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Towards a natural classification of Sordariomycetes: The genera *Frondisphaeria*, *Immersisphaeria*, *Lasiobertia*, *Pulmosphaeria* and *Yuea* (Sordariomycetes *incertae sedis*)

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Abstract

The type specimens of *Frondisphaeria*, *Immersisphaeria* and *Pulmosphaeria* were re-examined in order to determine their familial placements according to modern taxonomic concepts. Type specimens of *Lasiobertia* and *Yuea* were redrawn from the original descriptions. Based on morphological evidences, *Frondisphaeria palmicola* is placed in Diatrypaceae. *Immersisphaeria eichleriana*, *Lasiobertia africana* and *Pulmosphaeria archontophoenicis* are placed in Xylariales *incertae sedis* as they are not typical of any existing families of Xylariales. A possible relationship with Xylariaceae is suggested for *Yuea chusqueicola* based on the previously described morphological characters. Recollection of fresh materials, epitypification and multi-gene phylogenetic analyses are essential for all type species of these genera to clarify their familial status.

Key words: Ascomycota, Diatrypaceae, epitypification, Xylariaceae, Xylariomycetidae

Introduction

The Xylariales (Sordariomycetes, Xylariomycetidae) was introduced by Nannfeldt (1932) and Barr (1990) assigned eleven families to this order. Species in this order occur in various habitats and can be pathogens, saprobes, endophytes or epiphytes (Zhang *et al.* 2006, Kirk *et al.* 2008). In Lumbsch & Huhndorf (2009) Amphisphaeriaceae, Clypeosphaeriaceae, Diatrypaceae, Graphostromataceae, Hyponectriaceae and Xylariaceae were included in this order. Jaklitsch & Voglmayr (2012) re-described the type species of five genera of Xylariales and provided sequence data for phylogenetic analysis. Maharachchikumbura *et al.* (2015) accepted Amphisphaeriaceae, Apiosporaceae, Cainiaceae, Clypeosphaeriaceae, Conioeciaceae, Diatrypaceae, Graphostromataceae, Hyponectriaceae, Melogrammataceae, Bartalinaceae, Vialaeaceae and Xylariaceae in Xylariales. Hernandez-Restrepo *et al.* (2015) accepted Amphisphaeriaceae, Apiosporaceae, Clypeosphaeriaceae, Diatrypaceae, Hyponectriaceae, Microdochiaceae and Xylariaceae. According to Senanayake *et al.* (2015), the order Xylariales the above families accepted by Maharachchikumbura *et al.* (2015) together with Lopadostomaceae and Pseudomassariaceae as new families. Recently, Jaklitsch *et al.* (2016) synonymized the families Bartalinaceae, Discosiaceae and Pestalotiopsidaceae and introduced Sporocadaceae as a family of the Xylariales. They accepted Amphisphaeriaceae, Apiosporaceae, Beltraniaceae, Cainiaceae, Conioeciaceae, Diatrypaceae, Hyponectriaceae, Lopadostomataceae, Melogrammataceae, Microdochiaceae, Phlogicylindriaceae, Pseudomassariaceae, Requieriaceae, Sporocadaceae, Vialaeaceae and Xylariaceae in the Xylariales.

In the present study, we re-examined generic types of several genera which previously had been placed in Xylariales *incertae sedis* and Sordariomycetes *incertae sedis* by Lumbsch & Huhndorf (2009). *Frondisphaeria*, *Immersisphaeria* and *Pulmosphaeria* were re-examined and re-described from their type specimens while type

specimens of *Lasiobertia* and *Yuea* were redrawn from the original descriptions. We classified *Frondisphaeria* in Diatrypaceae, *Yuea* in Xylariaceae, *Immersisphaeria*, *Lasiobertia* and *Pulmosphaeria* in Xylariales *incertae sedis*. In this study, by illustrating and re-describing these type species we expect to highlight the need and stimulate interest to recollect and isolate these fungi.

Materials and methods

Examination of herbarium materials

The type specimens of *Frondisphaeria*, *Immersisphaeria* and *Pulmosphaeria* were borrowed from Swedish Museum of Natural History (S) and Plant Pathology Herbarium of Queensland Department of Agriculture and Fisheries (BRIP). Ascomata were rehydrated in 5% KOH prior to examination and sectioning. Specimens were examined with a stereo microscope (Motic SMZ 168) and fine forceps were used to remove one or two ascomata, which were mounted in water. Sections were cut by hand with a sharp razor blade and thin sections were cut with a LEICA CM1850 freezing microtome. The sections were transferred to a drop of water and a drop of Melzer's reagent for examination. Observations and photomicrographs of material mounted in water were made with a Nikon Eclipse 80i light microscope fitted with a Cannon 450D digital camera. Measurements were made with Tarosoft (R) Image Frame Work. *Lasiobertia* (Sivanesan 1978) and *Yuea* (Eriksson 2003) were redrawn from the original micrographs.

Taxonomy

Genus and type species descriptions are given, unless the genus is monotypic, when only the species description is given.

Frondisphaeria K.D. Hyde, Mycoscience 37(2): 169 (1996)

Facesoffungi number: FoF 01351

Saprobic on palms. **Sexual morph:** *Ascomata* immersed, developing beneath host surface, conical, with reduced stromata, visible as darkened areas, solitary, sometimes clustered, irregular in cross section, with tapered ends. *Ostioles* central, inconspicuous, periphysate, black. *Peridium* comprising a few layers, outwardly comprising loosely arranged, flattened, light brown cells, inwardly comprising thin walled, dark brown cells. *Hamathecium* comprising numerous, filamentous, septate, paraphyses with tapered ends. *Asci* 8-spored, unitunicate, clavate, pedicellate, with inconspicuous, J+, discoid, apical apparatus, slightly bluing in Melzer's reagent. *Ascospores* unicellular, hyaline, elongated fusiform, with narrow, apiculate ends, fasciculate, smooth-walled. **Asexual morph:** Undetermined.

Notes:—*Frondisphaeria* was introduced to accommodate *F. palmicola* K.D. Hyde, an ascomycete from palm leaves, with long-fusiform ascospores (Hyde 1996). Hyde (1996) mentioned that this genus shows characters of *Linocarpon* Syd. & P. Syd. by having unicellular, filiform ascospores and species of both genera occur mostly on palms. Fröhlich & Hyde (2000) added a second species, *F. joanneae* J. Fröhl. & K.D. Hyde. Hyde (1996) also stated that the morphology of the asci is reminiscent of the Diaporthaceae, while the presence of paraphyses, the reduced peridium and the lack of periphyses differentiate *Frondisphaeria* from the latter family. Besides, in *Linocarpon* the ascomata develop under distinct discs of clypeal tissue and their ostioles are very conspicuous (Hyde 1993). Therefore the familial affinities of *Frondisphaeria* remained unknown.

Huhndorf *et al.* (2004) grouped *Linocarpon*, which was formerly placed in Lasiosphaeriaceae, in Sordariomycetidae *incertae sedis*. Phylogenetic analysis of species of Lasiosphaeriaceae by Huhndorf *et al.* (2004) showed the family to be highly paraphyletic and genera segregated into numerous clades dispersed throughout several orders (Chaetosphaeriales, Coniochaetales and Coronoporales). *Frondisphaeria* is morphologically similar to *Pedumispora* K.D. Hyde & E.B.G. Jones a genus described from mangrove roots with immersed ascomata, 8-spored, fusiform, unitunicate asci and curved, filiform ascospores (Hyde & Jones 1992). However *Pedumispora* differs by having subglobose, ostiolate ascomata, asci lacking apical apparatus and multi septate (13–17 septa), slightly inflated and yellow-yellowish brown ascospores (Hyde and Jones 1992). Klaysuban *et al.* (2014) clarified the phylogenetic classification of *P. rhizophorae* K.D. Hyde & E.B.G. Jones using molecular phylogenetic data. Their study revealed that *P. rhizophorae* is distantly placed from the Diaporthales where it was previously classified by Hyde & Jones (1992) and groups in the Diatrypaceae, Xylariales with strong support. Considering these morphological similarities and the presence of an inconspicuous

apical apparatus in ascus we tentatively refer *Frondisphaeria* to Diatrypaceae until the fresh materials to be recovered and molecular data for *Frondisphaeria* species are available.

Type species:—*Frondisphaeria palmicola* K.D. Hyde, Mycoscience 37(2): 169 (1996) *Facesoffunginumber*: FoF01362.

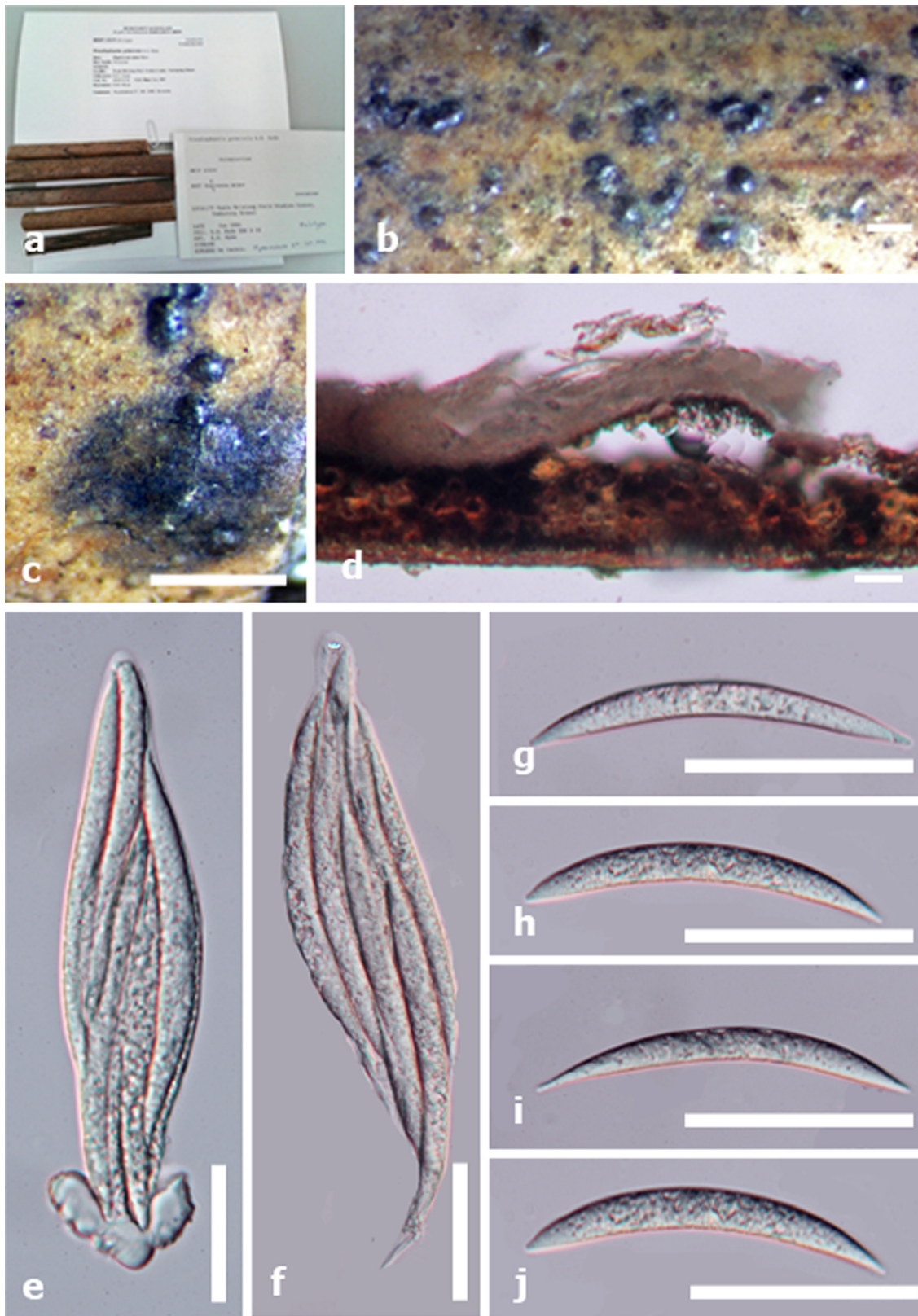


FIGURE 1. *Frondisphaeria palmicola* (Material examined: BRUNEI, on rachis of *Eugeissona minor* Griff., June 1993, K.D. Hyde, BRIP 23235 holotype!) a. Herbarium package. b, c. Stromata in wood. d. Cross section of stromata showing ascomata encased in stromatal tissue. e. Mature asci in water. f. Asci with apical apparatus bluing in Melzer's reagent. g–j. Ascospores. Scale bars: b = 5 mm, c = 3 mm, d = 100 μ m, e, f = 20 μ m, g–j = 50 μ m.

Saprobic on rachis of *Eugeissona minor* Griff. **Sexual morph:** *Ascomata* 1000–1800 × 170–260 μm (\bar{x} = 1574 × 2256 μm, n = 10), immersed, visible as irregularly arranged, conical to dome-shaped areas, solitary or clustered, light brown, carbonaceous, in cross section irregularly rectangular, with tapered ends. *Ostioles* central, inconspicuous, periphysate, black. *Peridium* 30–50 μm (\bar{x} = 41.5 μm, n = 10) wide, outwardly comprising loosely arranged, flattened, light brown-grey cells, inwardly comprising thin-walled, compressed, dark brown cells. *Hamathecium* comprising numerous, filamentous, septate, paraphyses, 5 μm wide at base, with tapered ends. *Asci* 155–230 × 22–30 μm (\bar{x} = 173 × 27.6 μm, n = 20), 8-spored, unitunicate, clavate, narrow at the apex, pedicellate, with inconspicuous, J+, discoid, 2–4 × 1–2 μm (\bar{x} = 3.3 × 1.6 μm, n = 20) apical apparatus. *Ascospores* 80–110 × 7.5–10 μm (\bar{x} = 91 × 8.6 μm, n = 20), crowded, unicellular, hyaline, long-fusiform, slightly curved at the ends, smooth-walled. **Asexual morph:** Undetermined.

Immersisphaeria Jaklitsch, Mycotaxon 101: 18 (2007)

Facesoffunginumber: FoF01359

Habitat on hardwood covered by the corticiaceous basidiomycete, *Phanerochaete tuberculata* (P. Karst.) Parmasto. **Sexual morph:** *Pseudostromata* pulvinate, fleshy, yellowish brown. *Ascomata* immersed, globose to subglobose in cross section, solitary, dark brown to black ostiolar dots present. *Ostioles* slightly higher than the surface, black, conical. *Peridium* thin, comprising hyaline, pseudoparenchymatous cells of *textura angularis*. *Hamathecium* comprising paraphyses emerging from the upper part of peridium, with sparse, hyaline paraphyses, 2.5–4 μm wide at base. *Asci* 8-spored, unitunicate, cylindrical, short stipitate, thickened at base, without apical apparatus. *Ascospores* uniseriate, light brown, 2-celled, ellipsoid, smooth-walled, straight to sigmoid germ slit. **Asexual morph:** undetermined.

Notes:—*Immersisphaeria eichleriana* (Bres.) Jaklitsch was introduced to replace *Hypocrea eichleriana* Bres., a fungicolous fungus. The characters of *I. eichleriana* are unique and differ from *Trichoderma* Pers. by having a fungicolous habit with ascomata containing hyaline peridium and cylindrical asci with brown ascospores. Jaklitsch (2007) suggested this fungus can be associated with Hypocreales and Phyllacorales based on the morphology of the hyaline peridium. However due to differences in the other characters, such as reduced stromata, brown ascospores and apically free paraphyses *I. eichleriana* cannot be placed in either of these orders (Jaklitsch 2007). He also compared the relationships of *Immersisphaeria* with *Helminthosphaeria* Fuckel, which share the fungicolous habitat and also with *Coniochaeta* (Sacc.) Cooke based on the unicellular brown ascospores in cylindrical asci. Jaklitsch (2007) also suggested the possibility to accommodate this in Xylariaceae. However due to the difference of morphological characters, *Immersisphaeria* cannot be assigned to any of the mentioned genera or families. Therefore Jaklitsch (2007) placed *Immersisphaeria* in the Sordariomycetes *incertae sedis*. In this paper we tentatively placed *Immersisphaeria* in the Xylariales as genera *incertae sedis* based on morphological characters such as immersed ascomata and unitunicate, 8-spored asci with small, ellipsoidal, brown ascospores with germ slit, until molecular data and asexual characters are introduced to determine the familial placement.

Type species:—*Immersisphaeria eichleriana* (Bres.) Jaklitsch, Mycotaxon 101: 18 (2007).

Facesoffunginumber: FoF01360.

Habitat on hardwood covered by the corticiaceous basidiomycete, *Phanerochaete tuberculata* (P. Karst.) Parmasto. **Sexual morph:** *Pseudostromata* 0.1–0.2 mm diam × 0.1 mm thick (\bar{x} = 0.16 × 0.1 mm, n = 10), pulvinate, surface yellowish brown, black dots present in the host surface. *Ascomata* 145–185 × 120–180 μm (\bar{x} = 167 × 162 μm, n = 10), entirely immersed in the host tissue, globose, ellipsoidal to obpyriform, base rounded, solitary or gregarious, visible in the surface of the host as dark brown to black circular dots. *Ostioles* in cross section 20–40 × 25–40 μm (\bar{x} = 32 × 36 μm, n = 10) at the apex, papillate, black, visible as tiny black dots, perforation 7–10 μm wide, conical, slightly projecting over the surface of the host. *Peridium* 19–27 μm wide, well defined, comprising hyaline, pseudoparenchymatous cells of *textura angularis*. *Hamathecium* comprising sparse, hyaline paraphyses, 2.5–4 μm (\bar{x} = 3.1 μm, n = 20) wide, more or less than the asci length. *Asci* 8-spored, unitunicate, cylindrical, short-stipitate, apex slightly thickened, without apical apparatus, stipe cylindrical or sometimes thickened at the base, spore-bearing parts 45–55 μm long (\bar{x} = 53 μm, n = 20), stipes 8–18 μm long (\bar{x} = 12 μm, n = 20). *Ascospores* 6.5–7 × 3.7–4.3 μm (\bar{x} = 6.7 × 4.1 μm, n = 20), uniseriate, unicellular, light brown, ellipsoidal, with narrowly rounded ends, with germ slit, straight, up to spore-length, smooth-walled. **Asexual morph:** Undetermined.

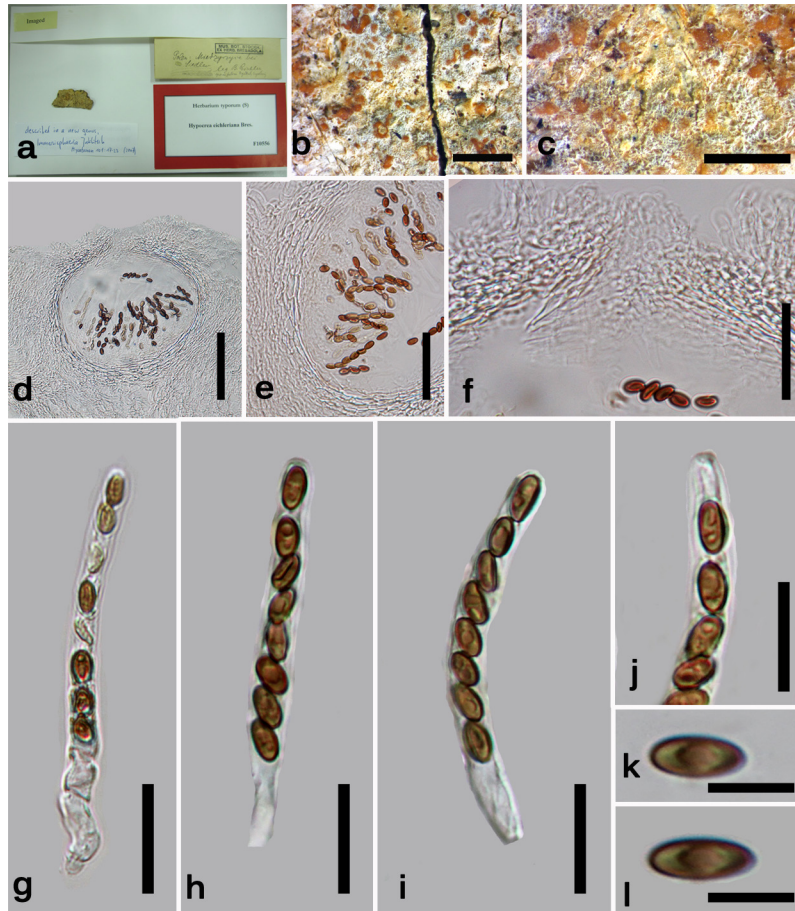


FIGURE 2. *Immersisphaeria eichleriana* (Material examined: POLAND, Polen, Miedzyrzycze bei Siedleo, 1990, B. Eichler, F 10556, holotype!) a. Herbarium material. b. Stromata in wood. c. Black dots in stromatal surface. d. Cross section through ascoma. e. Peridium. f. Ostiole. g–i. Mature ascus (with germ slit shown by arrow). j. Ascus apex. k, l. Ascospores. Scale bars: b–d = 0.5 mm, d–f = 30 μ m, g–j = 10 μ m, k–l = 5 μ m.

Lasiobertia Sivan., Trans. Br. mycol. Soc. 70(3): 383 (1978)

Facesoffunginumber: FoF01357

Saprobic on palms. **Sexual morph**: *Ascomata* erumpent through host, superficial, partially embedded in thin subiculum, dark brown or black, uniperitheciate, turberculate, non ostiolate, single or aggregated in groups, globose. *Peridium* comprising several layers, outwardly comprising thick-walled, coriaceous, brown, pseudoparenchymatic cells, inwardly comprising less thickened, pale brown cells, with simple Munk pores. *Hamathecium* comprising numerous, hyaline, filiform paraphyses. *Asci* 8-spored, unitunicate, cylindrical, pedicellate, with a J⁺, apical apparatus. *Ascospores* overlapping uniseriate, hyaline, 2-celled, elongate fusoid, septate in the middle, with slightly curved, pointed ends, smooth-walled. **Asexual morph**: Hyphomycetous. melanographium-like, *Conidiophores* simple, extensively branched, brown, septate, macro-nematous. *Conidiogenous cells* polyblastic, terminal, integrated, short, cylindrical, sympodial, light brown, denticulate. *Conidia* solitary, dark brown, simple, ovoid to reniform, 1-celled, with a hyaline longitudinal slit.

Notes:—*Lasiobertia* was introduced by Sivanesan (1978), describing the relationship with Coronophorales and Lasiosphaeriaceae as well as to the Xylariales. Hyde (1993) suggested a generic relationship to *Oxydothis* Penz. & Sacc. based on the presence of an amyloid apical apparatus in asci, morphology of longfusiform, apiculate ascospores and paraphyses. Therefore, Wang & Hyde (1999) suggested the placement of *Lasiobertia* in the Clypeosphaeriaceae until further data are available. Kirk *et al.* (2001) placed the genus in Apiosporaceae. Huhndorf *et al.* (2004b) introduced the second species *Lasiobertia portoricensis* Huhndorf *et al.* which differs from *L. africana* in having shorter, wider ascospores and with ascomata that are less coarsely tuberculate and have a smaller sterile base. The asexual morph associated with *L. africana* was not found associated with *L. portoricensis*. We were unable to loan the type material from IMI, thus morphological observations were not possible. Based on molecular data, *Lasiobertia* was placed in

the Xylariomycetidae (Huhndorf *et al.* 2004a, b). Based on the characters described by Sivanesan (1978), we further place *Lasiobertia* in Xylariales *incertae sedis* until its taxonomic position is clarified with other similar genera like *Oxydothis*. The type needs recollecting, sequencing and epitypifying in order to clarify the familial status.

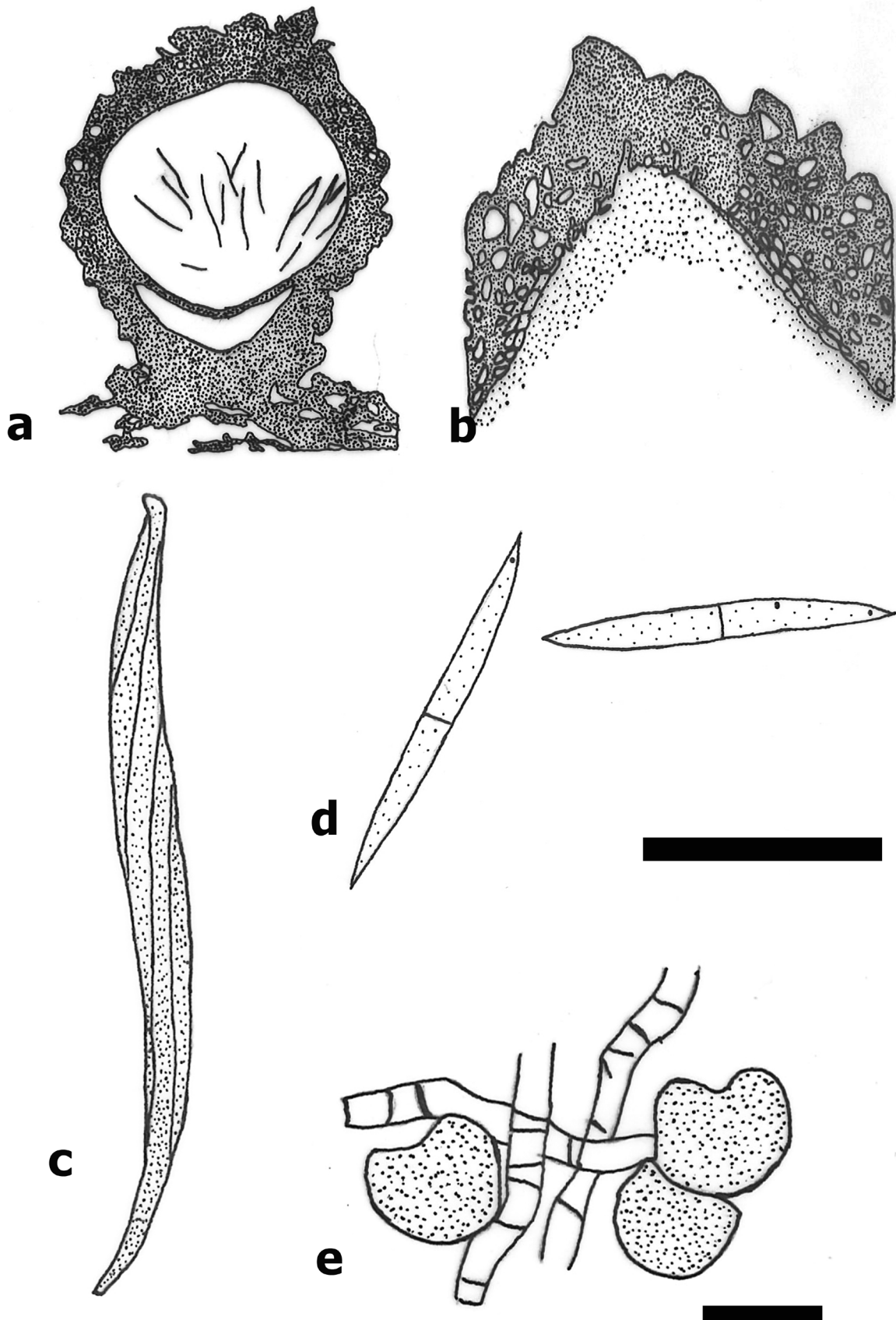


FIGURE 3: *Lasiobertia africana* (redrawn from Sivanesan (1978)). a. Ascomata. b. Apical region of the ascomata. c. Asci. d. Ascospores. e. Conidiophores and conidia. Scale bars: a–d = 50 μ m, e = 20 μ m.

Type species:—*Lasiobertia africana* Sivan., Trans. Br. mycol. Soc. 70(3): 383 (1978).

Facesoffunginumber: FoF01358.

Saprobic on palms. **Sexual morph:** *Ascomata* erumpent and superficial, partially embedded in thin subiculum, coarsely tuberculate, dark brown or black, uniperitheciate, non ostiolate, single or aggregated to form groups, globose, in cross section $340\text{--}510 \times 250\text{--}370 \mu\text{m}$ ($\bar{x} = 378 \times 325 \mu\text{m}$, $n = 10$), with sterile stalk $100\text{--}140 \times 180\text{--}230 \mu\text{m}$ ($\bar{x} = 137 \times 205 \mu\text{m}$, $n = 10$), basal region of the stalk slightly immersed in the host tissue. *Peridium* $>50 \mu\text{m}$ wide, comprising several layers, outwardly comprising thick-walled, coriaceous, brown, pseudoparenchymatic cells, middle cell layers dark brown, thick-walled, globose, inwardly comprising less thickened, pale brown cells. *Hamathecium* comprising numerous, hyaline, filiform paraphyses. *Asci* $140\text{--}175 \times 9\text{--}11 \mu\text{m}$ ($\bar{x} = 153 \times 10 \mu\text{m}$, $n = 20$), 8-spored, unitunicate, cylindrical, pedicellate, with a distinct, J+, apical apparatus. *Ascospores* $55\text{--}74 \times 4.5\text{--}6 \mu\text{m}$ ($\bar{x} = 62 \times 5 \mu\text{m}$, $n = 20$), overlapping uniseriate, hyaline, 2-celled, elongate fusoid, septate in the middle, with slightly curved, pointed ends, smooth-walled. **Asexual morph:** Hyphomycetous, melanographium-like. *Conidiophores* simple, extensively branched, brown, septate, erect, smooth, variable in length, up to $400 \mu\text{m}$ long, $3.5 \mu\text{m}$ wide at the base, macronematous. *Conidiogenous cells* polyblastic, terminal, integrated, short, cylindrical, sympodial, light brown, with short, cylindrical denticles. *Conidia* $11\text{--}20 \times 5.5\text{--}10 \mu\text{m}$ ($\bar{x} = 17 \times 7 \mu\text{m}$, $n = 20$), solitary, dry, dark brown, simple, ovoid to reniform, 1-celled, with a hyaline longitudinal slit (re-described from Sivanesan 1978).

Pulmosphaeria Joanne E. Taylor, K.D. Hyde & E.B.G. Jones, Sydowia 48(2): 256 (1996)

facesoffunginumber: FoF01353

Notes:—This monotypic genus was introduced by Taylor *et al.* (1996) to accommodate fungi with immersed ascomata, which occur in adjacent pairs with a central common ostiole. This species resembles *Palmicola archontophoenicis* K.D. Hyde, and both these fungi had been isolated from the same host from Australia (Taylor *et al.* 1996). *Palmicola archontophoenicis* and *Pulmosphaeria archontophoenicis* have similar ascal and ascospores morphologies, except that ascospores in *Palmicola archontophoenicis* are multi-septate (Hyde 1993). Due to these similarities with *Palmicola*, Taylor *et al.* (1996) suggested *Pulmosphaeria* to be placed in Lasiosphaeriaceae. However they also noticed that, these two genera are also different from each other because in *Pulmosphaeria* stroma is absent or poorly developed, ascomata are nearly all in pairs, paraphyses deliquescent and ascospores are filiform with an obtuse apex and an acute base and an eccentrically placed basal septum. Taylor *et al.* (1996) also considered the possibility of including *Pulmosphaeria* within Hyponectriaceae, which also possess reduced stromatic tissues, cylindrical asci with a J+ or J- apical ring and variously shaped ascospores (Taylor *et al.* 1996). However this family Hyponectriaceae is in need of morphological and molecular phylogenetic revision. Huhndorf *et al.* (2004a) and Kirk *et al.* (2001) placed *Pulmosphaeria* in Xylariales genera *incertae sedis*. Therefore we retain *Pulmosphaeria* in Xylariales genera *incertae sedis* until the true affinities are established based on molecular analysis.

Type species:—*Pulmosphaeria archontophoenicis* Joanne E. Taylor, K.D. Hyde & E.B.G. Jones, Sydowia 48(2): 256 (1996).

Facesoffunginumber: FoF01354.

Saprobic on dead petioles of *Archontophoenix alexandrae* (F. Muell.) H. Wendl. & Drude. **Sexual morph:** *Ascomata* $570\text{--}740 \times 110\text{--}200 \mu\text{m}$ ($\bar{x} = 678 \times 185 \mu\text{m}$, $n = 10$), immersed in a poorly developed stroma, developing beneath the slightly raised areas comprising host cuticle and epidermal cell layers, occurring in pairs, with a central ostiole, cylindrical, with their long axis horizontal to the host surface, in cross section $310\text{--}425 \times 110\text{--}200 \mu\text{m}$ ($\bar{x} = 376 \times 187 \mu\text{m}$, $n = 10$). *Peridium* composed of several cell layers, outwardly comprising light brown, angular cells, inwardly comprising hyaline, angular cells. *Hamathecium* comprising few, deliquescent paraphyses, less than $5 \mu\text{m}$ wide. *Asci* $210\text{--}330 \times 23\text{--}36 \mu\text{m}$ ($\bar{x} = 289 \times 28 \mu\text{m}$, $n = 20$), 8-spored, unitunicate, cylindrical, short pedicellate, apical apparatus not bluing in Melzer's reagent, J-, indistinct, $5\text{--}9 \times 5\text{--}6 \mu\text{m}$ ($\bar{x} = 7.4 \times 5.6 \mu\text{m}$, $n = 20$). *Ascospores* $152\text{--}200 \times 7.5\text{--}11 \mu\text{m}$ ($\bar{x} = 187 \times 9 \mu\text{m}$, $n = 20$), crowded, unicellular, hyaline, filiform, apex obtuse, tapering to base, 1-septate, septum $45\text{--}62.5 \mu\text{m}$ ($\bar{x} = 57 \mu\text{m}$, $n = 20$) from the base, smooth-walled. **Asexual morph:** Undetermined.

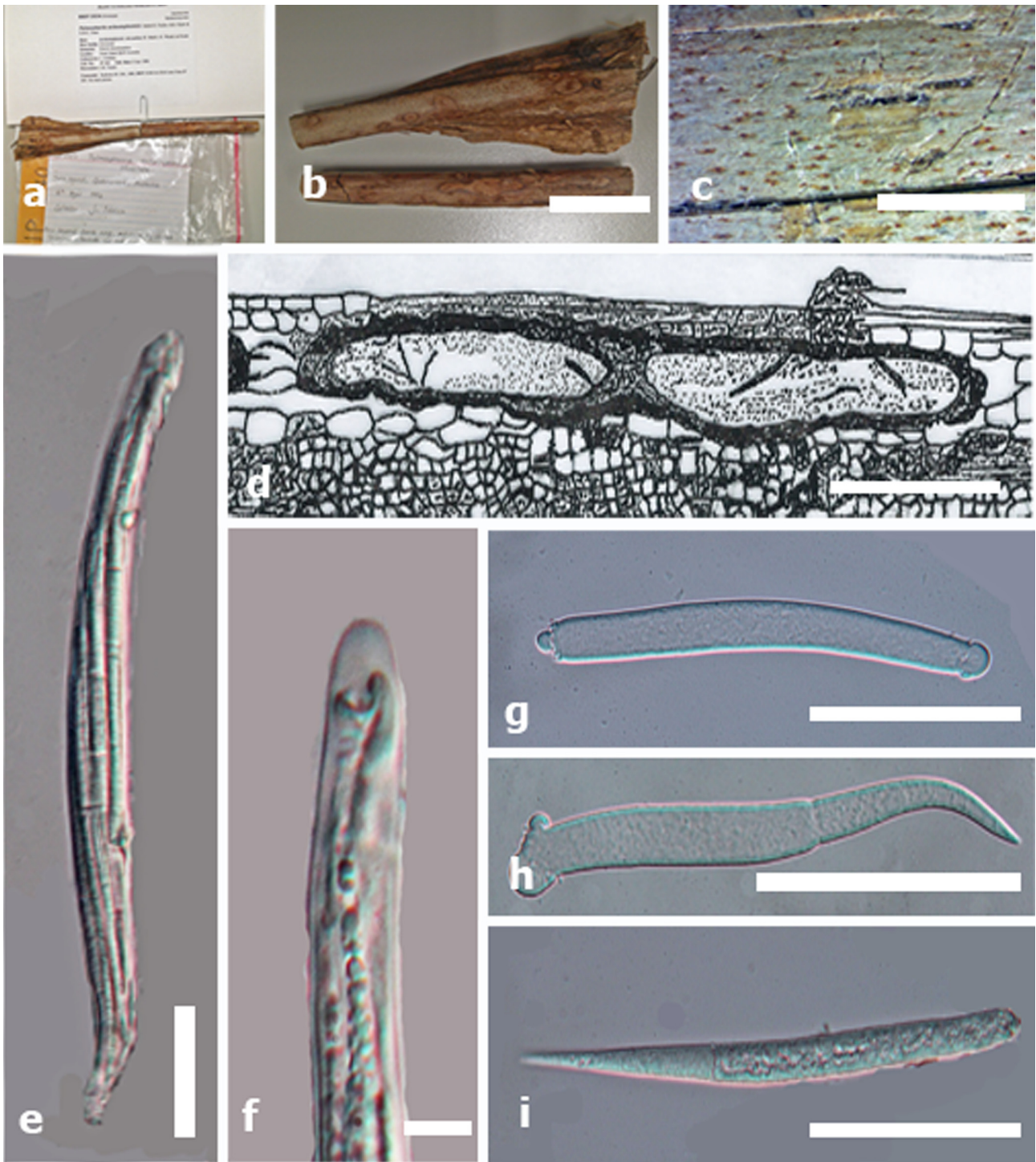


FIGURE 4. *Pulmosphaeria archontophoenicis* (Material examined: AUSTRALIA, Queensland, on dead petiole of *Archontophoenix alexandrae* (F. Muell.) H. Wendl. & Drude, 17 April 1995, J.E. Taylor and K.D. Hyde, BRIP 23234 holotype!) a. Herbarium specimen details. b, c. Stromata in wood. d. Drawing of cross section of stromata showing ascomata encased in stromatal tissue. e. Mature asci. f. Asci with J- apical apparatus not bluing in Melzer's reagent. g–i. Ascospores. Scale bars: b = 5 mm, c = 1000 μ m, d= 200 μ m, e = 20 μ m, f = 5 μ m, g–i = 50 μ m.

Yuea O.E. Erikss., Mycotaxon 85: 314 (2003)

facesoffunginumber: FoF01355

Notes:—The monotypic genus *Yuea* was introduced to accommodate *Anthostoma chusqueicola* Speg., which was placed in Diatrypaceae by Eriksson (2003). *Anthostoma chusqueicola*, however is not related to the generic type *Anthostoma decipiens* (DC.) Nitschke, which is now included in *Cryptosphaeria* Ces. & De Not. (Eriksson 2003). *Yuea*

chusqueicola O.E. Erikss. (= *Anthostoma chusqueicola*) is a bambusicolous fungus characterized by immersed, non-clypeate ascomata, with a J+, apical apparatus and ascospores with a helical germ slit (Eriksson 2003). According to these morphological characters Eriksson (2003) considered the new genus to be similar to several genera in Xylariales, especially genera in Xylariaceae, which have ascospores with helical germ slits (i.e. *Helicogermis*, *Rosellinia*, *Kretzschmaria*) but since most of them are stromatic with embedded perithecia he did not place *Y. chusqueicola* in any of them. Eriksson (2003) considered *Yuea* in Xylariales genera *incertae sedis*. However it is noteworthy that there are several genera in Xylariaceae with reduced stromata such as *Anthostomella*, *Ascotricha*, *Calceomyces* and *Conioliariella*. Therefore a possible relationship with the family Xylariaceae can be suggested for *Yuea*, considering the dark, immersed, ostiolate ascomata, 8-spored, cylindrical asci with J+, discoid apical apparatus and pigmented, ellipsoidal ascospores with a helical germ slit.

Type species:—*Yuea chusqueicola* O.E. Erikss., Mycotaxon 85: 314 (2003).

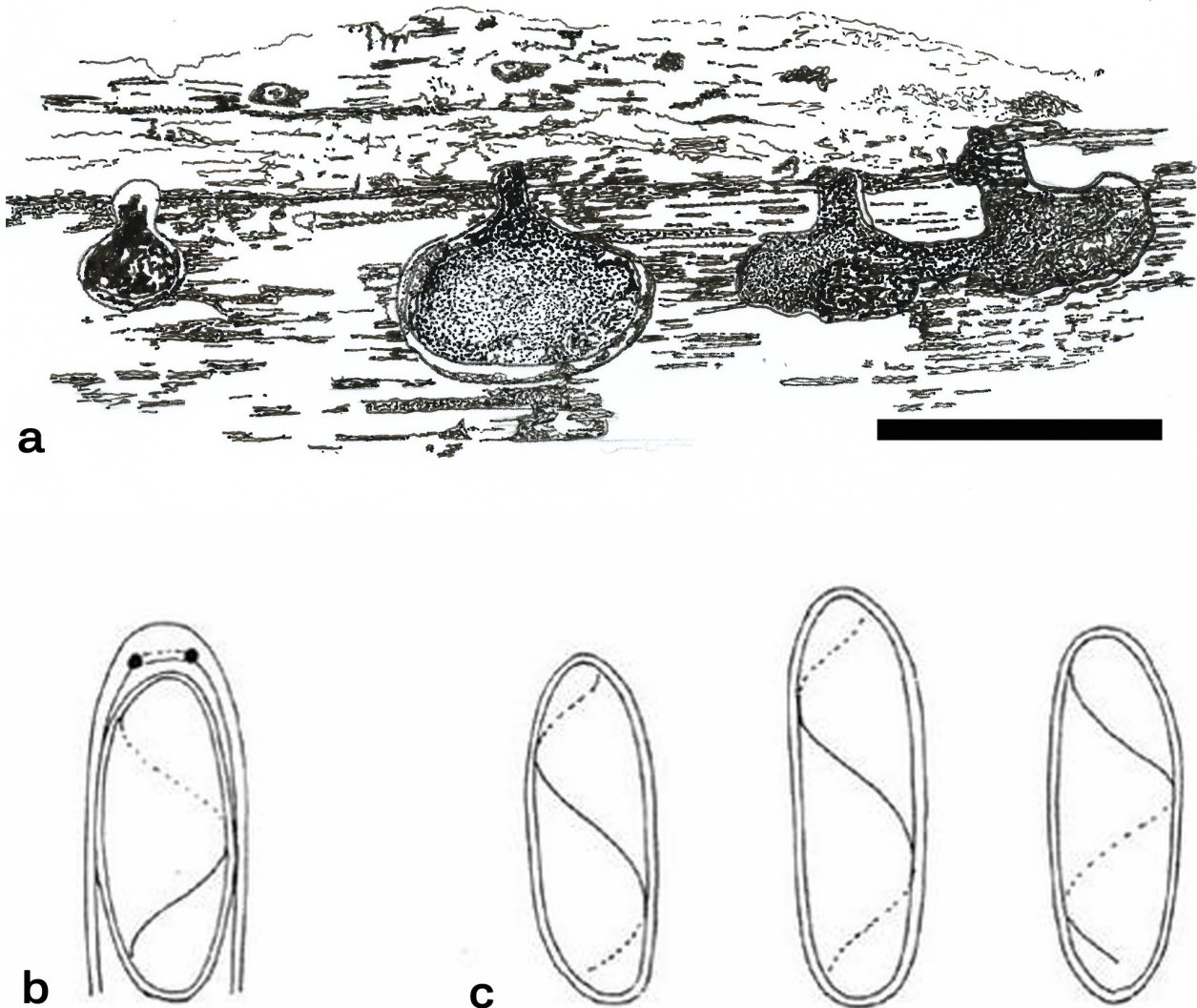


FIGURE 5. *Yuea chusqueicola* (redrawn from Eriksson (2003)). a. Ascomata in culms of *Chusquea cummingii*. b. Ascus apex. c. Ascospores with spiral germ slit. Scale bars: a = 10 mm, b, c = 30 μ m.

Facesoffunginumber: FoF01356.

On culms of *Chusquea cummingii* Nees. **Sexual morph:** *Ascomata* 500–700 \times 300–400 μ m (\bar{x} = 678 \times 355 μ m, n = 10), individual ascomata seated in a separate cavity in the bamboo and covered by a thin crust of bamboo fragments, scattered, flattened, subglobose, non-clypeate, with a faint blackening zone around the ostiole, central ostiolar neck broad and short, with shiny black hymenium. *Ostioles* sometimes slightly papillate. *Peridium* 15–20 μ m (\bar{x} = 17 μ m, n = 10) wide, strongly compressed, thin walled, outwardly comprising brown cell layers, inwardly hyaline cell layers. *Hamathecium* comprising sparsely branched paraphyses, less than 5 μ m wide at the base, immersed in the gelatinous mass between asci. *Asci* 250–300 \times 10–12 μ m (\bar{x} = 285 \times 11.5 μ m, n = 20), 8-spored, unitunicate,

cylindrical, short pedicellate, with J+, apical apparatus. *Ascospores* 25–32 × 8–10 μm (\bar{x} = 28 × 8.7 μm, n = 20), overlapping uniseriate, unicellular, brown, ellipsoidal-subcylindrical, equilateral or slightly inequilateral, terete or slightly compressed, apically rounded, sometimes attenuated towards one or both ends, smooth, aseptate, with few irregular oil droplets, with spiral germ slit, spiraling one full circumference, 5 μm from the ends of spores, distinct, firm, with a 0.7 μm wide, gelatinous sheath. **Asexual morph:** Undetermined (re-described from Eriksson 2003).

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