERS (1996) were likewise observed in the present material. This very distinctive character is best seen in KOH or in PVA-lactophenol than in water.

Whether what we term here secondary germ slits are true germ slits is questionable since they appear somewhat different in being underlined by darker bands. It cannot be ruled out they are just ornamentations on the epispore or folds due to desiccation (see comments on *H. aeruginosum*, this paper).

The relatively massive apical apparatus with a sharp lateral rim is most unusual among known species of *Hypoxylon* and can be considered a further distinctive character. ROGERS & SAMUELS (1985, as *H. dumontii*) reported on the occurrence of the sexual morph in culture for the first time in *Hypoxylon*, which sets this taxon apart from other species in many respects.

Hypoxylon ochraceum was one of the two species already recorded in FWI (Guadeloupe, Marie-Galante) by JU & ROGERS (1996).

The collection CLLMAR 11045 illustrated here was cultured and sequenced and designated as the epitype of *H. ochraceum* (KUHNER *et al.*, 2014).

Hypoxylon pelliculosum Petch, *Ann. Roy. Bot. Gard. (Peradenya)*, 8: 155 (1924). Plate 30

Stromata glomerate, few-peritheciate, 0.85–2 mm long × 0.85–1.5 mm wide × 0.9–1.1 mm thick, confluent into slightly larger pulvinate stromata to 3 mm long × 1.2 mm wide, with conspicuous perithecial contours; surface dark brick (60, oac637) to sepia (63, oac635), pruinose, shiny black where the pruina is worn off; subsurface orange brown in section, ochreous (44, oac756) when crumbled, composed of waxy granules that appear dull yellow in water, yielding luteous (12, oac810) to slightly orange (7, oac629) pigments in 10% KOH, slightly fading after prolonged incubation; subperithecial tissue blackish, soft-textured, 0.4–0.6 mm thick. **Perithecia** spherical 0.4–0.5 mm diam. **Ostioles** umbilicate, encircled at maturity by a small whitish powdery disc, overmature stromata with discoid-flattened areas around the ostioles.

Asci cylindrical to slightly clavate, with eight obliquely uniseriate ascospores, 110–150 µm total length, the spore-bearing parts 54–67 × 7–8.5 µm, the stipes 50–90 µm long, without visible apical apparatus or occasionally with a discoid structure faintly bluing in Melzer's reagent, no bluing observed in Lugol's solution. **Paraphyses** filiform, copious. **Ascospores** (9.1–) 9.8–11.0 (–11.9) × (5.0–) 5.3–5.9 (–6.2) µm, Q = (1.6–) 1.7–2.0 (–2.1); N = 60 (Me = 10.3 × 5.6 µm; Qe = 1.9), ellipsoid-inequilateral with narrowly rounded ends, most often ventrally concave, dark brown, with a straight germ slit spore-length; perispore dehiscent in 10% KOH, thick, coarsely transversely striated; epispore smooth.

Asexual morph on the natural substrate not observed.

Specimen examined: FRENCH WEST INDIES: MARTINIQUE: Fort-de-France, Absalon, trail to Plateau Michel, ca. 350 m, hygrophilic rainforest, corticated branchlets of Mahogany (*Swietenia macrophylla* King, *Meliaceae*), 5 Jun. 2014, *leg.* J. Fournier, MJF 14052 (LIP).

Known distribution: French Guiana, Martinique, Sri Lanka.

Discussion: This *Hypoxylon* is characterized by small glomerate, few-peritheciate stromata with reddish brown surface, spherical perithecia under a subsurface consisting of orange yellow waxy granules yielding orange yellow pigments in 10% KOH, combined with asci lacking an apical apparatus bluing in iodine and dark brown inequilateral ascospores averaging 10.3 × 5.6 µm with a straight germ slit spore-length and coarsely striated perispores dehiscing in 10% KOH. It conforms in all respects to the description of *H. pelliculosum* given by JU & ROGERS (1996) but deviates in that no apical apparatus was detected while these authors describe it as discoid 0.5 × 2–2.5 µm. Just in one case (Fig. J) a faintly bluing discoid structure was observed. *Hypoxylon pelliculosum* is a poorly known taxon,

known only from the type collection in Sri Lanka and an old specimen collected in French Guiana regarded as *H. hypomiltum* by Montagne (JU & ROGERS, 1996).

The present material conforms likewise well to Petch's original description (PETCH, 1924) but this author reported the presence of a widely effused clay-coloured or pale red-brown byssoid tissue at initial stage, under which the stromata gradually develop. The epithet "*pelliculosum*" is most likely derived from this initial byssoid tissue. We did not observe such a structure in our collection.

The species most resembling our fungus is *H. notatum* Berk. & M.A. Curtis with brown glomerate stromata, spherical perithecia, asci with highly reduced apical apparatus not bluing in Melzer's reagent and dark brown strongly inequilateral ascospores. *Hypoxylon notatum* is mainly different from *H. pelliculosum* in having yellow with greenish yellow tone KOH-extractable pigments and larger ascospores 12–16 × 6–7.5 µm with a faintly striated perispore. *Hypoxylon isabellinum*, like *H. pelliculosum*, features small glomerate stromata and strongly inequilateral ascospores of similar dimensions with a coarsely striated perispore; it primarily differs from *H. pelliculosum* by a greenish stromatal surface, yellowish stromatal granules yielding pale isabelline pigments in 10% KOH and asci provided with a conspicuous and amyloid apical apparatus.

Hypoxylon cf. pilgerianum Henn. sp. 1, *Beiblatt zur Hedwigia*, 39: 138 (1900). Plate 31

Stromata effused-applanate, 4–50 mm long × 3–16 mm wide × 0.25–0.35 mm thick, irregularly elongate to lobed, often coalescent; surface dark vinaceous (82, oac523), pruinose, even, with perithecial contours slightly exposed; dull orange brown granules beneath the surface and between the perithecia, abundant around the base, appearing orange brown when observed in water, with KOH-extractable pigments sienna (8, oac630) within 1 min incubation, turning greyish sepia (106, oac640) after 30 min incubation; the tissue beneath the perithecia greyish brown, inconspicuous to 0.20 mm thick. **Perithecia** spherical, 0.13–0.17 mm diam, scattered, rarely in contact. **Ostioles** umbilicate, inconspicuous.

Asci cylindrical, with eight obliquely uniseriate ascospores, short-stipitate, 76–80 µm total length, the spore-bearing parts 64–68 × 5–6.5 µm, the stipes 11–15 µm long, with apical apparatus discoid, 0.8–1 × 2.5 µm, bluing in Melzer's reagent. **Ascospores** (7.6–) 7.9–9.1 (–10) × (3.4–) 3.7–4.3 (–4.4) µm, Q = (1.9–) 2–2.3 (–2.4); N = 60 (Me = 8.5 × 4 µm; Qe = 2.1), ellipsoid-inequilateral with narrowly rounded ends, brown, with a straight germ slit spore-length; perispore dehiscent in KOH, smooth to faintly striated; epispore smooth.

Asexual morph on the natural substrate not seen.

Specimens examined: FRENCH WEST INDIES: MARTINIQUE: Prêcheur, Anse Couleuvre, coastal mesophilic rainforest, on inner side of dead culms of bamboo, 2 Dec. 2006, *leg.* C. Lechat, CLL 6130-2 (LIP); *ibid.*, dead culms of bamboo, 1 Sept. 2007, *leg.* J. Fournier, MJF 07242 (LIP).

Additional specimens examined: MADAGASCAR: Parc Tsimbazaza-Antanarivo, bamboo, 7 Mar. 1981, *leg.* G. Gilles, MAD 11 (JDR). MALAYSIA, North Borneo, Sabah, bamboo, Jun. 1999, *leg.* T. Læssøe, TL 6211. TAIWAN: Taipei Co., Wu-lai, 25 Apr. 2003, *leg.* Y.-M. Ju & H.-M. Hsieh, HAST 92042505. USA: Puerto Rico, El Yunque, bamboo, Jun. 1998, *leg.* J.D. Rogers (JDR).

Known distribution: Pantropical.

Discussion: *Hypoxylon pilgerianum* was first collected in Brazil on *Chusquea* sp. (HENNING, 1900) and listed as a synonym of *H. rubiginosum* (Pers. : Fr.) Fr. by MILLER (1961) according to his very wide concept of the latter. *Hypoxylon pilgerianum* was reinstated by JU & ROGERS (1996) after a much narrower delimitation of *H. rubiginosum*. Effused purplish to reddish brown stromata with small spherical perithecia, orange brown KOH-extractable pigments and medium-sized inequilateral ascospores with a straight germ slit and a

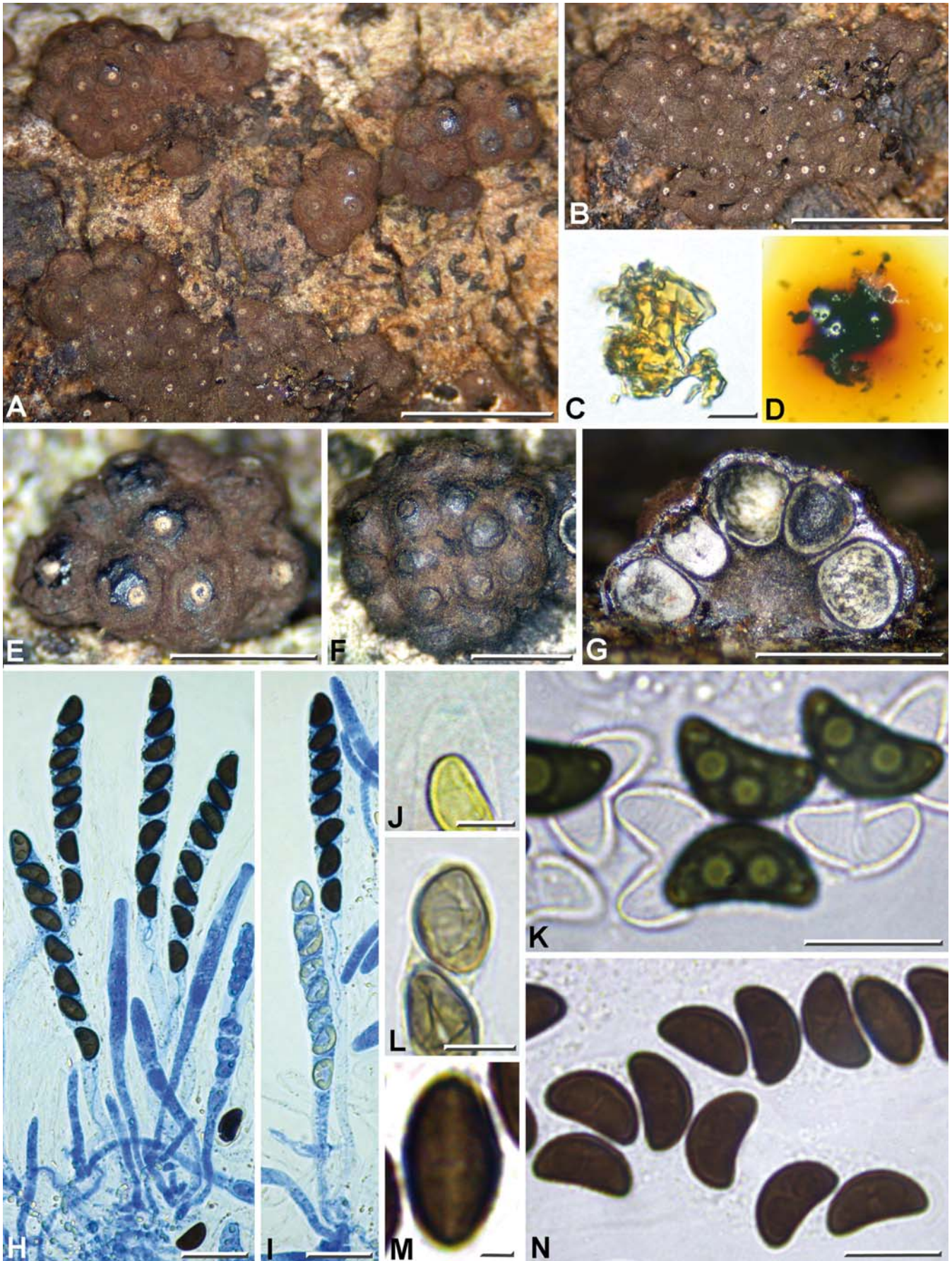


Plate 30 — *Hypoxylon pelliculosum*

MJF 14052. A: Glomerate and pulvinate stromata on host surface; B: Pulvinate stroma; C: Stromatal granules in water; D: KOH-extractable pigments after 1 min incubation; E: Mature stroma showing the perithecial contours and the whitish discs around the ostioles; F: Overmature stroma; G: Overmature stroma in vertical section showing the perithecia and the basal tissue; H, I: Mature and immature asci in blue Waterman ink and 1% SDS; J: Ascus apex in Melzer's reagent, showing a faintly bluing discoid structure; K: Ascospores in 10% KOH, showing a coarsely striated dehiscent perispore; L: Ascus apical apex in Lugol's solution showing the absence of apical apparatus; M: Ascospore in dorsal view showing the germ slit; N: Ascospores in water. Scale bars: A, B = 2 mm; C, N, K = 10 μ m; E-G = 1 mm; H, I = 20 μ m; J, L = 5 μ m; M = 2 μ m.

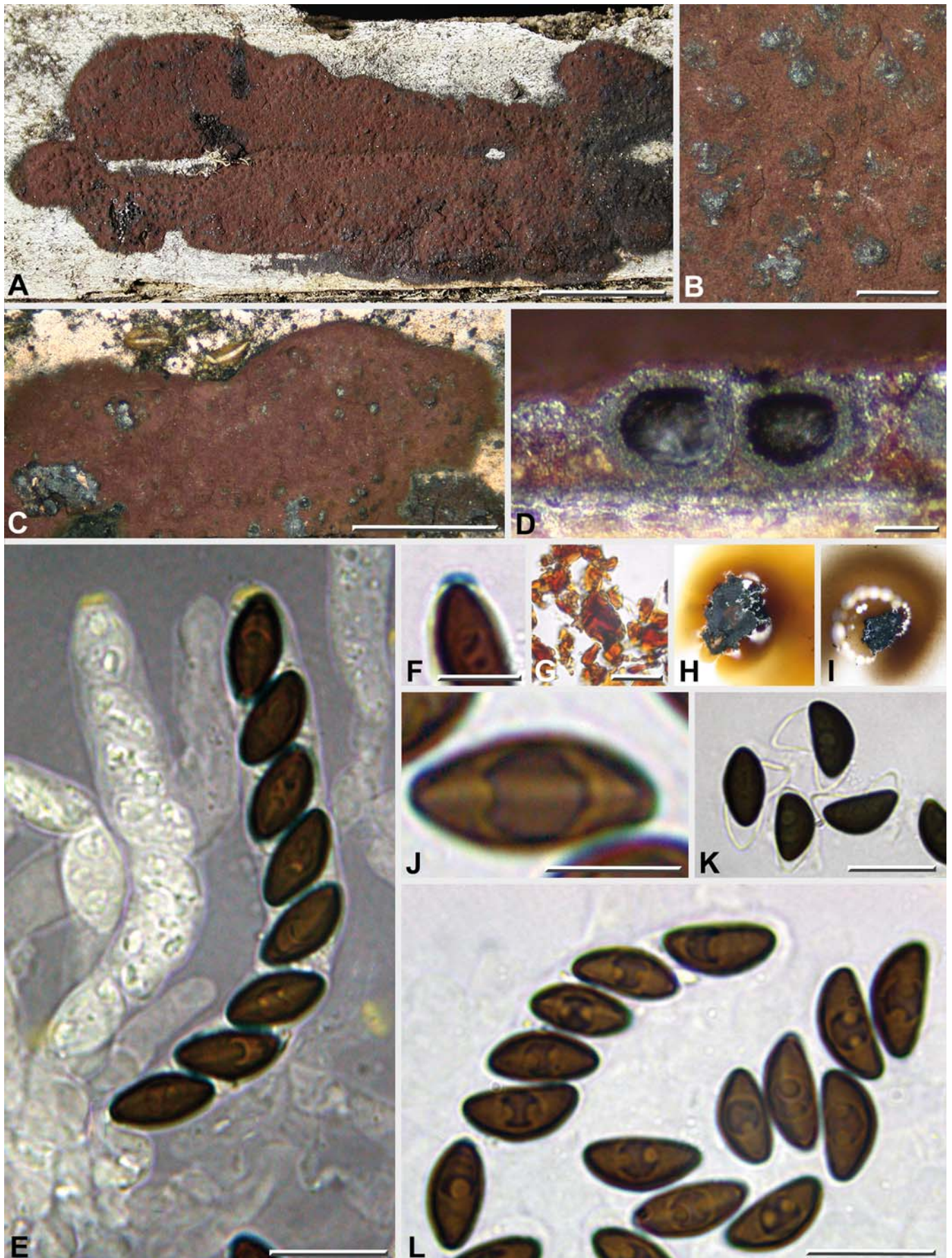


Plate 31 — *Hypoxylon* cf. *H. pilgerianum* sp. 1

CLL 6031-2. A, C: Mature stromata; B: Stromatal surface in close-up showing the perithecial contours and the ostioles; D: Stroma in vertical section showing the perithecia surrounded by dull orange brown waxy granules; E: Immature and mature asci in black Pelikan ink; F: Ascus apical apparatus in Melzer's reagent; G: Stromatal waxy granules in water; H, I: KOH-extractable pigments after 1 min and 30 min incubation respectively; J: Ascospore in dorsal view showing the germ slit; K: Ascospores perispores dehiscing in 10% KOH; L: Ascospores in water. Scale bars: A = 5 mm; B, C = 2 mm; D = 100 μ m; E, G, K, L = 10 μ m; F, J = 5 μ m.

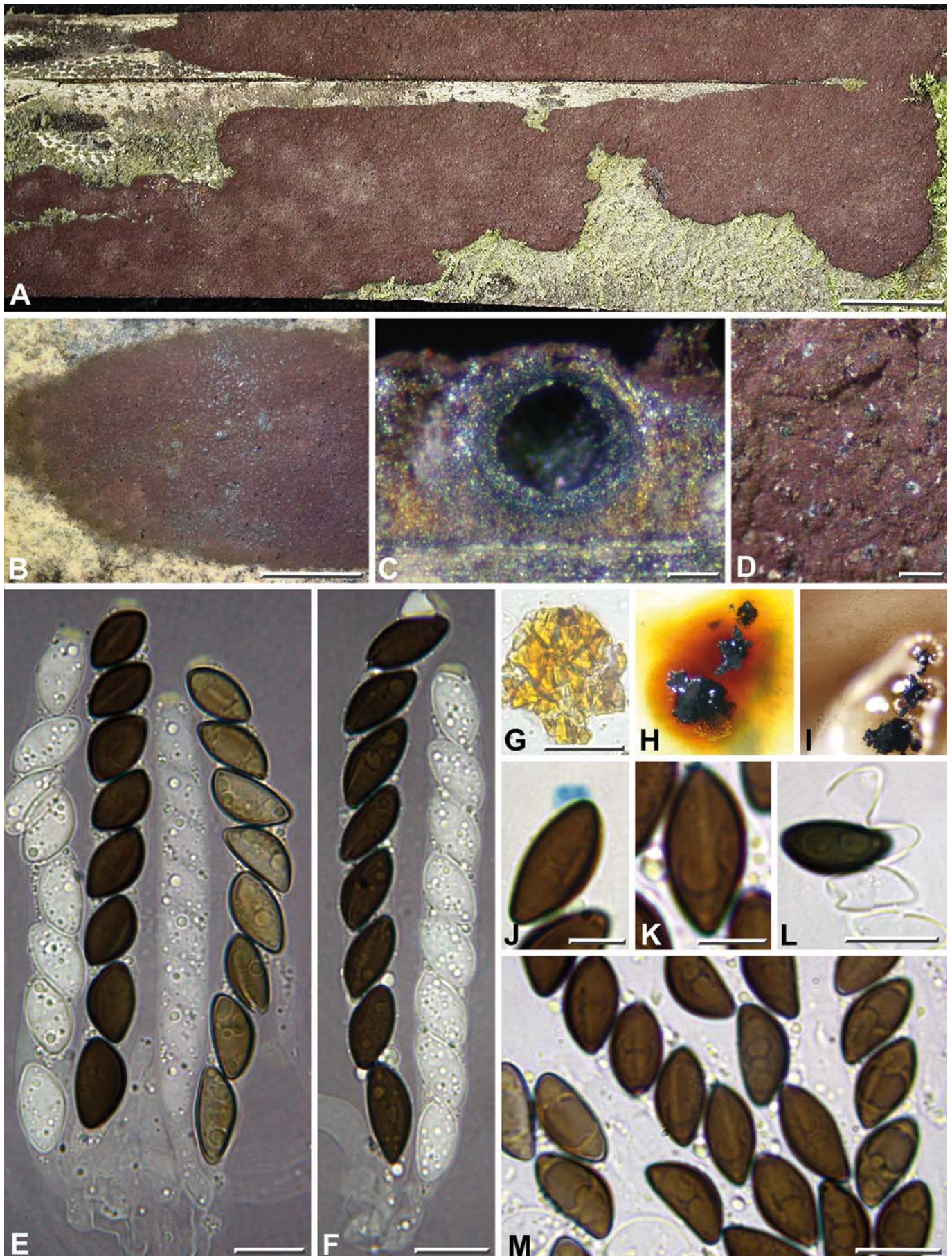


Plate 32 — *Hypoxylon* cf. *H. pilgerianum* sp. 2

MJF 13056. A: Mature stromata; B: Immature stroma; C: Stroma in vertical section showing a perithecium surrounded by orange yellow waxy granules; D: Stroma in close-up showing the uneven surface and the ostioles; E, F: Immature and mature asci in black Pelikan ink; G: Stromatal waxy granules in water; H, I: KOH-extractable pigments after 1 min and 30 min incubation respectively; J: Ascinal apical apparatus in Melzer's reagent; K: Ascospore in dorsal view showing the germ slit; L: Ascospores perispores dehiscent in 10% KOH; M: Ascospores in water. Scale bars: A = 10 mm; B = 2 mm; C, D = 100 μ m; E-G, L, M = 10 μ m; J, K = 5 μ m.

perispore dehiscent in 10% KOH are commonly found on dead culms of bamboo in tropics and usually referred to *H. pilgerianum* as defined by Ju & ROGERS (1996). The two collections from Martinique studied here conform to Ju & Rogers' concept of *H. pilgerianum* but the collection MJF 13056 described in this paper as *H. cf. pilgerianum* sp. 2, although likewise conforming to this concept, deviates in having different stromatal granules, larger perithecia and larger ascospores. As the ascospores dimensions of what we call sp. 1 and sp. 2 do not overlap we attempted to have a wider overview based of additional available specimens. The results of ascospores measurements are summarized in Table 2 and compared with data found in literature. All results fall within the size range accepted by Ju & ROGERS (1996) for *H. pilgerianum* but interestingly our sp. 1 closely clusters with another Caribbean collection from Puerto Rico and a record from Papua New Guinea by VAN DER GUCHT (1995). Collections from Madagascar, Malaysia and Taiwan appear intermediate regarding ascospores dimensions and also show variations in ascospore shape. Unfortunately ascospores dimensions alone do not allow to safely segregate subtaxa until the type collection is re-evaluated and further discriminant characters involved.

For the time being, we regard the collections of sp.1 and sp. 2 as possibly different but we prefer to keep them under the name *H. pilgerianum* until the delimitation of this taxon is improved.

***Hypoxylon cf. pilgerianum* Henn. sp. 2**, *Beiblatt zur Hedwigia*, 39: 138 (1900). Plates 32–33

Stromata effused-applanate, 12–88 mm long × 4–19 mm wide × 0.35–0.40 mm thick, irregularly elongate to lobed, often coalescent; surface dark vinaceous (82, oac523), pruinose, uneven, with perithecial contours slightly to conspicuously exposed; dull orange granules beneath the surface and between the perithecia, abundant around the base, appearing orange yellow when observed in water, with KOH-extractable pigments sienna (8, oac630) within 1 min incubation, turning greyish sepia (106, oac640) after 30 min incubation; the tissue beneath the perithecia greyish brown, often inconspicuous. **Perithecia** spherical, 0.30–0.35 mm diam, rarely in contact. **Ostioles** umbilicate, fringed with white material forming a disc 30–40 µm diam.

Asci cylindrical, with eight obliquely uniseriate ascospores, short-stipitate to sessile, 90–95 µm total length, the spore-bearing parts 72–78 × 6–7 µm, the stipes 14–20 µm long, with apical apparatus discoid, 1.3–1.6 × 2.7–3 µm, bluing in Melzer's reagent.

Ascospores (10.3–) 10.9–12.5 (–12.8) × (4.9–) 5.2–6.1 (–6.7) µm, Q = (1.8–) 1.9–2.3 (–2.4); N = 60 (Me = 11.6 × 5.7 µm; Qe = 2.1), ellipsoid-inequilateral with narrowly rounded to subacute ends, brown, with a straight germ slit spore-length; perispore dehiscent in KOH, faintly striated to smooth; episporium smooth.

Asexual morph on the natural substrate (Plate 33): Synnematosus, forming dense greyish brown colonies around and on immature stromata; synnemata 0.3–1 mm high, upright, with fasciculate blackish brown conidiophores 4–5 µm wide, roughened, differentiated into greyish brown fluffy conidiogenous heads; conidiogenous structure virgariella-like, sporothrix-like in places, conidiogenous cells pale brown, turning bluish grey in 3% KOH, finely roughened, 6.5–21 × 1.8–2.2 µm, conidia ellipsoid, 3.2–3.6 × 1.5–1.8 µm, subhyaline, smooth.

Specimens examined: FRENCH WEST INDIES: MARTINIQUE: Fort-de-France, Absalon, roadside to thermal resort, hygrophilic rainforest, on dead culms of bamboo, 7 Aug. 2013, leg. J. Fournier, MJF 13056 (LIP).

Known distribution: Martinique.

Discussion: This collection externally resembles other collections usually regarded as *H. pilgerianum* but a closer examination shows it deviates primarily by different stromatal granules and larger ascospores. See discussion under *Hypoxylon cf. pilgerianum* sp. 1.

***Hypoxylon pulicidum* J. Fourn., Polishook & Bills, *PLoS ONE*, 7 (10): e46687 (2012). Plate 34**

Stromata irregularly effused-pulvinate to elongate, confluent, 7–50 mm long × 3–22 mm wide × 0.9–1.4 mm thick, often growing beside and over old black depauperate stromata, with faintly exposed discoid perithecial contours; surface pruinose, dark vinaceous (82, oac523) to brown vinaceous (84, oac525), subsurface blackish, a carbonaceous crust containing dark reddish brown granules scattered within the carbonaceous tissue, yielding dilute olivaceous (48, oac817) pigments in 10% KOH, not changing colour upon prolonged incubation; interperithecial tissue fibrous, grey brown, lacking waxy granules; subperithecial tissue greyish brown to blackish, 0.1–0.5 mm thick, seated on a thin black line. **Perithecia** lanceolate, 0.7–1 × 0.3–0.35 mm, occasionally with perithecial contents citrine green (67, oac25) in immature stromata. **Ostioles** umbilicate, faintly papillate in old black stromata.

Asci cylindrical, short- to long-stipitate, 80–190 µm total length, the spore-bearing parts 46–58 × 4.5–5.5 µm, the stipes 30–90

Table 2 — Comparison of ascospores dimensions recorded on herbarium specimens or reported in literature *. Material from Puerto Rico and Madagascar was kindly provided by J.D. Rogers, material from Malaysia was kindly provided by T. Læssøe and material from Taiwan was kindly provided by Y.-M. Ju.

	Extreme values	Q = quotient l/w N = number of measurements	Mean values
<i>H. pilgerianum</i> Protologue Hennings* Brazil	10–12 × 4–5 µm	–	Me = 11 × 4.5 µm; Qe = 2.4
Ju & Rogers * 1996	8.5–12 (–13.5) × 4–5 (–5.5) µm	–	Me = 10.3 × 4.5 µm; Qe = 2.2
CLL 6130-2 Martinique sp. 1	(7.6–) 7.9–9.1 (–10) × (3.4–) 3.7–4.3 (–4.4) µm	Q = (1.9–) 2–2.3 (–2.4); N = 60	Me = 8.5 × 4 µm; Qe = 2.1
MJF 07242 Martinique sp. 1	(7.2–) 7.4–8.9 (–9.7) × (3.4–) 3.7–4.1 (–4.3) µm	Q = (1.8–) 1.9–2.4 (–2.7); N = 70	Me = 8.2 × 3.9 µm; Qe = 2.1
MJF 13056 Martinique sp. 2	(10.3–) 10.9–12.5 (–12.8) × (4.9–) 5.2–6.1 (–6.7) µm	Q = (1.8–) 1.9–2.3 (–2.4); N = 60	Me = 11.6 × 5.7 µm; Qe = 2.1
MJF 14142 Martinique sp. 2	(10.1–) 10.5–11.9 (–12.2) × (4.7–) 4.9–5.5 (–5.8) µm	Q = (1.9–) 2–2.3 (–2.4); N = 60	Me = 11.2 × 5.2 µm; Qe = 2.2
Puerto Rico	(7.4–) 7.44–8.6 (–8.7) × (3.3–) 3.6–4.1 (–4.2) µm	Q = (1.9–) 2–2.4 (–2.5); N = 14	Me = 8.1 × 3.8 µm; Qe = 2.2
Van der Gucht 89-735 PNG * 1995	7.8–9 × 3.5–4.5 µm	–	Me = 8.39 ± 0.40 × 3.90 ± 0.24 µm
TL6211 Malaysia	(9.2–) 10–11.8 (–12.8) × (4.5–) 5.3–6.1 (–6.6) µm	Q = (1.6–) 1.7–2.1 (–2.2); N = 54	Me = 10.8 × 5.7 µm; Qe = 1.9
MAD 11 Madagascar	(8.5–) 8.9–9.8 (–10) × (3.5–) 3.8–4.4 (–5.2) µm	Q = (1.6–) 2.1–2.5 (–2.6); N = 15	Me = 9.3 × 4.1 µm; Qe = 2.3
HAST 92042505 Taiwan	(8.8–) 9.2–10.6 (–11.5) × (4.5–) 4.8–5.4 (–6) µm	Q = (1.7–) 1.8–2.1 (–2.4); N = 60	Me = 9.8 × 5.1 µm; Qe = 1.9

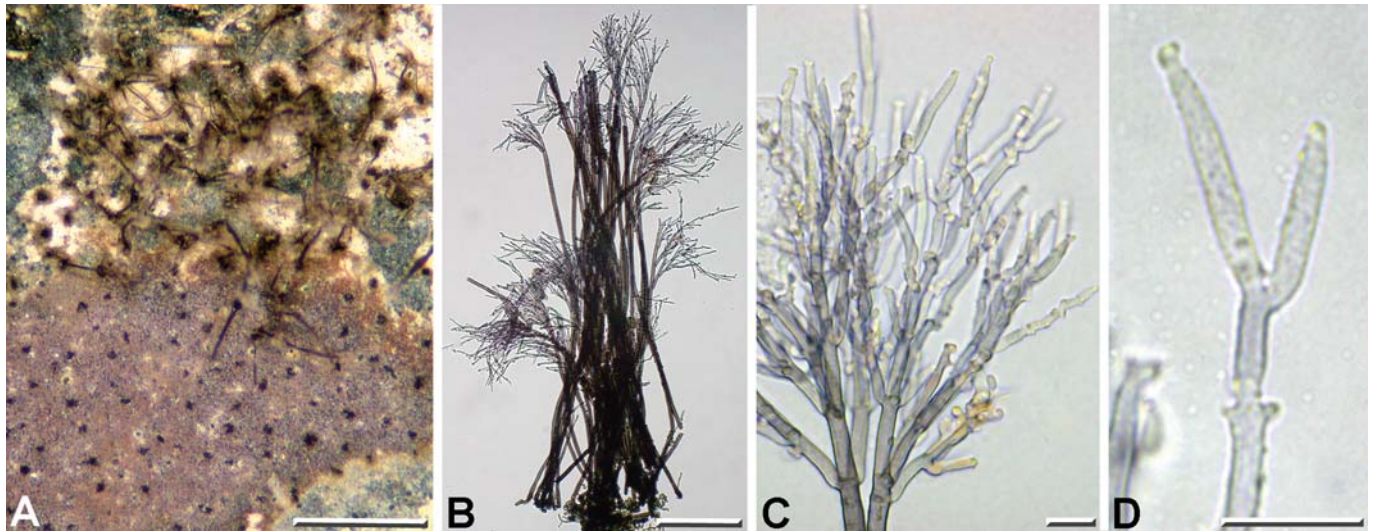


Plate 33 — *Hypoxylon* cf. *H. pilgerianum* sp. 2 asexual morph

MJF 14142. A: Synnemata of the asexual morph at the margin of a stromatal primordium; B: Tuft of synnemata in 3% KOH; C, D: virgariella-like conidiogenous structures, in 3% KOH. Scale bars: A = 1 mm; B = 100 μ m; C, D = 10 μ m.

(–135) μ m long, originating in unilateral spicate arrangement from long ascogenous hyphae, with amyloid apical apparatus discoid, 0.8×1.7 – 2μ m. **Ascospores** (6.4–) 6.7–8.3 (–8.9) \times (2.7–) 2.9–3.7 (–4) μ m, $Q = (1.7$ –) 2–2.6 (–3.1); $N = 140$; (Me = $7.5 \times 3.35 \mu$ m ; Qe = 2.2), narrowly ellipsoid-equilateral with broadly rounded ends to oblong, yellowish brown, uniseriate in the ascus, with a faint germ slit spore-length to slightly less than spore-length. Perispore indehiscent in 10% KOH; epispore smooth, olivaceous in 10% KOH.

Asexual morph on the natural substrate not seen. Asexual morph in culture on artificial media nodulisporium-like (BILLS *et al.*, 2012).

Specimens examined: FRENCH WEST INDIES: MARTINIQUE: Case-Pilote, Fond Boucher, trail to Morne Venté, mesophilic to xerophilic forest, on rotten blackened wood, 17 Aug. 2013, *leg.* J. Fournier, MJF 13299 (LIP); Prêcheur, Anse Lévrier, coastal mesophilic forest, on rotten wood, Sept. 2003, *leg.* C. Lechat, CLL0727 (LIP); Prêcheur, Anse Couleuvre, coastal mesophilic forest, on rotten blackened wood, 27 Aug. 2007, *leg.* J. Fournier, MJF 07147 (holotype LIP); *ibid.*, 23 Aug. 2013, *leg.* J. Fournier, MJF 13374 (LIP); Sainte-Marie, La Philippe forest, coastal mesophilic forest, on rotten blackened wood, 14 Aug. 2013, *leg.* J. Fournier, MJF 13205 (LIP); *ibid.*, same date, *leg.* J. Fournier, MJF 13219 (LIP); *ibid.*, 21 Aug. 2013, *leg.* J. Fournier, MJF 13346 (LIP).

Known distribution of sexual morph: Martinique. Distribution of endophytic state: Pantropical (BILLS *et al.*, 2012).

Discussion: *Hypoxylon pulicidum* was recently segregated from *H. investiens* based on morphological, molecular, cultural and chemical evidence (BILLS *et al.*, 2012). The *Hypoxylon* collected in Martinique was shown to be the sexual morph corresponding to pantropical endophytic strains producing a nodulisporium-like asexual morph in culture from which nodulisporic acids, a potent insecticide, were isolated since 1992 (BILLS *et al.*, 2012). Molecular phylogenetic studies carried out in order to name the fungus responsible for the insecticide activity were not conclusive but *H. investiens* was suspected to be its closest relative (PLATAS *et al.*, 2009). Indeed *H. pulicidum* looks very much like *H. investiens* and they could not be distinguished in the field. Moreover, they both occur preferably on rotten blackened wood in the same habitats. A first comparative morphological study, based on two scanty and hardly mature collections (BILLS *et al.*, 2012) showed that the main difference between the two taxa is the colour of the KOH-extractable pigments, olivaceous yellow-brown for *H. pulicidum* vs. dull green for *H. investiens*, supported by two different HPLC profiles (BILLS *et al.*, 2012); the green colour of perithecial contents observed in the two first collections was supposed to be a diagnostic character but

it was not observed again in the abundant and more mature material collected in 2013, which suggests it is a contingent character that is not discriminant. In the original description, the ascospores of *H. pulicidum* were supposed to differ from those of *H. investiens* in being slightly smaller and narrower but a comparison carried out on a larger scale showed that the variation ranges in both species completely overlap and thus cannot be used to distinguish them. However, the carbonaceous tissue restricted to the subsurface proved to be consistent in all the collections examined and makes a reliable differential character in contrast to *H. investiens* in which the carbonaceous tissue is not restricted to the outer crust but encases entirely every perithecium. The presence of slightly papillate ostioles on old weathered black stromata appears likewise to be a differential character since it is consistent in *H. pulicidum* and is not encountered in *H. investiens*.

Hypoxylon dussii resembles *H. pulicidum* in many respects but can be separated based on the brittle crust present around the perithecia of the former that is restricted to the subsurface in the latter and larger and more broadly ellipsoid ascospores (this paper).

The endophytic strains of *H. pulicidum* show a pantropical distribution, which suggests that the sexual morph should have the same wide distribution and is not restricted to Martinique. It is most likely the case but its strong similarity with the common, widespread pantropical *H. investiens* probably still accounts for their confusion.

Hypoxylon rickii Y.-M. Ju & J.D. Rogers, *Mycologia Memoirs*, 20: 174 (1996). Plate 35

Stromata widely effused to effused-pulvinate, 14–100 mm long \times 12–32 mm wide \times 1–1.7 mm thick, with inconspicuous to slightly exposed perithecial contours; surface fulvous (43, oac706) to rust (39, oac643), pruinose, even to slightly nodulose, black where the pruina is worn off; subsurface reddish brown, composed of amorphous waxy granules that appear orange when observed in water and extend downwards, often conspicuous around the base of perithecia, with orange (7, oac629) to scarlet (5, oac628) KOH-extractable pigments, not notably changing upon prolonged incubation; subperithecial tissue black, woody, 0.4–0.85 mm thick, frequently with a layer of grey to white tissue just beneath the perithecia. **Perithecia** tubular, long tubular or lanceolate, 0.6–0.85 \times 0.3–0.4 mm, more obovoid at periphery. **Ostioles** umbilicate, surrounded by a white pruinose disc 60–80 μ m diam.

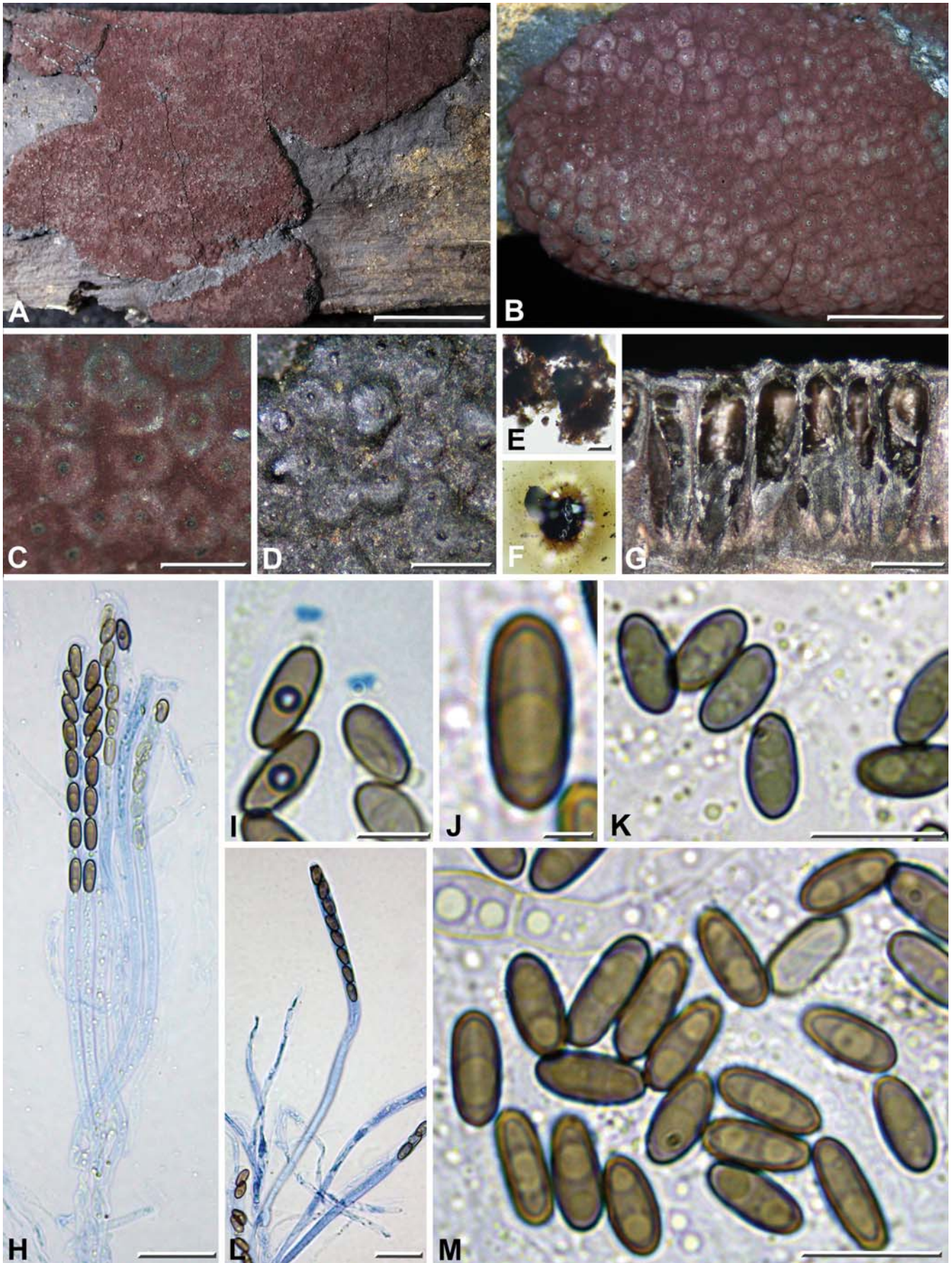


Plate 34 — *Hypoxylon pulvicidum*

A: MJF 13346; B-M: MJF 13205. A, B: Effused stromata in surface view; C: Stromatal surface in close-up showing the perithecial contours and the ostioles; D: Stromatal surface of an overmature black stroma in close-up showing the finely papillate ostioles; E: Stromatal dark brown granules mixed with carbonaceous elements, in water; F: KOH-extractable pigments after 1 min incubation; G: Stroma in vertical section showing the perithecia beneath the carbonaceous crust and the greyish brown basal tissue; H, L: Long-stipitate asci in blue Waterman ink in 1% SDS; I: Ascinal apical apparatus in Melzer's reagent; J: Ascospore in water, showing the germ slit; K: Ascospores in 10% KOH; M: Ascospores in water. Scale bars: A = 10 mm; B = 2 mm; C, D, G = 0.5 mm; E, K, M = 10 μ m; H, L = 20 μ m; I = 5 μ m; J = 2 μ m.

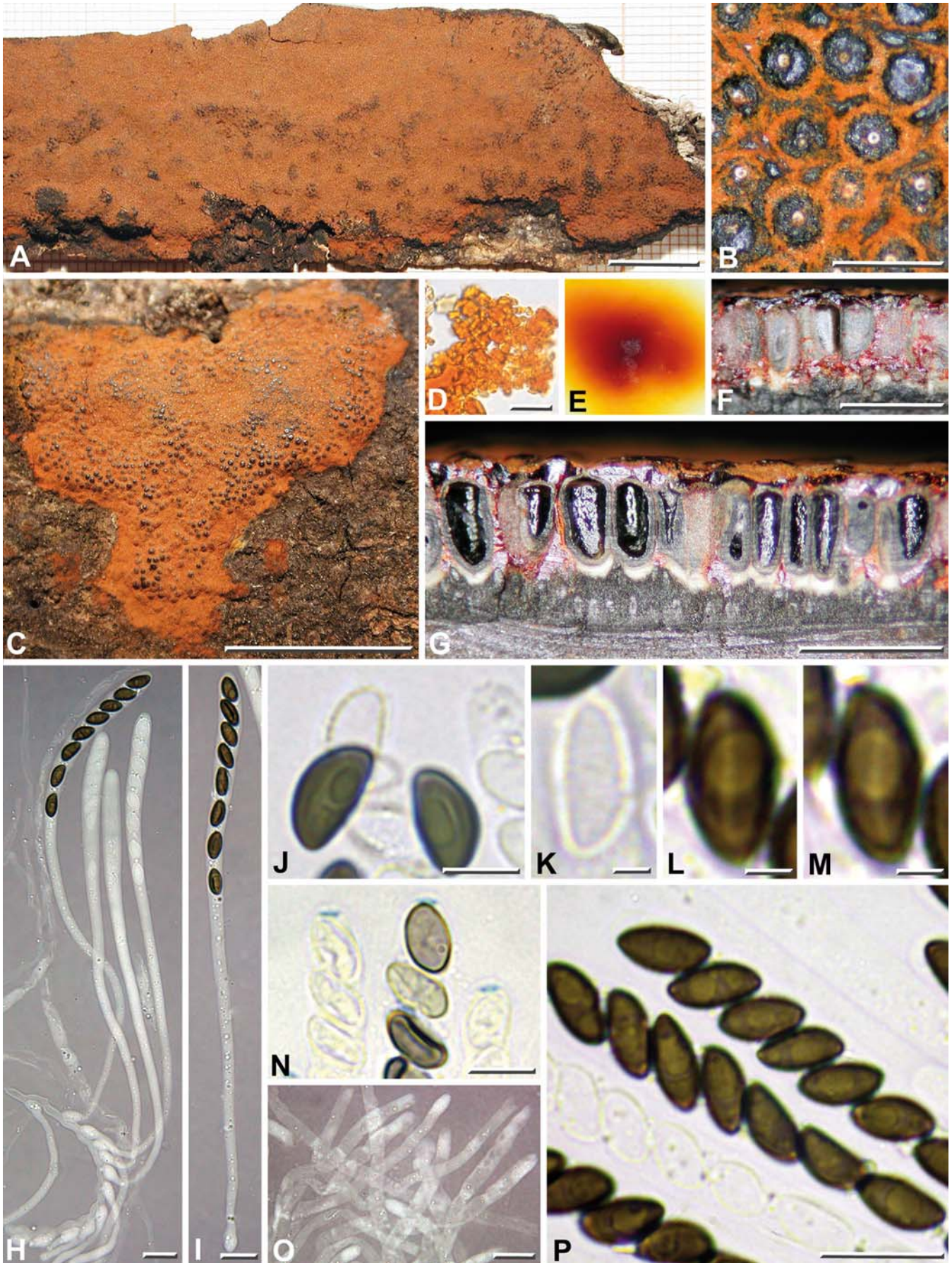


Plate 35 — *Hypoxylon rickii*

CLL 2023. A, C: Effused-pulvinate stromata; B: Close-up on stromatal surface showing the ostioles; D: Stromatal granules in water; E: KOH-extractable pigments (1 min incubation); F: Stroma in vertical section (broken) showing the perithecia and the red waxy granules; G: Stroma in vertical section showing the perithecia, the waxy granules and the basal tissue; H: Immature and mature asci in black Pelikan ink, arising from an ascogenous hypha; I: Mature ascus in black Pelikan ink; J, K: Striated perispores dehiscing in 10% KOH; L, M: Ascospores in dorsal view showing the straight to slightly sigmoid germ slit; N: Ascical apical apparatus in Melzer's reagent; O: Paraphyses in black Pelikan ink; P: Ascospores in water. Scale bars: A, C = 10 mm; B = 0.5 mm; D, H, I, O, P = 10 μ m; F, G = 1 mm; J, N = 5 μ m; K-M = 2 μ m.

Asci cylindrical, with eight obliquely uniseriate ascospores, 100–125 µm total length, the spore-bearing parts 50–58 × 4.5–5.5 µm, the stipes 45–70 µm long, arising in spicate arrangement from long ascogenous hyphae, with a discoid apical apparatus 0.4–0.5 × 1.5–1.8 µm, bluing in Melzer's reagent. **Paraphyses** thin-walled, septate, 4–6 µm wide at base, tapering to 2.5–3 µm, with broadly rounded ends. **Ascospores** (6.2–) 6.8–7.4 (–7.9) × (3–) 3.2–3.7 (–4) µm, Q = (1.7–)1.9–2.2 (–2.3); N = 60 (Me = 7.1 × 3.5 µm; Qe = 2.1), ellipsoid-inequilateral with narrowly rounded ends, brown, with a straight to slightly sigmoid germ slit spore-length on the most convex side; perispore dehiscent in 10% KOH, striated; epispore smooth.

Asexual morph on the natural substrate not observed. Asexual morph in culture on OA nodulisporium-like, based on material from Mexico (JU & ROGERS, 1996).

Specimens examined: FRENCH WEST INDIES: GUADELOUPE: Goubeyre, Houelmont, on bark of *Citharexylum* sp. (*Verbenaceae*), 1 Dec. 1988, *leg.* J. Vivant, JV 412 (JF); *sine loco*, on bark, Aug. 2004, *leg.* C. Lechat, CLL 2023 (LIP); Saint-Louis de Marie-Galante, Les Sources, mesophilic rainforest, on bark, 2 Dec. 2005, *leg.* C. Lechat, CLL 5502 (LIP). MARTINIQUE: Case-Pilote, Morne Rose, mesophilic rainforest, on bark, 1 Sept. 2010, *leg.* J. Fournier, MJF 10324 (LIP, epitype); Saint-Esprit, Bois La Charles, mesophilic rainforest, on bark, 29 Aug. 2005, *leg.* C. Lechat, CLL 5256 (LIP).

Known distribution: Neotropical, subtropical.

Discussion: *Hypoxyylon rickii* was separated from other tropical *Hypoxyylon* spp. with an orange stromatal surface by JU & ROGERS (1996), primarily based on its nodulisporium-like asexual morph in culture. It is characterized by thick, often widely effused stromata with a dull orange surface, long tubular perithecia, orange red stromatal granules and KOH-extractable pigments and small inequilateral ascospores with perispore dehiscent in 10% KOH. The most resembling species are *H. haematostroma*, *H. jecorinum* Berk. & Ravenel and *H. polyporoideum* Berk. ex Cooke, from which the most discriminant morphological character is the smaller ascospores of *H. rickii* 6.8–7.4 × 3.2–3.7 µm vs. 12.5–17 × 6.1–8.4 µm, 8–9.5 × 4–5 µm and 9.5–15 × 4–7 µm respectively. *Hypoxyylon polyporoideum* was considered as a synonym of *H. crocopeplum* Berk. & M.A. Curtis by MILLER (1961) and JU & ROGERS (1996) but was reinstated by HSIEH *et al.* (2005).

The collection MJF 10324 was cultured and sequenced and designated as the epitype of *H. rickii* (KUHNER *et al.*, 2014).

Hypoxyylon rubellum Penzig & Sacc., *Malpighia*, 11: 491 (1897). Plate 36

Stromata glomerate, few-peritheciate, crowded, separate to confluent, with perithecial contours half-exposed, 1–2.5 mm diam × 0.75–0.9 mm thick; surface bay (6, oac622) to dark vinaceous (82, oac523), pruinose; yellow and orange waxy granules just beneath surface and around perithecia, extending downwards into the subperithecial tissue, yielding luteous (12, oac810) to orange (7, oac629) pigments in 10% KOH, not notably changing colour after prolonged incubation; subperithecial tissue greyish brown to blackish, interspersed with streaks of orange granules. **Perithecia** spherical, 0.35–0.4 mm diam. **Ostioles** umbilicate.

Asci cylindrical, short-stipitate to almost sessile, with eight obliquely uniseriate ascospores, 120–130 µm total length, the spore-bearing parts 100–115 × 12–13 µm, the stipes 10–15 µm long, with a discoid apical apparatus 0.8–1 × 3–3.5 µm, bluing in Melzer's reagent. **Paraphyses** moniliform, 7–8 µm diam, very thin-walled, evanescent. **Ascospores** (17.1–) 18.1–21.1 (–22.2) × (6.9–) 7.5–8.5 (–8.9) µm, Q = (2.1–) 2.2–2.7 (–2.9); N = 60 (Me = 19.7 × 8 µm; Qe = 2.5), broadly fusiform-equilateral with acute ends, dark brown, with a straight germ slit spore-length; perispore indehiscent in 10% KOH; epispore with shallow depressions delimited by reticulate rims, best

seen in chloral-lactophenol; epispore of immature hyaline ascospores turns bluish grey in 10% KOH.

Asexual morph on the natural substrate not observed. Asexual morph in culture on PDYA described by ROGERS *et al.* (1987).

Specimens examined: FRENCH WEST INDIES: MARTINIQUE: Saint-Joseph, Coeur Bouliki forest, hygrophilic rainforest, on dead culms of bamboo, 26 Aug. 2007, *leg.* J. Fournier, MJF 07103 (LIP); Schoelcher, Fontaine Didier, Duclos River, hygrophilic rainforest, on dead culms of bamboo, 28 Aug. 2007, *leg.* J. Fournier, MJF 07160 (LIP); Morne-Rouge, Domaine d'Emeraude, hygrophilic rainforest, on dead culms of bamboo, 9 Aug. 2013, *leg.* J. Fournier, MJF 13097 (LIP).

Known distribution: French Guiana, Indonesia, Martinique.

Discussion: *Hypoxyylon rubellum* is a distinctive monocot-inhabiting *Hypoxyylon* with small glomerate, dark brick stromata with orange KOH-extractable pigments and large fusiform ascospores with indehiscent perispore and dented epispore. *Hypoxyylon venezuelense* Y.-M. Ju & J.D. Rogers also occurs on bamboo and has luteous KOH-extractable pigments but its stromata are pulvinate, with smaller perithecia and its ascospores are smaller (14–17 × 6–6.5 µm) than those of *H. rubellum*, with a less than spore length and slightly oblique germ slit and smooth epispore. It is noteworthy that our three collections of *H. rubellum* come from hygrophilic rainforest and not from lower and dryer locations.

Hypoxyylon rugulosporum K. Van der Gucht, Y.-M. Ju & J.D. Rogers, *Mycologia*, 89 (3) : 506 (1997). Plate 37

Stromata effused-pulvinate, discoid to irregularly elongate or lobed, 8–70 mm long × 4–40 mm wide × 1.6–2.2 mm thick, with abrupt margin and slightly exposed perithecial contours; surface dark brick (60, oac637) to dark vinaceous (82, oac523), pruinose, rarely uneven, with subsurface layer bipartite, composed of amorphous waxy granules that appear luteous (12, oac810) when observed in water but dissolve and do not change colour in 10% KOH, yielding faint yellowish pigments only visible under the microscope, seated on a black carbonaceous layer 80–100 µm thick covering the perithecia; a fragment of stroma yields dilute livid violet (79, oac400) pigments in 10% KOH, not notably changing colour after 20–30 min incubation, but the granules responsible for this reaction were not detected with the microscope in the carbonaceous crust; subperithecial tissue 0.7–1.5 mm thick, olivaceous brown to grey brown, slightly orange in places, woody. **Perithecia** tubular to lanceolate, 0.8–0.9 × 0.35–0.4 mm. **Ostioles** inconspicuous or minutely umbilicate.

Asci cylindrical, with eight obliquely uniseriate ascospores, 160–180 µm total length, the spore-bearing parts 72–80 × 9–10 µm, the stipes 80–105 µm long, originating from long ascogenous hyphae in unilateral spicate arrangement, with apical apparatus discoid, 1–1.3 × 2.5–2.7 µm, bluing in Melzer's reagent. **Paraphyses** abundant, 2.7–3.5 µm broad at base, tapering above asci to 1.5–2 µm, relatively thick-walled, filled with dense and conspicuous refractive material forming long cylindrical bodies. **Ascospores** (12.7–) 13.2–15.2 (–16.9) × (5.5–) 5.9–7.0 (–7.4) µm, Q = (1.8–) 2.0–2.45 (–2.5), N = 50 (Me = 14.2 × 6.5 µm; Qe = 2.2), ellipsoid-inequilateral, with narrowly rounded to subacute ends, dark brown, with a conspicuous straight germ slit spore-length on the most convex side, infrequently on the flattened side, parallel to the sides or slightly sigmoid; perispore indehiscent in 10% KOH; epispore smooth.

Asexual morph on the natural substrate present in MJF 10183, nodulisporium-like, illustrated in FOURNIER & LECHAT (2015a).

Specimens examined: FRENCH WEST INDIES: MARTINIQUE: Schoelcher, Case Navire River, lowland rainforest, on dead culms of bamboo on the riverbank, 5 Aug. 2013, *leg.* J. Fournier & C. Lechat, MJF 13016 (LIP); *ibid.*, same host, 28 Aug. 2010, *leg.* J. Fournier, MJF 10183 (LIP). PAPUA NEW GUINEA: Madang Province: Baiteta, bam-

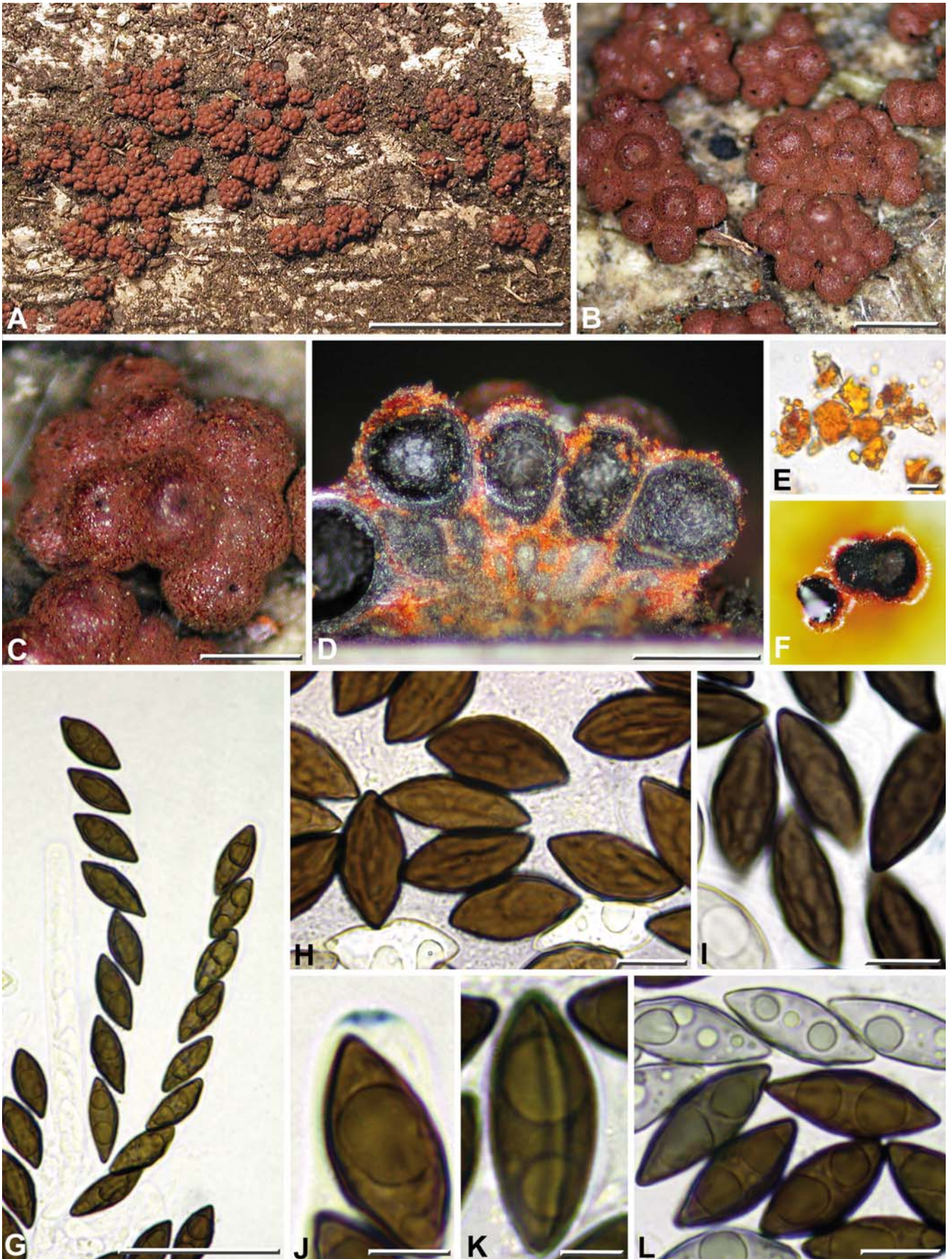


Plate 36 — *Hypoxylon rubellum*

MJF 07103. A: Glomerate stromata on host surface; B, C: Close-up on stromata showing the perithecial contours and the ostioles; D: Stroma in vertical section showing the perithecia, the waxy granules and the basal tissue; E: Stromatal granules in water; F: KOH-extractable pigments (1 min incubation); G: Asci in 1% SDS; H: Ascospores in water; I: Ascospores in chloral-lactophenol; J: Ascocal apical apparatus in Melzer's reagent; K: Ascospore in 10% KOH showing the germ slit; L: Ascospores in 10% KOH showing the absence of dehiscent perispores. Scale bars: A = 10 mm; B = 1 mm; C, D = 0.5 mm; E, H, I, L = 10 µm; G = 40 µm; J, K = 5 µm.

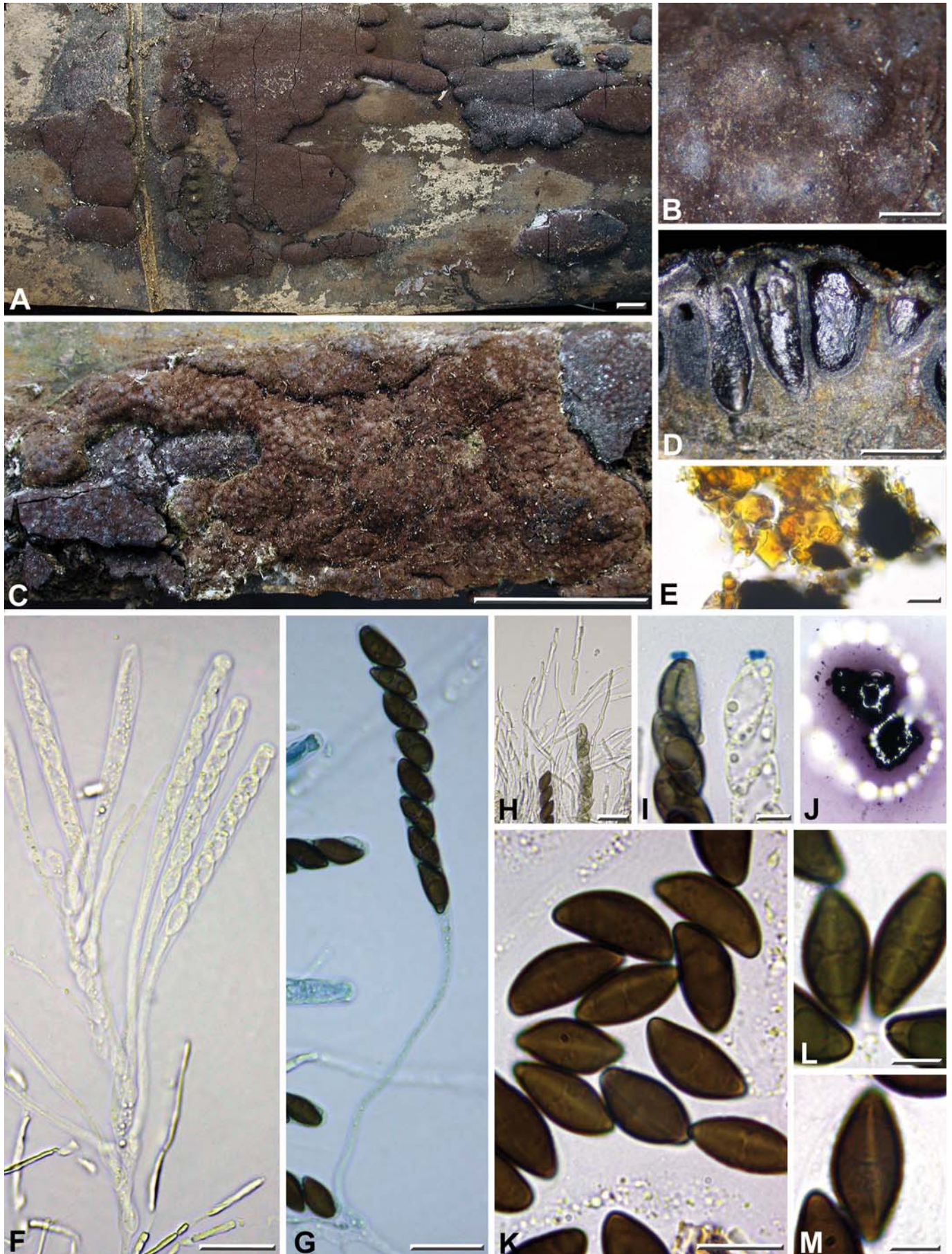


Plate 37 — *Hypoxylon rugulosporum*

MJF 13016. A: Overmature stromata on bamboo surface; B: Stromatal surface in close-up showing the ostioles; C: Mature stroma in surface view; D: Stroma in vertical section showing the perithecia and the basal tissue; E: Waxy granules of the subsurface observed in water; F: Immature asci in 1% SDS arising from long ascogogenous hyphae; G: Mature ascus in dilute blue Waterman ink; H: Paraphyses with refractive contents (in water); I: Ascus apical apparatus in Melzer's reagent; J: Pigments released in 10% KOH after 1 min incubation; K: Ascospores in water; L, M: Ascospores in 10% KOH showing germ slits. Scale bars: A, C = 10 mm; B, D = 0.5 mm; E, K = 10 μ m; F, G, H = 20 μ m; M, I = 5 μ m.

boo culm in lowland rainforest, 2 Jan. 1992, *leg.* K. Van der Gucht & L. De Meister, isotype WSP 69692.

Known distribution: Papua New Guinea, Martinique.

Discussion: This *Hypoxylon* is distinctive on several accounts, its occurrence on bamboo on which it forms thick and wide spreading stromata, the violet pigments released in 10% KOH, the large ascospores with an indehiscent perispore and a hamathecium of strongly refractive paraphyses. *Hypoxylon* spp. known to occur on bamboo are few in the literature, most of them have orange or brown stromatal pigments and the only two known bambusicolous species that have purple KOH-extractable pigments are *H. laminosum* (KUHNER *et al.*, 2014; this paper) and *H. rugulosporum* (VAN DER GUCHT *et al.*, 1997).

The former, known from Martinique, interestingly from exactly the same clump of bamboos, can be easily ruled out based on its daldinioid hemispherical stromata with a lamellate interior.

The latter, known from Papua New Guinea, is characterized by wrinkled ascospores and a sigmoid germ slit but FOURNIER & LECHAT (2015a) demonstrated that was an artifact likely due to overdrying and that the Caribbean collection was conspecific with the isotype material, making it the first record from the Neotropics.

It is noteworthy that in spite of an extensive search for this *Hypoxylon* on bamboo culms all over the island of Martinique we failed to find it again in another place.

Hypoxylon samuelsii Y.-M. Ju & J.D. Rogers, *Mycologia Memoirs*, 20: 180 (1996). Plate 38

Stromata effused-pulvinate on wood, irregularly lobed, at times confluent, 4–82 mm long × 4–22 mm wide × 0.8–1.7 mm thick, conspicuously bumpy on bark, with perithecial contours not or barely exposed, with sloping margins; stromatal surface dark vinaceous (82, oac523), pruinose, rust (39, oac643) when the outermost layer of pruina is worn off; orange yellow waxy granules beneath the surface and between the perithecia, appearing yellow and orange when observed in water, with KOH-extractable pigments orange (7, oac629) with a yellow halo within 1 min incubation, slightly fading after 30 min incubation; subperithecial tissue black, woody, homogeneous, 0.3–1.2 mm thick. **Perithecia** obovoid to tubular, 0.4–0.6 × 0.2–0.3 mm. **Ostioles** umbilicate, inconspicuous.

Asci cylindrical, with eight obliquely uniseriate ascospores, 110–155 µm total length, the spore-bearing parts 67–72 × 4.5–5.5 µm, the stipes 50–90 µm long, originating from long ascogenous hyphae in spicate arrangement, with apical apparatus discoid, 0.3–0.5 × 1.5–1.8 mm, bluing in Melzer's reagent. **Paraphyses** septate, 2.5–4.5 µm wide, copious, slightly embedded in mucilage. **Ascospores** (7.1–) 7.3–9 (–9.8) × (2.6–) 2.8–3.3 (–3.4) µm, Q = (2.2–) 2.4–3 (–3.5); N = 65 (Me = 8.1 × 3 µm; Qe = 2.7), narrowly ellipsoid-equilateral to oblong with narrowly to less frequently broadly rounded ends, often slightly twisted or with a bevelled end, pale brown to brown, with an inconspicuous straight germ slit 3.5–4.5 µm long; perispore indehiscent in 10% KOH; epispore smooth, immature ascospores greyish blue in 10% KOH.

Asexual morph on the natural substrate not seen.

Specimens examined: FRENCH GUIANA: Upper Marouini R., vic. Monpé Soula, on bark, 28 Aug. 1987, *leg.* G.J. Samuels *et al.* 6098, WSP 69636, isotype. FRENCH WEST INDIES: GUADELOUPE: Goyave, path to Chute Moreau, on bark and dead wood, 14 Aug. 2008, *leg.* C. Lechat, CLL 8223 (LIP, epitype). MARTINIQUE: Case-Pilote, Crête Jean-Louis, on old stromata of *Kretzschmaria* sp. on dead wood, 21 Aug. 2005, *leg.* C. Lechat, CLL 5101 (LIP). INDONESIA: North Sulawesi, Eastern Dumoga-Bone National park, vic. Camp 1440, 00°37' N, 123°51' E, 1440 m, on corticated wood, 3–5 Oct. 1985, *leg.* G.J. Samuels 2138 (NY), as *H. hypomiltum*.

Known distribution: Australia, French Guiana, Grenada, Guadeloupe, Martinique, Indonesia.

Discussion: *Hypoxylon samuelsii* is diagnosed based on dark vinaceous stromata with a rust tinge, orange yellow stromatal granules yielding orange pigments in 10% KOH, tubular perithecia, thick subperithecial tissue and narrowly ellipsoid equilateral ascospores with a short inconspicuous germ slit and an indehiscent perispore. *Hypoxylon fendleri* has a similar stromatal surface varying from dark vinaceous to rust but it is readily separated from *H. samuelsii* based on its thinner stromata, obovoid perithecia and larger inequilateral ascospores with a sigmoid germ slit and a perispore dehiscent in 10% KOH. *Hypoxylon retpela* Van der Gucht & Van der Veken (VAN DER GUCHT & VAN DER VEKEN, 1992) likewise features a vinaceous stromatal surface associated with orange stromatal granules but it differs from *H. samuelsii* by a paler vinaceous surface and larger inequilateral ascospores 9.5–12 × 4.5–5 µm with a long straight germ slit and a conspicuously striated perispore dehiscent in 10% KOH. *Hypoxylon retpela* is so far unknown from the Neotropics.

Ascospores of *H. samuelsii* appear variable in dimensions, shape and colour. While the ascospores of CLL 8223 illustrated above conform well to those of the type collection (Me = 7.6 × 3 µm), those of CLL 5101 are slightly more broadly ellipsoid and average 7.5 × 3.6 µm. The collection from Indonesia listed in JU & ROGERS (1996) is more strongly deviating in having dark brown to blackish brown ascospores averaging 8.3 × 4.6 µm with an almost spore-length germ slit and might represent a different taxon. Interestingly, SAN MARTÍN *et al.* (1999b) reported as *Hypoxylon cf. samuelsii* a collection from Mexico deviating by wider ascospores 7–9 × 5–5.5 (–6.5) µm.

The specimen CLL 8223 was designated as the epitype of *H. samuelsii* (KUHNER *et al.*, 2014)

Hypoxylon sclerophaeum Berk. & M.A. Curtis **var. parvisporum** J. Fourn. & Lechat, *Ascomycete.org*, 7 (1): 5 (2015). Plate 39

Stromata effused-pulvinate, 8–83 mm long × 6–32 mm wide × 1.3–4.7 mm thick, irregular and bumpy with often lobed margins, with inconspicuous perithecial contours, the base broadly attached to the substrate; surface dark brick (60, oac637) to dark vinaceous (82, oac523), pruinose, roughened by ostiolar rings, with subsurface layer reddish brown, composed of amorphous waxy granules that appear yellowish and reddish brown when observed in water and extend downwards, delicately lining the perithecial walls, yielding dilute livid violet (79, oac401) pigments in 10% KOH, that turn purple slate (102, oac397) after 20–30 min incubation; subperithecial tissue massive, blackish, woody, with inconspicuous carbonaceous vertically oriented streaks. **Perithecia** long tubular to lanceolate, 0.8–0.9 × 0.25–0.3 mm. **Ostioles** umbilicate, frequently surrounded by conspicuous cream-coloured powdery rings 100–170 µm diam that become raised above stromatal surface on mature stromata.

Asci cylindrical, with eight obliquely uniseriate ascospores, (90–) 115–185 µm total length, the spore-bearing parts 68–76 × 6.5–7.3 µm, the stipes (20–) 45–115 µm long, originating from long ascogenous hyphae in unilateral spicate arrangement, with apical apparatus discoid to cuneate, 0.8–1 × 2.3–2.7 µm, bluing in Melzer's reagent. **Paraphyses** filiform, minutely guttulate. **Ascospores** (9.4–) 9.7–11.2 (–11.9) × (4.1–) 4.3–5.1 (–5.5) µm, Q = (1.9–) 2.0–2.5 (–2.7); N = 40 (Me = 10.4 × 4.8 µm; Qe = 2.2), ellipsoid-equilateral with narrowly rounded ends, often heteropolar with one end more narrowly rounded than the other, pale olivaceous brown, with a faint germ slit half spore-length, straight to rarely oblique-sigmoid, central to often closer to one end, best seen in 10% KOH or in PVA-lactophenol; perispore indehiscent in 10% KOH; epispore smooth.

Asexual morph on the natural substrate not seen.

Specimens examined: FRENCH WEST INDIES: MARTINIQUE: Sainte-Marie, La Philippe forest, Trou Mulet, coastal rainforest, base of a blackened decorticated stump, associated with *Xylaria curta* Fr., 14 Aug. 2013, *leg.* J. Fournier & C. Lechat, MJF 13209 (Holotype, LIP). *Hypoxylon ferrugineum* Otth var. *braziliensis* Theiss. ined.: BRAZIL, Rio Grande do Sul, São Leopoldo, 1906, Rick J. in Theissen F., Decades

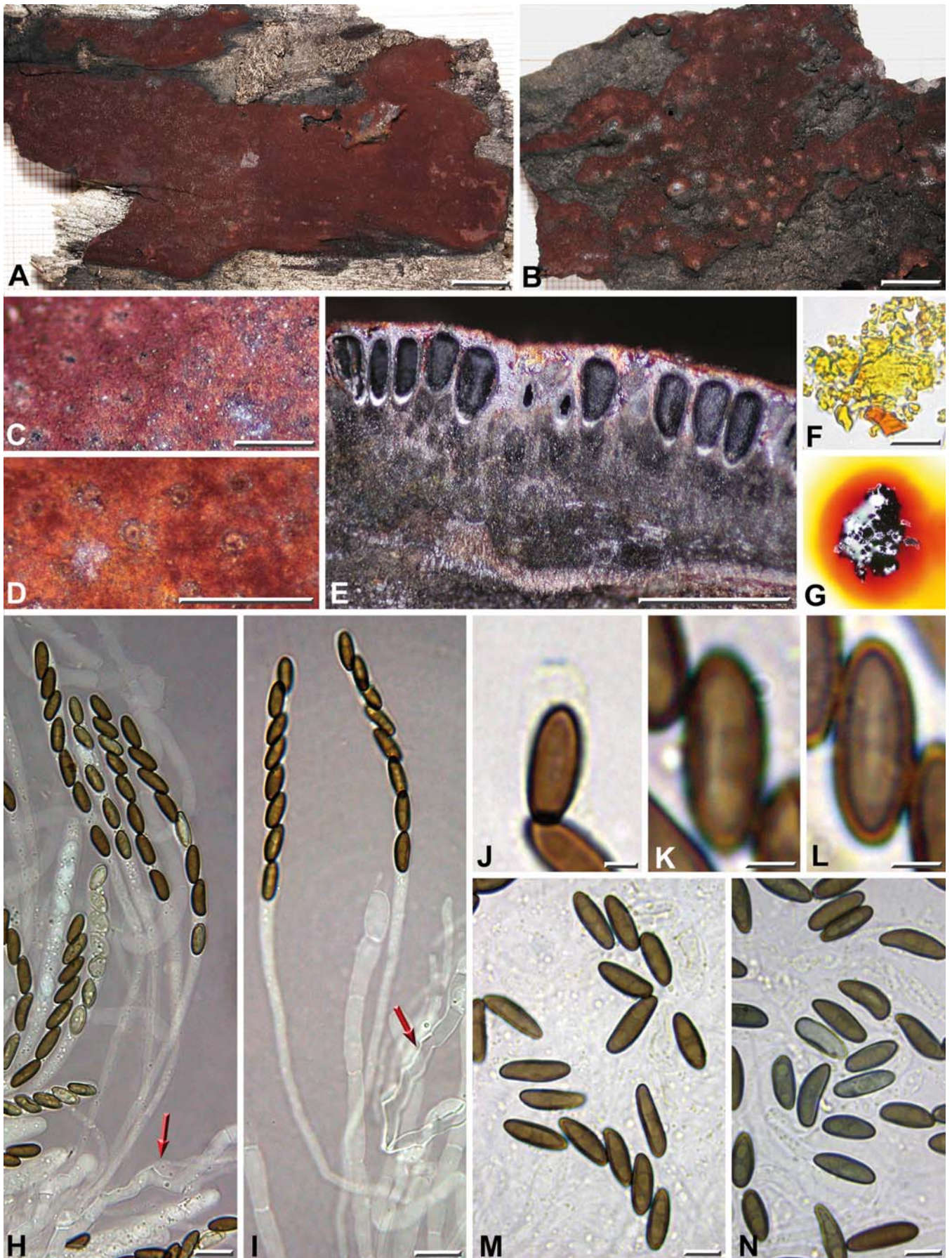


Plate 38 — *Hypoxylon samuelsii*

CLL 8223. A, B: Effused-pulvinate stromata on wood (A) and bark (B); C, D: Close-up on stromatal surface showing the ostioles and varying from vinaceous (C) to rust (D); E: Stroma in vertical section showing the perithecia, the orange brown subsurface crust and the thick subperithecial tissue; F: Stromatal granules in water; G: KOH-extractable pigments (1 min incubation); H, I: Mature asci in black Pelikan ink arising from ascogenous hyphae (arrows) and paraphyses; J: Ascular apical apparatus in Melzer's reagent; K, L: Ascospores in water and Melzer's reagent respectively, showing the short germ slit; M: Ascospores in water; N: Ascospores in 10% KOH lacking a dehiscent perispore and the bluish discoloration of immature ascospores. Scale bars: A, B = 10 mm; C, D = 0.5 mm; E = 1 mm; F, H, I = 10 μ m; J-L = 2 μ m; M, N = 5 μ m.

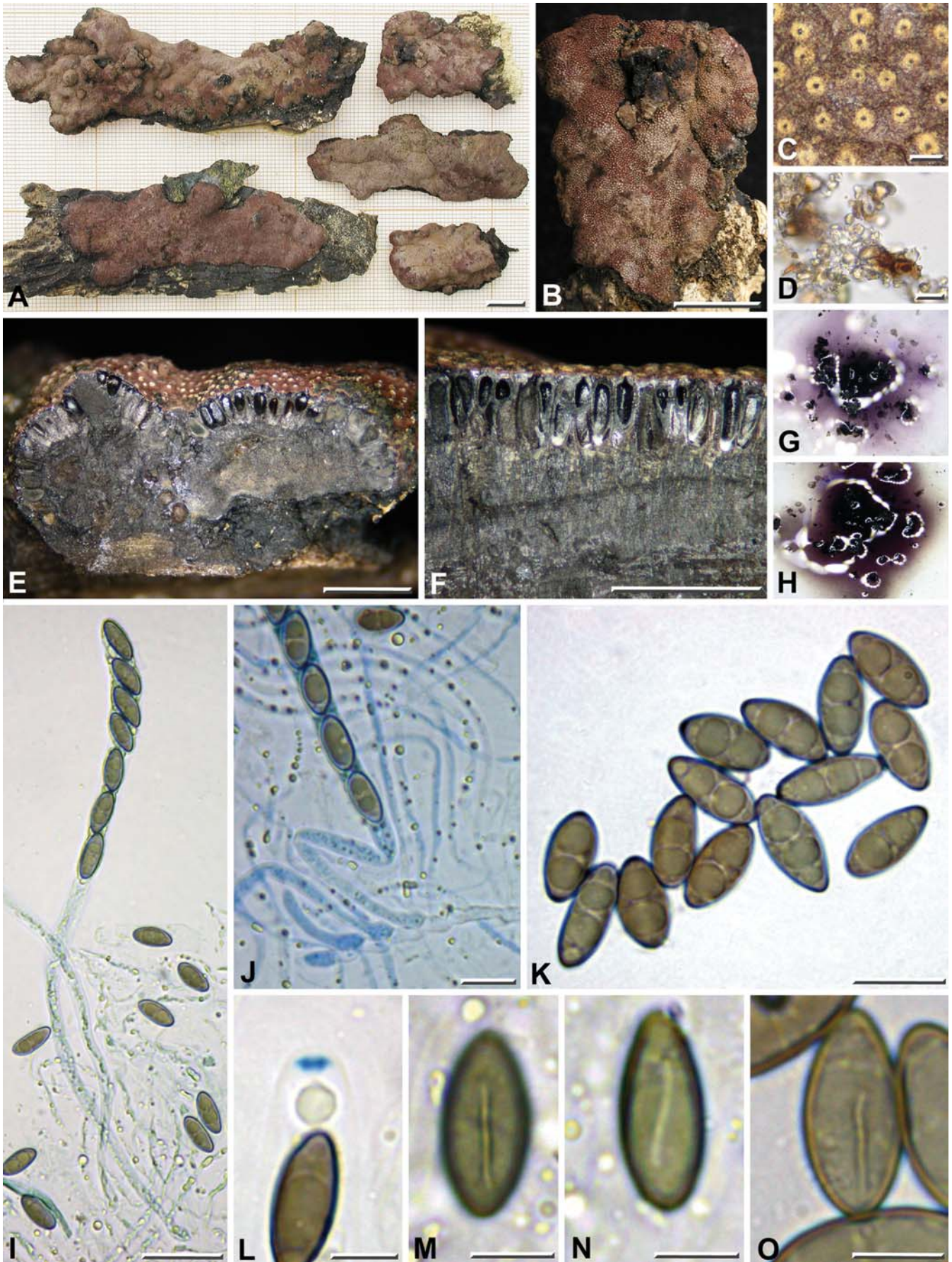


Plate 39 — *Hypoxylon sclerophaeum* var. *parvisporum*

Holotype MJF 13209. A, B: Effused-pulvinate stromata; C: Stromatal surface in close-up showing the ostioles surrounded by powdery rings; D: Waxy granules of the subsurface observed in water; E: Stroma in vertical section showing the massive basal tissue; F: Stroma in vertical section showing the perithecia; G, H: Pigments released in 10% KOH after 1 min and 30 min incubation respectively; I: Long-stipitate mature ascus in dilute black Waterman ink; J: Mature ascus in 1% SDS arising from a long ascogenous hypha and paraphyses; K: Ascospores in water; L: Ascus apical apparatus in Melzer's reagent; M, N: Ascospores in 10% KOH showing the lack of dehiscent perispores and variously shaped germ slits; O: Ascospore in PVA-lactophenol showing the germ slit. Scale bars: A, B = 10 mm; C = 0.2 mm; D, J, K = 10 μ m; E, F = 2 mm; I = 20 μ m; L-O = 5 μ m.

Fungorum Brazilienses 125 (BPI 591209). SURINAM: Type ? of *H. sclerophaeum* Berk. & M.A. Curtis, on bark, ex Herb. Schweinitz (NY).

Known distribution: Martinique.

Discussion: The present fungus is characterized by effused-pulvinate stromata broadly attached to the substrate, with a vinaceous brown surface and inconspicuous perithecial contours, violaceous KOH-extractable pigments, long tubular perithecia seated on a thick black woody tissue, umbilicate ostioles and light brown equilateral ascospores $9.7\text{--}11.2 \times 4.3\text{--}5.1 \mu\text{m}$ with a germ slit much less than spore-length and a perispore indehiscent in 10% KOH. FOURNIER & LECHAT (2015a) assessed that it conforms well to *H. sclerophaeum* as delimited by JU & ROGERS (1996) and to two ancient representative specimens from Brazil listed above but deviates in having significantly smaller ascospores. Therefore the new variety *parvisporum* was created to accommodate it. It is so far known only from the type collection in Martinique.

Hypoxylon sepiaceum J. Fourn. & Lechat *sp. nov.* — MycoBank MB 813523. Plate 40

Diagnosis: Differs from other *Hypoxylon* spp. with effused stromata and a dull brown stromatal surface by the combination of brownish orange KOH-extractable pigments, narrowly ellipsoid-inequilateral ascospores averaging $8.4 \times 3.9 \mu\text{m}$ with a perispore dehiscent in 10% KOH and a straight germ slit much less than spore-length.

Holotype: FRENCH WEST INDIES: MARTINIQUE: Sainte-Marie, La Philippe forest, Trou Mulet, coastal mesophilic forest, corticated log of Mahogany (*Swietenia macrophylla* King, *Meliaceae*), 21 Aug. 2013, *leg.* J. Fournier, MJF 13350 (LIP).

Etymology: From Latin *sepia* = cuttlefish, for the brown dye extracted from its ink, in reference to the dull brown stromatal surface of the fungus.

Stromata effused-applanate, irregularly elongate, with sinuous to lobed margins, $10\text{--}120 \text{ mm long} \times 7\text{--}54 \text{ mm wide} \times 0.5\text{--}0.9 \text{ mm thick}$, with barely to slightly exposed perithecial contours; surface sepia (63, oac636) to dark brick (60, oac639), most often with a faint olivaceous tone, pruinose, wrinkled, with subsurface layer dark orange brown, composed of amorphous waxy granules that appear yellow to orange when observed in water, interspersed in places with colourless angular crystals $3\text{--}7 \mu\text{m}$ in their greatest dimension, not dissolved in 10% KOH; the waxy granules extend downwards between the perithecial walls and yield sienna (8, oac665) pigments in 10% KOH with a fugacious yellow halo, not notably changing colour after 20–30 min incubation; subperithecial tissue $0.1\text{--}0.2 \text{ mm thick}$, olivaceous brown, woody, barely differentiated from the underlying bark tissue. **Perithecia** obovoid, $0.4\text{--}0.45 \times 0.3 \text{ mm}$ or tubular $0.65\text{--}0.75 \times 0.25 \text{ mm}$. **Ostioles** umbilicate, inconspicuous.

Asci cylindrical, with eight obliquely uniseriate ascospores, $90\text{--}145 \mu\text{m}$ total length, the spore-bearing parts $58\text{--}70 \times 5.5\text{--}7 \mu\text{m}$, the stipes $29\text{--}77 \mu\text{m}$ long, originating from long ascogenous hyphae in unilateral spicate arrangement, with apical apparatus discoid, $0.7\text{--}0.9 \times 1.8\text{--}2.2 \mu\text{m}$, bluing in Melzer's reagent. **Paraphyses** filiform, minutely guttulate, evanescent. **Ascospores** (7.3–) $7.6\text{--}9.6$ (–10.3) \times (3.3–) $3.5\text{--}4.3$ (–4.9) μm , $Q = (1.6\text{--}) 1.8\text{--}2.4$ (–2.7); $N = 144$ ($Me = 8.4 \times 3.9 \mu\text{m}$; $Q_e = 2, 2$), ellipsoid-inequilateral with narrowly rounded ends, medium brown, with an inconspicuous germ slit ca. half spore-length, straight, parallel to the sides, best seen in 10% KOH or in PVA-lactophenol; perispore dehiscent in 10% KOH, smooth to faintly transversely striated; epispore smooth.

Asexual morph on the natural substrate not observed.

Other specimens examined: FRENCH WEST INDIES: MARTINIQUE: Fort-de-France, Absalon, trail to Plateau Michel, ca. 350 m, hygrophilic rainforest, corticated branch, 15 Aug. 2013, *leg.* J. Fournier, MJF 13225 (LIP, paratype); *ibid.*, corticated branch, 15 Aug. 2013,

leg. J. Fournier, MJF 13238 (LIP, paratype); *ibid.*, corticated branch, on effete stromata of *Camillea* sp., 5 Jun. 2014, *leg.* J. Fournier, MJF 14042 (LIP, paratype); Rivière-Pilote, Lépinay forest, mesophilic rainforest, corticated branch, 10 Aug. 2013, *leg.* O. Roze, MJF 13108 (LIP, paratype).

Known distribution: Martinique.

Discussion: This *Hypoxylon* lacks distinctive characters but the combination of its macro- and micromorphological features does not fit well any known species.

The most resembling species is *H. hypomiltum*, from which *H. sepiaceum* mainly differs by its slightly larger and inequilateral ascospores; it likewise lacks the matrix of dark thick-walled hyphae within which lie the olivaceous yellow waxy granules typical for *H. hypomiltum*.

An unnamed taxon, *Hypoxylon* sp. Ju 80091401, strongly resembles *H. sepiaceum* and was also regarded as "probably closely related" to *H. hypomiltum* by JU & ROGERS (1996). This unnamed taxon indeed has inequilateral ascospores $8\text{--}10.5 \times 4.5\text{--}5 \mu\text{m}$ with a short but slightly oblique germ slit, and furthermore deviates from *H. sepiaceum* in having yellow to luteous KOH-extractable pigments and spherical perithecia 0.2 mm diam . This taxon was not described as new owing to the immature state of the collection.

Hypoxylon subgilvum Berk. & Broome as conceived by JU & ROGERS (1996) should likewise be considered because of its stromata occasionally umber to sepia and its ascospores $7\text{--}11 \times 3.5\text{--}5 \mu\text{m}$. However, the stromatal surface and the KOH-extractable pigments of *H. subgilvum* differ in being more reddish orange and its ascospores in being dark brown with a straight germ slit spore-length, which was confirmed by the examination of the holotype (see comments on *H. subgilvum* in this paper).

Hypoxylon sepiaceum seems to be not uncommon in Martinique but may be easily overlooked owing to its dull brown stromatal surface often weakly contrasting with the underlying bark.

Hypoxylon sofaiense J. Fourn. & Lechat *sp. nov.* — MycoBank MB 813524. Plate 41

Diagnosis: Differs from known *Hypoxylon* spp. with effused stromata by the combination of abundant sulphur yellow waxy granules inside the stroma that yield orange pigments in KOH, short-stipitate asci and strongly inequilateral ascospores $7.6\text{--}9 \times 3.8\text{--}4.5 \mu\text{m}$ with a conspicuously striated perispore dehiscent in 10% KOH.

Holotype: FRENCH WEST INDIES: GUADELOUPE: Sainte-Rose, Sofaiã, path to Saut des Trois Cornes, mesophilic rainforest, dead corticated branch ca. 2 cm diam , Nov. 2005, *leg.* C. Lechat, CLL 5406 (LIP).

Etymology: After Sofaiã (= sulphurous spring), the location in Guadeloupe where the holotype comes from and for the similarity of the stromatal granules with sulphur.

Stromata effused-applanate, ellipsoid to elongate, confluent, $8\text{--}60 \text{ mm long} \times 4\text{--}13 \text{ mm wide} \times 0.35\text{--}0.5 \text{ mm thick}$, with effused margins; surface dark brick (60, dark oac635), sometimes with a faint purplish tone, slightly uneven and wrinkled, pruinose, with perithecial contours not exposed or barely exposed towards margins; subsurface composed of a thick layer of waxy granules that appear orange when compact but sulphur yellow when bruised and observed in water, extending downwards between the perithecia, with KOH-extractable pigments orange (7, oac629), not notably changing upon prolonged incubation; the tissue below the perithecial layer dark greyish brown, inconspicuous, often reduced to a thin darker line. **Perithecia** obovoid to tubular, $0.25\text{--}0.4 \times 0.2\text{--}0.3 \text{ mm}$, subglobose at periphery. **Ostioles** umbilicate, often encircled by a small whitish pruinose disc.

Asci cylindrical, originating in bundles from short contorted and ramified ascogenous hyphae, with eight obliquely uniseriate

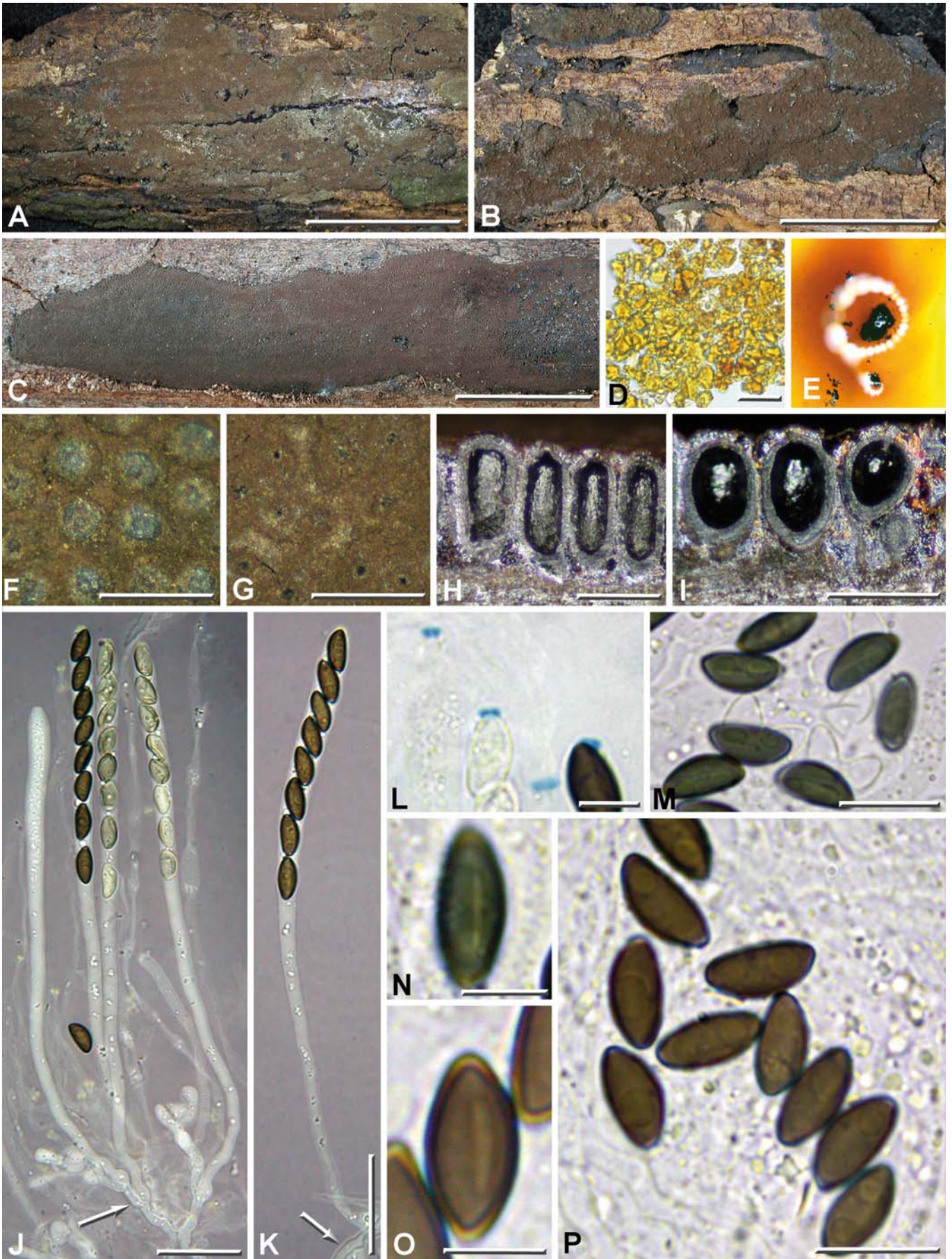


Plate 40 — *Hypoxylon sepiaceum*

A, B, D, E, G-P: Holotype MJF 13350, C, F: MJF 13238. A-C: Effused stromata on bark; D: Stromatal waxy granules in water; E: KOH-extractable pigments after 1 min incubation; F, G: Stromatal surface in close-up showing the ostioles and the variously exposed perithecial contours; H, I: Stromata in vertical section showing the tubular or ovoid perithecia; J, K: Immature and mature asci arising from ascogenous hyphae (arrows), in black Pelikan ink; L: Ascinal apical apparatus in Melzer's reagent; M: Ascospores with a perispore dehiscent in 10% KOH; N, O: Ascospores mounted in 10% KOH and PVA-lactophenol respectively, showing the short germ slit; P: Ascospores in water. Scale bars: A = 50 mm; B, C = 20 mm; D, M, P = 10 µm; F-I = 0.5 mm; J, K = 20 µm; L, N, O = 5 µm.

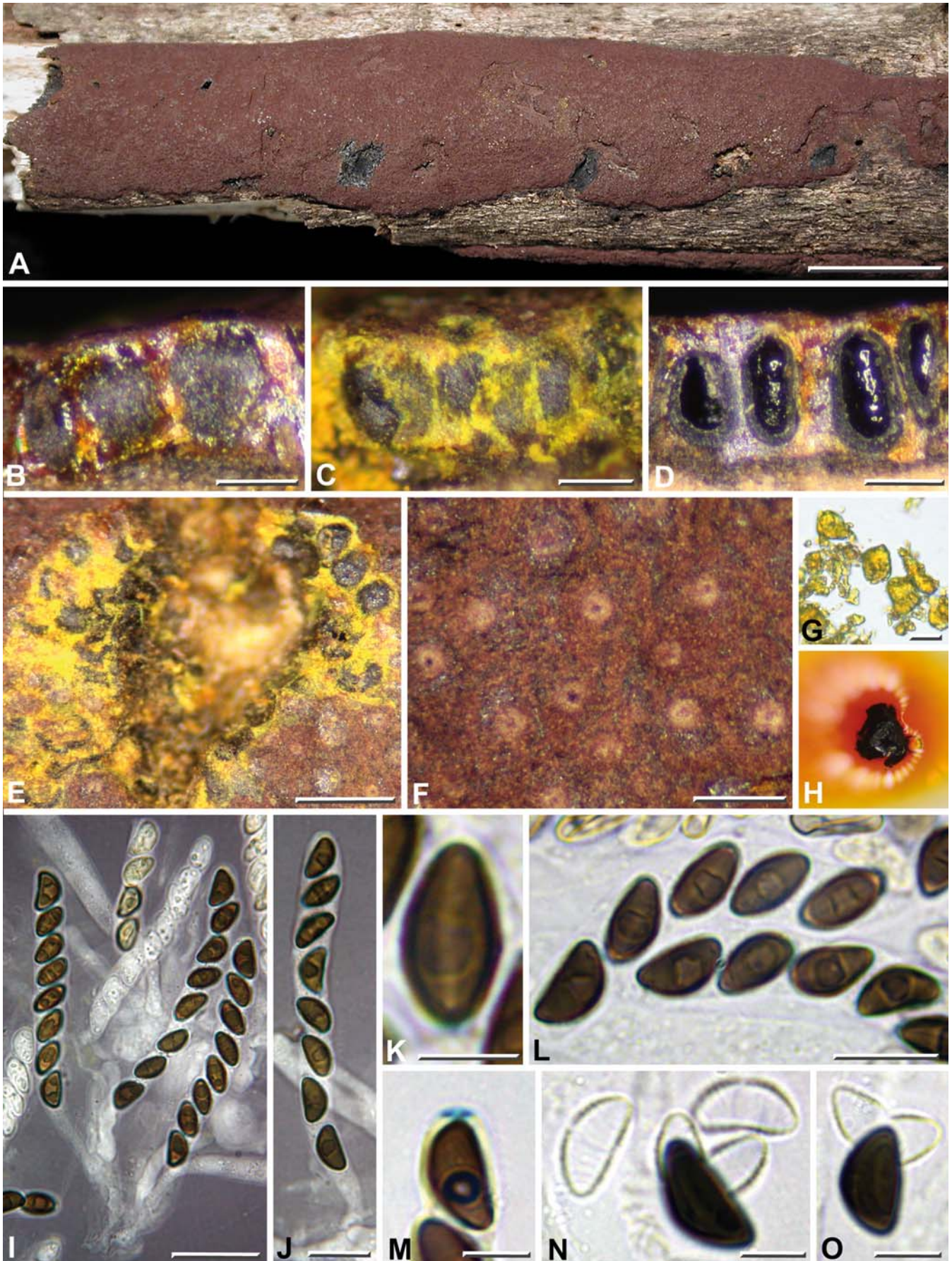


Plate 41 — *Hypoxylon sofaiense*

Holotype CLL 5046. A: Effused stroma in surface view; B: Stroma in vertical section (broken) showing the perithecia encased in compact waxy granules appearing as an orange crust; C: Stroma in vertical section (broken) showing the perithecia surrounded by crumbled sulphur yellow waxy granules; D: Stroma in vertical section showing the obovoid to tubular perithecia; E: Close-up on a bruised part of the stromatal surface; F: Stromatal surface in close-up showing the ostioles; G: Waxy granules in water; H: KOH-extractable pigments after 1 min incubation; I, J: Mature asci in black Pelikan ink; K: Ascospore in dorsal view showing the germ slit; L: Ascospores in water, in side and dorsal/ventral view; M: Ascus apical apparatus in Melzer's reagent; N, O : Ascospores in 10% KOH showing the dehiscent striated perispores. Scale bars : A = 10 mm; B-D, F = 0.2 mm; E = 0.5 mm; G, J, L = 10 μ m; I = 20 μ m; K, M-O = 5 μ m.

ascospores, 65–72 µm total length, the spore-bearing parts 52–58 × 6–6.5 µm, the stipes 10–15 µm long, with a discoid apical apparatus 0.5–0.8 × 2.2–2.5 µm bluing in Melzer's reagent. **Paraphyses** 4–5 µm wide at base, tapering above asci, septate, embedded in mucilage. **Ascospores** (7–) 7.6–9.0 (–9.3) × (3.5–) 3.8–4.5 (–4.9) µm, Q = (1.7–) 1.8–2.2 (–2.4); N = 100 (Me = 8.3 × 4.2 µm; Qe = 2), ellipsoid strongly inequilateral with most often broadly rounded ends, slightly laterally flattened, medium brown, with a conspicuous straight germ slit spore-length; perispore dehiscent in 10% KOH, conspicuously transversely striated; epispore smooth.

Asexual morph on the natural substrate not seen.

Known distribution: Guadeloupe.

Discussion: *Hypoxylon sofaiense* is characterized by thin effused-applanate stromata with reddish brown surface and abundant sulphur yellow waxy granules readily appearing upon bruising and yielding orange pigments in 10% KOH, combined with short-stipitate asci and relatively small strongly inequilateral ascospores with a conspicuously striated perispore dehiscent in 10% KOH. This combination of characters is reminiscent of *H. perforatum* (Schwein.: Fr.) Fr. because of the yellow stromatal granules and the inequilateral ascospores. Interestingly, preliminary unpublished HPLC results (STADLER, pers. comm., 2006) also suggest this relationship since the main stromatal compounds of *H. sofaiense* are derivatives of hypomiltin, the chemotaxonomic marker of *H. perforatum*. However, *H. perforatum* is different in having usually pulvinate stromata, less abundant stromatal granules yielding citrine yellow pigments in KOH and more narrowly ellipsoid ascospores averaging 9.7 × 4.3 µm with a faintly striated perispore. Following a suggestion from Dr. Ju (pers. comm., 2006), we also considered *H. rubiginosum* var. *microsporium* A.J.S. Whalley as a possible name for our fungus. According to the protologue (WHALLEY, 1981) this taxon collected in Australia differs from typical *H. rubiginosum* by smaller ascospores 6–8 × 3–4.5 µm and its rust red to brown stromata are 1–2 µm thick. JU & ROGERS (1996) reported that the type was missing and proposed as lectotype a collection from Sierra Leone on *Raphia hookeri*. However, it appears that the thinly effused stromata, the strongly inequilateral ascospores and the conspicuously striated perispores of our fungus, let alone the other characters, do not fit *H. rubiginosum*, whatever the dimensions of the ascospores.

Finally, we also considered *H. pelliculosum* and *H. retpela* for their conspicuously ornamented perispores associated with orange stromatal pigments but the former has glomerate stromata and its asci lack an apical apparatus while the latter has livid vinaceous stromata; furthermore, both differ from *H. sofaiense* by larger ascospores respectively 9.8–11.0 × 5.3–5.9 and 9.5–12 × 4.5–5 µm and more coarsely ornamented perispores.

Hypoxylon subgilvum Berk. & Broome, *J. Linn. Soc., Bot.*, 14: 120 (1873). Plates 42–43

Stromata thinly effused, suborbicular to elongate, 8–33 mm long × 5–13 mm wide × 0.4–0.6 mm thick, with conspicuously exposed perithecial contours; surface bay (6, oac636) with a faint vinaceous tone, pruinose, with subsurface layer reddish orange, composed of amorphous waxy granules that appear orange yellow when observed in water and encase the perithecia downwards, yielding orange (7, oac629) to scarlet (5, oac614) pigments in 10% KOH, not notably changing colour after 20–30 min incubation; subperithecial tissue 0.1–0.3 mm thick, dark brown with dull orange streaks, woody. **Perithecia** subspherical, 0.25–0.3 mm diam. **Ostioles** umbilicate, inconspicuous.

Asci cylindrical, with eight obliquely uniseriate ascospores, 110–135 µm total length, the spore-bearing parts 70–76 × 6.5–7.3 µm, the stipes 36–62 µm long, originating in bundles from short ascogenous hyphae in unilateral spicate arrangement, with apical apparatus discoid, 0.7–1 × 2.2–2.6 µm, bluing in Melzer's reagent.

Paraphyses filiform, 3–4 µm wide, sparsely guttulate. **Ascospores** (8.4–) 9.5–10.7 (–11.1) × (4.1–) 4.7–5.1 (–5.2) µm, Q = (1.7–) 1.9–2.2 (–2.6); N = 60 (Me = 10 × 4.8 µm; Qe = 2.1), ellipsoid strongly inequilateral, with narrowly rounded ends, dark brown to blackish brown, with a faint straight germ slit spore-length, parallel to the sides; perispore readily dehiscent in 10% KOH, also in water, faintly transversely striated; epispore smooth.

Asexual morph on the natural substrate (Plate 43): Scattered colonies present at the margins of young stromata, fluffy, buff (45, oac853), with a virgariella- to nodulisporium-like conidiogenous structure; conidiophores 45–70 µm high, pale brown, conidiogenous cells subhyaline, roughened, 7–18 × 2–3 µm, conidia ellipsoid, yellowish, finely roughened, 3.8–5 × 2.3–3 µm. Asexual morph in culture on OA nodulisporium-like, based on material from Hawaii, Mexico, Taiwan and Venezuela (JU & ROGERS, 1996).

Specimens examined: FRENCH WEST INDIES: MARTINIQUE: Case-Pilote, Fond Boucher, trail to Morne Venté, xero-to mesophilic forest, on wood and bark of a dead branch and over a *Hypoxylon* sp. and a *Biscogniauxia* sp., 17 Aug. 2013, leg. J. Fournier, MJF 13291 (LIP). SRI LANKA: Central Province: *sine loco*, Dec. 1868, leg. G.H.K. Thwaites 1087, [K (M) 124723, holotype of *H. subgilvum*]. USA: FLO-RIDA: Gainesville, decorticated blackened wood, 26 Jun. 1919, leg. C.J. Humphrey, as *H. rubiginosum* by C.G. Lloyd and as *H. crocopeplum* by J.H. Miller (BPI 10760).

Known distribution: Pantropical.

Discussion: Owing to its thin, effused, dull orange brown stromata with spherical perithecia, orange yellow stromatal pigments and dense orange KOH-extractable pigments, combined with dark brown inequilateral ascospores with a straight germ slit this *Hypoxylon* keys out to *H. crocopeplum* or *H. subgilvum*. Both species differ by the dimensions of their ascospores and conidia in culture but their ascospores size ranges overlap (9.5–15 × 4–7 µm and 7–11 × 3.5–5 µm respectively). Based on molecular data, the wide concept of *H. crocopeplum* defined by JU & ROGERS (1996) was more narrowly delimited by HSIEH *et al.* (2005) by the reinstatement of *H. polyporoideum* for specimens with thick stromata and long tubular perithecia that were previously included in *H. crocopeplum*. However, the wide ascospores size range of *H. crocopeplum* remained unchanged, making it difficult to discriminate the two species without data on the asexual morph obtained in culture or without molecular data. The type specimen of *H. crocopeplum* is from South Carolina (USA), it was not revised as to ascospores dimensions during this survey but we had the opportunity to study a specimen from Florida (BPI 10760) included in *H. crocopeplum* by JU & ROGERS (1996). This specimen has ascospores (13.4–) 13.8–17.1 (–17.5) × (7.1–) 7.3–8.3 (–8.6) µm, Q = (1.7–) 1.8–2.1 (–2.2); N = 32 (Me = 15.2 × 7.9 µm; Qe = 1.9). On the other hand we studied the holotype of *H. subgilvum* [K (M) 124723] in which the ascospores are (8.9–) 9.1–9.9 (–10.6) × (4.2–) 4.5–5.0 (–5.1) µm, Q = (1.7–) 1.9–2.2 (–2.3); N = 36 (Me = 9.5 × 4.8 µm; Qe = 2.0) and the mature stroma is similar to our collection. As the ascospores of our collection conform well to those of the type of *H. subgilvum* and clearly differ from those of the collection of *H. crocopeplum* we examined, we tentatively refer our specimen from Martinique to *H. subgilvum*, until further cultural, chemotaxonomic and molecular data on these species become available.

Because of the faint vinaceous colour of the stromatal surface associated with an orange subsurface in our collection, a comparison with *H. fendleri* appears necessary. It primarily differs from *H. fendleri* by its ascospores that have a straight germ slit vs. sigmoid in *H. fendleri*.

The superposition of a series of three stromatal layers visible on plate 42 (Fig. D) suggests a fungicolous habitat, with the basal black layer an effete *Biscogniauxia* and the mid layer a dead *Hypoxylon* with slightly larger perithecia but most likely the same as the above living *Hypoxylon*, based on ascospore morphology and orange stromatal granules. However, the stromata developing on wood (plate 42, fig. A, upper left) are not associated with other fungi. The occur-

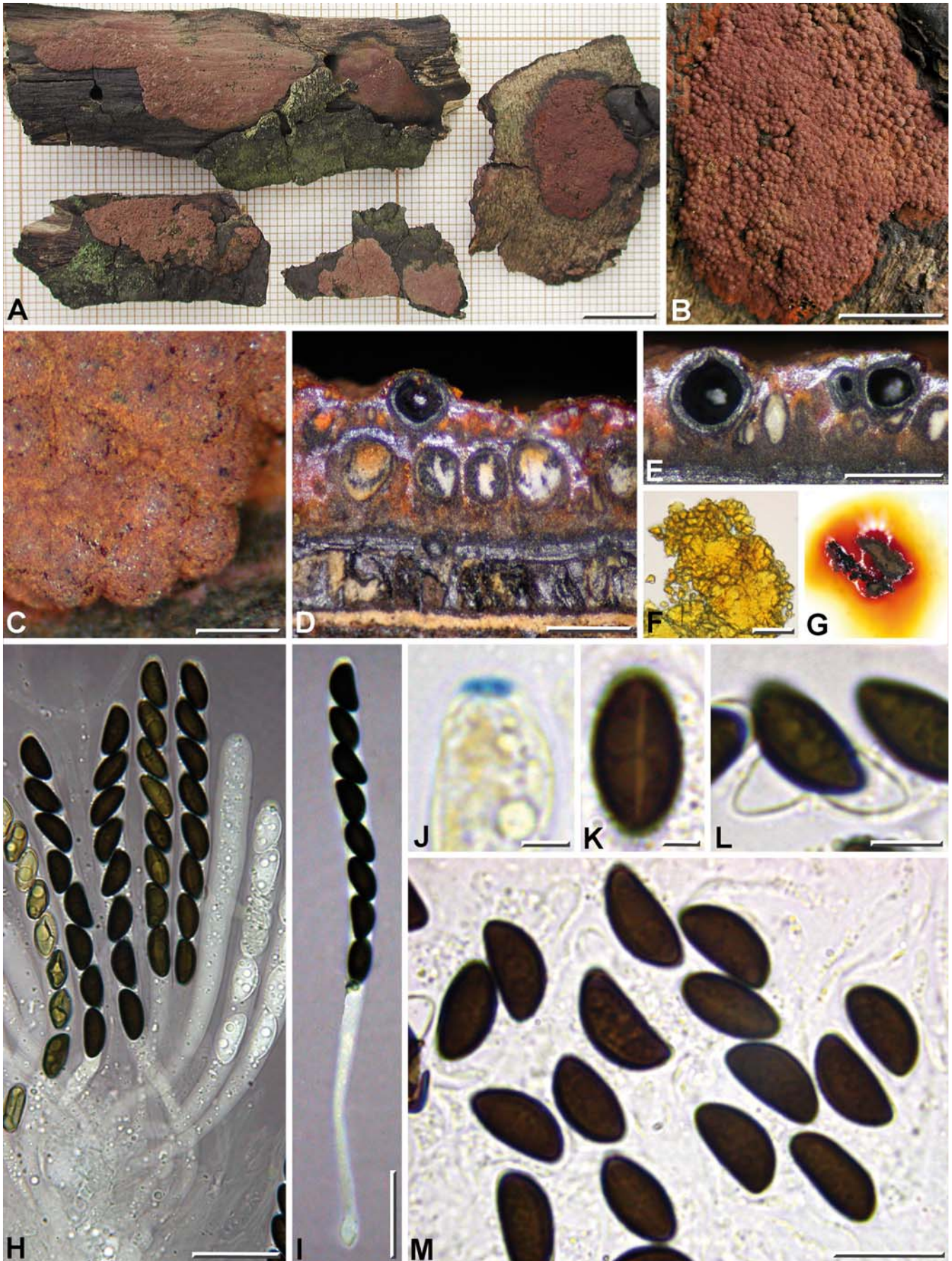


Plate 42 — *Hypoxylon subgilvum*

MJF 13291. A: Stromata in surface view; B: Stroma with nodulose surface; C: Close-up on stromatal surface showing the perithecial contours and the scaly superficial pruina; D: Stroma in vertical section showing the underlying stromata of effete *Hypoxylon* sp. (reddish brown) and *Biscogniauxia* sp. (black); E: Stroma in vertical section, on bark; F: Stromatal waxy granules in water; G: KOH-extractable pigments after 1 min incubation; H, I: Bundle of immature and mature asci arising from a short ascogenous hypha, surrounded by sparse paraphysis, in black Pelikan ink; J: Ascospore in dorsal view showing the germ slit, in water; K: Ascospore in dorsal view showing the germ slit, in water; L: Ascospore in 10% KOH showing the dehiscient perispore; M: Ascospores in water. Scale bars: A = 10 mm; B = 5 mm; C-E = 0.5 mm; F, M = 10 μ m; H, I = 20 μ m; J, K = 2 μ m; L = 5 μ m.

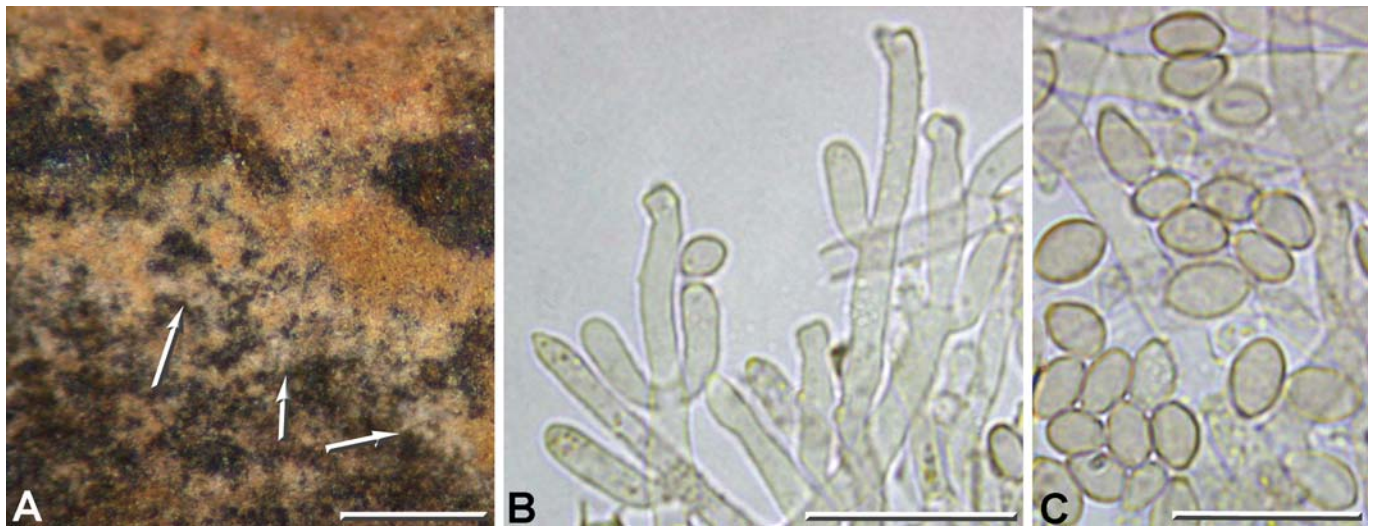


Plate 43 — *Hypoxylon subgilvum* asexual morph

MJF 13291. A: Colonies of asexual morph at the margin of a young primordium (arrows); B: Nodulisporium- and virgariella-like conidiogenous structures, in 1% SDS; C: Conidia in 1% SDS. Scale bars: A = 0.2 mm; B = 20 μ m; C = 10 μ m.

rence on other xylariaceous fungi present on bark should therefore be fortuitous.

Hypoxylon subtrugodes J. Fourn. & Lechat *sp. nov.* — MycoBank MB 813525. Plate 44

Diagnosis: Differs from the most similar *Hypoxylon trugodes* by small subspherical perithecia vs. long tubular, ascospores averaging $15.3 \times 6.8 \mu\text{m}$ vs. $7.7 \times 3.3 \mu\text{m}$ and a more conspicuously ornamented perispore.

Holotype: FRENCH WEST INDIES: MARTINIQUE: Case-Pilote, Fond Boucher, trail to Morne Venté, xero-to mesophilic forest, dead corticated branch, 17 Aug. 2013, *leg.* J. Fournier, MJF 13277 (LIP).

Etymology: Resembling *H. trugodes*.

Stroma effused-applanate, elongate with irregular margin, 50 mm long \times 9 mm wide \times 0.6–0.7 (–1.2) mm thick, with slightly to conspicuously exposed perithecial contours; surface dark vinaceous (82, oac523), pruinose, with subsurface layer pale ochreous (44, oac804), composed of amorphous waxy granules that appear yellowish when observed in water and extend downwards between the perithecial walls, yielding fugacious amber (47, oac852) shortly luteous (12, oac810) pigments in 10% KOH, turning fawn (87, oac645) after 20–30 min incubation; subperithecial tissue 0.3–0.9 mm thick, blackish to yellowish brown, woody. **Perithecia** obovoid to subspherical, 0.3–0.35 \times 0.25–0.3 mm. **Ostioles** umbilicate, inconspicuous.

Asci cylindrical, with 4–6 (–8) uniseriate ascospores, 130–190 μm total length, the spore-bearing parts 68–95 \times 9–10 μm , the stipes 54–95 (–113) μm long, originating from long ascogenous hyphae in unilateral spicate arrangement, with apical apparatus discoid, 1.3–1.6 \times 3–3.4 μm , bluing in Melzer's reagent. **Paraphyses** filiform, minutely guttulate. **Ascospores** (13.1–) 14.2–16.7 (–17.4) \times (5.4–) 6.3–7.3 (–7.7) μm , $Q = (1.9\text{--}) 2.1\text{--}2.5$ (–2.8); $N = 65$ ($Me = 15.3 \times 6.8 \mu\text{m}$; $Q_e = 2.3$), ellipsoid strongly inequilateral, frequently navicular, with narrowly rounded ends, dark brown to blackish brown, with an inconspicuous germ slit almost spore-length, straight, parallel to the sides; perispore dehiscent in 10% KOH, thick, conspicuously transversely striated, striae somewhat wavy and anastomosed; epispore smooth.

Asexual morph on the natural substrate not observed.

Other specimen examined: FRENCH WEST INDIES: MARTINIQUE: Case-Pilote, Fond Boucher, trail to Morne Venté, xero-to mesophilic

forest, dead corticated twig 6 mm diam, 25 Aug. 2010, MJF 10119 (LIP, paratype) (scanty and hardly mature).

Known distribution: Martinique.

Discussion: This *Hypoxylon* is characterized by a dark vinaceous and slightly nodulose stromatal surface, subspherical perithecia, yellowish stromatal granules with luteous to fawn KOH-extractable pigments and blackish brown navicular ascospores averaging $15.3 \times 6.8 \mu\text{m}$ with a faint straight germ slit and a conspicuously ornamented perispore dehiscent in 10% KOH. The collection MJF 10119 is hardly mature and deviates in its stromatal surface almost devoid of a vinaceous tone.

The species to which it should be first compared is *H. trugodes* for its unusual combination of stromata with a purplish surface and yellow stromatal granules with luteous to cinnamon KOH-extractable pigments. *Hypoxylon subtrugodes* can be readily distinguished from *H. trugodes* by its small spherical perithecia vs. long tubular and much larger ascospores averaging $15.3 \times 6.8 \mu\text{m}$ vs. $7.7 \times 3.3 \mu\text{m}$ with more conspicuously ornamented perispores. It should also be compared with *H. arawakianum* (this paper) based on similar yellowish waxy granules and KOH-extractable pigments. They primarily differ by ascospores dimensions that do not overlap, averaging respectively $15.3 \times 6.8 \mu\text{m}$ vs. $10.4 \times 5.2 \mu\text{m}$, ascospore shape, respectively with narrowly rounded ends vs. broadly rounded ends and long-stipitate asci for the former vs. short-stipitate asci for the latter.

The pantropical *H. subrutulum* Starb. has similar strongly inequilateral, dark brown ascospores $13\text{--}23 \times 6.5\text{--}10 \mu\text{m}$ with conspicuously striated dehiscent perispores. It differs from *H. subtrugodes* in lacking a vinaceous tone on stromatal surface and in having dark reddish brown stromatal granules yielding olivaceous KOH-extractable pigments (JU & ROGERS, 1996).

A collection from Mexico reported by SAN MARTIN *et al.* (1999b) as *Hypoxylon* sp. aff. *ferrugineum* Otth. features ascospores that are similar in size and shape to those of *H. subtrugodes*. It primarily differs from *H. subtrugodes* by orange KOH-extractable pigments, asci devoid of apical apparatus and ascospores with inconspicuously ornamented perispores.

The ornamentation of the perispores as seen by light microscopy appears different from the transversely oriented ridges usually encountered on the perispores of many *Hypoxylon* spp and might be a further differential character. In *H. subtrugodes* the ornamentation of the perispore seems to consist of low wavy ridges somewhat anastomosing, but this feature should be studied by SEM for a better appraisal.

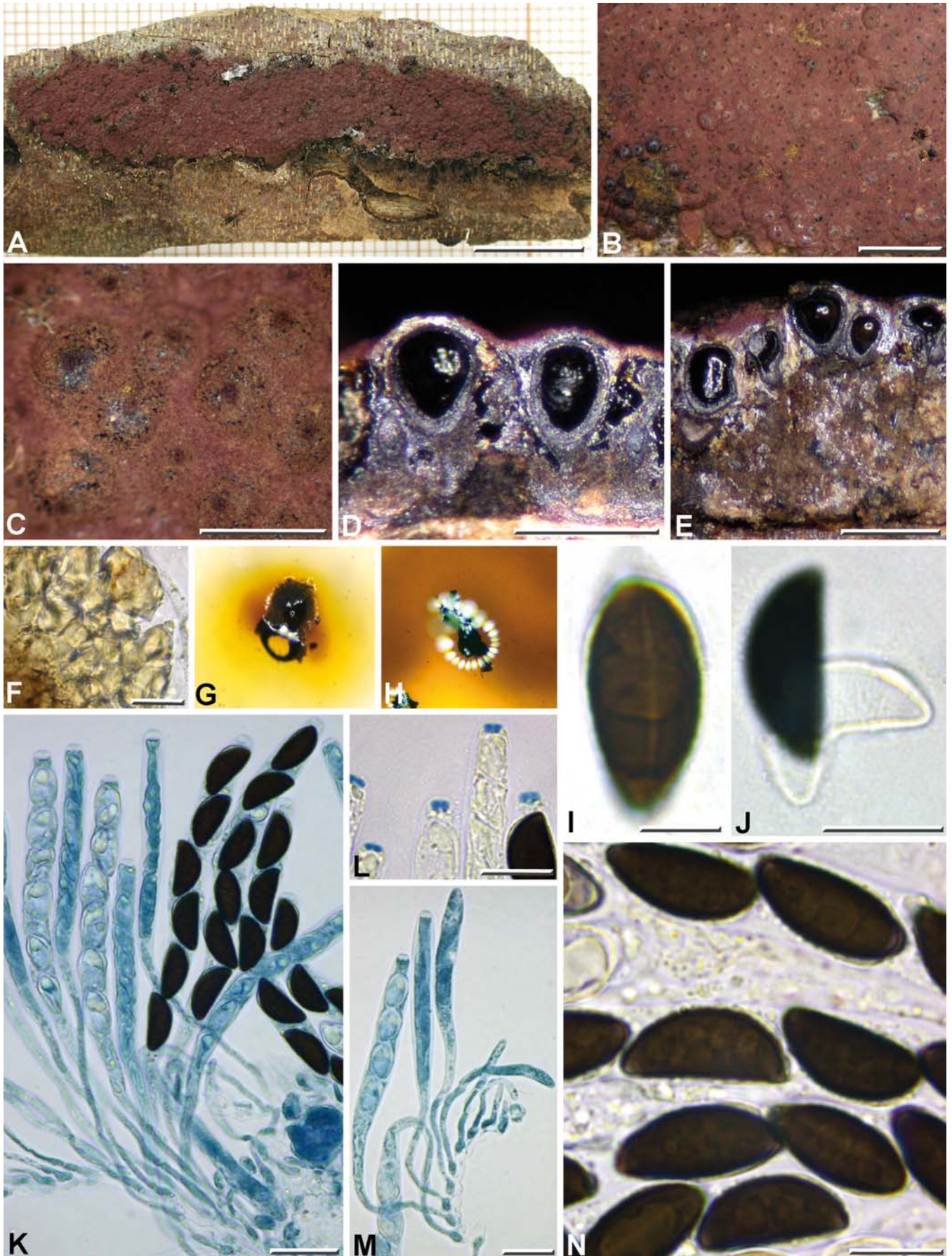


Plate 44 — *Hypoxylon subtrugodes*

Holotype MJF 13277. A: Stroma in surface view; B, C: Stromatal surface in close-up showing the perithecial contours and the ostioles; D, E: Stroma in vertical section showing the perithecia, the yellowish subsurface granules and the variable thickness of the subperithecial tissue; F: Stromatal granules observed in water; G, H: KOH-extractable pigments after 1 min and 30 min incubation respectively; I: Ascospore in dorsal view showing the thin germ slit, in water; J: Ascospore in 10% KOH showing a dehiscent ornamented perispore; K, M: Immature and mature asci originating from ascogenous hyphae, in black Waterman ink with 1% SDS; L: Ascical apical apparatus in Melzer's reagent; N: Ascospores in water. Scale bars: A = 10 mm; B = 2 mm; C-E = 0.5 mm; F, J, L, N = 10 μ m; I = 5 μ m; K, M = 20 μ m.

Stromata peltate-discoid, 20–25 mm diam × 8–10 mm thick, with inconspicuous perithecial contours, margin entire; surface slightly undulate, matt, pruinose, chestnut (40, dark oac635); reverse black, slightly roughened, attached to the substrate by a central or eccentric connective; subsurface dull brown, a thin crust of amorphous waxy granules that appear yellowish brown when observed in water, not extending downwards between perithecia, yielding fugacious amber (47, oac852), soon followed by greyish sepia (106, oac640) KOH-extractable pigments, fading after prolonged incubation; subperithecial tissue massive, woody, 6–8 mm thick, blackish, faintly lamellate, with thin black streaks radiating from the base. **Perithecia** narrowly lanceolate, 1.2–1.7 × 0.2–0.3 mm, the base filled with white subhymenial tissue. **Ostioles** umbilicate.

Asci cylindrical, with eight obliquely uniseriate or irregularly biserial ascospores, 220–250 µm total length, very long-stipitate, the spore-bearing parts 50–60 × 5.5–9 µm, the stipes 160–190 µm long, arising in unilateral spicate arrangement from long ascogenous hyphae, with a discoid apical apparatus 0.5–0.7 × 2–2.2 µm, bluing in Melzer's reagent. **Paraphyses** not seen. **Ascospores** (8.5–) 8.7–10.6 (–11.1) × (3.1–) 3.7–4.3 (–4.6) µm, $Q = (2–) 2.1–2.7 (–3.1)$; $N = 60$ ($Me = 9.8 \times 4 \mu\text{m}$; $Q_e = 2.4$), ellipsoid-inequilateral with narrowly to broadly rounded ends, often twisted or irregularly shaped, at times with a bevelled end, brown, with a straight or slightly sigmoid germ slit less than spore length, parallel to the sides or oblique. Perispore indehiscent in 10% KOH, epispore smooth.

Asexual morph on the natural substrate not observed.

Specimens examined: FRENCH WEST INDIES: MARTINIQUE: Schoelcher, Duclos River next to Fontaine Didier, hygrophilic rainforest, on a dead corticated branch of *Ficus* sp., 28 Aug. 2007, leg. J. Fournier, MJF 07169 (LIP). PANAMA: Gamboa, substrate unknown, 2014, leg. E. Esquivel-Rios, JF 14032 (JF). U.S.A: HAWAII: Vao Valley, Maui, on *Kva* dead wood, 21 Dec. 1927, leg. C.L. Shear, Shear #115 (BPI), as *H. sclerophaeum* by J.H. MILLER (1961).

Known distribution: Pantropical.

Discussion: *Hypoxyton* spp. with massive peltate stromata were regarded as *H. sclerophaeum* by MILLER (1961). JU & ROGERS (1996) showed that several different species were lumped under this name and *H. tortisporum* was segregated based on the combination of oliveaceous brown KOH-extractable pigments with highly irregular brown ascospores with a short germ slit and a perispore indehiscent in 10% KOH. The most resembling species with peltate stromata is *H. symphyon* A. Möller which likewise features irregularly shaped ascospores. *Hypoxyton symphyon* is a rarely recorded neotropical species that we did not encounter in Guadeloupe or Martinique. It can be separated from *H. tortisporum* by its KOH-extractable pigments that either lack or are purple slate and by ascospores with the germ slit frequently on the flattened side (JU & ROGERS, 1996).

Basically, the ascospores of *H. tortisporum* are ellipsoid slightly inequilateral with narrowly to broadly rounded ends and a short germ slit on the convex side but an unusually high number appears somewhat twisted or rhomboid, involving variable orientations of the germ slit.

The three different collections examined are consistent as to the morphological features and show a similar anatomy of the massive subperithecial tissue, associating a lamellate structure to thin black streaks radiating from the base. This character might also be diagnostic since other species with lamellate interior like *H. laminosum* and *H. nicaraguense* lack black radiating streaks.

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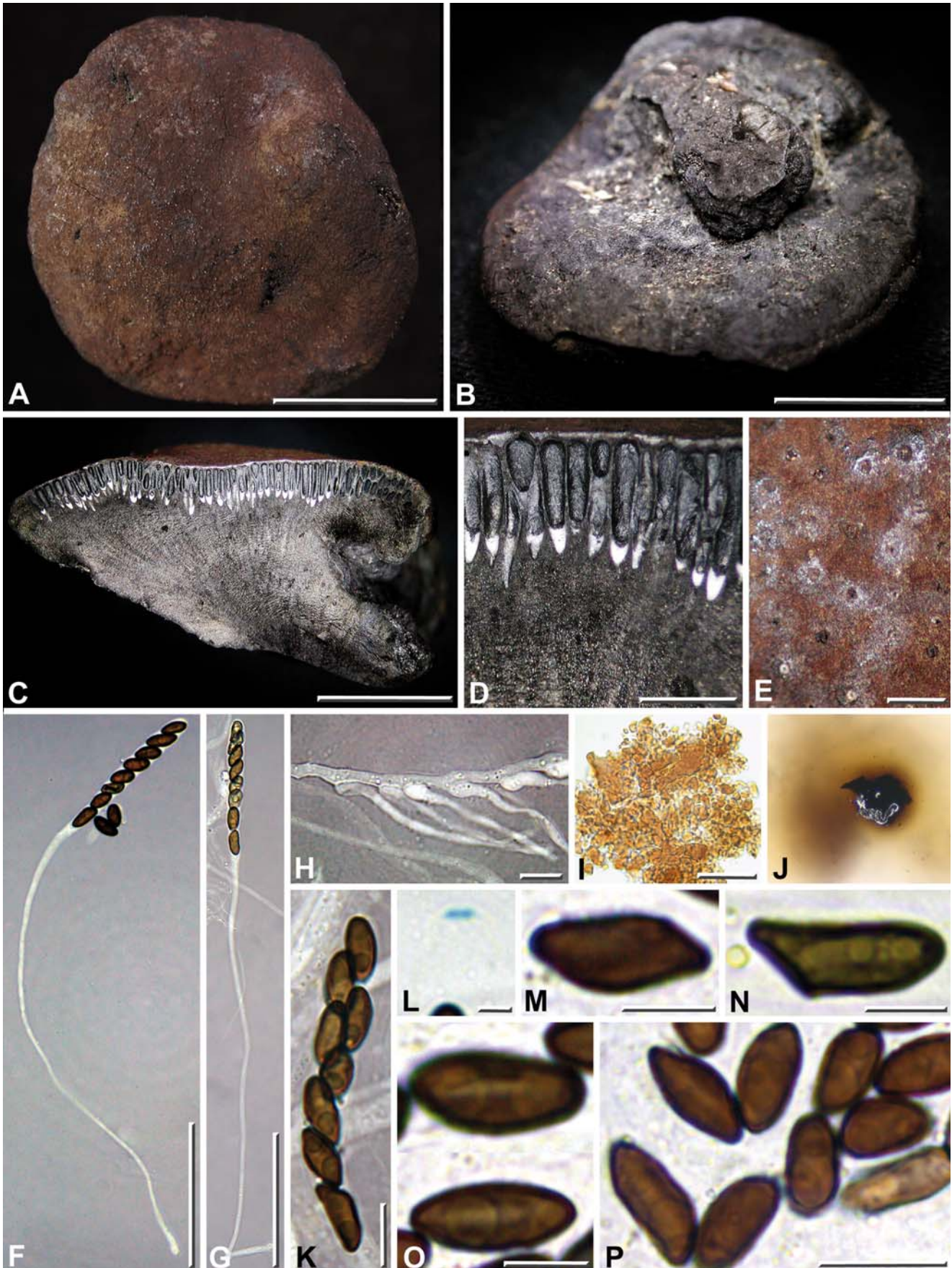


Plate 45 — *Hypoxylon tortisporum*

MJF 07169. A: Stroma in top view; B: Underside of a stroma showing the connective; C: Stroma in vertical section showing the perithecial layer and the thick blackish subperithecial tissue with radiating black streaks; D: Close-up on the perithecial layer and the thick blackish subperithecial tissue with radiating black streaks; E: Close-up on stromatal surface showing the ostioles; F, G: Mature long-stipitate asci in black Pelikan ink; H: Ascogenous hyphae with attached ascial stipes, in black Pelikan ink; I: Stromatal granules in water; J: KOH-extractable pigments after 1 min incubation; K: Spore-bearing part of an ascus with partially biseriolate arrangement of ascospores; L: Ascical apparatus in Melzer's reagent; M: Rhomboid ascospore, in water; N: Ascospore with a bevelled end, in 10% KOH; O: Ascospores in dorsal view showing the germ slits, in water; P: Various shaped ascospores, in water. Scale bars: A, B = 10 mm; C = 5 mm; D = 100 µm; E-G = 50 µm; H, I, K, P = 10 µm; L = 2 µm; M-O = 5 µm.

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