

Towards unraveling relationships in *Xylariomycetidae* (*Sordariomycetes*)

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Abstract The classification of subclass *Xylariomycetidae* is revisited with additional collections and phylogeny based on novel rDNA sequence data. Phylogenetic inferences are provided and are based on analysis of 115 sequence data, including new data for 27 strains. An updated outline to the subclass is presented based on the phylogenies and comprises two orders, 18 families and 222 genera. An account of each order, family and genus in the subclass is given. We accept the orders *Amphisphaeriales* and *Xylariales* based on morphological and phylogenetic evidence. *Amphisphaeriales* comprises *Amphisphaeriaceae*, *Bartaliniaceae* fam. nov., *Clypeosphaeriaceae*, *Discosiaceae*

fam. nov., *Pestalotiopsisaceae* fam. nov. and *Phlogicylindriaceae* fam. nov. *Xylariales* comprises *Apiosporaceae*, *Cainiaceae*, *Coniocessiaceae*, *Diatrypaceae*, *Graphostromataceae* (doubtful), *Hyponectriaceae*, *Iodosphaeriaceae*, *Lopadostomaceae* fam. nov., *Melogrammataceae*, *Pseudomassariaceae* fam. nov., *Vialaeaceae* and *Xylariaceae*. The new genera and species introduced are *Arthrimum hyphopodii*, *A. subglobosa*, *Cainia anthoxanthis*, *Ciferriascosea* gen. nov., *C. fluctamurum*, *C. rectamurum*, *Discosia neofraxinea*, *D. pseudopleurochaeta*, *Hyalotiella rubi*, *Seimatosporium cornii*, *S. ficeae*, *S. vitis* and *Truncatella spartii*.

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Keywords *Amphisphaeriales* · *Apiosporaceae* · *Bartaliniaceae* · *Cainiaceae* · *Ciferriascosea* · *Clypeosphaeriaceae* · *Conioceciaceae* · *Discosiaceae* · *Diatrypaceae* · *Hyponectriaceae* · *Hypoxyloideae* · *Iodosphaeriaceae* · *Lopadostomaceae* · *Melogrammataceae* · *Pestalotiopsisaceae* · *Phlogicylindriaceae* · *Pseudomassariaceae* · *Vialaeaceae* · *Xylariaceae* · *Xylarioideae*

Introduction

The order *Amphisphaeriales* was introduced by Eriksson and Hawksworth (1986), and in most subsequent cases was treated as a synonym of *Xylariales*. The family *Amphisphaeriaceae* was introduced by Winter (1884–1886) as “*Amphisphaerieae*”, based on the type genus *Amphisphaeria*. It was distinguished from other families in having partially immersed ascomata in the substrate and from its unique shape of the ostiolar canal. *Amphisphaeriaceae* was reintroduced by Müller and von Arx (1962) based on the presence of a small iodine positive ring or disc in the ascus apex and in having ascomata immersed under a clypeus (Kang et al. 1999b). Hawksworth et al. (1995) included *Amphisphaeriaceae* in the order *Xylariales*.

The *Xylariales* was initially included in the class *Hymenoascomycetes* by Barr (1990), but later placed in the subclass *Xylariomycetidae* (Eriksson and Winka 1997). Several of the most well-known species may form conspicuous stromata and are clearly visible on the surface of decaying plants (Kuhnert et al. 2013). Krug (1978) introduced the family *Cainiaceae* to accommodate the genus *Cainia* whose species were previously placed under *Amphisphaeriaceae*. During a revision of the genera of *Calosphaeriaceae*, Barr et al. (1993) introduced *Graphostromataceae* as a monotypic family in the order *Xylariales* based on the nodulisporium-like conidial morph and diatrype-like sexual morph having allantoid ascospores. The family *Apiosporaceae* was introduced by Hyde et al. (1998). Later, Crous and Groenewald (2013) used molecular data to confirm the placement of this family in *Xylariales*, as a sister group to *Amphisphaeriaceae*.

Conioceciaceae was introduced by Asgari and Zare (2011), placed in *Xylariales* and comprised of the single genus *Coniocecia* with four species. *Vialaeaceae* was introduced by Cannon (1995) for species with isthmoid ascospores. Recent studies have provided phylogenetic evidence that this is a well-supported family in *Xylariales* (Shoemaker et al. 2013; McTaggart et al. 2013; Senanayake et al. 2014).

LSU molecular data have shown a close relationship between *Amphisphaeriaceae*, *Cainiaceae*, *Clypeosphaeriaceae* and *Hyponectriaceae* (Jeewon 2001) in *Xylariales*. Also, in an attempt to show the evolutionary relationships among the accepted families of this order, Smith et al. (2003) used molecular data, which resulted in showing *Xylariales* as a

monophyletic group containing *Amphisphaeriaceae*, *Apiosporaceae*, *Clypeosphaeriaceae*, *Diatrypaceae*, *Graphostromataceae*, *Hyponectriaceae* and *Xylariaceae*. However, the use of 28S and 18S alone proved to be inadequate for determining the relationships between these families.

Lumbsch and Huhndorf (2010) treated the order *Xylariales* with six families and 154 genera. Currently 11 families have been listed for *Xylariales*, namely; *Amphisphaeriaceae*, *Apiosporaceae*, *Cainiaceae*, *Clypeosphaeriaceae*, *Conioceciaceae*, *Diatrypaceae*, *Graphostromataceae*, *Hyponectriaceae*, *Melogrammataceae*, *Vialaeaceae* and *Xylariaceae* (Maharachchikumbura et al. 2015). Renewed interest in the group *Xylariales* has resulted in the publication of monographs for the genera *Daldinia*, *Pestalotiopsis* and *Rosellinia* (Petrini 2013; Maharachchikumbura et al. 2014; Stadler et al. 2014). The amphisphaeriaceous members of *Xylariales* are however, still relatively poorly understood and there is no natural classification developed for the group.

As a result of various collections of microfungi from China, Italy and Thailand, we have encountered several genera of *Amphisphaeriales* and subjected them to morpho-molecular studies. The phylogeny resulting from the analyses of a combined LSU and ITS gene dataset show that our understanding of the order is fragmentary. In this paper, we resurrect the order *Amphisphaeriales* and provide a natural classification for the taxa of *Xylariomycetidae*.

Materials and methods

Specimen collection, morphological examination and photomicrography

Fresh, plant materials, such as leaves, twigs, stems and bark were collected from different geographical localities in China, Italy and Thailand. Fresh materials were placed in paper bags and all collection details were noted. Specimens were brought to the laboratory and examined under a stereomicroscope to observe the characteristics of stromata and fruiting bodies.

Macro-morphological characters were photographed by a digital camera fitted to the stereomicroscope. A few fruiting bodies were transferred to a drop of water mounted on a slide using a fine needle or forceps for rehydration and they were crushed to show internal structures. Hand sections of fruit bodies were made by a razor blade and mounted in a water drop. Morphological characteristics of ascomata/conidiomata, asci, ascospores/conidia and other tissues associated with ascomata were photographed using a digital camera fitted with the compound microscope. Melzer's reagent, Indian ink and 5 % KOH were used when necessary. All microphotographs were arranged using Adobe Photoshop CS3 extended (v. 10.0) and all measurements were made with Tarosoft image

framework (v. 0.9.0.7). Specimens were preserved and deposited at accessible herbaria.

Single spore isolation

Few fruiting bodies were picked from the substrate using a sterilized needle and placed in few drops of sterilized distilled water mounted on a sterilized cavity slide as detailed in Chomnunti et al. (2014). Fruiting bodies were crushed to separate the spores and obtain a spore suspension. The suspension was inoculated on to fresh Malt Extract Agar (MEA) or Potato Dextrose Agar (PDA) plates and incubated at room temperature. Germinating ascospores/conidia were aseptically transferred to fresh culture plates. Colonies were photographed and characters noted. Living cultures are deposited at BCC, MFLU, GU and ICMP culture collections.

Promoting asexual morphs

Dried and sterilized, grass leaves or pine needles were laid parallel to the colony margin of pure cultures which were grown on water agar. Conidiomata produced on both water agar and sterilized pine needles were observed after few weeks of incubation at 20 °C. Morphological characteristics were studied as mentioned above.

Herbarium specimen examination

Types and other relevant authentic specimens were loaned from different accessible herbaria (G, MFLU, NY, PDD, S, WU). A small part of the herbarium specimen was cut and rehydrated using 5 % KOH. Micro-morphological characters were observed from rehydrated ascomata and photography was done as previously described. Some specimens were re-drawn based on previously illustrated authentic specimens.

DNA extraction, PCR amplification, sequencing and phylogenetic analyses

Fresh fungal mycelium grown on MEA or PDA for 4 weeks at 20 °C was scraped from the colony margin and were used for genomic DNA extraction using a modified protocol of Doyle and Doyle (1987) and Lee and Taylor (1990). PCR amplification and sequencing of LSU region using the primer pair LROR/LR5 and ITS region using primer pair ITS5/ITS4 was performed (Vilgalys and Hester 1990; White et al. 1990). The PCR products were visualized on 1 % agarose electrophoresis gel stained with ethidium bromide. Purification and sequencing of PCR products were carried out at BGI Ltd. Shenzhen, PR China. The DNA sequences generated from this study were deposited at GenBank.

The sequences generated in this study were supplemented with additional sequences obtained from GenBank (Table 1)

based on blast searches and published literature. Multiple sequence alignments were generated with MAFFT v. 7 (<http://mafft.cbrc.jp/alignment/server/index.html>); the alignment was improved with MEGA v. 5.2.2 (Kumar et al. 2012) or BioEdit v. 7.0.5.2 (Hall 1999). The phylogenetic analyses were performed for Maximum Likelihood in RAxML 7.4.2 Black Box or RAxMI GUI (Stamatakis 2006; Stamatakis et al. 2008), Maximum Parsimony in PAUP v. 4.0b10 (Swofford 2003), or Bayesian inference in MrBayes v. 3.2.1 (Ronquist et al. 2012) as specified in the legend of each phylogenetic tree.

Results and discussion

The phylogeny resulting from the analysis of LSU and ITS sequence data is shown in Fig. 1. Overall, the topologies obtained from the different phylogenetic analyses were similar. The separation between *Xylariales* and *Amphisphaeriales* is not well-supported, however morphologically they are distinct and we treat them as distinct orders.

The order *Amphisphaeriales* separates into nine clades labeled as A-H with varying support. Clade A has weak support and is represented by *Discosiales* fam. nov. Species of *Adisciso*, *Discosia*, *Discostroma*, *Sarcostroma* and *Seimatosporium* grouped in Clade A in congruence with previous findings (Maharachchikumbura et al. 2014; Li et al. 2015a). Species of *Discostroma* and *Seimatosporium* have been linked by molecular data (Tanaka et al. 2011), however the molecular links have not been proven for the types of either genera. Although the support is weak, we introduce this as a new family because of morphological similarities in the included genera and the fact that this group of genera always cluster together in analyses. Clade B includes *Ciliochorella*, *Leptotypa*, *Monochaetia*, *Neopestalotiopsis*, *Pestalotiopsis*, *Pseudopestalotiopsis* and *Seiridium* and are accommodated in a new family, *Pestalotiopsidaceae* introduced in this paper. Both morphological similarities and sequence analysis support their status as a family. Clade C includes species of *Bartalinia*, *Broomella*, *Dyrithiopsis*, *Hyalotiella*, *Truncatella* and *Zetiaspizna* and a new family *Bartaliniaceae* is introduced to accommodate these taxa. Both morphological similarities and sequence analysis support their establishment as a family. Clades D include the genera *Immersidiscosia* and *Ellurema*, and are phylogenetically closely related to *Discosiales*, *Pestalotiopsidaceae* and *Bartaliniaceae*. However, the relationships of *Immersidiscosia* and *Ellurema* to any of the above families are poorly resolved and therefore the genera are placed in *Amphisphaeriales* genera *incertae sedis* (the LSU region of *Ellurema indica* isolate MIU43478, accession: U43478, needs resequencing as it has a short sequence, approximately around 450 bp). Clade E comprises of two species of the asexual genus *Phylogicylindria* and two species of the sexual genus *Ciferriascosea* and these are

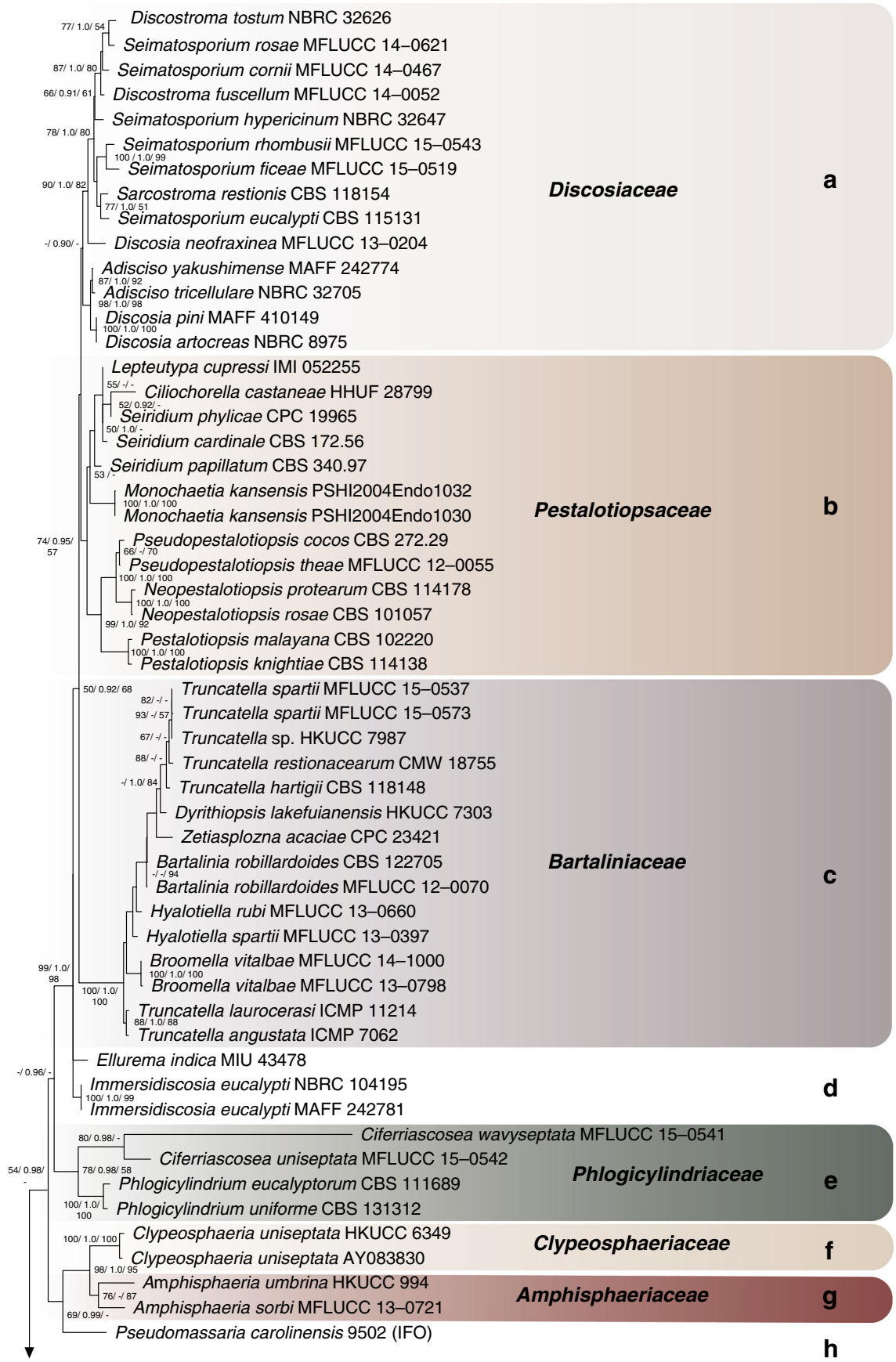
Table 1 Isolates sequenced in this study and their GenBank and culture accession numbers

Taxon name	Culture accession no	Genbank accession no	
		LSU	ITS
<i>Amphisphaeria sorbi</i>	MFLUCC 13–0721	KP744475	KR092797
<i>Annulohyphoxylon multiforme</i>	CBS119016	KT281893	KC477234
<i>Arthriniium hyphopodii</i>	MFLUCC 15–0003	KR069111	KR069110
<i>Arthriniium subglobosum</i>	MFLUCC 11–0397	KR069113	KR069112
<i>Bartalinia robillardoides</i>	MFLUCC 12–0070	KR559738	KT162919
<i>Biscogniauxia nummularia</i>	MUCL 51395	KT281894	JX658444
<i>Broomella vitalbae</i>	MFLUCC 14–1000	KP757750	KP757754
<i>Broomella vitalbae</i>	MFLUCC 13–0798	KP757749	KR092788
<i>Cainia anthoxanthis</i>	MFLUCC 15–0539	KR092777	KR092787
<i>Cainia graminis</i>	MFLUCC 15–0540	KR092781	KR092793
<i>Ciferriascosea rectamurum</i>	MFLUCC 15–0542	KR092776	KR092786
<i>Ciferriascosea fluctamurum</i>	MFLUCC 15–0541	KR092778	KR092789
<i>Diatrype disciformis</i>	MFLUCC 15–0538	KR092784	KR092795
<i>Daldinia concentrica</i>	CBS113277	KT281895	AY616683
<i>Discosia neofraxinea</i>	MFLUCC 13–0204	KR072672	KR072673
<i>Discostroma fuscillum</i>	MFLUCC 14–0052	KT005514	KT005515
<i>Hyalotiella rubi</i>	MFLUCC 13–0660	KR092775	KR092799
<i>Eutypa flavovirens</i>	MFLUCC 13–0625	KR092774	KR092798
<i>Hyalotiella spartii</i>	MFLUCC 13–0397	KP757752	KP757756
<i>Kretzschmaria deusta</i>	CBS 163.93	KT281896	KT281901
<i>Podosordaria tulasnei</i>	CBS 128.80	KT281897	KT281902
<i>Poronia punctata</i>	CBS 656.78	KT281900	KT281904
<i>Pseudomassaria chondrospora</i>	MFLUCC 15–0545	KR092779	KR092790
<i>Pseudomassaria corni</i>	MFLUCC 15–0544	–	KR092791
<i>Sarcoxydon compunctum</i>	CBS 359.61	KT281898	KT281903
<i>Seimatosporium cornii</i>	MFLUCC 14–0467	KR559739	KT162918
<i>Seimatosporium rhombisporum</i>	MFLUCC 15–0543	KR092780	KR092792
<i>Seimatosporium ficeae</i>	MFLUCC 15–0519	KR920686	KR092800
<i>Seimatosporium rosae</i>	MFLUCC 14–0621	KT198727	KT198726
<i>Seimatosporium vitis</i>	MFLUCC 14–0051	KR920362	KR920363
<i>Truncatella spartii</i>	MFLUCC 15–0537	KR092782	KR092794
<i>Vialaea mangiferae</i>	MFLUCC 12–0808	KF724975	KF724974
<i>Xylaria obovata</i>	MFLUCC 13–0115	KR049089	KR049088
<i>Xylaria polymorpha</i>	MUCL 49884	KT281899	FN689809

accommodated in a new family, *Phylogicylindriaceae* introduced in this paper (note: the LSU sequences of *Ciferriascosea* are rather short; accession: KR092778, KR092776). Clade F is represented by the family *Clypeosphaeriaceae* and is well-separated from *Amphisphaeriaceae sensu stricto*. Clade G has good support and represents *Amphisphaeriaceae sensu stricto*. Two *Amphisphaeria* species are included here. Clade H is represented by *P. carolinensis* (IFO 9502), a taxon that may not belong to *Pseudomassaria*. The same observation was reported by Jaklitsch and Voglmayr (2012).

The order *Xylariales* comprises 14 clades with varying support labeled I–V. Clade I represents the xylaroid clade of *Xylariaceae* which includes the epitype of *Xylaria hypoxylon*

Fig. 1 Consensus tree resulting from a Maximum Likelihood analysis of the combined LSU and ITS sequence alignment of *Xylariomycetidae* and other isolates in *Sordariomycetes*. Families are indicated in coloured blocks. RAxML bootstrap support values (MLB above 50 %), Bayesian posterior probabilities (PP above 90 %) and maximum parsimony bootstrap support values (MPB above 50 %) are given at the nodes (MLB/PP /MPB). The scale bar represents the expected number of changes per site. The tree was rooted to *Dothidea sambuci* and *Botrytis fuckeliana*



**A
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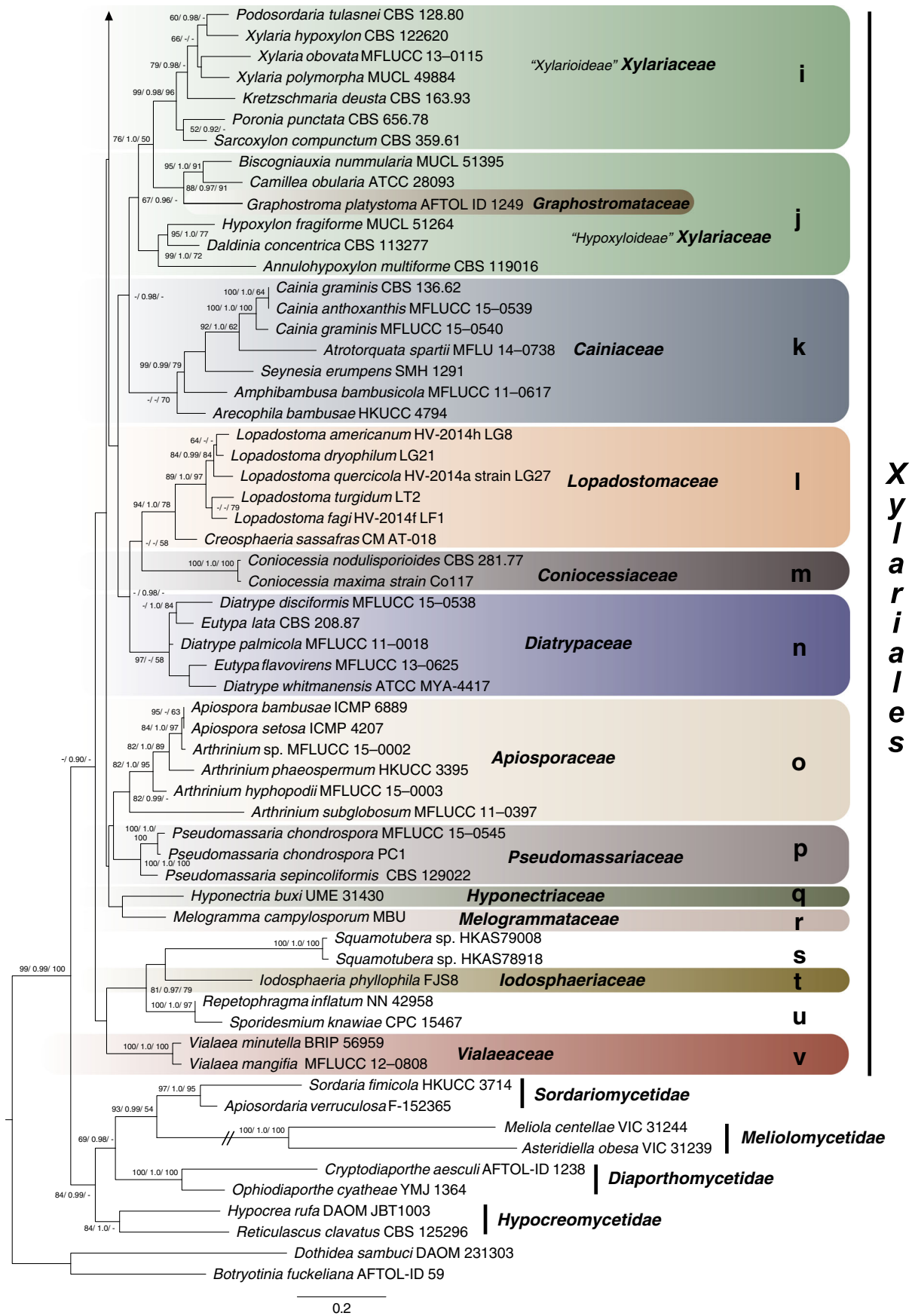


Fig. 1 (continued)

(CBS 122620), the type species of *Xylaria*. However the strains in this subfamily have short LSU sequence data. Other species groups in the clade I are *Podosordaria*, *Kretzschmaria*, *Poronia* and *Sarcoxydon*. Clade J is represented the hypoxylid clade of *Xylariaceae*. However, within the clade J includes the monotypic family *Graphostromataceae* represented by the generic type *Graphostroma platystoma*, showing affinities with *Biscogniauxia* Kunze and *Camillea* Fr (see notes under *Graphostroma*). Clade K is the family *Cainiaceae* comprising *Amphibambusa bambusicola*, *Arecophila bambusae*, *Atrorquata spartii*, *Cainia* spp. and *Seynesia erumpens*. *Atrorquata* was previously placed in *Amphisphaeraceae* (Lumbsch and Huhndorf 2007; Maharachchikumbura et al. 2015) and Kang et al. (1999a, b) pointed out that it morphologically resembles *Cainia*. Clade L represents a newly introduced family *Lopadostomaceae*. Generally the obtained data indicate a close relationship between *Lopadostoma* and *Creosphaeria* and is in agreement with Jaklitsch et al. (2014). All *Coniooessia* LSU sequence data in GenBank are short and clade M represents the family *Coniooessiaceae*. Another significant clade was formed by the family *Diatrypaceae* and is represented by clade N as a sister group to *Lopadostomaceae* and *Coniooessiaceae*. *Diatrypaceae* comprises *Eutypa* / *Diatrype* species. Another significant clade is the family *Apiosporaceae* (Clade O) and Crous and Groenewald (2013) analyzed LSU rDNA sequence data and confirmed that the *Apiosporaceae* belongs in *Xylariales*, and is a sister group to *Amphisphaeriaceae*. *Apiosporaceae* was a sister group to *Pseudomassariaceae* in this study. Clade P corresponds to *Pseudomassaria* and is accommodated in a new family, *Pseudomassariaceae*. Based on LSU sequence data, Jaklitsch and Voglmayr (2012) reported anomalies in the taxonomic position of *Hyponecrista buxi* and they questioned the reliability of this strain. In the present study it (clade Q) form a sister clade to family *Melogrammataceae*. Clade R comprises the monotypic family *Melogrammataceae*. The genus *Squamotubera* is represented by clade S. Sequences analysis of *Iodosphaeria* (clade T) results in a distinct taxon and in the family *Iodosphaeriaceae*. Clade U is represented by *Sporidesmium knawiae* which is considered as synonymous to the sister species, *Repetophragma inflatum*. Clade V comprises of two species of *Vialaea* in the family *Vialaeaceae*.

Taxonomy

Outline of *Xylariomycetidae*

[§]=Sequence data in GenBank as at date on submission

Subclass *Xylariomycetidae* O.E. Erikss & Winka

Order *Amphisphaeriales* D. Hawksw. & O.E. Erikss.

Amphisphaeriaceae G. Winter

Amphisphaeria Ces & De Not. [§]

Bartaliniaceae Wijayawardene et al.

Bartalinea Tassi[§]

Broomella Sacc[§]

Dyrithiopsis L. Cai et al. [§]

Hyalotiella Papendorf[§]

Truncatella Steyaert[§]

Zetiasplozina Nag Raj [§]

Clypeosphaeriaceae G. Winter

Apioclypea K.D. Hyde[§]

Aquasphaeria K.D. Hyde

Brunneiapiospora K.D. Hyde et al. [§]

Clypeosphaeria Fuckel[§]

Crassoascus Checa et al.

Palmomyces K.D. Hyde et al. [§]

Discosiaceae Maharachch. & K.D. Hyde

Adisciso Kaz. Tanaka[§]

Discosia Lib. [§]

Discostroma Clem. [§]

Sarcostroma Cooke[§]

Seimatosporium Corda[§]

Pestalotiopsisidaceae Maharachch. & K.D. Hyde

Ciliochorella Syd. [§]

Neopestalotiopsis Maharachch. et al. [§]

Pestalotiopsis Steyaert[§]

Pseudopestalotiopsis Maharachch. et al. [§]

Seiridium Nees[§]

Phlogicylindriaceae Senan., & K.D. Hyde

Ciferriascosea Senan., et al. [§]

Phlogicylindrium Crous et al. [§]

Amphisphaeriales, genera *incertae sedis*

Amphisphaerella (Sacc.) Kirschst.

Beltraniella Subram.[§]

Bleptosporium Steyaert

Capsulospora K.D. Hyde[§]

Ceratosporium Schwein.

Ceriphora Höhn.

Ceriospora Niessl

Chitonospora E. Bommer et al.

Clypeophysalospora H.J. Swart

Distorimula San Martín et al.

Doliomyces Steyaert

Dyrithium M.E. Barr

Ellurema Nag Raj & W.B. Kendr. [§]

Flagellosphaeria Aptroot

Frondispora K.D. Hyde

Funiliomyces Aptroot[§]

Griphosphaerioma Höhn.

Hyalotiopsis Punith.

Immersidiscosia Kaz. Tanaka et al. [§]

Labridium Vestergr.

Lindquistomyces Aramb. et al.

Manokwaria K.D. Hyde

Microdochium Syd. [§]

Monochaetinula Muthumary et al.

Monographella Petr. [§]

Morinia Berl. & Bres. [§]

- Mukhakesa* Udaiyan & Hosag.
Neobroomella Petr.[#]
Ommatomyces Kohlm et al.[#]
Paracainiella Lar.N. Vassiljeva
Pemphidium Mont.
Reticulosphaeria Sivan. & Bahekar
Robillarda Sacc.[§]
Sporocadus Corda[§]
Synnemapestaloides T. Handa & Y. Harada
Urosporella G.F. Atk.
Urosporellopsis W.H. Hsieh et al.
Xylochora Arx & E. Müll.
Zetiaspizna Nag Raj[§]
Xylariales Nannf.
Apiosporaceae K.D. Hyde et al.
Appendicospora K.D. Hyde[§]
Arthrinium Kunze[§]
Dictyoarthrinium S. Hughes
Endocalyx Berk. & Broome
Scyphospora L.A. Kantsch.
Spegazzinia Sacc.[§]
Cainiaceae J.C. Krug
Areophila K.D. Hyde[§]
Atrorquata Kohlm. & Volkm.-Kohlm.[§]
Cainia Arx & E. Müll.[§]
Seynesia Sacc.[§]
Conioceciaceae Asgari & Zare
Coniocecia Dania García et al.[§]
Diatrypaceae Nitschke
Anthostoma Nitschke[§]
Cryptosphaeria Ces & De Not.[§]
Cryptovalsa Ces & De Not. ex Fuckel[§]
Diatrype Fr.[§]
Diatrypella (Ces & De Not.) De Not.[§]
Diamantina A.N. Mill. et al.[§]
Diatrypasimilis J.J. Zhou & Kohlm.[§]
Echinomyces Rappaz
Eutypa Tul. & C. Tul.[§]
Eutypella (Nitschke) Sacc.[§]
Leptoperidia Rappaz
Libertella Desm.
Monosporascus Pollack & Uecker[§]
Pedumispora K.D. Hyde & E.B.G. Jones[§]
Peroneutypa Berl.[§]
Phaeoisaria Höhn.[§]
Quaternaria Tul. & C. Tul.
Graphostromataceae M.E. Barr et al.
Graphostroma Piroz.[§]
Hyponectriaceae Petr.
Apiothyrium Petr.
Areomyces K.D. Hyde
Arwidsonia B. Erikss.
Cesatiella Sacc.
- Chamaeascus* L. Holm et al.
Charonectria Sacc.
Discosphaerina Höhn.[§]
Exarmidium P. Karst.
Frondicola K.D. Hyde
Hyponectria Sacc.[§]
Micronectria Speg.
Papilionovela Aptroot
Pellucida Dulym. et al.
Physalospora Niessl[§]
Phragmitensis M.K.M. Wong et al.
Rhachidicola K.D. Hyde & J. Fröhl.
Xenothecium Höhn.
Iodosphaeriaceae O. Hilber
Iodosphaeria Samuels[§]
Lopadostomaceae Daranagama & K.D. Hyde
Creosphaeria Theiss.[§]
Lopadostoma (Nitschke) Traverso[§]
Melogrammataceae G. Winter
Melogramma Fr.[§]
Pseudomassariaceae Senan., & K.D. Hyde
Leiosphaerella Hohn.[§]
Pseudomassaria Jacz.[§]
Vialaeaceae P.F. Cannon
Vialaea Sacc.[§]
Xylariaceae Tul. & C. Tul.
“Hypoxyloideae”
Annulohypoxyton Y.M. Ju et al.[§]
Anthocanalis Daranagama et al.[§]
Barrmaelia Rappaz[§]
Biscogniauxia Kuntze[§]
Calceomyces Udagawa & S Ueda[§]
Camillea Fr.[§]
Chlorostroma A.N. Mill. et al.
Collo-discula I Hino & Katum.[§] (cf. Stadler et al. 2013)
Daldinia Ces. & De Not.[§]
Entonaema Möller[§]
Hypoxyton Bull.[§]
Nodulisporium Preuss[§]
Obolarina Pouzar[§]
Phylacia Lév.[§]
Pyrenomyxa Morgan[§]
Pyriiformiascoma Daranagama et al.[§]
Rhopalostroma D. Hawksw.[§]
Rostrhypoxyton J Fourn & M Stadler[§]
Ruwenzoria J. Fourn. et al.[§]
Thamnomyces Ehrenb.[§]
Thuemenella Penz. & Sacc.[§]
Vivantia J.D. Rogers et al.
“Xylarioideae”
Amphirosellinia Y.M. Ju et al.[§]
Anthostomella Sacc.[§]
Appendixia B.S. Lu & K.D. Hyde

Areolospora S.C. Jong & E.E. Davis
Arthroxyllaria Seifert & W Gams[§]
Ascotricha Berk. [§]
Astrocystis Berk. & Broome[§]
Brunneiperidium Daranagama et al. [§]
Cannonia J.E. Taylor & K.D. Hyde[#]
Chaenocarpus Rebert.[#]
Coniolarrella Dania García et al. [§]
Cyanopulvis J. Fröhl. & K.D. Hyde
Durotheca Læssøe et al.
Emarcea Duong et al. [§]
Engleromyces Henn.
Entoleuca Syd. [§]
Euepilyxylon Füsting[§]
Fasciatispora K.D. Hyde[§]
Gigantospora B.S. Lu & K.D. Hyde
Guestia G.J.D. Sm. & K.D. Hyde[§]
Halorosellinia Whalley et al. [§]
Helicogermis Lodha & D. Hawksw.
Hypocopra (Fr) J. Kickx f[§]
Hypocreodendron Henn.
Induratia Samuels et al. [§]
Jumillera J.D. Rogers et al.
Kretzschmaria Fr. [§]
Kretzschmariella Viégas
Leprieuria Laessøe et al.
Leptomassaria Petr.
Lunatiannulus Daranagama et al. [§]
Muscodor Worapong et al. [§]
Myconeisia Kirschst.
Nemania Gray[§]
Nipicola K.D. Hyde
Occultitheca J.D. Rogers & Y.M. Ju[§]
Ophiorosellinia J.D. Rogers et al. [§]
Pandanicola K.D. Hyde
Paramphisphaeria F.A. Fernández et al.
Paucithecium Lloyd
Podosordaria Ellis. & Holw. [§]
Poroleprieuria M.C. González et al.
Poronia Willd. [§]
Rosellinia De Not. [§]
Sabalicola K.D. Hyde
Sarcoxyylon Cooke
Sclerodermatopsis Torrend
Spirodecospora B.S. Lu et al.
Steganopycnis Syd. & P Syd.
Stilbohypoxylon Henn. [§]
Streblema Chevall.
Striatodecospora D.Q. Zhou et al. [§]
Stromatoneurospora S.C. Jong & E.E. Davis[§]
Theissenia Maubl. [§]
Virgaria Nees[§]
Wawelia Namysl.

Xylaria Hill ex Schrank[§]
Xylocrea Möller
Xylotumulus J.D. Rogers et al. [§]
Xylariales, genera *incertae sedis*
Adomia S. Schatz
Ascotrichella Valldos. & Guarro
Biporispora J.D. Rogers et al.
Diamantina A.N. Mill. et al. [§]
Fassia Dennis
Lanceispora Nakagiri et al. [§]
Lasiobertia Sivan. [§]
Leiosphaerella Höhn.[§]
Linocarpon Syd. & P. Syd. [§]
Neolinocarpon K.D. Hyde[§]
Oxydothis Penz. & Sacc. [§]
Palmicola K.D. Hyde
Pidoplitchkoviella Kiril. [§]
Plectosphaera Theiss. [§]
Polyancora Voglmayr & Yule[§]
Pulmosphaeria Joanne E. Taylor et al. [§]
Sporidesmina Subram. & Bhat[§]
Squamotubera Henn.
Subramaniomyces Varghese & V.G. Rao[§]
Yuea O.E. Erikss.
Xylariomycetidae genera *incertae sedis*
Neohypodiscus J.D. Rogers et al.[#]
Whalleya J.D. Rogers et al. [§]

The latest outline of *Xylariomycetidae* was published by Maharachchikumbura et al. (2015). However, the present study, Norphanphoun et al. (2015) and Li et al. (2015b) have revised the group. A new outline is therefore provided below. This should be regarded as a working outline as there are many genera that lack sequence data, others where the type species has not been sequenced, some with incomplete sequence data, and other genera with only one or two taxa sequenced.

The subclass *Xylariomycetidae* was introduced by Eriksson and Winka (1997) and many species in the subclass have large stromata, containing numerous ascomata, asci with a J+ apical apparatus and brown unicellular ascospores (Maharachchikumbura et al. 2015). However, they may also have single ascomata, often immersed under a clypeus, and unicellular, apiosporous, trans-septate or muriform ascospores, ranging from hyaline to black (Zhang et al. 2006; Stadler et al. 2013). The subclass is presently rather confusing as many, especially the astromatic genera, lack sequence data (Maharachchikumbura et al. 2015). In addition, the connections of the sexual and asexual morphs have not been established for many of the stromatic genera, in particular in the *Xylariaceae*.

Amphisphaeriales D. Hawksw. & O.E. Erikss., Syst. Ascom. 5 (1): 177 (1986)

Facesoffungi number: FoF 00672

Saprobic, *pathogenic* or *endophytic* on plants, appearing as black spots on the host substrate, made up of fungal hyphae and host cells. **Sexual morph:** *Pseudostromata* or *stromata* if present, with immersed to erumpent, solitary, rarely aggregated, scattered, globose to subglobose, coriaceous, brown to black, ostiolate, ascomata with periphyses. *Peridium* with one or few layers, mostly comprising an outer layer of thick-walled, brown cells and inner layer of thick or thin-walled, hyaline cells. *Hamathecium* comprising septate, hyaline, paraphyses. *Asci* 8-spored, unitunicate, cylindrical, clavate or narrowly globose, short pedicellate, with J+ or J- apical ring. *Ascospores* uniseriate or multi-seriate, hyaline, light brown to dark brown, ellipsoid, apiosporous, fusiform or oval, unicellular to 4-septate smooth or ornamented, sometimes bearing hyaline, slender, unbranched appendages, sometimes with a gelatinous sheath. **Asexual morph:** Coelomycetous. *Conidiomata* stromatic, solitary to gregarious, immersed to erumpent, acervular, pycnidial to irregular, unilocular or irregularly plurilocular, dark brown to black. *Peridium* comprising brown cells of *textura angularis*. *Conidiophores* indistinct or if distinct, arising from the inner layer cells of basal stroma, sometimes reduced to conidiogenous cells, long, cylindrical, hyaline, septate and sometimes branched. *Conidiogenous cells* discrete, holoblastic, annelidic, indeterminate, integrated, cylindrical, ampulliform, or lageniform, smooth, hyaline, becoming pale brown with age. *Conidia* cylindrical, clavate, ellipsoid or fusiform, aseptate to 4-euseptate, hyaline, subhyaline, pale olivaceous or brown, bearing cellular, filiform or attenuated, sometimes only apical or having both apical and basal appendages.

Notes: The order *Amphisphaeriales* was introduced by Eriksson and Hawksworth (1986) to accommodate fungal taxa in *Amphisphaeriaceae*, *Cainiaceae*, *Clypeosphaeriaceae* and *Hyponectriaceae*. Eriksson and Hawksworth (1987) however, synonymized the *Amphisphaeriales* under *Xylariales* and this has been followed by subsequent authors (Lumbsch and Huhndorf 2007, 2010). As a result of combined LSU and ITS gene sequence analysis in this study (Fig. 1), we resurrect the order *Amphisphaeriales* with the currently existing families *Amphisphaeriaceae*, *Clypeosphaeriaceae* and four novel families; *Bartaliniaceae*, *Discosiaceae*, *Pestalotiopsisaceae* and *Phlogicylindriaceae*. Members in this order show a wide variation in morphology. However the sexual morph of this order is characterized by immersed to erumpent, mostly solitary, globose to subglobose, coriaceous ascomata, with or without stromatic tissues, cylindrical or clavate asci, with J+ or J- apical rings and ellipsoid, apiosporous, fusiform or oval, unicellular to trans-septate, variously coloured ascospores, with smooth or ornamented walls and with presence or absence of appendages. The asexual morphs have acervular or pycnidial conidiomata with holoblastic, annelidic, ampulliform, or

lageniform, conidiogenous cells and aseptate to trans-euseptate, variously coloured conidia, often bearing appendages.

Amphisphaeriaceae G. Winter [as ‘Amphisphaerieae’], Rabenh. Krypt.-Fl., Edn 2 (Leipzig) 1.2: 259 (1885)

Facesoffungi number: FoF 00673

Saprobic on branches and wood, appearing as slightly raised, black spots on host surface, often surrounded by black patches, herein termed the pseudostromata. **Sexual morph:** *Pseudostromata* when present made up of host cells and brown to black fungal hyphae. *Ascomata* scattered, solitary or clustered, immersed, globose to subglobose, coriaceous, dark brown, ostiolate, papillate. *Papilla* short, internally covered by hyaline, filamentous periphyses. *Peridium* two-layered, outer layer of thick-walled, brown cells of *textura angularis*, inner layer of small, thin-walled, hyaline cells of *textura angularis*. *Hamathecium* comprising numerous, septate, hyphae-like paraphyses. *Asci* 8-spored, unitunicate, cylindrical, short pedicellate, with J+ or J- apical ring. *Ascospores* uniseriate to overlapping uniseriate, light to dark brown, oval to fusiform, 1-septate, not or slightly constricted at the septum, smooth-walled, surrounded by mucilaginous sheath. **Asexual morph:** Coelomycetous. *Conidiomata* globose, dark brown. *Conidiophores* septate, branched, hyaline. *Conidiogenesis cells* elongate conical, septate, annelidic. *Conidia* 1-celled elongate-fusiform, hyaline.

Type: *Amphisphaeria* Ces. & De Not., Comm. Soc. crittog. Ital. 1 (4): 223 (1863)

Type species: *Amphisphaeria umbrina* (Fr.) De Not., Sfer. Ital.: 69 (1863)

Notes: The family *Amphisphaeriaceae* was introduced by Winter (1884–1886) to accommodate *Amphisphaeria* which is typified by *A. umbrina*. This family is characterised by immersed or erumpent perithecial ascomata, some forming in pseudostromata, with papillate ostioles, unitunicate, cylindrical, asci with J- or J+ apical rings, and light to dark brown, 1-celled ascospores (Kang et al. 1999b). This family was recognized as a heterogeneous sexual morph family accommodating 36 genera (Hawksworth et al. 1995). Kang et al. (1998) restricted the family to ten genera based on phylogenetic analysis of ITS sequence data, often with pestalotiopsis-like asexual morphs. However, later the family was reduced to 9 genera (Kirk et al. 2001) excluding some genera to *Cainiaceae*, *Clypeosphaeriaceae* and *Hyponectriaceae*. In this study we exclude most genera and restrict the family to *Amphisphaeria sensu stricto*.

Type: *Amphisphaeria* Ces. & De Not., Comm. Soc. crittog. Ital. 1 (4): 223 (1863)

Saprobic on woody branches, appearing as slightly raised, black dots on host surface, often surrounded by black patches, the pseudostromata. **Sexual morph:** *Pseudostromata* when present made up of host cells and brown to black fungal hyphae. *Ascomata* perithecial, scattered, solitary or clustered,

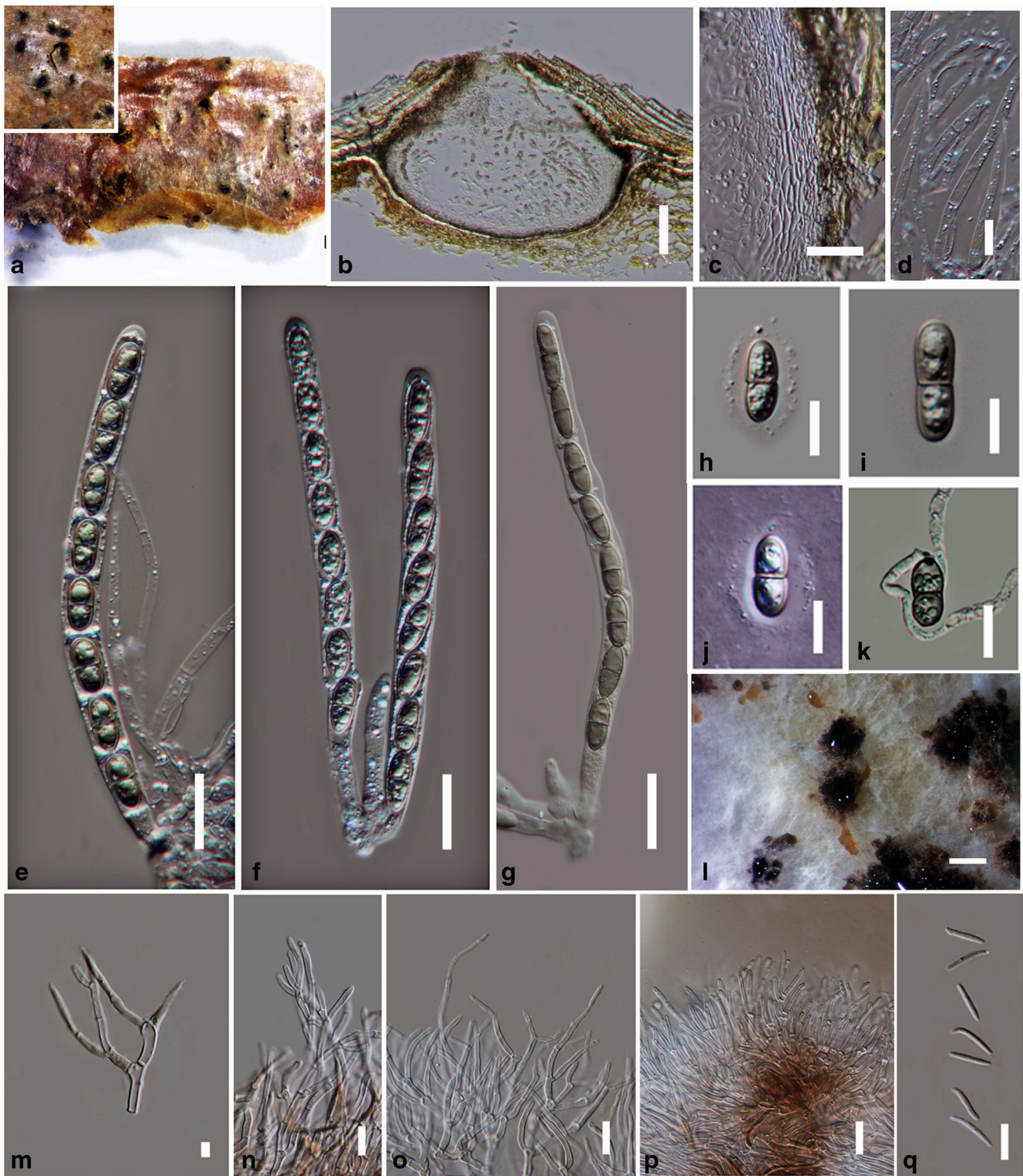


Fig. 2 *Amphisphaeria sorbi* (holotype) **a** Ascomata on substrate. **b** Cross section of ascoma. **c** Peridium. **d** Paraphyses. **e, f** Asci in water. **g** Asci in Melzer's reagent. **h, i** Ascospores. **j** Sheath around ascospore. **k** Germinating ascospore. **i** Conidiomata on MEA. **m–p** Conidiophore

and conidiogenous cells with attached conidia. **q**. Conidia. Scale bars: a=1 mm, b=100 μ m, c=50 μ m, e–g=20 μ m, d, h–k=10 μ m, l–q=10 μ m

immersed, globose to subglobose, coriaceous, dark brown, ostiolate, papillate. *Papilla* short, narrow, conical, periphysate. *Periphyses* hyaline, filamentous. *Peridium* two-layered, outer

layer comprising dark brown cells arranged in a *textura angularis* and inner layer comprising thin-walled, hyaline cells. *Hamathecium* comprising numerous, filamentous,



◀ **Fig. 3** *Bartalinia robillardoides* (MFLU 13–0084). **a** Conidiomata on leaf of Eucalyptus sp. **b c** Cross section of conidioma on leaf. **d, f** Developing conidia attached to conidiogenous cells. **e, f** Cross section of conidioma on PDA. **g–i**. Conidia. **j**. Culture on PDA. **k**. Germinating conidium. Scale bars: b–e=150 µm, d–f=20 µm, g–i, j=25 µm

septate, slightly tapering paraphyses. *Asci* 8-spored, unitunicate, cylindrical, indistinctly pedicellate, apex rounded, with J+ or J- apical ring. *Ascospores* uniseriate to overlapping uniseriate, light brown to dark brown, oval to fusiform, 1-septate, not or slightly constricted at the septum, smooth-walled or ornamented, sometimes with a mucilaginous sheath. **Asexual morph:** Coelomycetous. *Conidiomata* solitary or aggregated, globose, dark brown. *Peridium* comprising of thick-walled, septate, brown mycelium. *Conidiophores* septate, branched, thick-walled, hyaline. *Conidiogenous cells* elongate conical, thin-walled, septate, hyaline, annelidic. *Conidia* hyaline, elongate-fusiform, 1-celled, smooth-walled.

Notes: *Amphisphaeria* was introduced by Cesati and De Notaris (1863) without designating a generic type (Wang et al. 2004). Petrak (1923) proposed *A. umbrina* as the lectotype of the genus which was introduced earlier as *Sphaeria umbrina*. A description of *A. umbrina* was provided by Hyde et al. (1996). However this was not based on the type specimen. Hence, Hyde et al. (1996) epitypified a collection listed by Cesati and De Notaris (1863) as *S. umbrina* and also used a specimen used by Petrak (1923) to describe *A. umbrina* (Wang et al. 2004). The epitype of *A. umbrina* is illustrated in Wang et al. (2004). *Amphisphaeria umbrina* has a distinct clypeus comprising outer, brown and inner, hyaline cells of *textura angularis*, cylindrical asci, with a J-, discoid, subapical ring and ellipsoidal, light brown, one-median septate ascospores. Wang et al. (2004) accepted 12 species in the genus. Four species of *Amphisphaeria* have J-, apical rings (Wang et al. 2004; Liu et al. 2015). In this study, we illustrate the sexual and asexual morph of *Amphisphaeria sorbi*, the latter being introduced in Lui et al. (2015).

Amphisphaeria sorbi Senan. & K.D. Hyde, in Liu et al., Fungal Divers 71: 10 (2015), Fig. 2

Notes: This species was introduced in Liu et al. (2015) and is similar to *A. umbrina*. As this species formed an asexual morph in culture we illustrate both sexual and asexual morphs here (Fig. 2).

Material examined: ITALY, Trento [TN], Dimaro, Folgarida, on branch of *Sorbus aucuparia* L. (*Rosaceae*), 2 August 2013, E. Camporesi, IT 1400 (MFLU 14–0797, **holotype**).

Bartaliniaceae Wijayawardene, Maharachch. & K.D. Hyde, **fam. nov.**

Index Fungorum number: IF511183; *Facesoffungi number:* FoF 00667

Saprobic or rarely *pathogenic* causing leaf spots, on various hosts. **Sexual morph:** *Pseudostromata* immersed,

solitary, scattered. *Ascomata* immersed to semi-immersed, solitary to gregarious, globose to subglobose, black. *Ostiole* papillate, central, circular, periphysate. *Peridium* composed of brown to dark brown cells of *textura angularis* or *textura prismatica*, with thin inner layer composed of thin-walled, hyaline cells of *textura angularis*. *Hamathecium* comprising filiform, septate, hyaline, smooth-walled paraphyses. *Asci* 8-spored, unitunicate, cylindrical, short pedicellate, apically rounded a with J- or J+ subapical ring. *Ascospores* overlapping uniseriate, pale brown to brown, ellipsoid to fusiform, 3–4-septate, smooth-walled. **Asexual morph:** Coelomycetous. *Conidiomata* acervular or pycnidial to irregular, solitary to gregarious, superficial to sub-immersed, unilocular, globose to subglobose, dark brown to black. *Ostiole* apapillate. *Conidiomata wall* comprising two strata, inner wall composed of thick-walled, dark brown cells of *textura angularis*, inner wall thin, composed of hyaline to sub-hyaline cells of *textura angularis*. *Conidiophores* present or reduced to conidiogenous cells; when present cylindrical, hyaline, sparsely septate, smooth-walled. *Conidiogenous cells* holoblastic, ampulliform, integrated or discrete, determinate, hyaline, smooth-walled. *Conidia* fusiform, straight to slightly curved, subhyaline to brown, bearing only apical appendages or having both apical and basal appendages.

Type: *Bartalinia* Tassi, Bulletin Labor. Orto Bot. de R. Univ. Siena 3: 4 (1900)

Notes: In the molecular analyses (Fig. 1), *Bartalinia sensu stricto* groups with *Broomella*, *Hyalotiella* and *Truncatella* and forms a distinct clade in *Amphisphaeriales*. Further, the *Bartalinia* clade comprises a newly introduced genus viz. *Zetiasplozna*. This clade is distinct from the other families in *Amphisphaeriales* and thus we introduce a new family *Bartaliniaceae*.

The sexual morph genera in *Bartaliniaceae* are characterised by immersed to semi-immersed ascomata with papillate ostioles, unitunicate, cylindrical asci, with J- or J+ apical rings, and light to dark brown, 3–4-septate ascospores. The asexual typified genera have superficial to subimmersed acervular or pycnidial to irregular fruiting bodies, apapillate ostioles, conidiophores reduced to conidiogenous cells, holoblastic conidiogenesis and fusiform, straight to slightly curved, subhyaline to brown conidia with apical or apical and basal appendages.

Bartalinia Tassi, Bulletin Labor. Orto Bot. de R. Univ. Siena 3: 4 (1900)

Facesoffungi number: FoF 00659

Endophytic or *saprobic* on substrates of a range of plant hosts. **Sexual morph:** Undetermined. **Asexual morph:** *Conidiomata* pycnidial or variable, solitary to gregarious, subepidermal, erumpent at maturity, globose, unilocular, brown to black. *Conidiomata wall* two layered, outer layer comprising dark brown to black cells of *textura angularis*, inner wall comprising thin, hyaline cells of *textura angularis*.

Conidiophores reduced to conidiogenous cells. *Conidiogenous cells* ampulliform, holoblastic, discrete, determinate, hyaline, generated from inner layer of the pycnidium wall. *Conidia* hyaline to pale brown, subcylindrical, trans-septate, with appendages, basal cell with truncate base, obconic, hyaline, with single unbranched appendage; 3 median cells subcylindrical, hyaline to pale brown, apical cell conical, almost hyaline, with three-branched appendage.

Type species: Bartalinia robillardoides Tassi, Bulletin Labor. Orto Bot. de R. Univ. Siena 3: 4 (1900)

Notes: Tassi (1900) established *Bartalinia*, with *B. robillardoides* Tassi as the type species and currently, the genus comprises of 19 species epithets (Index Fungorum 2015). Morgan-Jones et al. (1972) accepted only nine species under *Bartalinia* and Sutton (1980) also accepted the same number. Sutton (1980) mentioned that the genus needs taxonomic revision. Von Arx (1981) reduced *Bartalinia* under *Seimatosporium* Corda, but this was rejected by Nag Raj (1993). Further, Nag Raj (1993) accepted only six species (including the type species), viz. *Bartalinia bischoffiae* Nag Raj, *B. lateripes* (Ellis & Everh.) Nag Raj, *B. laurina* (Mont.) Nag Raj, *B. pistacina* (J.L. Maas) Nag Raj and *B. tamarindi* Nag Raj. Five new species have been described since the revision of Nag Raj (1993) viz. *Bartalinia ananatis* Li Zeng et al. (Chi et al. 2002), *B. dracaenae* P.G. Xi et al. (Xi et al. 2000), *B. goniolimonis* Andrian. & Minter (Andrianova and Minter 2007), *B. mellea* F. Anderson & Bianchin. (Anderson and Bianchinotti 1996) and *B. pondoensis* Marincowitz et al. (Marincowitz et al. 2010).

Bartalinia robillardoides Tassi, Bulletin Labor. Orto Bot. de R. Univ. Siena 3: 4 (1900)

≡ *Seimatosporium robillardoides* (Tassi) Arx, Gen. Fungi Sporul. Cult., Edn 3 (Vaduz): 224 (1981)

Facesoffungi number: FOF 00660; Fig. 3

Saprobic on leaf, stems and branches of a range of host plants. **Sexual morph:** Undetermined. **Asexual morph:** *Conidiomata* 170–240 μm diam., 150–200 μm high, pycnidial or variable, solitary to gregarious, of subepidermal in origin, then erumpent, globose, unilocular, brown to black, with apiculate ostiole. *Pycnidial wall* of two layers, outer layer comprising dark brown to black cells of *textura angularis*, inner wall thin, hyaline. *Conidiophores* reduced to conidiogenous cells. *Conidiogenous cells* 2–7 × 2–3 μm, ampulliform, holoblastic, integrated, determinate, hyaline, smooth, generated from innermost layer of the pycnidium wall. *Conidia* 20–30 × 3–4 μm (\bar{x} = 22.52 × 3.21 μm, n = 20), hyaline to pale brown, subcylindrical, 4-septate, slightly constricted at the septa, smooth-walled, with appendages, basal cell hyaline, with a truncate base, obconic, 2–4 μm long, bearing an unbranched single appendage; 3 median cells subcylindrical, hyaline to pale brown, 15–22 μm long (altogether); apical cell conical, almost hyaline, 2–4 μm long,

with unbranched appendage, attenuate, flexuous, 15–20 μm, tri-radiate.

Culture characteristics: On PDA greyish brown, not zonate, fast growing, attaining 3 cm in 3 days at 25 °C, comprising circular, flat, thin mycelium.

Material examined: THAILAND, Chiang Rai, Mae Fah Luang University grounds, on leaves of *Eucalyptus* sp., 30 June 2012, Nalin N. Wijayawardene, NNW 120630–1 (MFLU 13–0084), living culture, MFLUCC 12–0070, GUCC T70

Notes: Our collection on leaves of *Eucalyptus* spp. morphologically resembles *Bartalinia robillardoides* (Nag Raj 1993; Crous et al. 2014a). Further, molecular data also showed that the new strain resides in *Bartalinia sensu stricto* with *B. robillardoides* (Fig. 3). Crous et al. (2014a) designated the lectotype and epitype of *B. robillardoides* as MBT178268 and CBS H-21728, respectively.

Broomella Sacc., Syll. fung. (Abellini) 2: 557 (1883)

= *Keissleria* Höhn., Annl. mycol. 16 (1/2): 93 (1918)

Facesoffungi number: FoF 00626

Saprobic on various hosts. **Sexual morph:** *Ascomata* solitary to gregarious, uniloculate, glabrous, globose to subglobose, papillate. *Ostiole* centrally located, composed of longitudinally aligned cells, and internally lined with hyaline periphyses. *Peridium* composed of light yellow, thick-walled cells of *textura prismatica* in the upper part and surrounding the ostiole, and thin-walled, hyaline to pale brown cells in other parts. *Hamathecium* comprising numerous, cylindrical, hypha-like, septate, paraphyses tapering towards the ends. *Asci* 8-spored, unitunicate, cylindrical to cylindrical-clavate, pedicellate, apically rounded, with a J- apical ring. *Ascospores* biseriolate or overlapping bi- or tri-seriolate, pale greyish brown, or brown, with ends cells yellowish to pale grayish brown, fusiform, glabrous, straight or inequilaterally curved, 3-septate, constricted at the septa, thick-walled, with doliform median cells, end cells conical, each bearing an unbranched, terminal tubular appendage. **Asexual morph:** Coelomycetous. *Conidiomata* stromatic, pycnidoid, scattered to gregarious, immersed to semi-immersed, rounded, oval or elongated, black, unilocular, papillate, glabrous. *Pycnidial wall* comprising thick-walled cells of *textura globulosa* to *textura angularis*, outwardly pale brown to brown, inwardly merging with relatively thin-walled and colourless cells. *Conidiophores* reduced to conidiogenous cells. *Conidiogenous cells* integrated, cylindrical, phialidic, percurrently proliferating 1–2-times, hyaline, smooth. *Conidia* pale brown or brown, fusiform to aciculate, with acute ends, straight or slightly curved, 3-septate, constricted at septa, verruculose, thick-walled, bearing a single tubular appendage at each end, or 2–5-appendage at apex and a single appendage at the base.

Type species: Broomella vitalbae (Berk. & Broome) Sacc., Syll. fung. (Abellini) 2: 558 (1883)

≡ *Hypocrea vitalbae* Berk. & Broome, Ann. Mag. nat. Hist., Ser. 33: 363 (1859)

Facesoffungi number: FoF 00589, Fig. 4

Notes: *Broomella* was introduced by Saccardo (1883) based on *B. vitalbae* (Berk. & Broome) Sacc. The genus is characterized by unitunicate, cylindrical-elongate asci, with a

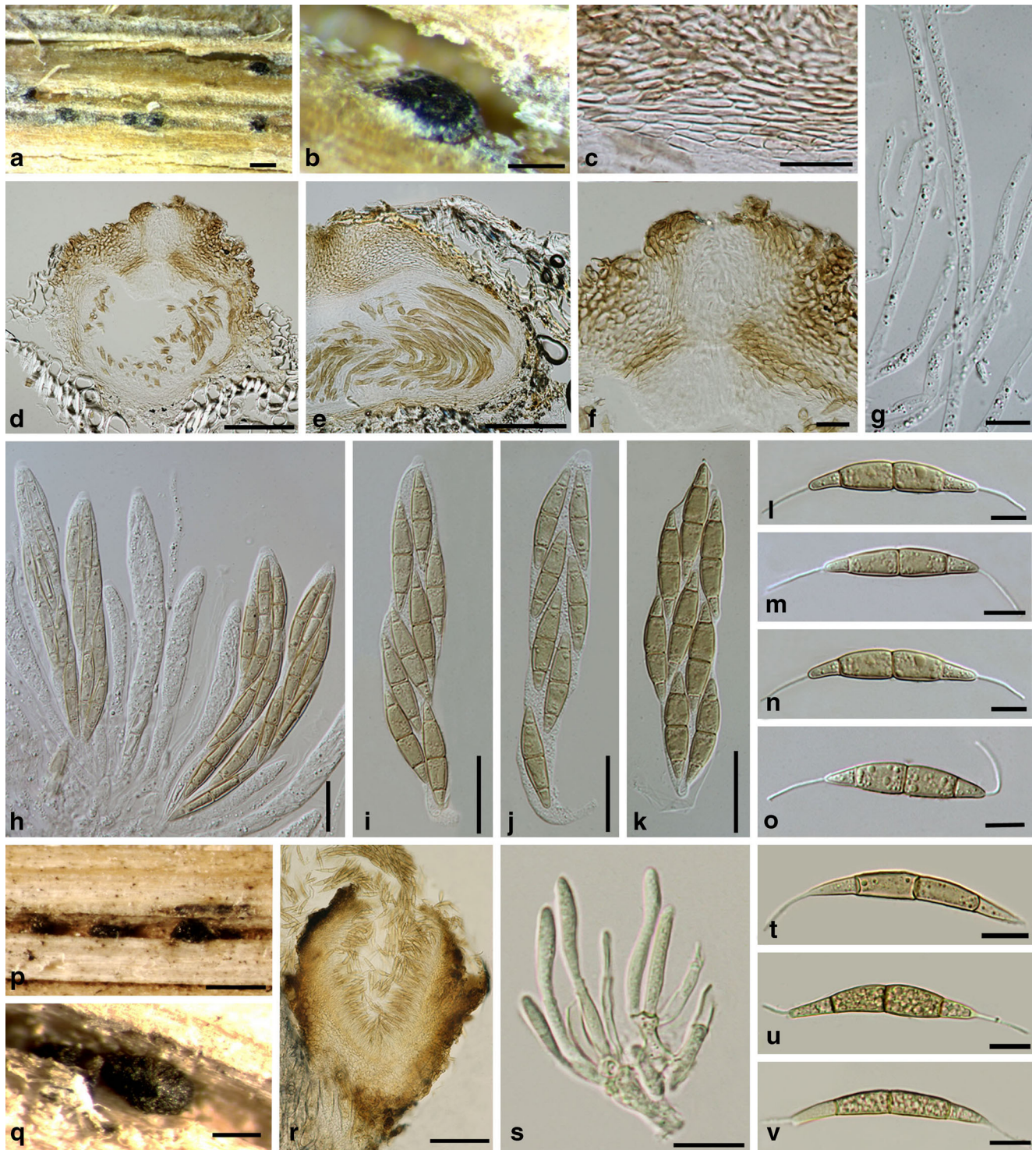


Fig. 4 *Broomella vitalbae* (epitype) **a, b** Black ascomata on the host. **c** Section of peridium. **d, e** Vertical section of ascomata. **f** Ostiole. **g** Paraphyses. **h–k** Asci with ascospores. **l–o** Ascospores. **p–q** Black conidiomata on the host. **r** Vertical section of conidiomata. **s**

Conidiophores, conidiogenous cells and developing conidia. **t–v** Conidia. Scale bars: **a**=500 μ m, **b**=200 μ m, **c**=20 μ m, **d–e**=100 μ m, **f**=20 μ m, **g–o**=10 μ m, **p**=200 μ m, **q**=500 μ m, **r**=100 μ m, **s–v**=10 μ m

J-, discoid apical ring, and 3-septate, ellipsoid-fusiform ascospores, with brown median cells, lighter terminal cells, and single, centric appendages arising from the ends (Shoemaker and Müller 1963; Li et al. 2015a). *Broomella* has been shown to be linked to a pestalotiod-like asexual morph (Shoemaker et al. 1989; Yuan and Zhao 1992; Kang et al. 1999a). Shoemaker and Müller (1963) introduced *B. acuta* Shoemaker & E. Müll. and *B. excelsa* Shoemaker & E. Müll. in the genus. There are 20 species epithets listed under *Broomella* in Index Fungorum (2015), however, none of these had been studied using sequence data. The *Broomella* species and their truncatella-like asexual morphs differ in various ways from the type species of *Broomella* and its asexual morph and are probably not congeneric. Through a study of LSU sequence data and together with existing morphological data, Li et al. (2015a) showed that *Broomella* appears to be a distinct, natural group in *Amphisphaeriaceae* and the asexual morph have conidia with a single apical and basal appendages.

Materials examined: ITALY. Province of Forli-Cesena [FC], Modigliana, Montebello, on dead stem of *Clematis vitalba*, 23 February 2013, Erio Camporesi, IT-1079 (MFLU 15-0065, **epitype**); ex-epitype living culture, MFLUCC 13-0798, ICMP; ITALY. Province of Arezzo [AR], Montemezzano, on dead stem of *Clematis vitalba*, 25 August 2013, Erio Camporesi, IT-1430 (MFLU 15-0054); living culture, MFLUCC 14-1000.

Hyalotiella Papendorf, Trans. Br. mycol. Soc. 50 (1): 69 (1967)

Index Fungorum number: IF 8588 **Facesoffunginumber:** FoF00627

Saprobic on various hosts. **Sexual morph:** *Ascomata* perithecial, immersed, becoming erumpent, solitary, gregarious or confluent, globose to subglobose, blackened, glabrous, papillate. *Ostiole* lined with filiform, hyaline, periphyses. *Peridium* composed of outer, dark brown, thick-walled cells of *textura angularis* and thin-walled, hyaline cells in the inner layers. *Hamathecium* comprising filiform, hyaline, paraphyses, evanescent at maturity. *Asci* 8-spored, unitunicate, cylindrical to clavate, short pedicellate, apex rounded, with a J+ subapical ring. *Ascospores* overlapping uniseriate, fusiform to ellipsoidal with obtuse apex, and with narrow base, initially hyaline, and becoming brown at maturity, mostly 1-septate, occasionally 2–3-septate, constricted at septa, straight or slightly curved, thick-walled, smooth. **Asexual morph:** Coelomycetous. *Conidiomata* stromatic, pycnidial, vase-shaped, scattered to gregarious, immersed or semi-immersed, globose to subglobose, unilocular, glabrous, brown to dark brown, ostiolate. *Ostiole* lageniform, single, centrally located, with a well-developed neck, thick-walled. *Peridium* thick-walled cells of *textura angularis*, brown to dark brown. *Conidiophores* arising all around the cavity of the conidioma, short, often reduced to conidiogenous cells. *Conidiogenous*

cells integrated, cylindrical, long, phialidic, hyaline, smooth. *Conidia* cylindrical to fusiform, with an obtuse apex and a narrow truncate base, straight or slightly curved, 3-septate, pale brown to brown except for the hyaline apical cell, median cells longer than ends cells, bearing 2–5-branched, filiform, flexuous, hyaline appendages arising from apical cell.

Type species: *Hyalotiella transvalensis* Papendorf, Trans. Br. mycol. Soc. 50 (1): 69 (1967).

Notes: *Hyalotiella* was introduced by Papendorf and Du-Toit (1967) with *H. transvalensis* Papendorf as type species. The genus is characterized by having vase-shaped pycnidia, with a long neck, and 3-septate, cylindrical, pale brown to brown conidia, with median cells that are longer than the ends cells, and 2–5-branched, filiform, apical appendages (Nag Raj 1993). According to the Index Fungorum (2015) there are four epithets in *Hyalotiella*. However, *H. subramanianii* was transferred to *Hyalotiopsis* by Nag Raj (1993) based on conidial characters and *Hyalotiella orientalis* was synonymised under *Hyalotiella americana* (Speg.) Nag Raj (Nag Raj 1993). Li et al. (2015a) introduced an additional taxon in *Hyalotiella*, namely, *H. spartii* W.J. Li et al. based on morphological characters, while they also provided a sequence for this species. Thus, to date, four species are accepted in *Hyalotiella*, viz. *H. americana*, *H. spartii* W.J. Li, Camporesi & K.D. Hyde, *H. transvalensis* and the sexual species *H. rubi* described in this paper.

The *Dyrithiopsis*-like sexual morph of *Hyalotiella* has not been previously reported (Sutton 1980; Nag Raj 1993). *Hyalotiella rubi* shows somewhat similar morphological characters (i.e., form of ascomata and ascospores) with the type species of *Dyrithiopsis*, viz. *Dyrithiopsis lakefuxianensis* L. Cai et al., but it is phylogenetically distinct from *D. lakefuxianensis* (Fig. 1) the latter has a *Monochaetiopsis* conidial state (Jeewon et al. 2003a, b).

Hyalotiella spartii W.J. Li, Camporesi & K.D. Hyde Cryptog., Mycol. 36 (1): 93–108 (2015).

Index Fungorum number: IF551047 **Facesoffunginumber:** FoF00590; Fig. 5

Saprobic on dead stems of *Spartium junceum*, forming conspicuous rounded, black conidiomata. **Sexual morph:** Undetermined. **Asexual morph:** coelomycetous. *Conidiomata* 250–300 μm high, 200–250 μm diam., stromatic, pycnidial, vase-shaped, scattered to gregarious, epidermal to subepidermal in origin, globose to subglobose, semi-immersed, unilocular with the locule occasionally convoluted or irregularly divided, glabrous, brown to dark brown, ostiolate. *Ostiole* lageniform, single, centrally located, with a well-developed neck, thick-walled. *Peridium* 30–50 μm wide, composed of 7–8-cell layers, with thick-walled cells of *textura angularis*, brown to dark brown. *Conidiophores* arising all around the cavity of the conidioma, short, often reduced to conidiogenous cells. *Conidiogenous* cells 10–15 μm wide, integrated, cylindrical, long, phialidic, hyaline, smooth. *Conidia*

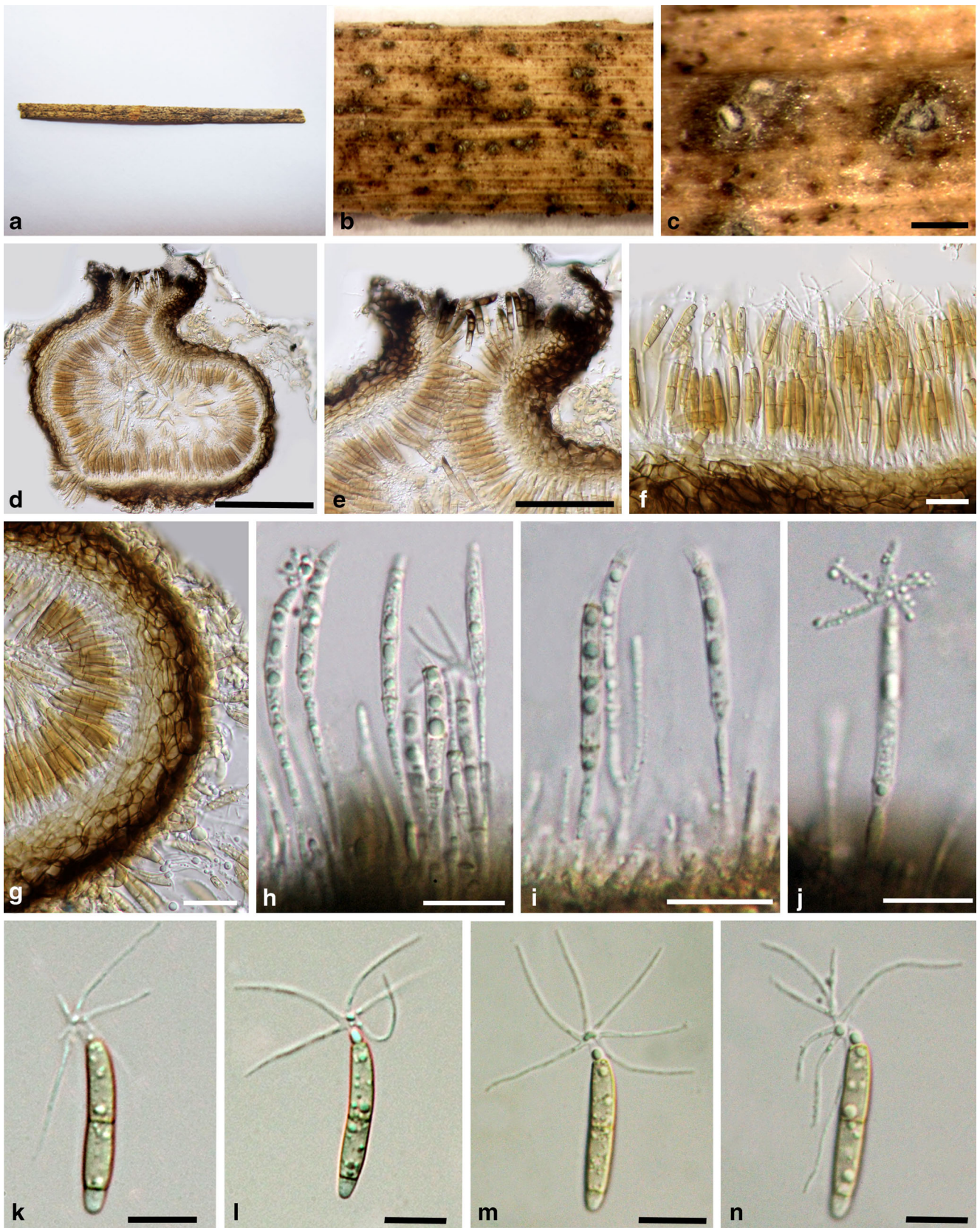


Fig. 5 *Hyalotiella spartii* (holotype) **a** Herbarium specimen. **b, c** Black conidiomata on the host. **d** Vertical section of conidioma. **e** Ostiole. **f, h–j** Conidiogenous cells and developing conidia. **g** Section of pycnidial wall. **k–n** Conidia. Scale bars: **c**=200 μ m, **d**=100 μ m, **e**=50 μ m, **f, h–j**=10 μ m, **g**=10 μ m, **k–n**=10 μ m

25–28 × 3–4 μm (\bar{x} = 26 × 3.5 μm; n = 20), fusiform, 3-septate, bearing apical appendages; basal cell obconic with an obtuse base, almost colourless, with 2 cylindrical to subcylindrical, thick-walled, yellowish to brown, median cells constricted at septa, and with conic, thin-walled, hyaline apical cell, with apical appendages 14–20 μm long, tubular, acellular, often irregularly or dichotomously branched at the base, filiform, flexuous, hyaline.

Materials examined: ITALY. Province of Forli-Cesena [FC], Santa Sofia, Collina di Pondo, on dead stem of *Spartium junceum*, 16 October 2012, Erio Camporesi, IT 812 (MFLU 15–0055 **holotype**); ex-type living culture, MFLUCC 13–0397=ICMP 20788; *ibid.*, IT-812B (MFLU 15–0066); living culture MFLUCC 15–0024=ICMP.

Hyalotiella rubi Senan., Camporesi & K. D. Hyde, *sp. nov.*

Index Fungorum Number: IF551189; **Facesoffungi number:** FoF 00680; Fig. 6

Etymology: Name referring to the host genus on which the species occurs.

Holotype: MFLU 15–0740

Saprobic on stems of *Rubus* sp., appearing as shiny, black, raised areas on substrate. **Sexual morph:** *Pseudostromata* made up of host cells and black fungal hyphae, forming a wide, darkened layer around the ostiole, and a thin, darkened, hyphal layer beneath the cuticle, spreading on the host surface to form a darkened region above the ascomata. 140–195 μm high, 200–245 μm diam., (\bar{x} = 165 × 220 μm, n = 20), perithecial, immersed, becoming erumpent, scattered, solitary or aggregated, globose to subglobose, coriaceous, with very short papillate ostiole, ostiolar canal lined with filiform, hyaline, periphyses. *Peridium* 10–20 μm wide (\bar{x} = 16 μm, n = 20), comprising two strata, outer stratum comprising 7–10 layers of compressed, thick-walled cells of *textura angularis* and inner stratum comprising 1–2 layers of hyaline, thin-walled, large, cells of *textura angularis*. *Hamathecium* comprising 2–5 μm wide (\bar{x} = 3 μm, n = 20), filiform, septate, hyaline paraphyses, evanescent at maturity. *Asci* 80–100 × 8–10.5 μm (\bar{x} = 90 × 9.5 μm, n = 20), 8-spored, unitunicate, cylindrical, short

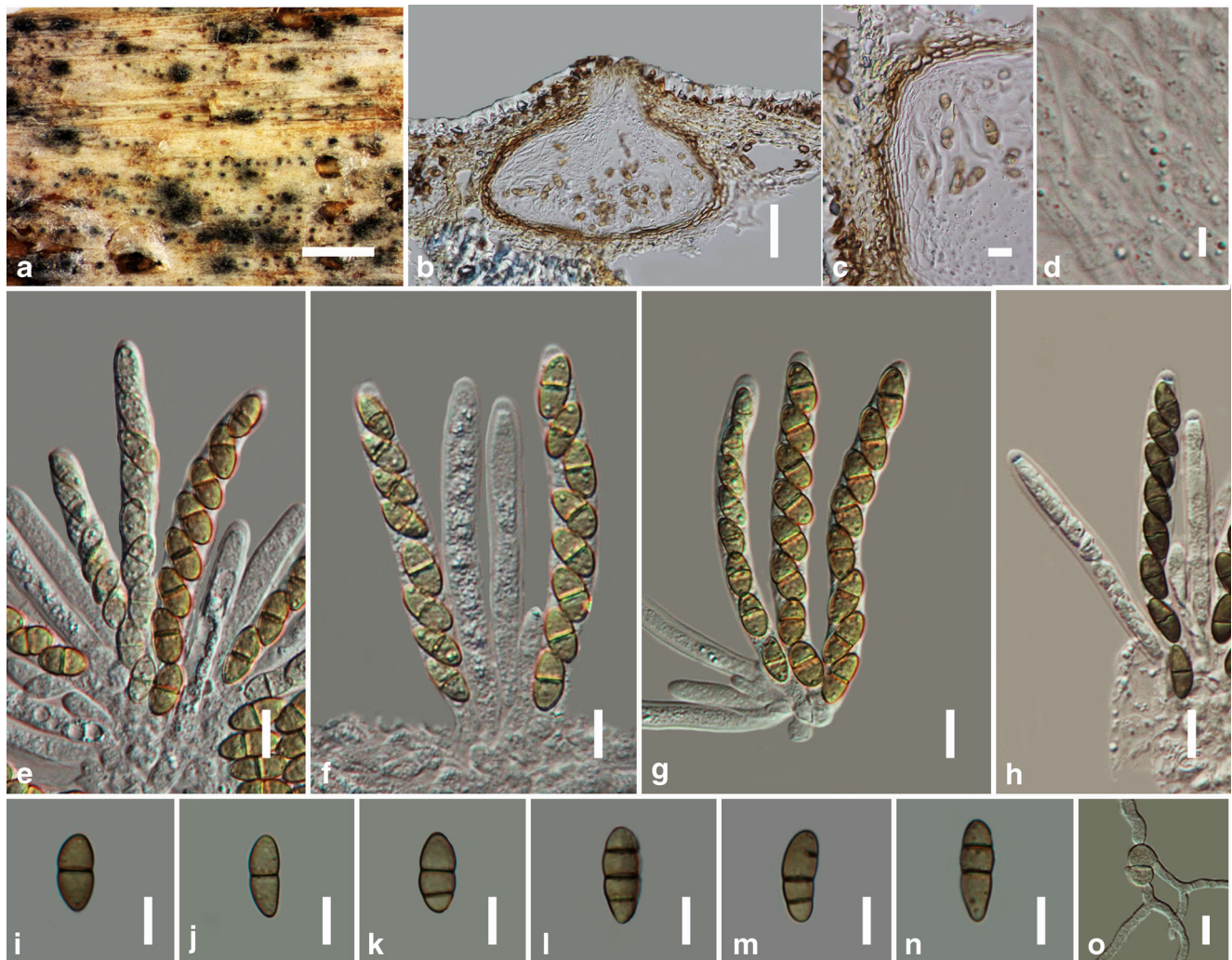


Fig. 6 *Hyalotiella rubi* (holotype) **a** Appearance of ascomata on host substrate. **b** Cross section of ascomata. **c** Peridium. **d** Paraphyses. **e–g** Asci. **h** Asci in Melzer's reagent showing J+, apical ring. **i–n** Ascospores. **o** Germinating ascospores. Scale bars: a=1 mm, b=50 μm, c–o=10 μm

pedicellate, apically rounded, with a J+ subapical ring. *Ascospores* 12–15 μm \times 5.5–7.5 μm (\bar{x} = 13.5 \times 6.5 μm , $n=20$), overlapping uniseriate, initially hyaline and becoming brown at maturity, ellipsoidal to fusiform with blunt ends, mostly 1-septate, rarely 2–3-septate, slightly constricted at the septa, lowest cell longer than upper cell, smooth-walled. **Asexual morph:** Undetermined.

Culture characters: growing on MEA reaching 2 cm within 7 days when incubated at 18 °C. Flat, circular, white colony with serrate margin and white woolly centre.

Materials examined: ITALY, Province of Forli-Cesena [FC], Premilcuore, Fiumicello, on dead branch of *Rubus* sp., 24 April 2013, Nello Camporesi, IT 1197 (MFLU 15–0740, **holotype**); *Ibid.*, (MFLU 15–0740bis, **isotype**); *ibid.*, (MFLU 15–0740tris, **paratype**); ex-type living cultures, MFLUCC 13–0660=ICMP.

Notes: *Hyalotiella rubi* is introduced as a new species in the family *Bartaliniaceae* based on the phylogenetic analysis of combined LSU and ITS sequence data. This is the first record of a sexual morph of *Hyalotiella*. However *Hyalotiella rubi* shows somewhat similar morphological characters to species of *Dyrithiopsis*. Phylogenetically they are not closely related. In the combined analyses of LSU and ITS sequence data of amphispheariaceae and xylariaceae taxa (Fig. 1), *H. rubi* shows a close affinity with *H. spartii*.

Truncatella Steyaert Bull. Jard. bot. État Brux. 19: 293 (1949)

***Facesoffungi* number:** FoF 00705.

Saprobic or mostly ***pathogenic*** on plant leaves and twigs.

Sexual morph: *Ascomata* solitary or gregarious, scattered, immersed under minute clypeus, uniloculate, globose to subglobose, coriaceous, papillate or apapillate, brown. *Ostiole* central, wide, rounded. *Papilla* composed of cells of *textura porrecta* and internally lined with hyaline periphyses. *Peridium* comprising light yellow or brown, thick-walled cells of *textura prismatica* in the upper part, and thick-walled, hyaline to pale brown cells of *textura angularis* in other parts. *Hamathecium* comprising numerous, hypha-like, septate, paraphyses, slightly constricted at the septa, tapering towards the ends. *Asci* 8-spored, unitunicate, cylindrical to cylindrical-clavate, pedicellate, apically rounded, with a J- apical ring. *Ascospores* biseriate or overlapping tri-seriate, hyaline when young, sometimes pale greyish-brown with doliform median cells and yellowish to pale greyish-brown end cells or brown at maturity, fusiform, glabrous, thick-walled, straight or inequilaterally curved, with pointed ends, 1–3-septate with constrictions at the septa and bearing unbranched, terminal appendages or ornamented wall. **Asexual morph:** Coelomycetous. *Conidiomata* acervular, immersed to semi-immersed, solitary to aggregated. *Peridium* comprising brown, thin-walled cells of *textura angularis*. *Conidiophores* hyaline, branched, septate, cylindrical. *Conidiogenous cells* holoblastic, indeterminate, integrated, cylindrical, hyaline,

smooth, with several percurrent proliferations. *Conidia* with brown median cells and hyaline apical and basal cells, fusiform, straight, 3-euseptate, constricted at the septa, sometimes with a simple or rarely branched, cellular appendage, conical at apical cell, hyaline, with 1 or more apical, simple or branched tubular appendages, smooth-walled, thick-walled.

Type species: *Truncatella truncata* (Lév.) Steyaert, Bull. Jard. bot. État Brux. 19: 295 (1949)

Notes: *Truncatella* introduced by Steyaert (1949) and is typified by *T. truncata*. The genus is typically associated with plants as an endophyte or pathogen (Shoemaker et al. 1989). According to molecular studies, *Truncatella* is paraphyletic with *Bartalinia* sharing a common ancestor (Jeewon et al. 2002; Li et al. 2015a). However, *Truncatella* may possibly be two genera. *Truncatella vitalbae* (Shoemaker & E. Müll.) Shoemaker et al., *T. excelsa* (Petr.) Shoemaker et al., and *T. pestalozzioides* (Dearn. & Fairm.) Shoemaker et al. were reported as the sexual morph of *Broomella* (Shoemaker et al. 1989). Li et al. (2015a) however, showed through molecular data that another coelomycetous species is the asexual morph of *B. vitalbae*. Hence the sexual morph of *Truncatella* still remains unresolved. Here we illustrate the sexual morph of a new *Truncatella* species as *Truncatella spartii*.

Truncatella spartii Senan., Camporesi & K. D. Hyde, *sp. nov.* Fig. 6

***Index Fungorum* number:** IF551196; ***Facesoffungi* number:** FoF 00685; Figs. 7 and 8

Etymology: Name referring to the host genus on which the species occurs.

Holotype: MFLU 15–0721

Saprobic on stems of *Spartium junceum* L., appearing as black, circular, flat dots on substrate. **Sexual morph:** *Ascomata* 115–140 μm high, 175–190 μm diam., (\bar{x} = 135 \times 180 μm , $n=20$), scattered, solitary, immersed, globose to subglobose, brown, ostiolate, apapillate. *Ostiole* wide, circular, even with host epidermis. *Peridium* 20–24 μm wide near to ostiole (\bar{x} = 22.5 μm , $n=20$), 6.5–13 μm wide at the base (\bar{x} = 9.5 μm , $n=20$), outwardly comprising 5–7 layers of brown cells of *textura angularis*, inwardly comprising 4–6 layers of thick-walled, hyaline cells of *textura angularis*. *Hamathecium* comprising 2.5–4 μm wide (\bar{x} = 3 μm , $n=20$), branched, septate, paraphyses, slightly constricted at the septa. *Asci* 62–70 \times 6–6.5 μm (\bar{x} = 65 \times 6.1 μm , $n=20$), 8-spored, unitunicate, cylindrical, short pedicellate, apex slightly pointed, with an indistinct, J-, apical apparatus. *Ascospores* 8–11.5 \times 3.5–4 μm (\bar{x} = 9.5 \times 3.6 μm , $n=20$), uniseriate to overlapping uniseriate, hyaline when young, brown at maturity, fusiform, with one thick septum, constricted at septum, pointed at ends. **Asexual morph:** Coelomycetous, *Conidiomata* 125–155 μm high, 145–180 μm diam., (\bar{x} = 140 \times 165 μm , $n=20$), pycnidial, immersed, globose, brown, ostiolate. *Conidiophores* 3–5 μm high, 3.5–4.5 μm diam. (\bar{x} = 3.5 \times 4 μm , $n=20$), hyaline, simple or branched, cylindrical,

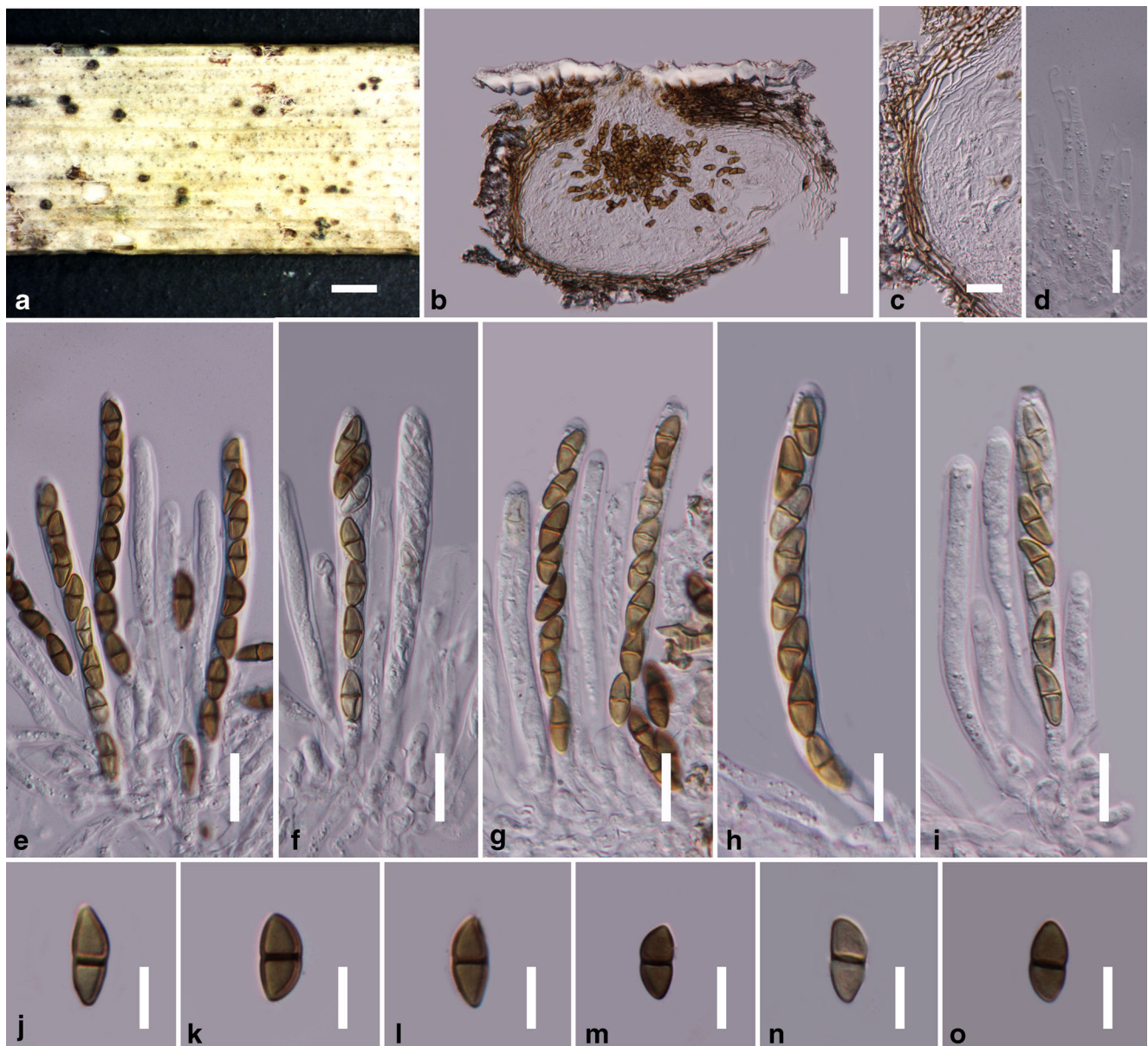


Fig. 7 *Truncatella spartii* (holotype). **a** Ascomata on host. **b** Cross section of ascoma. **c** Peridium. **d** Paraphyses. **e–i** Asci. **j–o** Ascospores. Scale bars: a=1 mm, b=50 μ m, c, d, j–o=10 μ m, e–i=20 μ m

aseptate. *Conidiogenous cells* 8–17 μ m long, 8–12 μ m wide, (\bar{x} = 11.5 \times 10.7 μ m, $n=20$), hyaline, cylindrical, annellidic. *Conidia* 8–12 \times 4–5.5 μ m (\bar{x} = 10 \times 5 μ m, $n=20$), clavate, 3-septate, constricted at the septa, central cells large, upper central cell slightly larger than lower central cell, light brown, thick-walled, basal cell conical, hyaline, narrowing towards the base, apical cell small, hyaline, conical, bearing appendages. *Appendages* 11–16 μ m long (\bar{x} = 14.5 μ m, $n=20$), 1–3, thin, slender, hyaline, of equal length to that of the conidia.

Culture characters: Growing on MEA reaching 1 cm within 7 days at 18 $^{\circ}$ C, fast growing, flat, colony circular, with serrate margin, sparse, white, aerial mycelia in the centre, with unbranched, hyaline, mycelia at the margin.

Materials examined: ITALY, Province of Forli-Cesena [FC], Galeata, Passo delle Forche, on branch of *Spartium junceum* L. (*Fabaceae*), 9 November 2013, Erio Camporesi, IT 1511 (MFLU 15–0721, **holotype**); *ibid.*, (MFLU 15–0721bis, **paratype**); living cultures, MFLUCC 15–0537 (from conidiomata), ICMP.

Notes: In this study we introduced a new species on *Spartium* from Italy as *Truncatella spartii*. Megablast search results of *T. spartii* in GenBank give *Truncatella helichrysi* (Severini) B. Sutton and *T. hartigii* (Tubaeuf) Steyaert. as close matches, however, it differs from them in having conical, hyaline apical cells, bearing 2–3 long, unbranched, hyaline conidial appendages. We observed

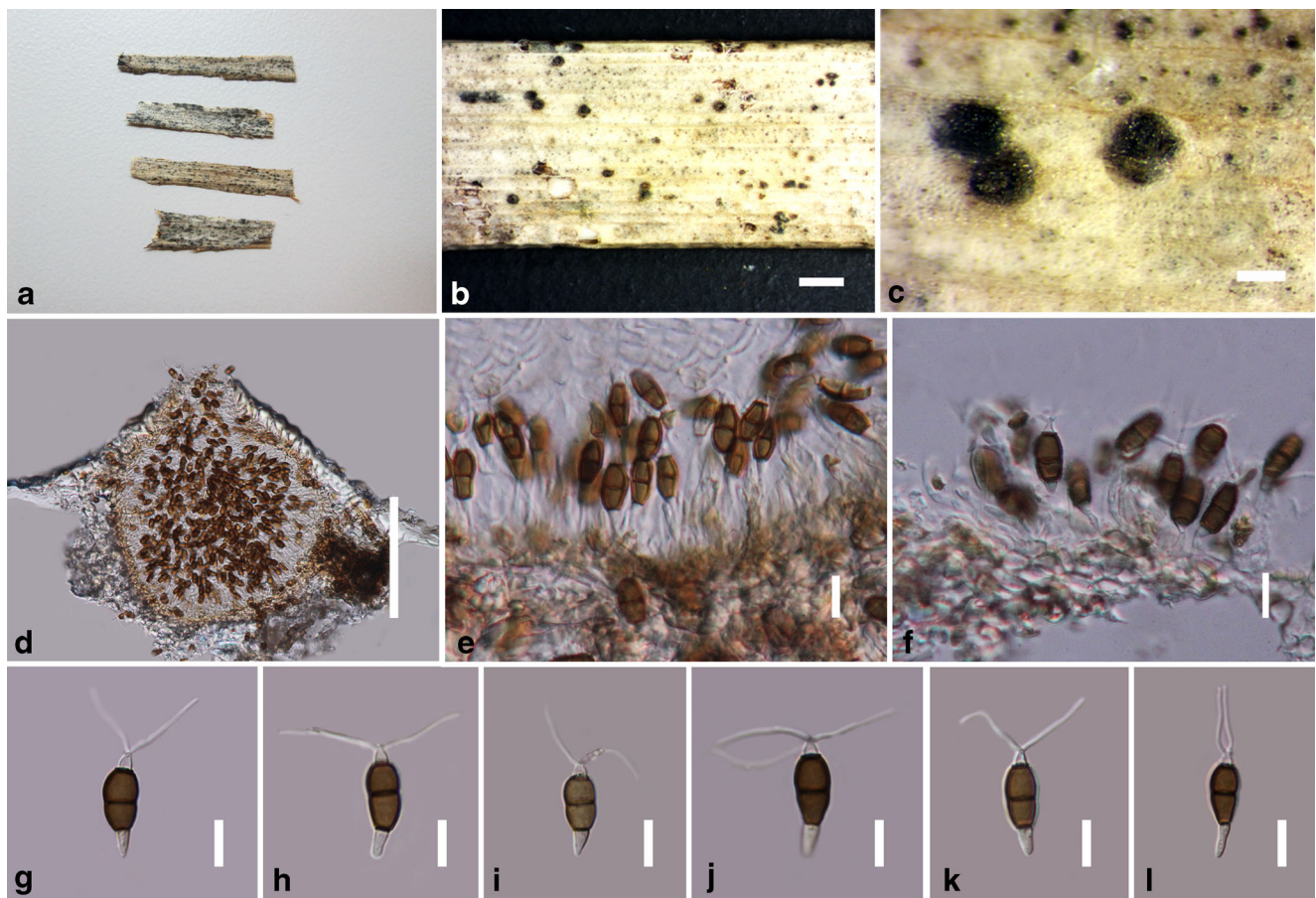


Fig. 8 *Truncatella spartii* (holotype). **a** Herbarium specimens. **b, c** Conidiomata on host. **d** Cross section of conidioma **e–f** Conidia attached to conidiogenous cells. **g–l** Conidia. Scale bars: **b**=1 mm, **c**=200 μ m, **d**=50 μ m, **e–i**=20 μ m

ascomata associated with conidiomata on the host and DNA extraction was made directly from the ascomata by picking up the inner contents using fine forceps and checking under a compound microscope. Sequence data from both the sexual and asexual morphs showed them to be *Truncatella*.

Clypeosphaeriaceae G. Winter [as ‘Clypeosphaerieae’], Rabenh. Krypt.-Fl., Edn 2 (Leipzig) 1.2: 554 (1886)

Facesoffungi number: FoF 00678

Hemibiotrophic or saprobic on woody or herbaceous plants. **Sexual morph:** *Pseudoclypeus* comprising both host and fungal tissues, black. *Ascomata* immersed to erumpent, rarely superficial, solitary or aggregated, globose to subglobose, coriaceous, brown to black, ostiolate, papillate. *Papilla* short, narrow, internally lined with hyaline, filamentous periphyses. *Peridium* comprising dark brown to light brown, thick-walled cells of *textura angularis*, inwardly hyaline. *Hamathecium* comprising numerous, hypha-like, septate, flexuose, paraphyses, embedded in a gelatinous matrix. *Asci* 8-spored, unitunicate, cylindrical to broadly cylindrical, pedicellate, with a wedge-shaped, J-, or J+ apical ring. *Ascospores* uniseriate to biseriate, hyaline to brown, ellipsoidal to fusiform, sometimes oval, straight or curved, unicellular or

septate, wall smooth or ornamented or striate, sometimes with sheaths, appendages, rarely with germ slits or germ pores.

Asexual morph: Undetermined.

Notes: The family *Clypeosphaeriaceae* was introduced by Winter (1884–1886) to accommodate *Anthostomella*, *Clypeosphaeria*, *Hypospila*, *Linospira* and *Trabutia*. Barr (1989) however, revisited the family and excluded all genera retaining *Clypeosphaeria* as the type of this monotypic family. Hawksworth et al. (1995) treated this family with *Apiorhynchostoma*, *Ceratostomella*, *Clypeosphaeria*, *Crassoascus*, *Duradens*, *Frondicola*, *Jobellisia*, *Melomastia* and *Pseudovalsaria* (Kang et al. 1999a; Smith et al. 2003). Lumbsch and Huhndorf (2010) accepted only *Apiorhynchostoma*, *Aquasphaeria*, *Brunneiapiospora*, *Clypeosphaeria*, *Crassoascus*, *Duradens*, *Palmomyces* and *Pseudovalsaria* in the family. Maharachchikumbura et al. (2015) accepted *Apioclypea*, *Aquasphaeria*, *Brunneiapiospora*, *Clypeosphaeria*, *Crassoascus* and *Palmomyces* as the genera in *Clypeosphaeriaceae*, following Lumbsch and Huhndorf (2010), as these genera, except for *Clypeosphaeria*, lack sequence data.

Type: *Clypeosphaeria* Fuckel, Jb. Nassau. Ver. Naturk. 23–24: 117 (1870) [1869–70]

Type species: Clypeosphaeria mamillana (Fr.) Lambotte, Flore Mycologique Belge 2: 247 (1880)

Clypeosphaeria mamillana (Fr.) Lambotte, Flore Mycologique Belge 2: 247 (1880)

Basionym: Clypeosphaeria notarisii Fuckel, Jb. nassau. Ver. Naturk. 23–24: 117 (1870).

Facesoffungi number: FoF 00709; Fig. 9

Saprobic on decaying wood. **Sexual morph:** *Clypeus* dome-shaped, well-developed, black. *Ascomata* 380–450 μm diam., 350–400 μm high (\bar{x} = 428 \times 389 μm , n = 10), immersed under the clypeus, solitary, scattered, globose to subglobose, coriaceous, black, ostiole central, papillate. *Papilla* short, narrow, internally lined with hyaline, filamentous periphyses. *Peridium* 20–35 μm wide (\bar{x} = 25 μm , n = 20), comprising outer, brown, elongated, flat, cells of *textura angularis* and inner, hyaline, elongated, flat, cells of *textura angularis*. *Hamathecium* comprising numerous, 3–5 μm wide (\bar{x} = 3.5 μm , n = 20), hypha-like, aseptate, unbranched, flexuose, paraphyses, tapering towards the apex. *Asci* 165–230 \times 8–11 μm (\bar{x} = 198 \times 10 μm , n = 20), 8-spored, unitunicate, cylindrical, short pedicellate, apex rounded, with 1.5–2.5 μm diam., 2.5–3.5 μm high (\bar{x} = 2.1 \times 2.8 μm , n = 20), wedge-shaped, J+ apical apparatus. *Ascospores* 20–25 \times 6–9 μm (\bar{x} = 20 \times 7 μm , n = 30), uniseriate, dark brown, ellipsoidal to fusiform, unicellular, straight or slightly curved, 0–5-distoseptate, not constricted at the septa, smooth-walled. **Asexual morph:** Undetermined.

Material examined: GERMANY, Ahlen, Oestricher forest, December 1823, K.W.G.L Fuckel (G00127177, **holotype**).

Notes: *Clypeosphaeria* is typified by *Clypeosphaeria mamillana* (Fr.) Lambotte (Kang et al. 1999a). This genus has been synonymized under several genera (Barr 1989), while Hyde et al. (1998) treated *Clypeosphaeria* as a monotypic genus, excluding all the other species. However currently 41 species have been listed under genus *Clypeosphaeria* (Mycobank 2015). *Clypeosphaeria* is characterized by 0–5-pseudoseptate ascospores, without germ pores. The type species *Clypeosphaeria mamillana* is previously named as *Clypeosphaeria notarisii* Fuckel (Kang et al. 1999a; Mycobank 2015). However *Clypeosphaeria notarisii* was an illegitimate name, because the name should be a combination with *Sphaeria clypeiformis* De Not. (Mycobank 2015).

Discosiaceae Maharachch. & K.D. Hyde, **fam. nov.**

Index Fungorum number IF551177; *Facesoffungi* number: 0665

Saprobic or *pathogenic* on plant leaves. **Sexual morph:** *Ascomata* scattered, immersed to erumpent. *Ostiole* circular, papillate. *Peridium* comprising several layers of compressed cells, brown at the base, dark brown outwardly. *Hamathecium* comprising numerous, hypha-like, flexuose, paraphyses. *Asci* 8-spored, unitunicate, obclavate to cylindrical, with a discoid, J+ subapical ring. *Ascospores* overlapping uniseriate or biseriate, obovoid to ellipsoid, transversally septate, with or

Fig. 9 *Clypeosphaeria mamillana* (holotype). **a** Herbarium packet. **b** Herbarium specimens. **c** Appearance of ascomata on host substrate. **d** Cross section of ascoma. **e** Peridium. **f, g** J+ apical ring of ascus in Melzer's reagent. **h–k** Asci. **l–o** Ascospores. Scale bars: c=500 μm , d=50 μm , e=10 μm , f, g=5 μm , h–k=10 μm , l–o=5 μm

without vertical septa, hyaline. **Asexual morph:** Coelomycetous. *Conidiomata* stromatic, scattered to gregarious, subepidermal or subepidermal in origin, immersed to erumpent. *Peridium* composed of 3–4 layers of cells of *textura angularis*, outer 1–2-layers brown and inner 1–2 layers hyaline or pale brown. *Conidiophores* arising from the inner layer cells of basal stroma, absent or reduced to conidiogenous cells, when present long, septate and branched. *Conidiogenous cells* holoblastic, annelidic, cylindrical or lageniform, hyaline. *Conidia* cylindrical to clavate, or fusiform, straight or curved, 2–4-euseptate, hyaline, pale olivaceous, or brown, bearing cellular, filiform or attenuated appendages.

Type: Discosia Lib., Pl. crypt. Arduenna, fasc. (Liège) 4: no. 346 (1837)

Notes: Phylogenetic analyses of combined LSU and ITS sequence data of *Discosia* and related genera show *Discosiaceae* taxa to be distinct from the family *Bartalinaceae* and *Pestalotiopsidaceae*. Hence the new family *Discosiaceae* is introduced for *Discosia* and *Adisciso*, *Discostroma*, *Immersidiscosia*, *Sarcostroma*, and *Seimatosporium* (Fig. 1). Members of the family *Discosiaceae* are saprobes, endophytes, or foliar pathogens in tropical and temperate regions (Nag Raj 1993; Tanaka et al. 2011). The family presently includes four coelomycetous asexual genera *Discosia*, *Immersidiscosia*, *Sarcostroma* and *Seimatosporium*, and two sexual genera *Adisciso* and *Discostroma*; which were earlier classified under *Amphisphaeriaceae*. Von Arx (1981) treated *Bartalinia*, *Bartaliniopsis*, *Bleptosporium*, *Doliomyces* and *Hyalotia* as synonyms of *Seimatosporium*. However, Nag Raj (1993) did not accept von Arx's (1981) treatment and sequence data also does not support this.

Discosia Lib., Pl. crypt. Arduenna, fasc. (Liège) 4: no. 346 (1837)

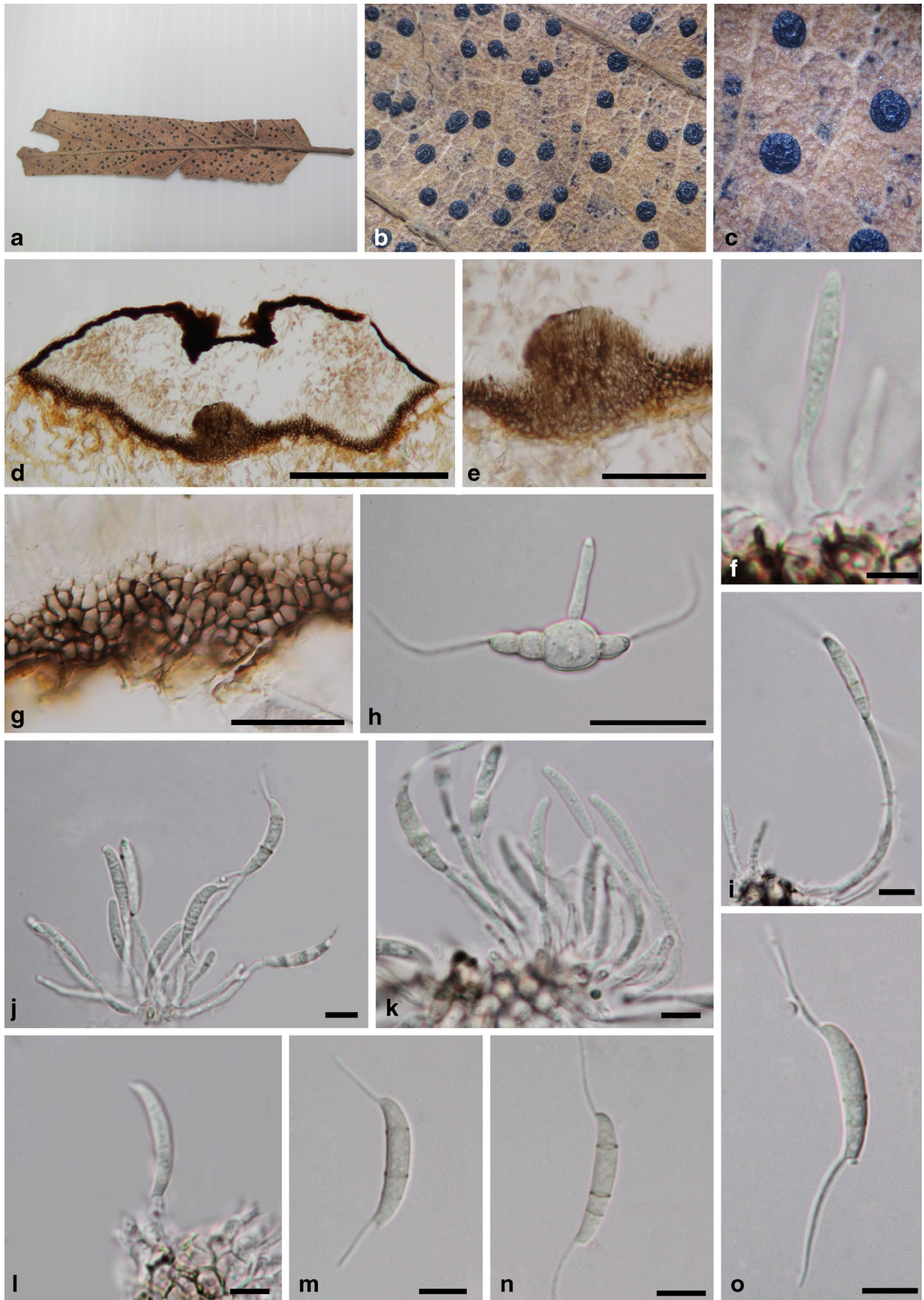
Discosia was described by Libert (1837) with *D. artocreas* (Tode) Fr. as the type. The coelomycetous *Discosia* is widespread in subarctic, temperate and tropical regions. *Discosia* species are generally saprobes or plant pathogens and rarely biotrophs (Crous et al. 2013).

Discosia neofraxinea W.J. Li, Camporesi & K.D. Hyde, **sp. nov.**

Index Fungorum number: IF551176; *Facesoffungi* number: FoF 00664; Fig. 10

Etymology: Named because its similarity with *Discosia fraxinea*.





◀ **Fig. 10** *Discosia neofragicola* (holotype). **a** Herbarium specimen. **b, c** Black conidiomata on the host. **d** Vertical section of conidioma. **e, g** Section of peridium. **h** Germinating spore. **f, i–l** Conidiogenous cells and developing conidia. **m–o** Conidia. Scale bars: **b**=200 μm , **c**=20 μm , **d**=100 μm , **e, g**=50 μm , **h–j**=10 μm , **f, i–l**=5 μm , **m–o**=5 μm

Holotype: MFLU 15–0375

Saprobic on dead leaf of *Fagus sylvatica*. **Sexual morph**: Undetermined. **Asexual morph**: Coelomycetous. *Conidiomata* 125–176 μm high, 450–550 μm diam., stromatic, pycnidoid, solitary or gregarious, superficial, globose to subglobose, unilocular, rugose, dull black, with a short beak, ostiolate. *Ostiole* 60–80 μm diam., circular or oval, opening to the exterior. *Peridium* 10–20 μm wide, composed of two types of pseudoparenchymatous cells, forming thick-walled cells of *textura epidermoidea* towards the apex, with *textura prismatica* at the base, with inner layers hyaline gradually merging with the outer dark brown layers. *Conidiophores* arising from the inner layer cells of the basal stroma, septate, unbranched or occasionally branched, long, cylindrical, hyaline, smooth. *Conidiogenous cells* 6–40 μm long \times 1–2 μm wide, holoblastic, cylindrical, hyaline, smooth-walled. *Conidia* 15–18 \times 2.5–3.5 μm (\bar{x} = 16 \times 3 μm ; n =30), median cells pale brown, naviculate to subcylindrical, narrow towards the base, 3-septate, slightly curved, with cells of unequal length, hyaline to pale brown, bearing appendages; basal cell narrowly obconic with a truncate base bearing a prominent dehiscence scar, with septa thicker and darker than the periclinal wall, with the second cell close to apical cell twice or more than two times that of the size of the third cell close to basal cell, with apical cell subconical and with an acute apex; appendage 10–20 μm long, single, unbranched, flexuous.

Materials examined: ITALY. Province of Forli-Cesena [FC], Santa Sofia, Campigna, on dead leaf of *Fagus sylvatica*, 24 June 2012, Erio Camporesi, IT 469 (MFLU 15–0375, **holotype**); ex-type living culture, MFLUCC 13–0204, ICMP; *ibid.* (HKAS 88184, **isotype**); *ibid.* Arezzo [AR], Santa Sofia, near Passo della Braccina, on dead leaf of *Fagus sylvatica*, 30 April 2013, Erio Camporesi, IT 469E (MFLU 15–0736, **paratype**); living culture, MFLUCC 13–0378; **paratype**); *ibid.* IT 469 F (MFLU 15–0737, **paratype**).

Notes: *Discosia neofraginea* is similar to *D. artocreas* (Tode) Fr. in having 3-septate, hyaline to pale brown conidia with single appendages at each end, but differs in the form of conidiomata and conidiogenous cells. *Discosia neofraginea* closely resembles *D. fraxinea* (Schwein.) Nag Raj which is known from *Fraxinus americana*. Both share similarities in the dimensions of conidia and conidiogenous cells, but differ in the form of conidiomata (Nag Raj 1993). *Discosia neofraginea* has superficial, globose to subglobose, unilocular, rugose, conidiomata, which are much smaller than the applanate to discoid, erumpent, unilocular to bilocular,

glabrous, occasionally rugose conidiomata in *D. fraxinea* (700–1000 μm diam., up to 80 μm high). Phylogenetically, the strains of *D. neofraginea* formed a discreet branch in *Discosia*. Based on a combination of morphology and phylogeny, we introduce *D. neofraginea* as a new taxon.

Discosia pseudopleurochaeta Wijayawardene, Camporesi & K.D. Hyde, **sp. nov.**

Index Fungorum number: IF551179; *Facesoffungi number*: FoF 00661; Fig. 11

Etymology: Named after its morphological similarity with *Discosia pleurochaeta*

Holotype: MFLU 15–0743

Saprobic on dead leaf of *Crataegus* sp. **Sexual morph**: Undetermined. **Asexual morph**: Coelomycetous. *Conidiomata* 300–360 μm diam., 40–80 μm high, stromatic, gregarious, occasionally confluent, flattened, glabrous, black, superficial, unilocular. *Ostiole* papillate, single circular, central. *Conidiomata wall* thick at the base, 15–25 μm , composed of pale brown, thin-walled cells of *textura angularis*, wall near ostiole thinner, composed of dark brown, thick-walled cells of *textura angularis*. *Conidiogenous cells* 3–5 \times 1–3 μm , holoblastic, discrete, determinate, conical, hyaline to pale brown, smooth, only in basal conidiomatal wall. *Conidia* 20–28 \times 3–5 μm (\bar{x} = 23.6 \times 4.11 μm , n =20), median cells pale brown, apical and basal cells sub-hyaline to hyaline, subcylindrical, tapered to a truncate base, apex obtuse, straight or slightly curved, dorsiventral, with 3-transverse septate, smooth-walled, bearing appendages at both ends; apical appendage 15–18 μm , long, tubular, unbranched; basal appendage 17–22 μm , long, tubular, unbranched.

Materials examined: ITALY, Province of Forli-Cesena [FC], Collinaccia - Castrocaro e Terra del Sol, dead and hanging leaf of *Crataegus* sp, 20 October 2012, Erio Camporesi, IT 836 (MFLU 15–0743, **holotype**); *ibid* (HGUP530 **paratype**)

Notes: Farr and Rossman (2015) list *Discosia artocreas* (Tode) Fr. and *Discosia faginea* Lib. from *Crataegus* spp. Nag Raj (1993) listed the latter species under ‘excluded or unexamined taxa’ as its type species was not available. *Discosia artocreas* has smaller conidia (conidial dimensions 14–22 \times 2–3 μm) than our collection and its appendages are inserted about 2–3 μm from the apical and basal septum (Nag Raj 1993), but in our collection both appendages are inserted very close (1–2 μm) to the apical and basal septa.

Further we checked Nag Raj (1993) to find other species which have close morphological characters with our collection. *Discosia pleurochaeta* Mont. & Durieu (19.5–27 \times 3–3.5 μm) has similar conidial dimensions, thus resembling our collection, but has narrower conidia. Further, *D. pleurochaeta* has longer conidiogenous cells (7–11 \times 2.5–3 μm) than our collection. Hence, we introduce a new species to accommodate our new collection based on morphology.

Seimatosporium Corda, Deutschl. Fl., 3 Abt. (Pilze Deutschl.) 3 (13): 79 (1833)

Facesoffungi number: FoF 00842

Saprobic on leaves, stem and bark of various plants, *pathogenic* on leaves of *Eucalyptus* spp. **Sexual morph:** *Discostroma*-like. **Asexual morph:** *Conidiomata* acervular, solitary to gregarious, superficial to immersed, unilocular, globose to subglobose, dark brown to black. *Conidiomata* wall composed of brown thin or thick-walled *textura angularis*. *Conidiophores* cylindrical, filiform, septate, branched, hyaline. *Conidiogenous cells* holoblastic, annellidic, integrated or discrete, hyaline, determinate. *Conidia* variable, cylindrical, fusiform or clavate or obovoid, (2–)3(–5)-septate, aguttulate, medium cells brown, basal cell hyaline, with or without basal appendage, or with the apical cell provided with a single, cellular, simple or branched appendage, basal cell truncate, continuous or occasionally constricted at the septa.

Fig. 12 *Discostroma fuscellum* (MFLU 15–0750). **a–c** Ascomata on host surface. **d, e** Section of ascoma. **f** Peridium. **g** Paraphyses. **h–j** Immature asci. **k** Mature ascus **l** Mature ascus in Congo red **m–o** Immature ascospores. **p–q** Mature ascospores. **r** Ring-like apical apparatus of ascus in Congo red **s** Germinating ascospore. **t, u** Culture on MEA. Scale bars: a–b, h–l=200 μ m, c–e=100 μ m, f–g, r=50 μ m, m–q=20 μ m, s=5 μ m, t–u=30 mm

Notes: Corda (1833) introduced *Seimatosporium* based on *S. rosae* as the type species. Sutton (1963), Shoemaker and Muller (1964) and Nag Raj (1993) provided taxonomic notes on the genus. Von Arx (1981) treated *Bartalinia*, *Bartiloniopsis*, *Bleptosporium*, *Doliomyces* and *Hyalotia* as generic synonyms of *Seimatosporium*. Nag Raj (1993) however, accepted *Seimatosporium* as a valid genus.

Nag Raj (1993) mentioned *Seimatosporium* has *Discostroma* sexual morphs. Okane et al. (1996) and

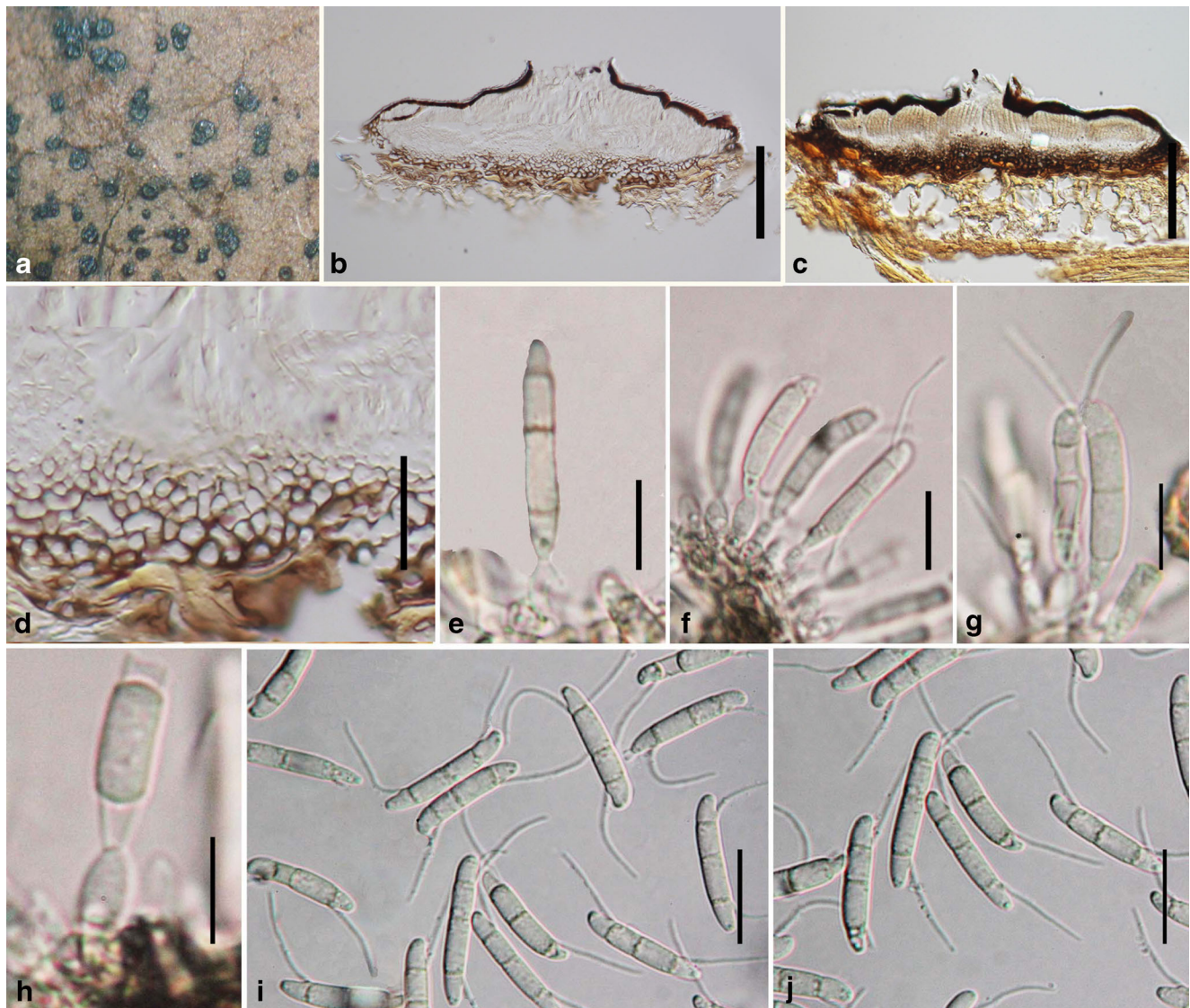
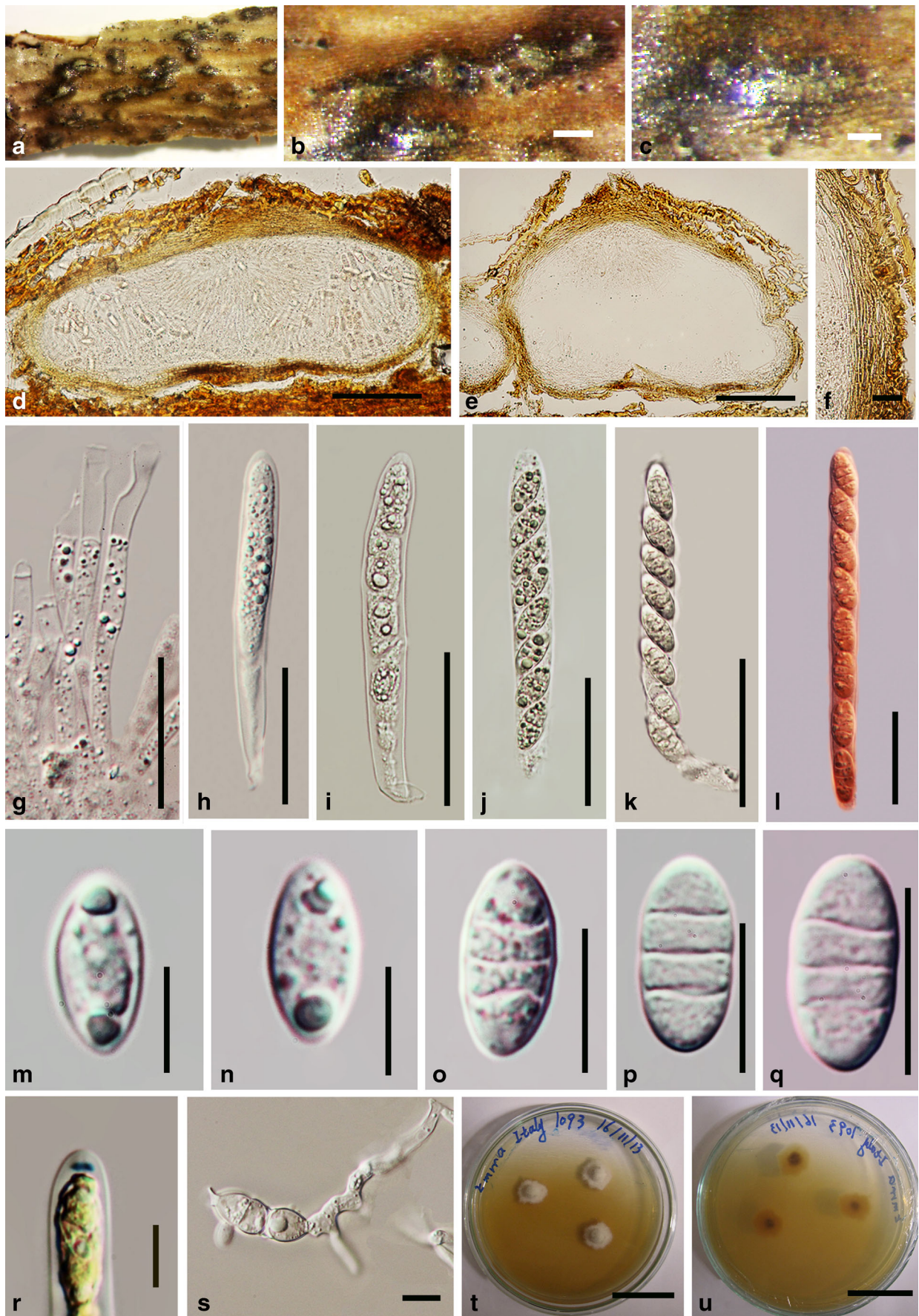


Fig. 11 *Discozia pseudopleurochaeta* (holotype). **a** Conidiomata on leaf. **b, c** Cross section of stromata. **d** Cross section of stromatic wall. **e–h** Developing conidia attached to conidiogenous cells. **i, j** Conidia. Scale bars: b, c=50 μ m, d=25 μ m, e–h=8 μ m, i, j=20 μ m



Hatakeyama and Harada (2004) also introduced *Seimatosporium* spp. with *Discostroma* sexual morphs. Barber et al. (2011) and Tanaka et al. (2011) also showed that both *Seimatosporium* and *Discostroma* cluster in a monophyletic clade in their molecular data analyses. However, both genera lack molecular data for their type species (Tanaka et al. 2011), thus we prefer to maintain both names until the link is proven by molecular analyses.

Discostroma Clem., Gen. fung. (Minneapolis): 50, 173 (1909)

Notes: Species of *Discostroma* and *Seimatosporium* have been linked by molecular data (Tanaka et al. 2011), however the molecular links have not been proven for the types of either genera. Both names should therefore be retained pending fresh collections of the types and a molecular study.

Discostroma fuscillum (Berk. & Broome) Huhndorf [as ‘fussella’], Bull. Ill. nat. Hist. Surv. 34 (5): 520 (1992)

Index Fungorum number: IF 359431; *Facesoffungi number:* FoF 00697; Fig. 12

Saprobic on dead stem of *Rosa canina*, forming conspicuous, rounded, brown to black ascomata. **Sexual morphs:** *Ascomata* 280–478 μm diam., 149–227 μm high (\bar{x} = 379 \times 188 μm , n = 30), solitary or clustered, immersed, semi-immersed or superficial, globose to subglobose, membranous, brown, ostiolate. *Peridium* 25–44 μm wide (\bar{x} = 35 μm , n = 30), three-layered, outer layer comprising brown, thick-walled cells of *textura angularis*, central layer comprising light brown to yellow, thin-walled cells of *textura angularis*, inner layer comprising hyaline, thin-walled cells of *textura angularis*. *Hamathecium* comprising 3–6 μm wide (\bar{x} = 4 μm , n = 30), numerous, hypha-like, septate, paraphyses, tapering distally, not embedded in a gelatinous matrix. *Asci* 103–127 \times 8–11 μm (\bar{x} = 115 \times 10 μm , n = 30), 8-spored, unitunicate, cylindrical, with pedicel often tapering to a point, apically rounded or truncate, with a refractive, J+, bipartite, apical ring. *Ascospores* 15–18 \times 6–8 μm (\bar{x} = 17 \times 7 μm , n = 30), uniseriate or overlapping uniseriate, fusiform or ellipsoidal, 0–4-septate, hyaline, smooth-walled, thick-walled. **Asexual morph:** Undetermined.

Culture characters: Colonies growing on PDA, reaching 7 cm diam. after 3 weeks at 20–25 °C, with whitened, dense, aerial mycelium on the surface, reverse similar in colour.

Material examined: ITALY. Province of Forli-Cesena [FC], Poggio Baldo - Predappio Alta, on dead stem of *Rosa canina*, 3 March 2013, Erio Camporesi, IT 1093 (MFLU 15–0750, MFLU 15–0751, MFLU 15–1134, MFLU 15–1135); living culture, MFLUCC 14–0052, ICMP.

Notes: There are 30 species recorded under *Discostroma* (Index Fungorum, 2015) and Paulus et al. (2006) provided a key to 28 *Discostroma* species. We consider our species to be *Discostroma fuscillum* based on morphology. *Discostroma fuscillum* was stated to have immersed perithecia with short protruding papillae, cylindrical asci, with a J+ apical ring and

Fig. 13 *Seimatosporium cornii* (holotype) **a, b** Conidiomata on *Cornus* sp. **c, d** Cross sections of conidiomata. **e** Paraphyses. **f–k** Developing conidia attach to conidiogenous cells. **l–n** Conidia. Scale bars: **c, d** = 100 μm , **e** = 30 μm , **f–n** = 15 μm

hyaline, 3-septate, elliptical, pigmented ascospores (Paulus et al. 2006). In our collection the ascospores were hyaline which agrees with Huhndorf (1992). Eriksson (2009) used *Leptosphaeria fuscilla* for *Discostroma fuscillum*, however, the morphology and phylogenetic analyses, show it to belong to *Discostroma* and is close to *Seimatosporium* and Tanaka et al. (2011) proposed to use *Discostroma fuscillum* for this taxon.

Seimatosporium cornii Wijayawardene, Camporesi & K.D. Hyde, **sp. nov.**

Index Fungorum number: IF551180; *Facesoffungi number:* FOF 00662; Fig. 13

Etymology: Named after the host genus on which the fungus occurs.

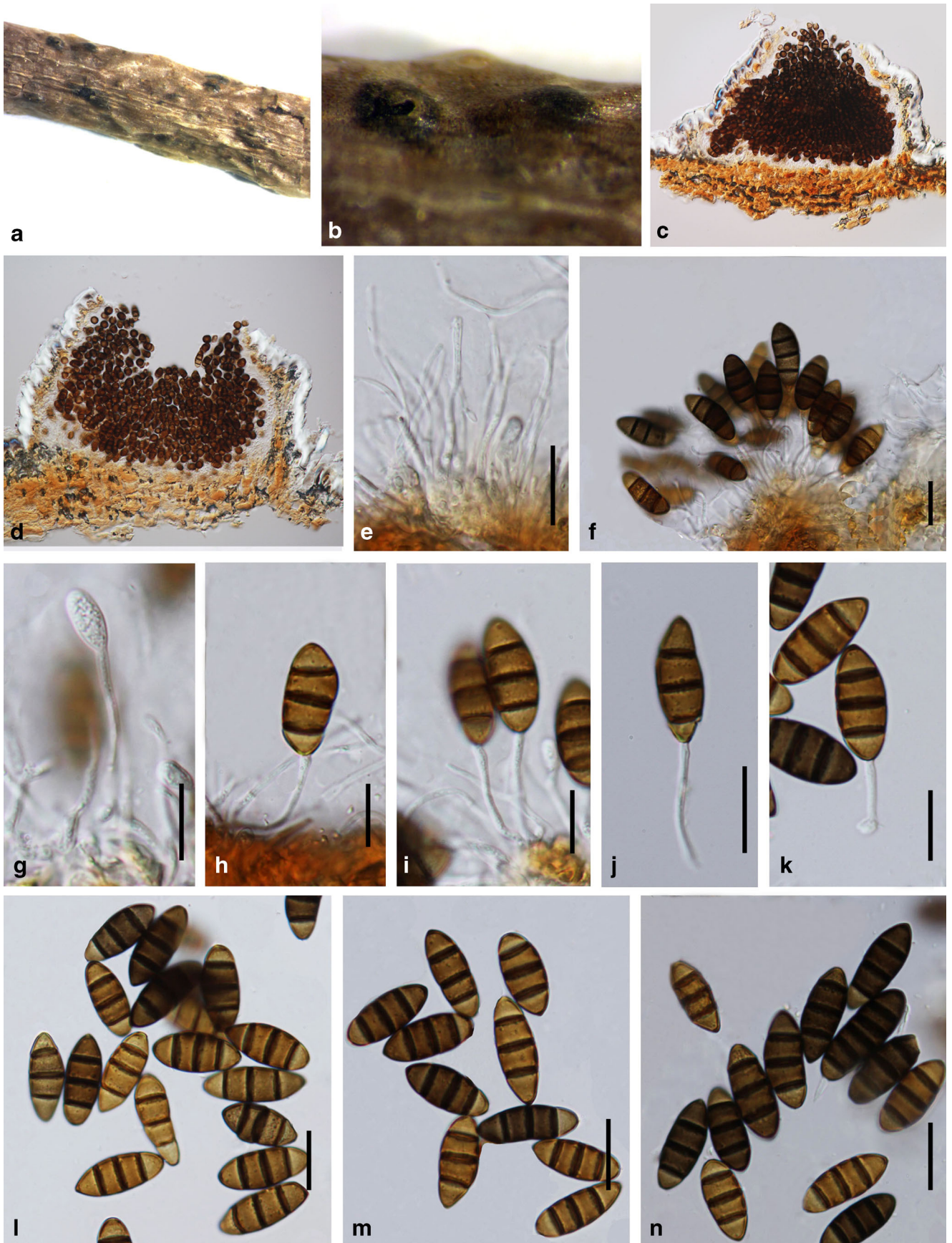
Holotype: MFLU 15–0742

Saprobic on dead branches of *Cornus* sp. **Sexual morph:** Undetermined. **Asexual morph:** *Conidiomata* 300–330 μm diam., 150–175 μm high, acervular, unilocular, subglobose, superficial to subepidermal, solitary, dark brown, apiculate ostiolate. *Conidiomata wall* multi-layered, outer wall thick, composed of brown cells of *textura angularis*, inner wall thin, hyaline. *Paraphyses* 30–60 μm , cylindrical, filiform, hyaline, aseptate. *Conidiophores* 13–30 \times 2–4 μm , long, cylindrical, branched, hyaline, smooth-walled. *Conidiogenous cells* holoblastic, annelidic, simple, integrated, determinate, hyaline. *Conidia* 21–29 \times 9–11 (\bar{x} = 24.9 \times 9.93, n = 20), median cells brown to dark brown, basal and apical cells subhyaline to pale brown, clavate or obovoid, occasionally truncate at base, straight to slightly curved, with 3-transverse septate, dark brown septa, aguttulate, smooth-walled, appendage absent.

Culture characteristics: slow growing, reaching 2.5–3 cm in 7 days at 18 °C, on PDA, white from above, grey from below, circular, with uneven margin, not zonate, with thin mycelium, becoming dense after 14 days

Materials examined: ITALY, Province of Pesaro-Urbino [PU], Monte Nerone, on branches of *Cornus* sp., 11 June 2012, Erio Camporesi, IT 426 (MFLU 15–0742, **holotype**); *ibid* (HGUP531 **paratype**); ex-type living culture, MFLUCC 14–0467, GUCC 0058.

Notes: Farr and Rossman (2015) reported *Seimatosporium lichenicola* (Corda) Shoemaker & E. Müll. (Conidial dimension 13–15 \times 5.5–6.5 μm *vide* Sutton 1980) and *Seimatosporium salicinum* (Corda) Nag Raj (11–17 \times 4–6 μm *vide* Nag Raj 1993) from *Cornus* spp. However, our collection is morphologically distinct from these two species and other known species in Sutton (1980) and Nag Raj (1993). Hence, we introduce this new species based on morphology and molecular data analyses.



Seimatosporium rhombisporum Senan. Camporesi & K.D. Hyde, *sp. nov.*

Index Fungorum number: IF551195; *Facesoffungi number*: FoF 00693; *Fig. 14*

Etymology: Species name refers to the rhomboid conidia.

Holotype: MFLU 15–0727

Saprobic on dead branches of *Vaccinium myrtillus* L.

Sexual morph: Undetermined. **Asexual morph**: *Conidiomata* 65–75 μm high, 105–125 μm diam., (\bar{x} = 70 \times 120 μm , $n=20$), acervular, uniloculate, subglobose to

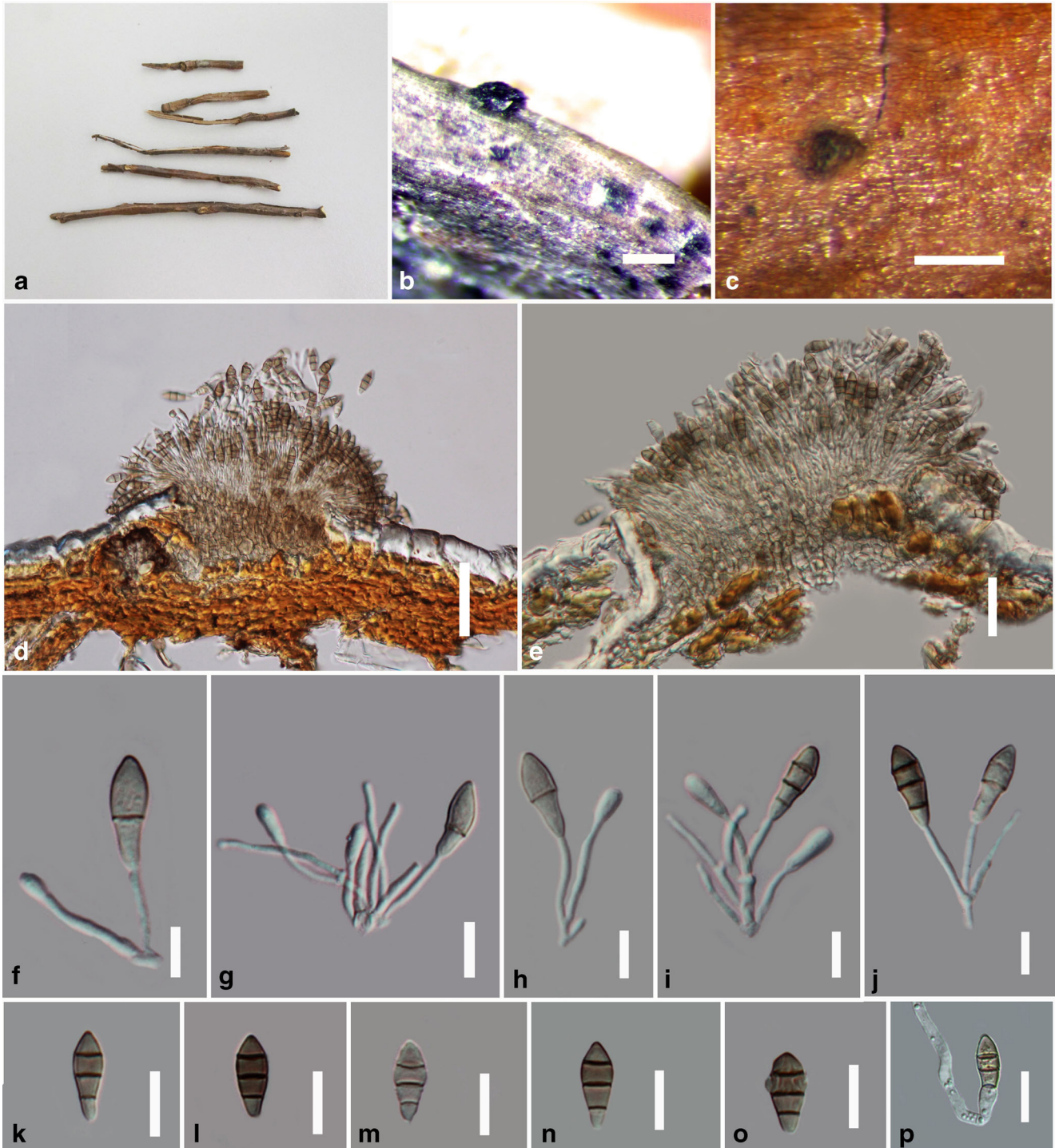


Fig. 14 *Seimatosporium rhombisporum* (holotype). **a** *Vaccinium myrtillus* stems with conidiomata. **b**, **c** Conidiomata. **d**, **e** Cross section of the conidiomata. **f–j** Conidia attached to conidiogenesis cells and

conidiophores. **k–o** Conidia. **p** Germinating conidia. Scale bars: **b**= 200 μm , **c**=500 μm , **d**=50 μm , **e–p**=10 μm

subconical, erumpent to superficial, solitary, dark brown. *Peridium* multi-layered, comprising brown, cells of *textura angularis* to *textura globosa*. *Conidiophores* 1–1.5 μm high, 0.5–1 μm wide (\bar{x} = 1.3 \times 0.7 μm , n = 20), cylindrical, branched, hyaline, smooth-walled. *Conidiogenous cells* 5.5–12.5 μm high, 0.5–1 μm diam., (\bar{x} = 7.5 \times 0.7 μm , n = 20), cylindrical, unbranched, holoblastic, annealed, simple, integrated, hyaline. *Conidia* 10.5–12 \times 3–4 μm (\bar{x} = 11 \times 3.6 μm , n = 20), clavate, with brown to dark brown median cells and hyaline to pale brown basal and apical cells, pointed at apex, blunt at base, straight to slightly curved, 3-transverse septate, septa thick, smooth-walled, lacking appendages with germinating hyphae originating from basal hyaline cell during germination.

Culture characters: Growing on MEA, reaching 1 cm within 7 days when incubated at 18 °C, flat, circular, white colony with smooth margin.

Material examined: ITALY, Province of Forli-Cesena [FC], Santa Sofia, Monte Falco, on *Vaccinium myrtillus* (*Ericaceae*), 7 May 2013, Erio Camporesi IT 1228, (MFLU15–0727, **holotype**) *ibid.*, (MFLU15–0727bis, **paratype**); living culture MFLUCC 15–0543, ICMP.

Notes: We introduce *Seimatosporium rhombisporum* sp. nov. which differs from other species in having erumpent, conidiomata with long, immersed conidiogenous cells. Conidiomata are filled with conidiogenous cells and conidia form at the apex. The dark, rhomboid conidia are quite specific and phylogenetic analysis (Fig. 1) indicates the uniqueness of this species. However, *Seimatosporium vaccinii* (Fuckel) B. Erikss. also has conidia without appendages and was obtained from the same host (Lee et al. 2006). The colour and shape of conidia are, however, different. Based on a megablast search of GenBank, the closest hit using LSU sequence data to our strain are *Sarcostroma bisetulatum* (Guba) Nag Raj (CBS 122695, EU552155; Identities=883/897 (98 %), Gaps=8/897 (0 %)), *Seimatosporium obtusum* (H.J. Swart & M.A. Will.) P.A. Barber & Crous (CPC 12935, JN871215; Identities=876/893 (98 %), Gaps=7/893 (0 %)), and *S. eucalypti* (McAlpine) H.J. Swart (CPC 158, JN871211; Identities=874/892 (98 %), Gaps=8/892 (0 %)). *Sarcostroma* was introduced to accommodate species having 2–5-septate conidia with only a basal appendage or without any appendages and Sutton (1980) synonymised *Sarcostroma* under *Seimatosporium*. Both *Seimatosporium obtusum* and *Seimatosporium eucalypti* (McAlpine) H.J. Swart have long, falcate, fusiform or sigmoid conidia with 3–4-septa, rarely 5-septa, and basal appendages. These species were excluded from *Seimatosporium* and included in *Vermisporium* based on their morphology and phylogeny (Barber et al. 2011). Therefore we introduce *Seimatosporium rhombisporum* as a new species considering both morphology and phylogeny.

Seimatosporium ficeae Dayarathne, Phookamsak & K.D. Hyde, *sp. nov.*

Index Fungorum number: IF551175; **Facesoffungi number:** FOF 00633; Fig. 15

Etymology: Name reflects the host *Ficus*, from which this species was isolated.

Holotype: MFLU 15–0703

Saprobic on living leaf of *Ficus* sp. **Sexual morph:** Undetermined. **Asexual morph:** *Conidiomata* 50–60 μm high, 45–90 μm diam., acervuli, globose, submerged, solitary, black. *Peridium* 10–15 μm wide, composed of hyaline to pale brown cells of *textura angularis* to *textura globosa*. *Conidiophores* up to 10 μm long, subcylindrical. *Conidiogenous cells* 13–22 μm long, holoblastic, cylindrical to ampulliform, hyaline, thin-walled, smooth, arising from the basal layers of conidiomata. *Conidia* 15–21 \times 5.5–7.5 μm (\bar{x} = 18 \times 6.5 μm , n = 30), fusiform, straight, 5-septate, concentric at the septa, with 4 median cells, brown, terminal cells, hyaline, bearing single 8–20 μm long, unbranched, central appendages at both ends.

Culture characters: Colonies on PDA slow growing, reaching 25 mm diam. after 2 weeks at 25–30 °C, upper side circular, white to gray, and cottony, lower side circular, white to gray.

Material examined: CHINA, Yunnan Province, Shangri-La, on leaf spots of *Ficus* sp., 30 October 2014, R. Phookamsak SGL 002 (MFLU 15–0703 **holotype**); ex-type living culture, MFLUCC 15–0519=ICMP.

Notes: The main differences between *Seimatosporium ficeae* and other species in *Seimatosporium* lie in the morphology of the conidia. The conidia of *S. ficeae* are 5-septate conidia with four, brown median cells and hyaline terminal cells at both ends. *S. consocium* (Peck) Shoemaker also possesses similar morphological characters to *S. ficeae*, including 5-septate with four brown to light brown median cells. Meanwhile, the conidial septation of *S. hysterioides* (Fuckel) Brockmann also exhibits a similar pattern with five septa but, abundantly they are 3–4-septate. Both *S. consocium* and *S. hysterioides* bear central apical appendages and eccentric basal appendages on conidia whereas *S. ficeae* comprises of central appendages at both ends. In the phylogenetic analysis (Fig. 1), *S. ficeae* is related to *S. hypericinum* (Ces.) B. Sutton which has curved, falcate, 4-celled conidia. However, they are well-separated with a high bootstrap support.

Seimatosporium vitis Y.P. Xiao, Camporesi & K.D. Hyde, *sp. nov.*

Index Fungorum number: IF551200; **Facesoffungi number:** FOF 00698; Fig. 16

Etymology: Name referring to the host genus on which the species occurs **Holotype:** MFLU 15–0746

Saprobic on dead stems of *Vitis vinifera*, forming conspicuous, rounded, black conidiomata. **Sexual morph:** Undetermined. **Asexual morph:** Coelomycetous. *Conidiomata* 274–368 μm diam., 112–162 μm high (\bar{x} = 321 \times 137 μm , n = 30), acervuli, solitary or gregarious, semi-

immersed, dark brown to black, elongate to rounded or irregular in outline. *Peridium* 25–39 μm wide (\bar{x} = 32 μm , n = 30), thin, comprising light brown, thin-walled cells of *textura angularis*. *Conidiophore* reduced to conidiogenous cells. *Conidiogenous cells* 1–2 μm diam., 13–36 μm long (\bar{x} = 1 \times 25 μm , n = 30), holoblastic, cylindrical, hyaline to pale brown, thick-walled, smooth. *Conidia* 34–40 \times 14–17 μm (\bar{x} = 15 \times 37 μm , n = 60), ellipsoid or fusiform, straight or slightly curved, 3-euseptate, constricted at septate, guttulate, bearing an appendage at the base, apical cell conical with broadly rounded apex, two median cells sub-cylindrical, brown to dark brown, relatively thick-walled than the end cells, basal cell

Fig. 16 *Seimatosporium vitis* (holotype) **a, b** Conidiomata on host surface. **c** Vertical section of conidioma. **d–f** Base of conidioma with conidiogenous cells, conidiophores and developing conidia. **g–k** Mature conidia. **l** Germinating conidium. **m** Culture from above on MEA medium. **n** Culture from below on MEA medium. Scale bars: a = 2.5 mm, b = 200 μm , c–d = 100 μm , e = 40 μm , f–k = 20 μm , l = 10 μm , m–n = 30 mm

obconical, pale brown, bearing appendages. *Appendages* 4–8 μm long (\bar{x} = 5 μm , n = 30), central or eccentric, single, unbranched, filiform.

Culture characters: growing on PDA, reaching 7 cm diam., after 2 weeks at 20–25 $^{\circ}\text{C}$, with circular, whitened to brown,

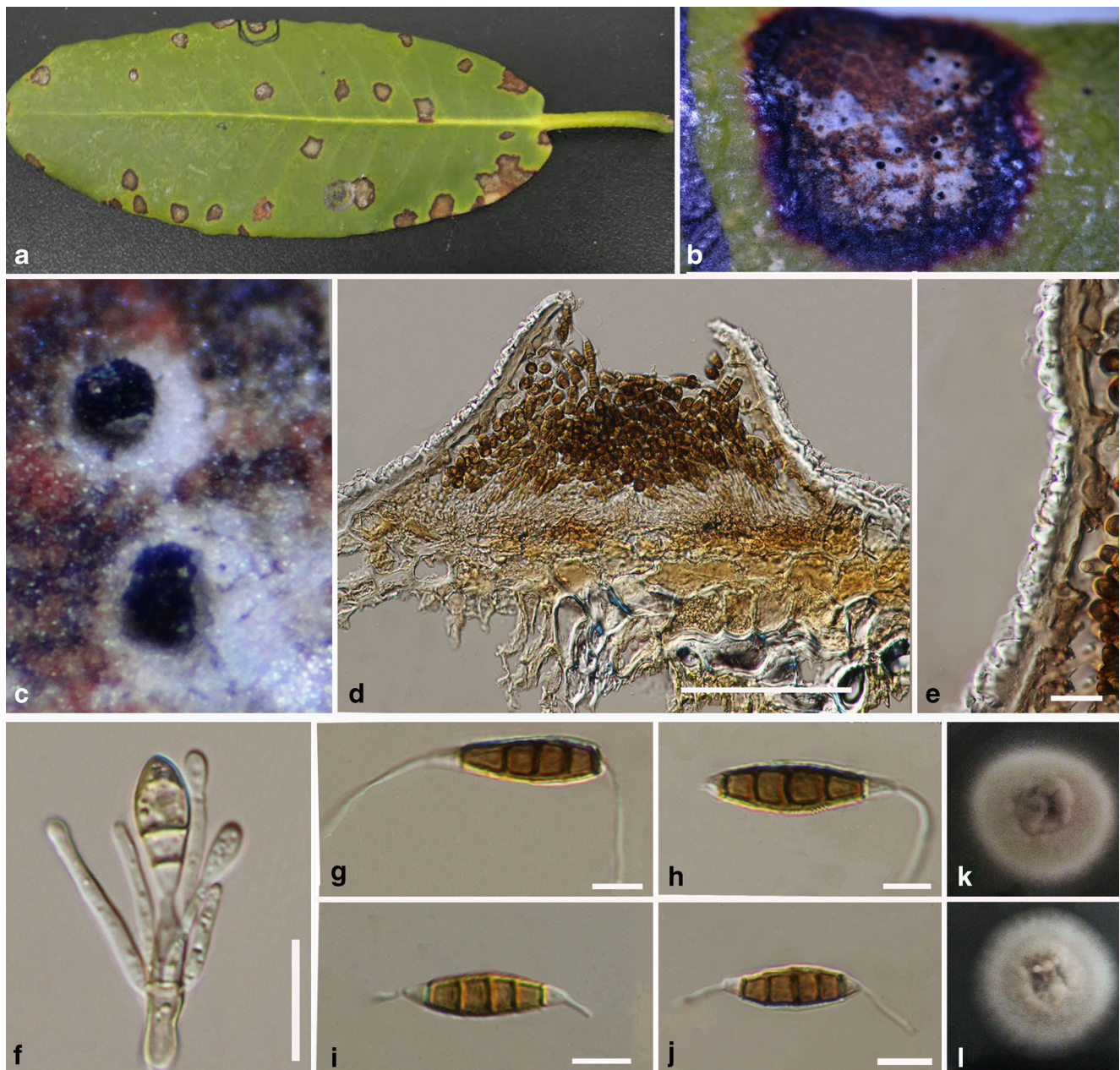
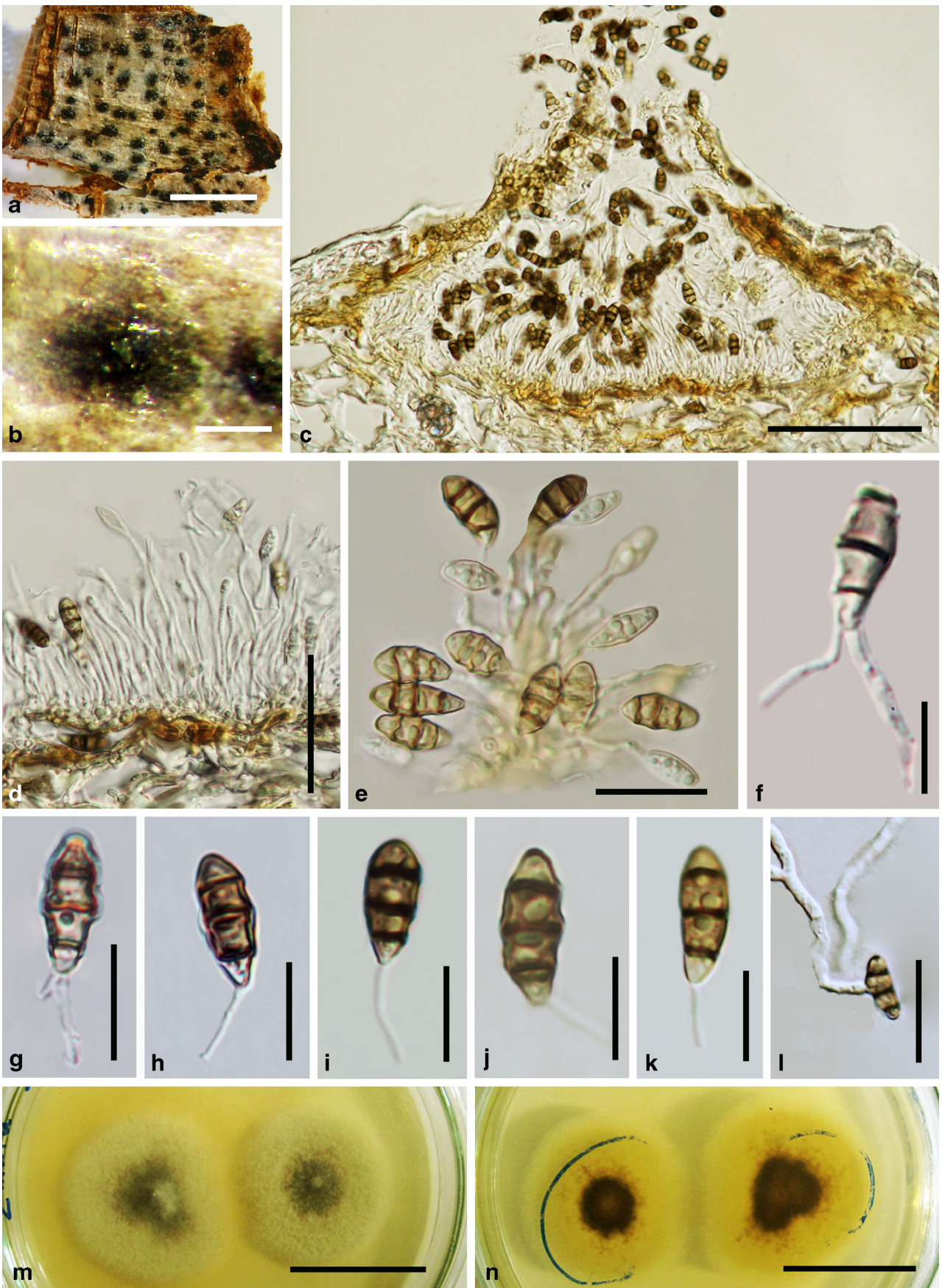


Fig. 15 *Seimatosporium ficcae* (holotype). **a** Pycnidium on host **b, c** Conidiomata on host tissue. **d** Section through conidiomata. **e** Section through peridium. **f** Conidiogenous cells. **g–j**. Conidia. **k–l** Culture of *Seimatosporium* sp. on PDA. Scale bars: d–e = 100 μm , f = 50 μm , g–j = 10 μm



dense, aerial mycelium on the surface, reverse similar in colour.

Material examined: ITALY. Province of Forlì-Cesena [FC], near Predappio Alta, on dead stem of *Vitis vinifera* L. (*Fabaceae*), 3 March 2013, Nello Camporesi, IT1092 (MFLU 15–0746, **holotype**); IT 1092 (MFLU 15–0747, MFLU 15–0748, 15–0749, **paratypes**); ex-type living cultures, MFLUCC 14–0052, ICMP, MFLUCC 14–0051.

Notes: *Seimatosporium vitis* is similar to *S. pistaciae* Crous & Mirab. which has conidia with an obtusely rounded apical cell, with a single apical appendage (Crous et al. 2014b). *Seimatosporium vitis* however, differs in having 3-septa, a conical, apical cell with broadly rounded apex, brown to dark brown, median cells and a pale brown basal cell bearing an appendage. This is the first *Seimatosporium* species to be described from *Vitis*.

Pestalotiopsidaceae Maharachch. & K.D. Hyde, *fam. nov.*
Index Fungorum number IF551178; Facesoffungi number: 0666

Saprobic or *pathogenic* on plants. **Sexual morph:** *Ascomata* scattered, solitary or in small group, immersed, apex short erumpent. *Ostiole* subglobose, papillate ostiolar canal periphysate. *Peridium* comprising several layers of dark brown to blackish, compressed cells. *Hamathecium* comprising tapering paraphyses. *Asci* 8-spored, unitunicate, cylindrical, short to long pedicellate, with a J+ or J- apical ring. *Ascospores* uniseriate, brown, ovoid to elliptic, straight or inequilateral, 2–3-septate. **Asexual morph:** Coelomycetous. *Conidiomata* acervular or pycnidial, subglobose, globose, clavate, solitary or aggregated, dark brown to black, immersed to erumpent, unilocular or irregularly plurilocular. *Peridium* comprising 2–3 strata of *textura angularis*, outer layer of pale brown, thick-walled cells, becoming hyaline in the inner layer. *Conidiophores* indistinct, often reduced to conidiogenous cells, when present peripheral, hyaline, branched or unbranched, cylindrical or lageniform. *Conidiogenous cells* discrete, holoblastic, annellidic, indeterminate, integrated, cylindrical, hyaline, smooth. *Conidia* ellipsoid to clavate, or fusiform, straight or curved, 3–4-euseptate, hyaline, pale olivaceous or brown, bearing cellular, filiform or attenuated appendages.

Type: ***Pestalotiopsis*** Steyaert, Bull. Jard. bot. État Brux. 19: 300 (1949)

Notes: The new family *Pestalotiopsidaceae*, which possesses pestalotiopsis-like asexual morphs is introduced for *Ciliochorella*, *Lepteutypa*, *Monochaetia*, *Neopestalotiopsis*, *Pestalotiopsis*, *Pseudopestalotiopsis* and *Seiridium* (Fig. 1). Maharachchikumbura et al. (2014) suggested that the monotypic genus *Pestalotia* (1839) might be a synonym of *Seiridium* (1816), since both genera have similar morphologies. Members of the *Pestalotiopsidaceae* are common phytopathogens that cause a variety of diseases in plants or are often isolated as saprobes or endophytes and are widely

distributed throughout tropical and temperate regions (Guba 1961; Barr 1975; Nag Raj 1993; Maharachchikumbura et al. 2014). The sexual morph of *Pestalotiopsis* is *Pestalosphaeria* (Barr 1975) and *Seiridium* has a *Lepteutypa* sexual morph (Nag Raj and Kendrick 1985).

Pestalotiopsis Steyaert, Bull. Jard. bot. État Brux. 19: 300 (1949)

Notes: Based on the conidial forms, Steyaert (1949) split *Pestalotia* into three genera, namely *Pestalotia*, *Pestalotiopsis* and *Truncatella*. *Pestalotiopsis* was introduced for species with 5-celled conidia and *P. maculans* is regarded as the type species. The conspicuous character of this genus is 5-celled, fusiform conidia, with three-coloured median cells, hyaline end cells, and one or more apical appendages. The sexual morph of *Pestalotiopsis* is *Pestalosphaeria* and only 13 species are known as compared to the asexual morph (254 species names). Maharachchikumbura et al. (2011) pointed out that the common *Pestalotiopsis* name should be applied to both morphs.

Neopestalotiopsis Maharachch. et al., Stud. Mycol. 79: 135 (2014)

Notes: Maharachchikumbura et al. (2014) resolved genera in the *Amphisphaeriaceae* based on analysis of LSU sequence data. Besides accepting *Pestalotiopsis*, they introduced *Neopestalotiopsis* and *Pseudopestalotiopsis*. Morphologically *Neopestalotiopsis* can easily be distinguished from *Pseudopestalotiopsis* and *Pestalotiopsis* by its versicolorous median cells. Furthermore, in *Neopestalotiopsis*, conidiophores are indistinct and often reduced to conidiogenous cells (Maharachchikumbura et al. 2014).

Pseudopestalotiopsis Maharachch. et al., Stud. Mycol. 79: 180 (2014)

Notes: *Pseudopestalotiopsis* was segregated from *Pestalotiopsis* based on the type *Pseudopestalotiopsis theae* (Sawada) Maharachch. et al. (Maharachchikumbura et al. 2014). They designated an epitype for *Pestalotiopsis theae* (Sawada) Steyaert from fresh leaves of *Camellia sinensis* collected in Thailand (Maharachchikumbura et al. 2013). *Pseudopestalotiopsis* can be distinguished from *Neopestalotiopsis* and *Pestalotiopsis* by sequence data and in having generally dark, concolourous, median cells with indistinct conidiophores (Maharachchikumbura et al. 2014).

Monochaetia (Sacc.) Allesch., Rabenh. Krypt.-Fl., Edn 2 (Leipzig) 1 (7): 665 (1902) [1903]

Notes: The genus *Monochaetia* was introduced by Allescher (1902), with *M. monochaeta* (Desm.) Allesch. as its type. No sexual morphs are conclusively known for this genus. Steyaert (1949) did not retain *Monochaetia* as a distinct genus, and transferred many of the species of *Monochaetia* into *Pestalotiopsis* or *Truncatella*. However, *Monochaetia* was considered as a distinct genus by Guba (1961) based on its single apical appendage. LSU phylogenetic analyses reveal

Monochaetia to represent a distinct genus from *Pestalotiopsis*, *Seiridium* and *Truncatella* (Maharachchikumbura et al. 2014). It is essential to incorporate molecular data and more taxon sampling in future analyses as *Monochaetia* includes 3-, 4-, and 6-celled conidial forms (Maharachchikumbura et al. 2014).

Seiridium Nees, Syst. Pilze (Würzburg): 22 (1816) [1816–17]

Notes: Sequence data has revealed *Seiridium* to represent a distinct genus in the family *Amphisphaeriaceae*, which is characterised by 6-celled conidia (Jeewon et al. 2003b; Maharachchikumbura et al. 2014) and in the present study it is placed in *Pestalotiopsidaceae*. *Blogiascospora* and *Lepteutypa* have been identified as the sexual morph of *Seiridium*. However, *Seiridium* is the oldest and most commonly used name and therefore, should be applied to represent both morphs.

Ciliochorella Syd., in Sydow & Mitter, Anns mycol. 33 (1/2): 62 (1935)

Notes: The genus *Ciliochorella* was introduced by Sydow and Mitter (1935), with *C. mangiferae* Syd. as its type. The sexual morph of the genus has not been reported (Hyde et al. 2011), and the characteristic feature of the genus is eustromatic, pycnidial conidiomata; indistinct conidiophores; enteroblastic or phialidic conidiogenesis and 3-euseptate conidia with pale brown median cells and cellular appendages (Nag Raj 1993). Presently seven species are known in *Ciliochorella* Tangthirasunun et al. (2015).

Phlogicylindriaceae Senan. & K.D. Hyde, **fam. nov.**

Index Fungorum Number: IF551190; *Facesoffungi number:* FoF 00681.

Saprobic on leaves, twigs and branches, presently only known from dicotyledons. **Sexual morph:** *Pseudostroma* scattered, solitary, immersed, black, thick around papilla, thinner towards the base. *Ascomata* forming under pseudostroma, solitary, globose, coriaceous, black, ostiolate, papillate. *Papilla* short, not prominent. *Peridium* comprising outer, brown, thick-walled cells of *textura angularis* and inner, hyaline to light brown, thin-walled cells of *textura angularis*. *Hamathecium* comprising relatively wide, septate, hyaline paraphyses. *Asci* 8-spored, unitunicate, cylindrical, with knob-like pedicel, apically rounded, with J+, discoid subapical ring. *Ascospores* overlapping uniseriate, hyaline, fusiform, equally 1-septate. **Asexual morph:** Coelomycetous *Conidiomata* slimy, erect tufts of hyaline conidial masses, synnematosus, indeterminate, turning brown with age. *Conidiophores* consisting of an intricate network of brown, smooth, branched cells. *Conidiogenous cells* hyaline, annellidic, smooth, becoming pale brown with age, ampulliform with elongated necks, with percurrent proliferations. *Conidia* formed apically, hyaline, cylindrical with obtusely rounded apex, aseptate to 1-septate.

Notes: The new family *Phlogicylindriaceae* is introduced to accommodate the genus *Phlogicylindrium* Crous et al. (Summerell et al. 2006). The type species, *Phlogicylindrium eucalypti* Crous et al. has no known sexual morph and occurred on lesions of living leaves of *Eucalyptus* in association with a *Mycosphaerella* species. *Phlogicylindrium* is unique in having slimy conidiomata, with erect tufts of hyaline conidial masses, and hyaline, unicellular to 1-septate, cylindrical conidia, with obtusely rounded apices (Summerell et al. 2006). The genus comprises three species (Index Fungorum 2015). During studies on Italian ascomycetes, we collected two species that cluster with *Phlogicylindrium*. Thus we introduce a second genus to *Phlogicylindriaceae* for which we know the sexual characters.

Type: Phlogicylindrium Crous et al., in Summerell et al., Fungal Diversity 23: 340 (2006)

Type species: Phlogicylindrium eucalypti Crous et al., in Summerell et al., Fungal Diversity 23: 340 (2006); Fig. 17.

Ciferriascosea Senan., Bhat, Camporesi & K. D. Hyde, **gen. nov.**

Index Fungorum Number: IF551191; *Facesoffungi number:* FoF 00682.

Etymology: in honour of late Dr Raffaele Ciferri, an eminent mycologist from Italy.

Saprobic on dead plant matter. **Sexual morph:** Appearing as scattered, black spots, slightly raised on the host surface. *Pseudostromata* scattered, solitary, immersed, black. *Ascomata* scattered, solitary, globose, coriaceous, brown to black, ostiolate, papillate. *Ostiolar papilla* short, narrow, inner wall lined by hyaline periphyses. *Peridium* comprising outer, brown, thick-walled, layer of cells of *textura angularis* and inner, hyaline, thick-walled, layer of cells of *textura angularis*. *Hamathecium* comprising filamentous, septate, branched, hyaline paraphyses. *Asci* 8-spored, unitunicate, cylindrical, short pedicellate, with an indistinct, J+ apical apparatus. *Ascospores* overlapping uniseriate, hyaline, fusiform with narrowly rounded, ends, median uniseptate, slightly constricted at the septum. **Asexual morph:** Undetermined.

Notes: *Ciferriascosea* is introduced to accommodate two taxa from *Spartium junceum*, collected in Italy. Morphologically these two species are almost similar. However they differ in dimension of the ascomata, asci and ascospores dimensions. The most obvious character to differentiate these species are the ascospore septa; *C. rectamurum* has straight, thick septa while *C. fluctamurum* has irregular, thin septa. Here we introduced this genus with *C. rectamurum* as the type species. However we could not obtain the asexual morph from the culture. Combined gene analysis of LSU and ITS sequences of this study shows the close affinity of *Ciferriascosea* species to *Phlogicylindrium* species.

Ciferriascosea rectamurum Senan., Bhat, Camporesi & K.D. Hyde, **sp. nov.**

Index Fungorum Number: IF551193; *Facesoffungi number*: FoF 00683; Fig. 18

Etymology: Species name based is on the straight, even septa of the ascospores.

Holotype: MFLU 15–0726

Saprobic on dead stem of *Spartium junceum* L. appearing as clear, scattered, black spots, slightly raised on the host surface. **Sexual morph**: *Pseudostromata* scattered, solitary, immersed, black. *Ascomata* 250–360 μm high, 340–400 μm diam., (\bar{x} = 265 \times 370 μm , n = 20), scattered, solitary, subglobose, coriaceous, black, ostiolate, papillate. *Ostiolar papilla* short, not prominent, internally covered by periphyses. *Peridium* 10–20 μm wide, (\bar{x} = 15 μm , n = 20), comprising 4–6 outer layers of brown, thick-walled, cells of *textura angularis* and 3–5 inner layers of hyaline, thick-walled cells of *textura angularis*. *Hamathecium* comprising 2.5–3.5 μm wide (\bar{x} = 2.4 μm , n = 20), filamentous, septate, branched, paraphyses. *Asci* 120–140 \times 10–13 μm (\bar{x} = 127 \times 12 μm , n = 20), 8-spored, unitunicate, cylindrical, pedicellate, apically rounded, apical apparatus J+, not prominent. *Ascospores* 20–26 \times 6–8 μm (\bar{x} = 23 \times 7 μm , n = 20), overlapping uniseriate, hyaline, fusiform, upper end pointed, lower end rounded, slightly curved,

Fig. 18 *Ciferriascosea rectamurum* (holotype). **a** Appearance of taxon on host substrate. **b** Cross section of pseudostroma and ascoma. **c** Peridium. **d–f** Asci. **g** Paraphyses. **h** J+ apical ring of ascus mounted in Melzer's reagent. **i–l** Ascospores. **m** Germinating ascospore. **n** Upper surface of culture. **o** Lower surface of culture. Scale bars: a = 1 mm, b = 100 μm , c–f, h = 20 μm , g, i–m = 10 μm

equally uniseptate, septum straight, slightly constricted at the septum, smooth-walled. **Asexual morph**: Undetermined.

Culture characters: Cultures growing on MEA reaching 1 cm within 7 days when incubated at 18 °C, circular, slightly raised, smooth, entire margin, white, and woolly, with aerial mycelium.

Materials examined: ITALY, Province of Forli-Cesena, Santa Sofia, Castellaccio di Corniolino, on branches of *Spartium junceum* L. (*Fabaceae*), 29 December 2012, Erio Camporesi, IT 986 (MFLU 15–0726, **holotype**), *ibid.*, (MFLU 15–0726Q, MFLU 15–0726R, **paratypes**); ex-type living cultures MFLUCC 15–0542, ICMP.

Ciferriascosea fluctamurum Senan., Bhat, Camporesi & K. D. Hyde, **sp.nov.**

Index Fungorum number: IF551194; *Facesoffungi number*: FoF 00684; Fig. 19.

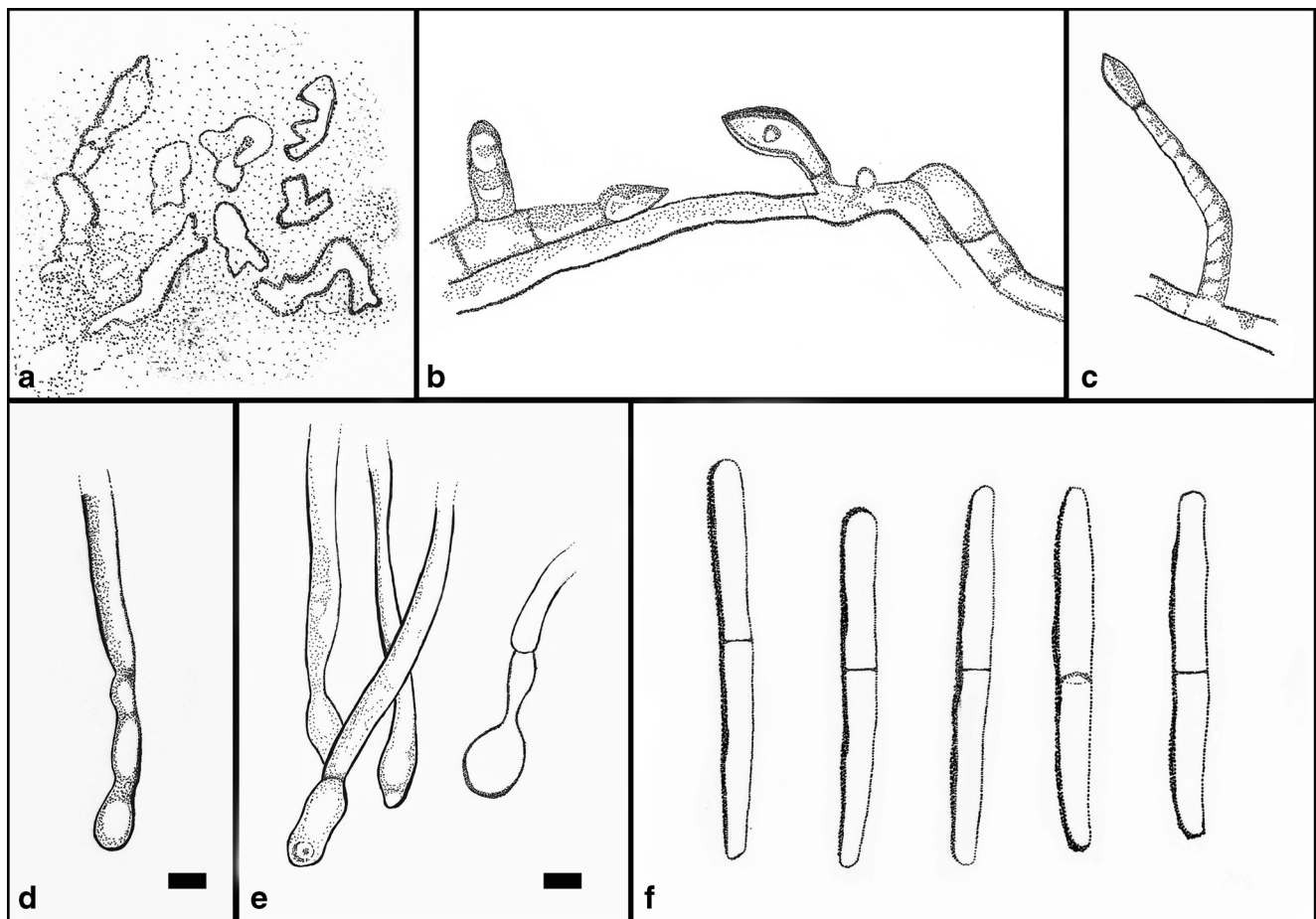
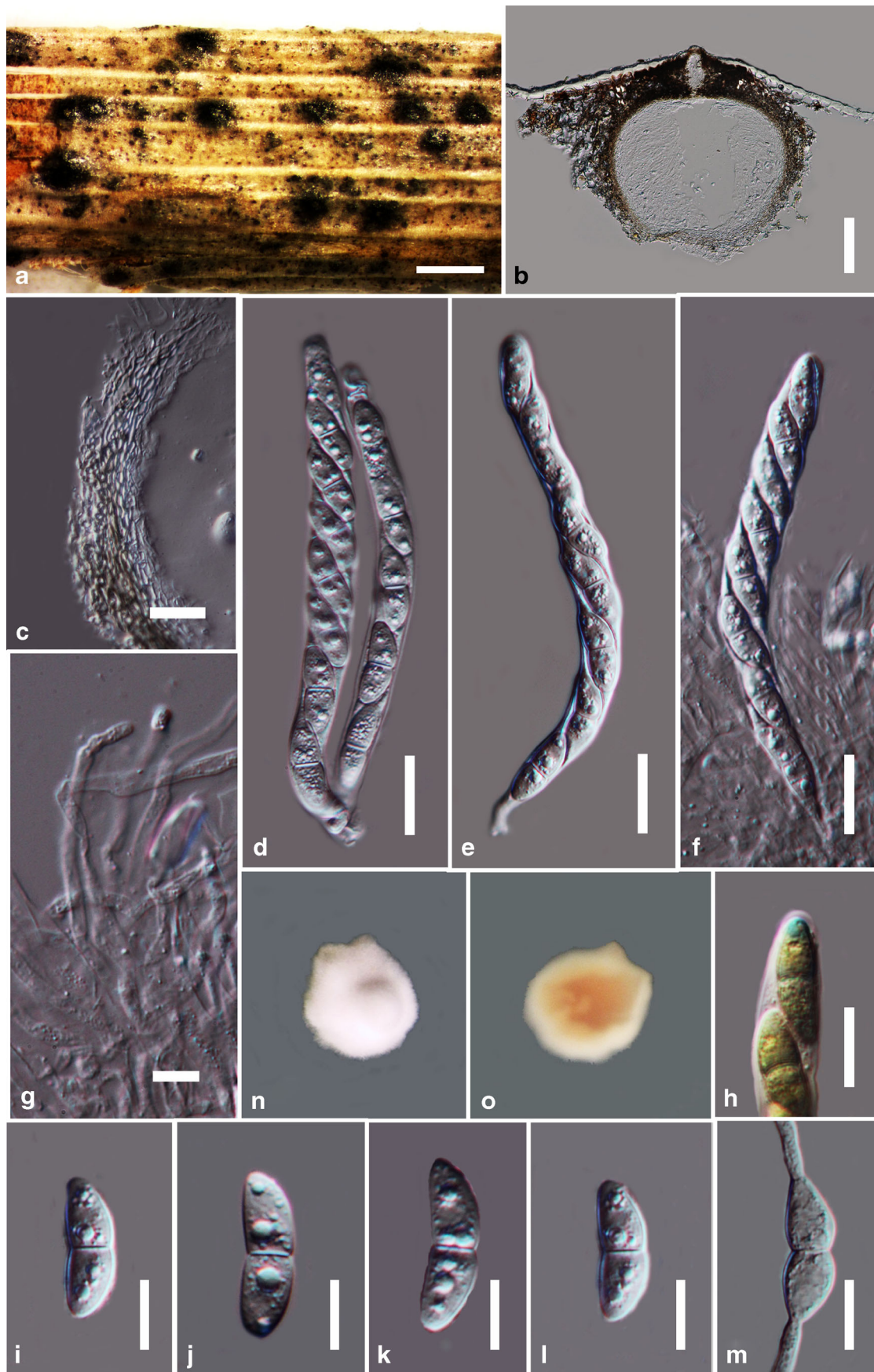


Fig. 17 *Phlogicylindrium eucalypti* (CBS H-19749, illustration based on Summerell et al. 2006). **a** Colony sporulating on MEA. **b–d** Conidiophores and conidiogenous cells in vitro. **e** Conidiogenous cells. **f** Conidia. Scale bars: 10 μm



Etymology: species name based on irregular septa in ascospores.

Holotype: MFLU 15–0725

Saprobic on dead stem of *Spartium junceum* L., appearing as slightly raised, scattered, black spots, on the host surface.

Sexual morph: *Pseudostromata* scattered, solitary, immersed, black, clypeate. *Ascomata* 140–190 μm high, 115–170 μm diam., (\bar{x} = 176 \times 125 μm , n = 20), scattered, solitary, globose, brown, ostiolate, papillate. *Ostiolar papilla* short, distinct, narrow. *Peridium* 5–8 μm wide (\bar{x} = 6.2 μm , n = 20), comprising 4–6 outer layers of brown, thick-walled, cells of *textura angularis* and 3–5 inner layers of hyaline, thick-walled cells of *textura angularis*. *Hamathecium* comprising 1.2–2.3 μm wide (\bar{x} = 1.8 μm , n = 20), filamentous, septate, branched, paraphyses. *Asci* 60–75 \times 6.5–8 μm (\bar{x} = 66 \times 7.3 μm , n = 20), 8-spored, unitunicate, cylindrical, apex rounded, base with short pedicel, apical apparatus J+, not prominent. *Ascospores* 9–10 \times 3–4 μm (\bar{x} = 9.4 \times 3.5 μm , n = 20), overlapping uniseriate, hyaline, fusiform, with narrowly rounded ends, median uniseptate, with a irregular septum, slightly constricted at the septum. **Asexual morph:** Undetermined.

Culture characters: Cultures growing on MEA reaching 1 cm within 7 days when incubated at 18 °C, circular, slightly raised, adpressed to the substrate, smooth, entire margined, white, with sparse aerial mycelium.

Material examined: ITALY, Province of Forli-Cesena [FC], Santa Sofia, Castellaccio di Corniolino, on branch of *Spartium junceum* L. (*Fabaceae*), 24 March 2013, Erio Camporesi, IT 1141 (MFLU 15–0725, **holotype**), (MFLU 15–0725bis, isotype); ex-type living cultures MFLUCC 15–0541, ICMP.

Notes: *Ciferriascosea fluctamurum* occurs on *Spartium junceum* and differs from *Ciferriascosea rectamurum* in having smaller asci and ascospores.

Xylariales

The order *Xylariales* is well-recognized (Maharachchikumbura et al. 2015) and treated with 11 families in this paper. *Xylariales* comprises *Apiosporaceae*, *Cainiaceae*, *Coniocessiaceae*, *Diatrypaeae*, *Graphostromataceae*, *Hyponectriaceae*, *Iodosphaeriaceae*, *Lopadostomaceae* fam. nov., *Pseudomassariaceae* fam. nov., *Vialaeaceae* and *Xylariaceae*.

Apiosporaceae K.D. Hyde et al., in Hyde et al., *Sydowia* 50 (1): 23 (1998)

Facesoffungi number: FoF 00629

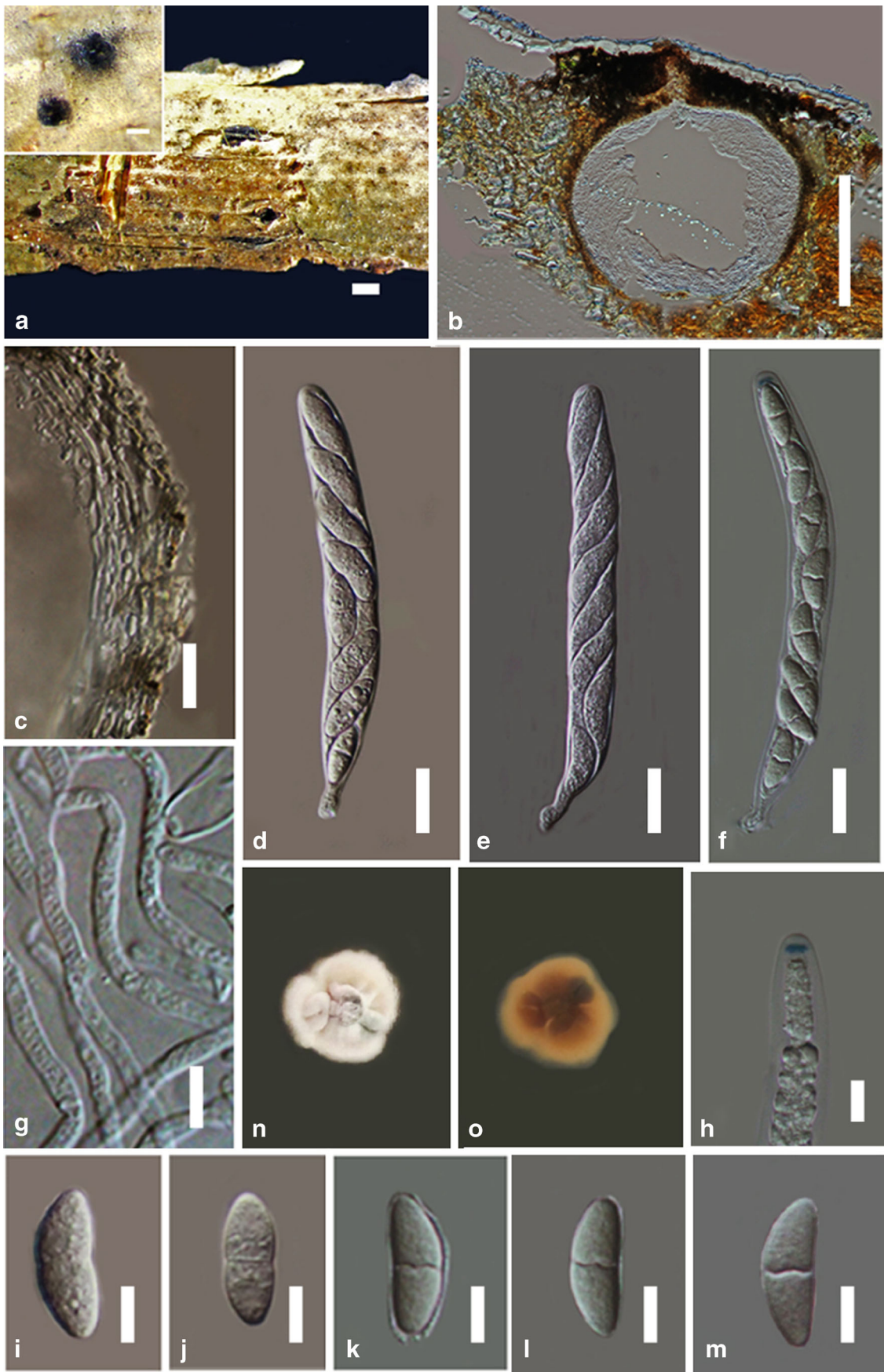
Saprobic or **pathogenic** on leaves, stems and roots of monocotyledons, mostly grasses, or **endophytic** on plant tissues, lichens, and marine algae, occasionally infecting humans, or isolated from soil. **Sexual morph:** *Pseudostromata* visible as raised, linear, blackened areas on the host surface, with neck and upper surface visible through slits in the host tissue, mostly gregarious, fusiform, ellipsoid to irregular, black, cells between ascomata and darkened layer above usually thick, composed of brown cells of *textura*

Fig. 19 *Ciferriascosea fluctamurum* (holotype). **a** Ascostromata on substrate. **b** Cross section. **c** Peridium. **d** Paraphyses. **e–g** Asci. **h** J+ apical ring of ascus mounted in Melzer's reagent. **i–m** Ascospores. **n** Upper surface of culture. **o** Lower surface of culture. Scale bars: a = 1 mm, b = 50 μm , c–h = 10 μm , i–m = 5 μm

angularis. *Ascomata* solitary or usually gregarious in linear groups, immersed under pseudostromata, globose to subglobose, membranous, papillate, ostiole with periphyses. *Peridium* composed of several layers, comprising smallish, brown, reddish brown to hyaline cells of *textura angularis*. *Hamathecium* composed of dense, hypha-like, long, broad, septate, branched, paraphyses. *Asci* 8-spored, unitunicate, broad cylindrical to clavate or subglobose, without an apical apparatus. *Ascospores* overlapping 1–3-seriate to irregularly arranged, hyaline, apiosporous, with a large, straight or curved, upper cell and smaller lower cell, usually surrounded by a gelatinous sheath. **Asexual morph:** Coelomycetous or Hyphomycetous, *Arthrimum* spp. *Conidiomata* sporodochial, solitary to gregarious, immersed, erumpent from host tissue when mature, irregular, black, carbonaceous, coriaceous. *Conidiomata* basal stroma composed of several layers of dark brown to hyaline cells of *textura angularis*, with thick side wall, thin at upper and lower walls. *Setae* absent, or occasionally present, intermingled among conidiophores. *Conidiophore mother cells* ampulliform, verrucose wall, producing a single single hyphoid, cylindrical, 1–2-septate, verrucose, flexuous conidiophore. *Conidiogenous cells* basauxic, cylindrical, with/without verrucose wall. *Conidia* globose to subglobose, dark brown, smooth-walled or with minute wall ornamentations, with a truncate basal scar.

Type: *Apiospora* Sacc., *Atti Soc. Veneto-Trent. Sci. Nat.*, Padova, Sér. 4: 85 (1875),

Notes: *Apiosporaceae* was introduced by Hyde et al. (1998), and is typified by *Apiospora*. This monophyletic family is characterized by apiospores, and a basauxic, *Arthrimum*-like conidiogenesis (Samuels et al. 1981; Hyde et al. 1998; Bahl 2006). Basauxic conidiogenesis is not very common, but is a unique type of 'conidial development' (Bhat 2010), seen only in some conidial fungi. Examples include genera such as *Arthrimum* (*Apiosporaceae*, *Xylariales*), *Dictyoarthrinium* (*Pezizomycotina incertae sedis*), *Cordella* (*Apiosporaceae*, *Xylariales*), *Pteronionium* (*Apiosporaceae*, *Xylariales*) and *Spagazzinia* (*Pezizomycotina incertae sedis*) (Ellis 1971, 1976; Kirk et al. 2008; Wijayawardene et al. 2012). However, these are not phylogenetically closely related (Liu et al. 2015), as molecular data only exists for *Arthrimum*; sequence data attributed to *Spagazzinia* in GenBank are probably wrong. In basauxic conidiogenesis, each conidiophore consists of a short 'conidiophore-mother-cell' (i.e., basal cell, in most cases ampulliform in shape) and an extensible filament arising from within it, which is conidiogenous. In this 'conidiogenous filament', the first conidium is always



terminal and holoblastic. Sometimes, this terminal cell also remains sterile (Bhat 2010). Later formed conidia are all of the blastic-type, but develop laterally and basipetally (one-below the other). *Apiospora* was previously placed in the family *Amphisphaeriaceae* (Müller and von Arx 1962). Barr (1976) transferred *Apiospora* to *Hyponectriaceae* and later moved the genus to *Lasiosphaeriaceae* (Barr 1990; Barr and Cannon 1994; Hawksworth et al. 1995). Hyde et al. (1998) re-examined the type species of *Apiospora* (*A. montagnei* Sacc.), described a new taxon *A. sinensis* and introduced the family *Apiosporaceae*. Phylogenetic analyses have shown that *Apiospora* is a distinct group accommodated in the order *Xylariales* (Huhndorf et al. 2004; Zhang et al. 2006; Jaklitsch and Voglmayr 2012; Dai et al. 2014; Sharma et al. 2014). In Crous and Groenewald (2013), *Arthrimum* is morphologically and phylogenetically circumscribed, and the sexual genus *Apiospora* is treated as a synonym, on the basis that *Arthrimum* is the older and more commonly encountered name, and is more frequently used in literature.

Arthrimum subglobosa D.Q. Dai & K.D. Hyde, *sp. nov.*

Index Fungorum number: IF551172; *Facesoffungi number*: FoF 00630; Fig. 20

Etymology: In reference to the subglobose asci.

Holotype: MFLU 15–0384

Saprobic on dead bamboo culms. **Sexual morph**: *Pseudostromata* visible as raised, blackened areas on the host surface, with parallel spots and upper black surface visible through slits in the host tissue, 1–3 mm long, 300–450 μm wide, 150–300 μm high, solitary to gregarious, in linear rows, irregular, black, cells between ascomata and darkened layer above usually 50–200 μm thick, composed of brown to pale brown, large, thin-walled cells of *textura angularis* mixed with the host tissues above. *Ascomata* 200–350 μm diam., 150–200 μm high, in groups of 3–5, immersed, subglobose with a flattened base, dark brown, coriaceous, papillate, ostiolate at the centre. *Peridium* laterally 10–20 μm thick, composed of dark brown, thick-walled cells of *textura angularis*. *Hamathecium* composed of 3–10 μm diam., long, filamentous, septate, unbranched, tapering paraphyses. *Asci* 75–150 \times 27–36 μm (\bar{x} = 105 \times 35.6 μm , n = 20), 8-spored, unitunicate, broadly cylindrical, clavate to subglobose, pedicel indistinct, apically rounded, with a shallow apical chamber. *Ascospores* 24–28 \times 8.5–12.5 μm (\bar{x} = 25.8 \times 9.5 μm , n = 20), overlapping 1–3-seriate, hyaline, apiosporous, clavate to sub-cylindrical, straight or curved, apical cell large, 17–22 \times 7–12.5 μm , with smaller basal cell, 5–10 \times 5–7 μm , occasionally at an acute angle from the larger cell at the constricted septum, smooth-walled, guttulate, surrounded by 5–8 μm thick gelatinous sheath. **Asexual morph**: Undetermined.

Culture characters: Ascospores germinating on PDA within 24 h and germ tubes produced from the lower cell. Colonies fast growing on PDA, reaching 6 mm in 2 weeks at 28 °C, circular, with an irregular edge, pale brown from above,

Fig. 20 *Arthrimum subglobosa* (holotype). **a** Appearance of pseudostromata in linear rows. **b, d** Section through ascoma also showing pseudostroma. **c** Asci. **e** Peridium of ascoma. **f** Paraphyses. **g, h** Ascospores. **i** Germinating ascospore. **j, k** Culture on PDA, **k** from below. Scale bars: a=1 mm, b=50 μm , c–e=10 μm , f–i=5 μm

brown to dark brown in the centre from below. Mycelium superficial to immersed in the media, with branched, septate, smooth hyphae.

Material examined: THAILAND, Chiang Rai, Mae Sae Village, on dead culm of bamboo, 14 May 2011, Dong-Qin Dai DDQ00034 (MFLU 15–0384, **holotype**), living culture, MFLUCC 11–0397, KIB s44, GZAAC.

Notes: *Arthrimum subglobosa* is characterized by linear pseudostromata and broadly cylindrical, clavate to subglobose asci and ascospores which are occasionally sharply curved. Our new strain can be compared with *Apiospora bambusae* (Turconi) Sivan. and *A. setosa* Samuels et al. in having almost similar sized asci and ascospores. However, *A. subglobosa* is phylogenetically separated from *A. bambusae* and *A. setosa* based on combined analysis of multigene sequence data (Fig. 1). Other bambusicolous species of *Apiospora* do not have subglobose asci and the size of asci is less than 27 μm wide (Theissen and Sydow 1915; Hyde et al. 1998; Bahl 2006). In *Arthrimum subglobosa* asci are more than 27 μm wide.

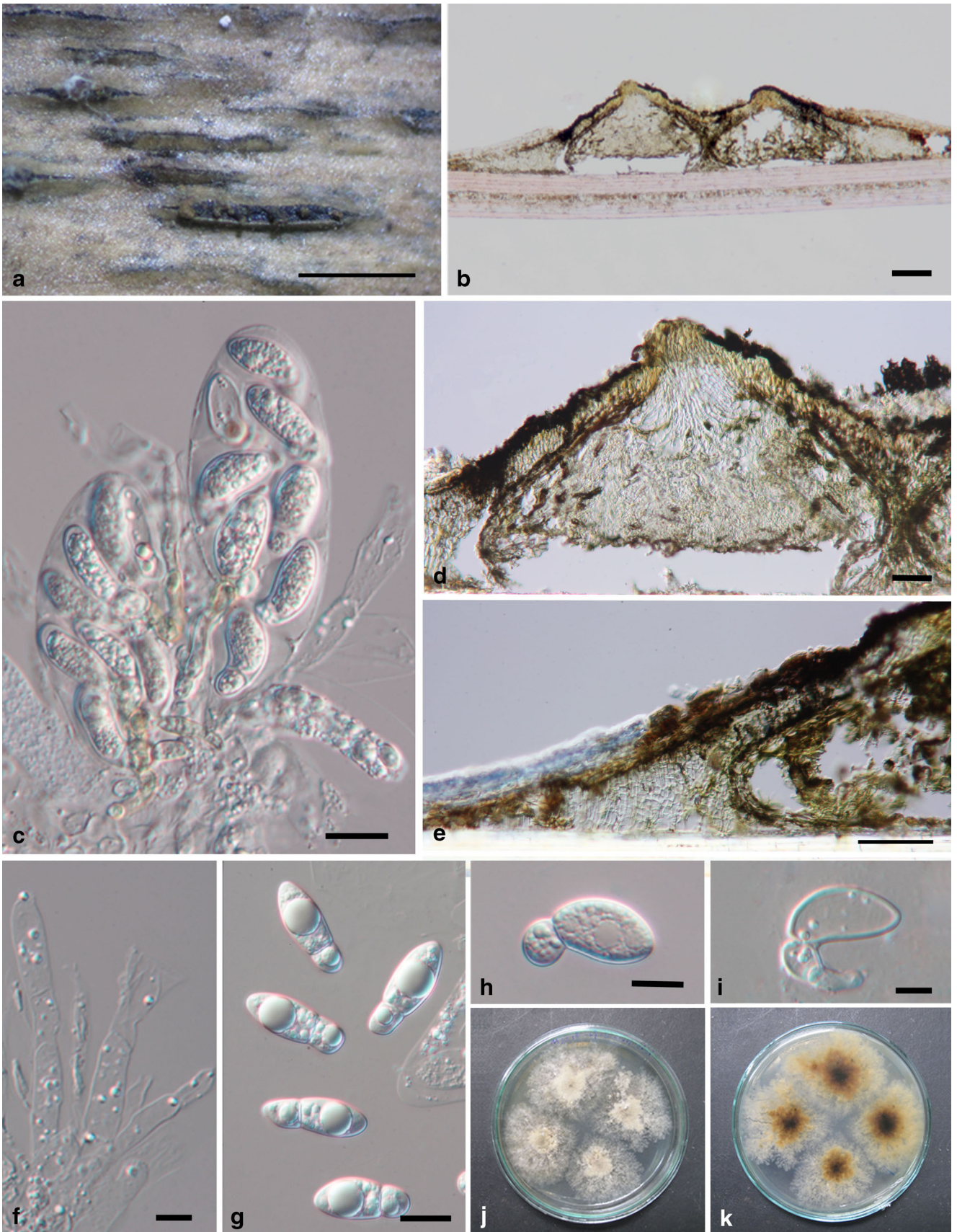
Arthrimum hyphopodii D.Q. Dai, D.J. Bhat & K.D. Hyde, *sp. nov.*

Index Fungorum number: IF551173; *Facesoffungi number*: FoF 00631; Fig. 21

Etymology: In reference to the conidia germ tubes producing hyphopodia

Holotype: MFLU 15–0383

Saprobic on dead bamboo culms. **Sexual morph**: Undetermined. **Asexual morph**: Coelomycetous. *Pseudostromata* solitary to gregarious, visible as raised, pustulate, blackened areas on the host surface, somewhat linear, with black conidial masses produced through slits in the host tissue. *Conidiomata* sporodochial, 300–500 μm wide, 400–550 μm long, 150–250 μm high, solitary to gregarious, immersed in host tissue, erumpent when mature, irregular, black, coriaceous. *Conidiomata wall* 100–150 μm thick, lower wall thin, around 10–20 μm wide, composed of one layer of dark brown to brown to hyaline cells of *textura angularis*. *Conidiophore mother cells* ampulliform, verrucose, producing a single conidiophore. *Conidiophores* 5–15 \times 2–3.5 μm (\bar{x} = 9.5 \times 2.6 μm , n = 20), hyphoid, cylindrical, 1–2-septate, straight to flexuous, verrucose. *Conidiogenous cells* 4–6 \times 2–3.5 μm (\bar{x} = 5.5 \times 2.6 μm , n = 20), basauxic, cylindrical, discrete, with verrucose wall. *Conidia* 5–10 \times 4–8 μm (\bar{x} = 6.5 \times 5.6 μm , n = 20), globose to subglobose, dark brown, smooth-walled, with a truncate basal scar, occasionally with a longitudinal, hyaline, thin, germ-slit.



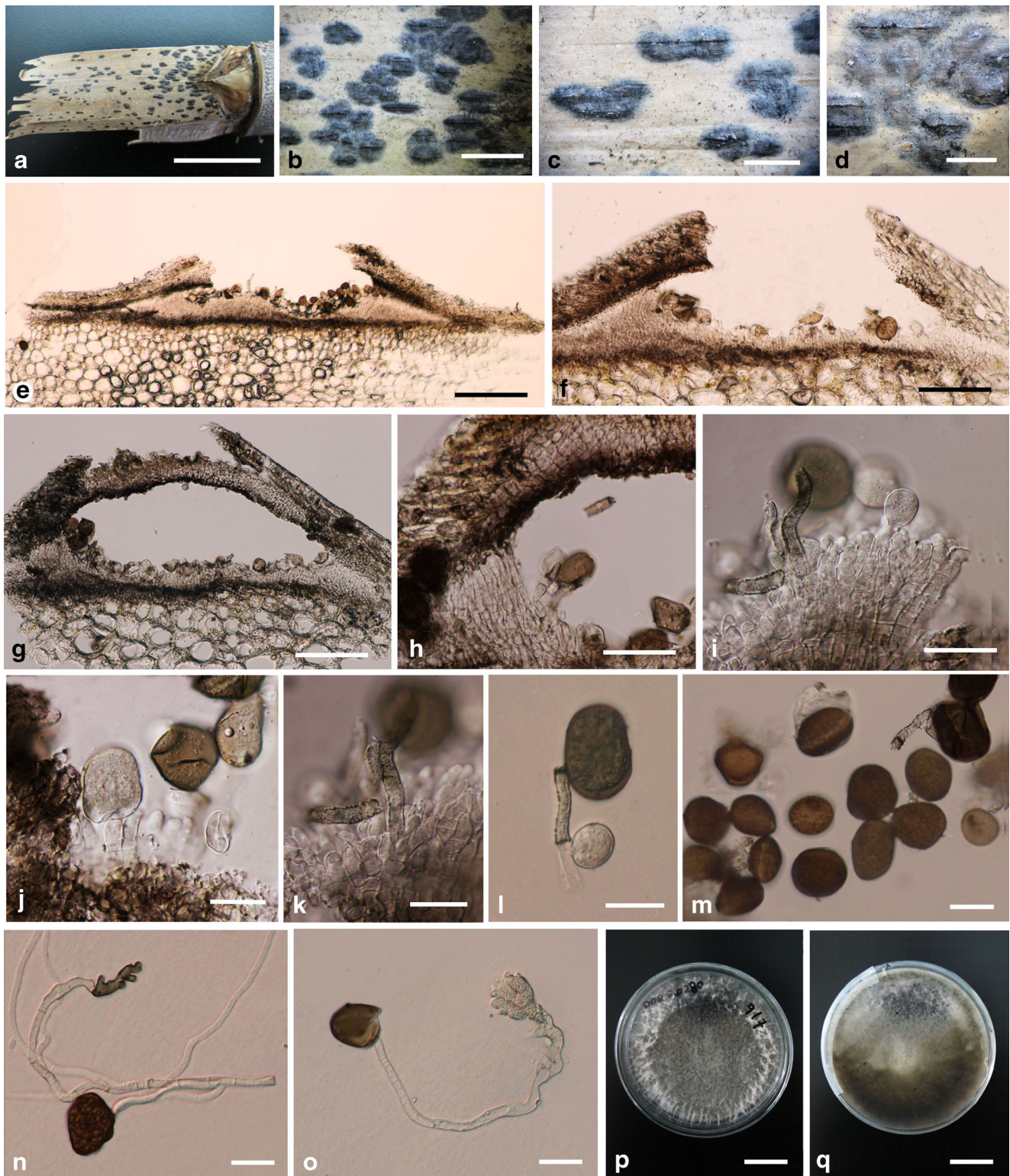


Fig. 21 *Arthriniium hyphopodii* (holotype). **a** Appearance of darkened pseudostromata on bamboo host. **b–d** Pseudostromata on bamboo host with linear cracking. **e–g** Sections of conidiomata. **h** Conidioma wall. **i–l** Conidiophores and conidiogenous cells. **m** Dark brown conidia. **n, o**

Germinating conidia with hyphopodia. **p, q** Cultures on PDA. Scale bars: **a**=5 cm, **b**=1 mm, **c, d**=500 μ m, **e–h**=100 μ m, **i–l**=5 μ m, **q, r**=25 mm

Culture characters: Conidia germinating on PDA within 24 h with germ tubes arising from the germ-slit, often

terminating in pale to dark brown, branched, lobed, irregular, thick-walled hyphopodia. Colonies growing fast on PDA,

reaching 90 mm in 2 weeks at 26 °C, cottony, circular, edge irregular, white from above, brown to dark brown in centre from below. Mycelium superficial to immersed in/on media, with branched, septate, smooth, hyphae.

Materials examined: CHINA, Kunming, Kunming Institute of Botany, Chinese Academy of Sciences, on dead culm of *Bambusa tuldoidea* Munro (*Poaceae*), 7 July 2014, Dong-Qin Dai DDQ00280 (MFLU 15–0383, **holotype**); living culture, MFLUCC 15–003, CBS; *Ibid.* (isotype in KUN, HKAS 83868).

Notes: *Arthrimum* was previously known as the asexual morph of *Apiospora* and has more than 50 species listed in Index Fungorum (2015). In *Arthrimum* conidiogenesis is basauxic (Ellis 1971; Bhat 2010). This new taxon produces brown hyphopodia at the apex of the germ tubes. Such a character has not been observed in other species of *Arthrimum*. Based on the blast search using the ITS sequence in NCBI's GenBank, the closest hits are species of *A. pterospermum* with poor coverage because of the sequence length. A similar search using the LSU sequence showed as closest hits *A. ovatum* (KF144950; Identities=867/885 (98 %), Gaps=3/885 (0 %)), *A. phragmites* (KF144956; Identities=865/885 (98 %), Gaps=3/885 (0 %)) and *A. rasikravindrii* (KF144961; Identities=866/887 (98 %), Gaps=5/887 (0 %)).

Cainiaceae J.C. Krug, Sydowia 30 (1–6): 123 (1978) [1977]

Facesoffungi number: FoF 00687

Saprobic on dead grasses and other monocotyledons, appearing as shiny black dots, slightly effuse from the substrate. **Sexual morph:** *Pseudostromata* poorly developed or lacking, or sometimes clypeate, scattered, superficial, dome-shaped or slightly effuse, smooth, dark brown to black. *Ascomata* immersed, solitary or aggregated, globose, subglobose or lenticular, coriaceous, brown, with papillate ostiole. *Ostiolar papilla* short, internally lined by small, hyaline periphyses. *Peridium* one or two-layered, if two-layered, outer layer comprising thick-walled, brown cells of *textura angularis* and inner layer comprising thin-walled hyaline cells of *textura angularis*. *Hamathecium* comprising abundant, filamentous, septate, paraphyses, slightly constricted at the septa and longer than asci. *Asci* 8-spored, unitunicate, cylindrical, broadly cylindrical to clavate, short pedicellate, with a complex, layered, J+, cylindrical or dome-shaped apical ring. *Ascospores* uniseriate, overlapping uniseriate to biseriate, hyaline when young and very dark brown at maturity, ellipsoidal or spherical, unicellular to 1-septate, slightly constricted at the septum, wall ornamented with reticulations or longitudinal striations, longitudinal germ slits or germ pores, surrounded by a hyaline gelatinous sheath. **Asexual morph:** Coelomycetous. *Conidiomata* pycnidial, scattered, immersed, globose to subglobose, black. *Conidiophores* hyaline, denticulate, sympodially proliferating. *Conidiogenous cells* with 1–

3 phialides, filiform, branched or simple, septate, hyaline. *Conidia* elongate fusiform, falcate to lunate, unicellular or septate, hyaline, with pointed ends.

Type: *Cainia* Arx & E. Müll., Acta bot. neerl. 4 (1): 111 (1955)

Notes: The family *Cainiaceae* was introduced to accommodate species with a unique ascial apical ring, comprising a series of rings and longitudinal germ slits in the ascospores (Krug 1978). Almost all members in this family are from monocotyledons and mostly grasses. In addition to *Cainia*, *Atrotorquata*, *Arecophila*, *Ceriphora*, *Reticulosphaeria* and *Ommatomyces* have been placed in this family at various times (Kohlmeyer and Kohlmeyer 1993; Hyde et al. 1996). *Seynesia* has also been included based on phylogenetic analysis (Maharachchikumbura et al. 2015). Sequence data are available in GenBank for *Arecophila*, *Cainia* and *Seynesia* and their placement in *Cainiaceae* is confirmed based on molecular analysis (Smith et al. 2003; Maharachchikumbura et al. 2015). A new *Atrotorquata* species was introduced as *A. spartii* (Liu et al. 2015), however analysis of LSU gene sequence data indicate that the phylogenetic placement of *A. spartii* is not in *Cainiaceae* although the morphological characters are similar. However combined LSU and ITS gene analysis (Fig. 1) shows the phylogenetic placement of *Atrotorquata* in *Cainiaceae*. Hence we include *Atrotorquata* in *Cainiaceae*. Another new genus, *Amphibambusa* was introduced from bamboo in Liu et al. (2015) and LSU gene analysis and morphology indicates the genus belongs to *Cainiaceae*. The asexual morph of *Cainiaceae* observed from a pure culture of *Cainia desmazieresii* has been reported by Muller and Corbaz (1956) as *Rhabdospora*-like. However, Krug (1978) was unable to obtain the asexual morph from *Cainia desmazieresii* in culture (Kang et al. 1999b) and we have also been unsuccessful.

Type species: *Cainia graminis* (Niessl) Arx & E. Müll., Acta bot. neerl. 4 (1): 112 (1955)

Cainia Arx & E. Müll., Acta bot. neerl. 4 (1): 111 (1955)

Facesoffungi number: FoF 00688

Type species: *Cainia graminis* (Niessl) Arx & E. Müll., Acta bot. neerl. 4 (1): 112 (1955)

Basionym: *Delitschia graminis* Niessl, Notiz. Pyr.: 48 (1876)

Saprobic or **pathogenic** on *Poaceae*, forming leaf or stem spots, appearing as black, shiny, raised, scattered dots on host surface. **Sexual morph:** *Pseudoclypeus* indistinct, scattered, rarely clustered, superficial, dome-shaped, effuse, dark brown to black, each containing a single, or rarely several ascomata, surface smooth. *Ascomata* immersed, scattered, solitary or aggregated, globose to subglobose, coriaceous, with papillate ostioles. *Ostioles* short, internally covered with hyaline, filamentous periphyses. *Peridium* comprising outer layer of thick-walled brown cells and inner layer comprising thick-walled hyaline cells, both of *textura angularis*.

Hamathecium comprising numerous, filamentous, unbranched, septate paraphyses, slightly constricted at the septa, longer than asci. *Asci* 8-spored, unitunicate, cylindrical to clavate, short pedicellate, apex rounded, with a complex, layered, J+, wedge-shaped to cylindrical, apical ring. *Ascospores* overlapping uniseriate to biseriate, dark brown, ellipsoidal, with one, median septum, constricted at the septum, wall with longitudinal striations, surrounded by a gelatinous sheath. **Asexual morph:** Coelomycetous. *Conidiomata* pycnidia, scattered, immersed, globose to subglobose, black. *Conidiophores* hyaline, denticulate. *Conidiogenous cells* with 1–3 phialides, filiform, simple or branched, septate, hyaline. *Conidia* elongate-fusiform to filiform, falcate to lunate, with holoblastic conidiogenesis, unicellular or septate, hyaline, sometimes with pointed ends (description of asexual morph form Krug 1977 and Kang et al. 1999a, b).

Notes: Members of *Cainia* mainly occur on grass hosts. *Cainia* was introduced by von Arx and Müller (1955) based on *Delitschia graminis* Niessl and re-named as *Cainia graminis*. This genus is characterized by immersed ascomata, cylindrical asci with a characteristic J+ apical apparatus with series of rings, brown, two-celled, ascospores with longitudinal striations, and ascospores surrounded by a mucilaginous sheath. *Cainia* presently comprises *C. desmazieri* C. Moreau & E. Müll. and *C. graminis* (Krug 1978). *Cainia deutziae* E. Müll. and *C. cupula* (Ellis) E. Müll. were excluded from the genus and placed in *Arecophila* as *Arecophila deutziae* (E. Müll.) You Z. Wang et al. (Wang et al. 2004) and *Discostroma* as *Discostroma cupulum* (Ellis) M.E. Barr respectively (Barr 1993).

Cainia graminis (Niessl) Arx & E. Müll., Acta bot. neerl. 4 (1): 112 (1955)

Facesoffungi number: FoF 00689; Fig. 22.

Saprobic on leaves of *Lolium* sp., appearing as black dots on leaf. **Sexual morph:** *Pseudoclypeus* scattered, rarely clustered, superficial, dome-shaped, effuse, dark brown to black, each containing a single, or rarely several ascomata, with smooth surface. *Ascomata* 330–480 µm high, 350–515 µm diam., (\bar{x} = 400 × 450 µm, n = 20), scattered, immersed, globose to subglobose, coriaceous, short papillate, brown, extending slightly above the surface of the pseudoclypeus, with small ostiole. *Papilla* short, internally covered with hyaline paraphyses. *Peridium* 23–35 µm wide (\bar{x} = 29 µm, n = 20), comprising outer, thick-walled, dark brown cells of *textura angularis* and inner, thick-walled, hyaline cells of *textura angularis*. *Hamathecium* comprising 2.5–4 µm wide (\bar{x} = 3.5 µm, n = 20), filamentous, septate, hyaline, paraphyses. *Asci* 170–185 × 20–30 µm (\bar{x} = 180 × 23 µm, n = 20), 8-spored, unitunicate, cylindrical to slightly clavate, short pedicellate, narrowly rounded at the apex, apical apparatus distinct, dome-shaped, horizontally divided into a series of 3–4 rings, ring at the apex J-, basal rings J+. *Ascospores* 26–30 × 10–11 µm (\bar{x} = 27.5 × 10.5 µm, n = 20), biseriate, hyaline when

Fig. 22 *Cainia graminis* (reference specimen). **a** Appearance of ascomata on host substrate. **b** Cross section of ascoma. **c** Peridium. **d** Paraphyses. **e** Complex J+, apical ring in Melzer's reagent. **f–i** Asci. **j–n** Ascospores. **o** Germinating ascospore, germ tubes coming from germ slit. Note: apical pad of ascospore showing in **k**. Scale bars: a = 500 µm, b = 100 µm, c, j–o = 10 µm, d, e = 5 µm, f–i = 20 µm

young, becoming pale yellow-brown, and finally very dark brown at maturity, ellipsoidal, broadly narrow and rounded towards the ends, 1-septate, septum in centre, slightly constricted at the septa, with 8 longitudinal striations superficially resembling ridges and an apical thickening or mucilaginous pad of the wall at each end of the spore, surrounded by a hyaline gelatinous sheath, germination via germ slit. **Asexual morph:** Undetermined.

Culture characters: Colonies growing on MEA, reaching 1 cm within 7 days at 18 °C, fast growing, circular, with smooth flat colonies, centre of colony white, woolly and colony margin with unbranched, hyaline, hyphae, tightly adpressed to the media.

Materials examined: ITALY, Province of Forli-Cesena [FC], Santa Sofia, Corniolo, stem of *Lolium temulentum* L (*Poaceae*), 25 September 2013, Erio Camporesi, IT 1462 (MFLU 15–0724, **reference specimen designated here**); living culture, MFLUCC 15–0540, MFLUCC 14–0987, ICMP; *Ibid.* (MFLU 15–0724bis, MFLU 15–0724tris, **duplicates of reference specimen**).

Notes: Morphological comparison and a Mega blast search using the LSU sequence indicated the closest hit to our strain is *Cainia graminis* (CBS 136.62, AF431949; Identities = 880/885 (99 %), Gaps = 1/885 (0 %)). As well as morphological characters of our strain were almost identical to *Cainia graminis* which was illustrated by Krug (1978). However we do not epitype this collection because the host and locality of type material is not the same, and thus designate it as a reference specimen (sensu Ariyawansa et al. 2014).

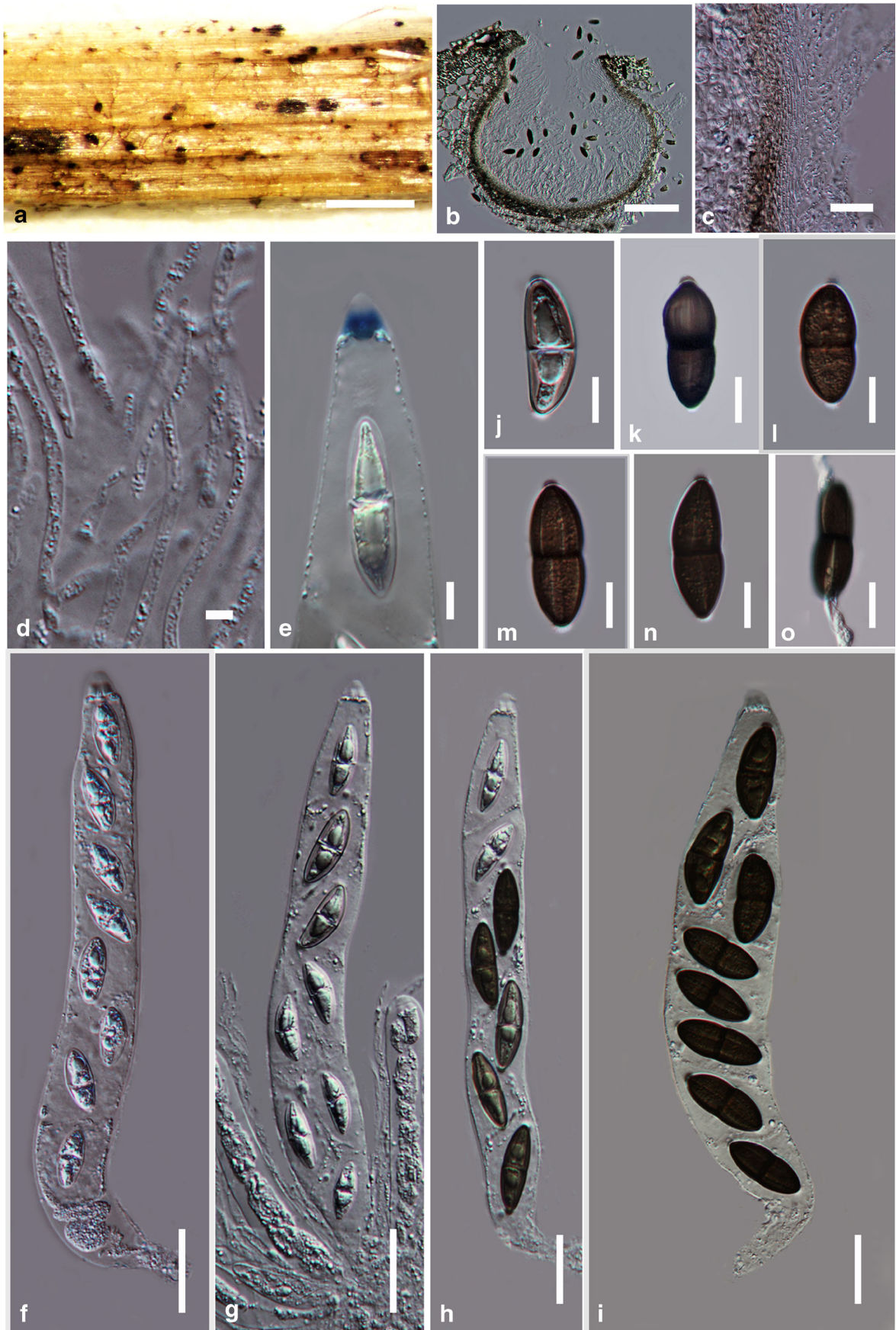
Cainia anthoxanthis Senan., Camporesi & K.D. Hyde, *sp. nov.*

Index fungorum number: IF551188; *Facesoffungi* number: FoF 00690; Fig. 23.

Etymology: Named after the host genus on which the fungus occurs.

Holotype: MFLU 15–0539

Saprobic on leaves of *Anthoxanthum odoratum* L., appearing as black dots on leaf surface. **Sexual morph:** *Pseudoclypeus* scattered, superficial, dome-shaped, thick, occasionally slightly effuse, black, each containing a single ascomata, smooth. *Ascomata* 270–300 µm high, 230–250 µm diam., (\bar{x} = 280 × 235 µm, n = 20), scattered, immersed, globose to subglobose, coriaceous, brown, extending slightly above the surface of the pseudoclypeus, ostiolate, papillate. *Papilla* short, internally covered with hyaline, filamentous, paraphyses. *Peridium* 10–20 µm wide (\bar{x} = 17 µm, n = 20) outer



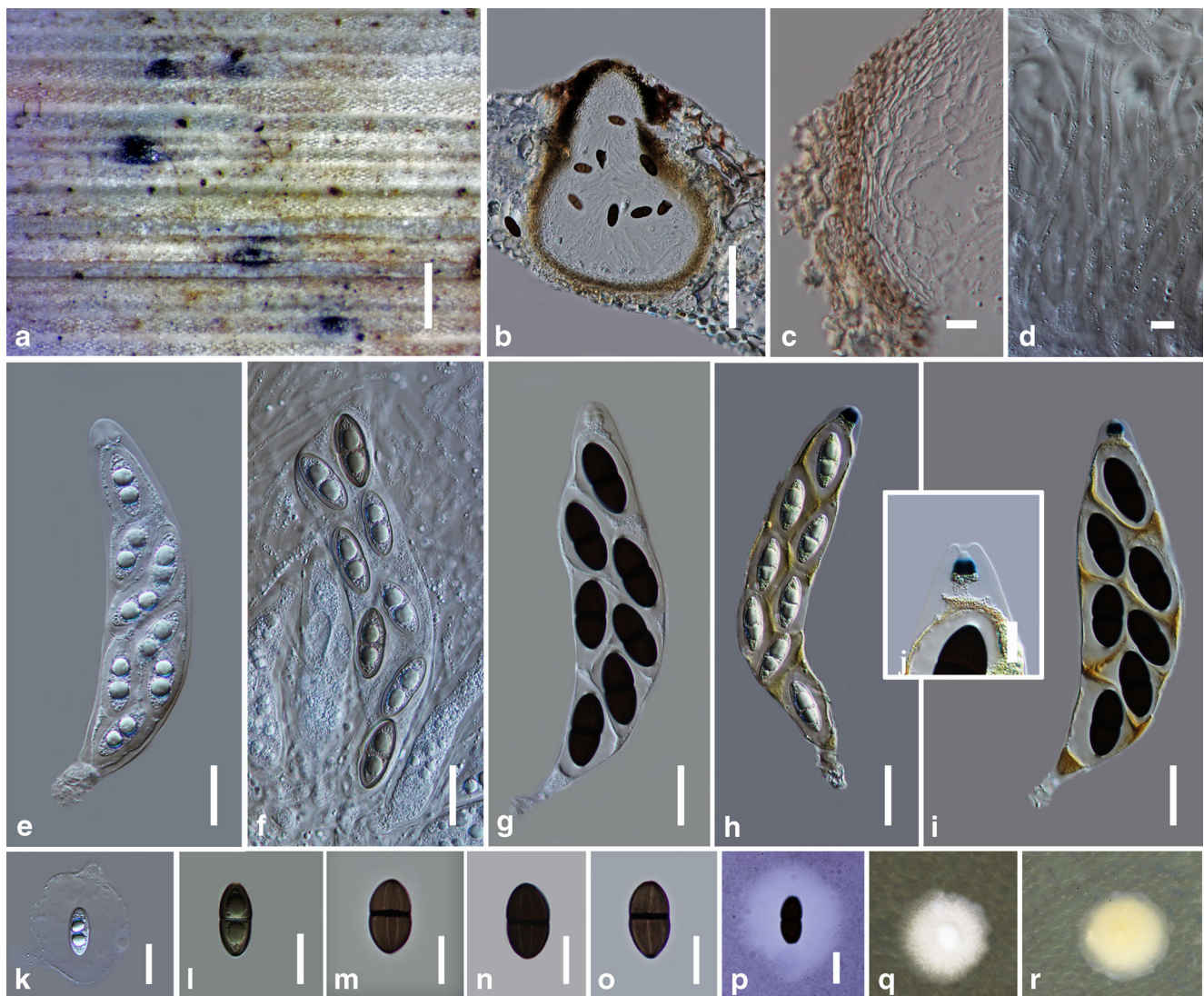


Fig. 23 *Cainia anthoxanthis* (holotype) **a** Appearance of pseudoclypeus on the host substrate. **b** Cross section of ascoma showing black pseudoclypeus around the neck **c** Peridium. **d** Paraphyses. **e–g** Asci in water. **h–i** Asci in Melzer's reagent with J+ ring. **j** Apical J+ ring of ascus. **k–o** Ascospores. **p** Ascospore sheath in Indian ink. **q** Culture growing on

MEA from above. **r** Culture growing on MEA from below. Note: The ascospore in **p** is mounted in Indian ink and after adding this chemical the texture of the ascospore changed. Scale bars: **a**=500 μ m, **b**=100 μ m, **c–d**=10 μ m, **e–p**=50 μ m

layers comprising of thick-walled, dark brown cells of *textura angularis* and inner layers, of thin-walled, hyaline cells of *textura angularis*. *Hamathecium* comprising 2.5–5.5 μ m wide (\bar{x} = 3.6 μ m, n = 20), filamentous, septate, hyaline, paraphyses. *Asci* 170–205 \times 30–40 μ m (\bar{x} = 180 \times 35 μ m, n = 20), sparse, 8-spored, unitunicate, ovoid to clavate, slightly curved, with indistinct short pedicel, narrowly rounded at the apex, apical apparatus 6.5–8.5 μ m high, 6–9.5 μ m wide (\bar{x} = 8 \times 7.5 μ m, n = 10), J+, distinct, dome-shaped, divide in two parts by vertical furrows and horizontally divided into a series of 3–5 rings, ring at the apex of the apparatus J-, basal rings J+. *Ascospores* 25–35 \times 10–15 μ m (\bar{x} = 30 \times 12 μ m, n = 20) biserial, hyaline when young, becoming pale yellowish brown and finally very dark brown at maturity, ellipsoidal, broadly narrow and

rounded at the ends, 1-septate, septum median, slightly constricted at the septum, with 8 longitudinal striations, superficially resembling ridges and an apical thickening of the wall at each end of the spore, surrounded by a hyaline, gelatinous sheath. **Asexual morph:** Undetermined.

Culture characters: Cultures on MEA slow growing, reaching 1 cm diam. within 10 days at 18 $^{\circ}$ C, colonies circular, flat, with diffuse margins. Centre of the colony white, woolly, with clusters of mycelia, margin of the colony with unbranched, hyaline, mycelia.

Materials examined: ITALY, Province of Forli-Cesena [FC], Premilcuore, Valbura, on leaves of *Anthoxanthum odoratum* L. (*Poaceae*), 2 February 2013, Erio Camporesi, IT 1040 (MFLU15–0723, **holotype**); ex-type living culture,

MFLUCC 15–0539, ICMP. *Ibid.* (MFLU 15–0575, **isotype**); *Ibid.* MFLU15–0723bis, MFLU 15–0575bis, MFLU15–0723tris, **paratypes**).

Notes: Based on a megablast search of the GenBank nucleotide database, the closest hit using the LSU sequence for our collection (MFLU 15–0723) is *Cainia graminis* (CBS 136.62, AF452033, Identities=900/930 (98 %), Gaps=0/930 (0 %)). Morphologically *Cainia anthoxanthis* differs from *Cainia graminis* in having small ascomata, asci with a biseriate ascospore arrangement, a shorter ascus apical ring with a rounded apex and ascospores with a large sheath. The ascospores of *Cainia anthoxanthis* are more oval at maturity and apical pad is not obvious. However *Cainia graminis* having more elongated, fusiform ascospores with prominent apical pad. Based on both morphology and molecular phylogeny, *Cainia anthoxanthis* is identified as a new species of *Cainia*.

Conioceciaceae Asgari & Zare, Mycol. Progr. 10 (2): 195 (2011)

Facesoffungi number: FoF 00671

Saprobic on grasses, soil and dung. **Sexual morph:** *Ascomata* small, less than 200 μm diam., superficial, subglobose to pyriform, glabrous or pilose, ostiolate, commonly with hypha-like ostiolar projections. *Peridium* thin, membranaceous, translucent or sometimes opaque, outer layer with cells of *textura intricata*. *Hamathecium* with abundant or few paraphyses. *Asci* 4-spored, unitunicate, cylindrical to subcylindrical, J-, without apical ring structures. *Ascospores* dark brown to black, 1-celled, ellipsoidal or fusiform, smooth-walled, with a distinct germ-slit extending over the entire length of spores. **Asexual morph:** Hyphomycetous, nodulisporium-like. *Conidiophores* micronematous to macronematous, simple or branched, smooth-walled or verrucose; hyaline. *Conidiogenous cells* integrated, terminal, discrete, elongating sympodially, with persistent conspicuous denticles, hyaline. *Conidia* globose, subglobose to pyriform, smooth-walled or verruculose, with a rounded apex, and hyaline, attenuated and truncated base and a more or less distinct projection at the point of attachment to the conidiogenous cells (Asgari and Zare 2011).

Notes: The family *Conioceciaceae* was introduced by Asgari and Zare (2011) to accommodate the genus *Coniocecia* with a nodulisporium-like asexual morph. García et al. (2006) had introduced the genus and placed it in *Xylariales* genera, *incertae sedis*. The family is unique in the order *Xylariales* in having a hyaline asexual morph with polyblastic conidiogenesis (nodulisporium-like), contrasting with the generally pigmented *Nodulisporium* asexual morphs in *Xylariales* (Asgari and Zare 2011). Members of *Conioceciaceae* can also be distinguished from *Xylariaceae* in possessing nonstromatic ascomata, and asci with non-amyloid apical structures (Asgari and Zare 2011). Asgari and Zare (2011) introduced four new species in *Coniocecia* and provided molecular data indicating this was a distinct

lineage of *Xylariales*. Thus they introduced the new family. In this study (Fig. 1) we confirm its distinctness as a family and place it in the order *Xylariales*.

Type: *Coniocecia* Dania García et al., in García et al., Mycol. Res. 110 (11): 1284 (2006)

Type species: *Coniocecia nodulisporioides* (D. Hawksw.) Dania García et al., in García et al., Mycol. Res. 110 (11): 1285 (2006); Fig. 24.

\equiv *Coniochaeta nodulisporioides* D. Hawksw., Norw. J. Bot. 25 (1): 15 (1978)

Diatrypaceae Nitschke [as ‘Diatrypeae’], Verh. naturh. Ver. preuss. Rheinl. 26: 73 (1869)

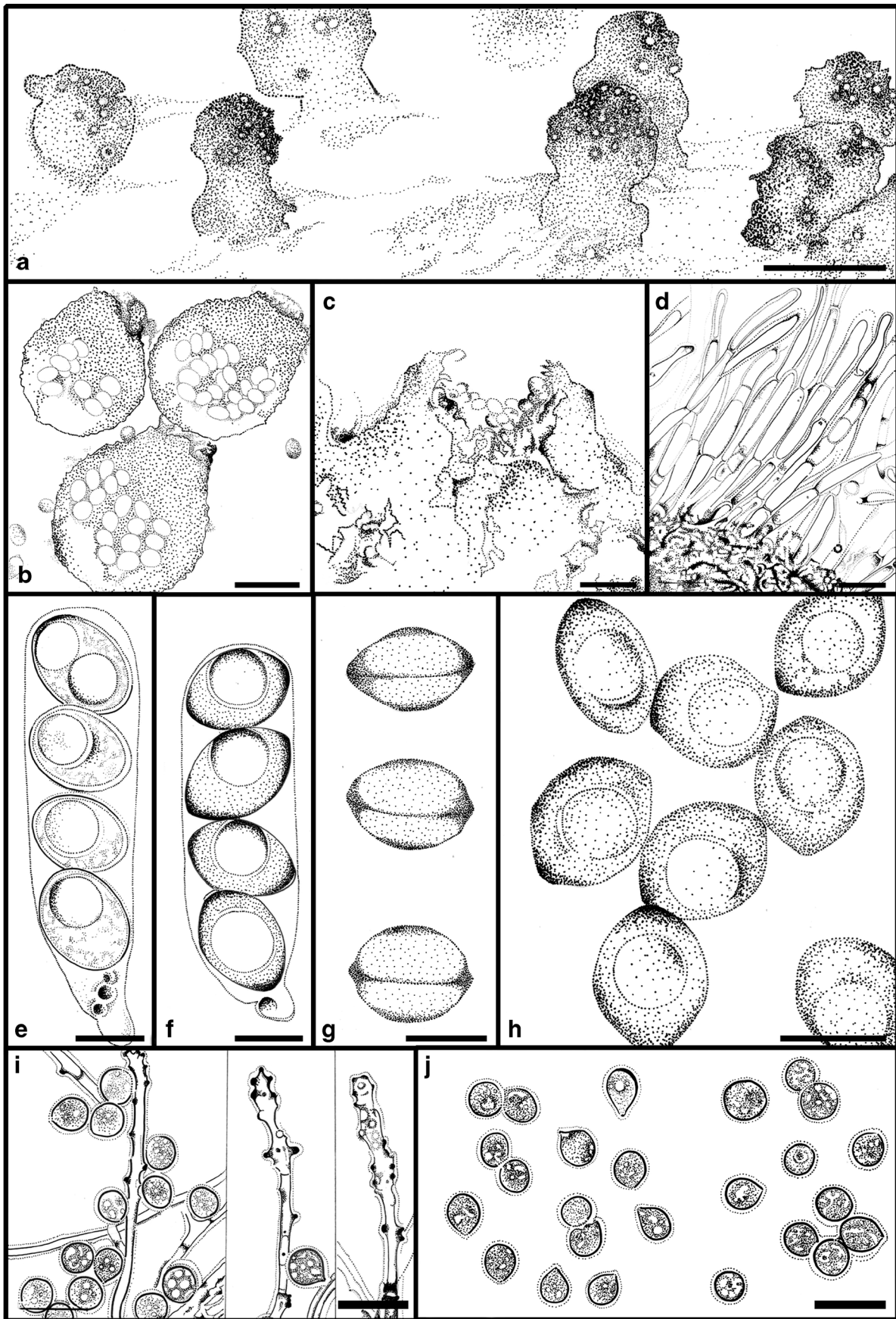
Facesoffungi number: FoF 00679

Saprobic or **pathogenic** mostly on trees. **Sexual morph:** *Stromata* eustromatic or pseudostromatic, well-developed, immersed to erumpent or rarely superficial, mostly black or dark brown, with somewhat carbonaceous outer layer, inner layer pale, loosely packed, parenchymatous. *Ascomata* perithecial, immersed in stromatic tissues, globose to subglobose, coriaceous, mostly brown, with long, ostiolar necks. *Ostioles* sulcate, inner layer covered with hyaline, periphyses. *Peridium* with two layers, outer layer comprising brown cells of *textura angularis* and inner layer comprising hyaline cells of *textura angularis*. *Hamathecium* comprising long, wide, thin-walled, branched, septate, paraphyses, arising from base of perithecia and slightly constricted at septa. *Asci* 8-spored or polysporous, unitunicate, cylindrical, with a very long pedicel with a more or less truncate apex, with J-, or J+ apical apparatus. *Ascospores* hyaline to light brown, crowded, allantoid. **Asexual morph:** Coelomycetous, libertella-like. *Conidiomata* on host, acervular, subcortical, astromatic, erumpent, yellow to red, with branched conidiophores, in culture pycnidial, superficial, solitary or aggregated, subconical, globose to subglobose, yellow, dark brown to black, with thick peridium, comprising brown, thick-walled cells of *textura angularis* with branched conidiophores, arising from pseudoparenchymatous cells or interwoven hyphae. *Conidiogenous cells* in dense palisades, cylindrical, straight or curved, apically distorted or bearing annellations. *Conidia* filiform, curved, or rarely straight, with flattened base and blunt apex, hyaline.

Type: *Diatrype* Fr., Summa veg. Scand., Section Post. (Stockholm) 384 (1849)

Type species: *Diatrype disciformis* (Hoffm.) Fr., Summa veg. Scand., Section Post. (Stockholm): 385 (1849)

Notes: The family *Diatrypaceae* was introduced by Nitschke (1869) and is a well-studied family comprising 15 genera (Maharachchikumbura et al. 2015). The type genus is *Diatrype*, and other genera are *Anthostoma*, *Cryptosphaeria*, *Cryptovalsa*, *Diatrypella*, *Diatrypasimilis*, *Echinomyces*, *Eutypa*, *Eutypella*, *Leptoperidia*, *Monosporascus*, *Pedumispora*, *Peroneutypa*, *Phaeoisaria*, and *Quaternaria* (Maharachchikumbura et al. 2015). Sequence data is lacking



◀ **Fig. 24** *Coniocessia nodulisporioides* (illustration based on Asgari and Zare (2011) **a** Masses of ascospores on host surface. **b** Ascomata. **c** Hypha-like ostiolar projections. **d** Paraphyses. **e** Immature ascus. **f** Mature ascus. **g, h** Ascospores. **i** Conidiophores and conidiogenous cells. **j** Conidia. Scale bars: a=100 μm , b=50 μm , c–j=10 μm

for *Echinomyces*, *Leptoperidia*, *Peroneutypa* and *Quaternaria*. Recent papers with sequence data providing backbone trees are Carmaran et al. (2006) and Trouillas et al. (2010) as well as Liu et al. (2015) in which a new species of *Diatrype* from palms was introduced. In the present account we provide a description and reference specimen (sensu Ariyawansa et al. 2014) for the generic type, *Diatrype disciformis* (Hoffm.) Fr. and a collection of *Eutypa flavovirens* (Pers.) Tul. & C. Tul.

Diatrype Fr., Summa veg. Scand., Section Post. (Stockholm) 384 (1849)

Facesoffungi number: FoF 00702

Saprobic on bark. **Sexual morph:** *Stromata* scattered or aggregated on host substrate, sometimes spread over a large area of the host, erumpent to superficial, orbicular, disc-like, with flat or convex surface, sometimes spread over the host evenly, arising through the cracks in bark epidermis or beneath the epidermis, edges of cracks remaining as pointed, angular parts, numerous ascomata immersed in one stroma, ostioles opening to surface appearing as black spots, comprising an outer, dark brown, small, tightly packed, thin parenchymatous cell layer and inner, yellowish white, large, loosely packed, parenchymatous cell layer. *Ascomata* perithecial, immersed in stromatic tissues aggregated, globose to subglobose, narrowing towards the apex and very narrow at the base of ostiolar canal, pale brown, thin-walled, ostiolate. *Ostiolar canal* immersed in only dark outer layer of stromata, short, compressed, apex wider than base, periphysate, ostiolar opening covered with carbonaceous, black cells. *Periphyses* hyaline, filamentous, short, curved towards the cavity. *Peridium* thin, comprising outer, brown, thick-walled cells of *textura angularis* and inner, hyaline, thick-walled cells of *textura angularis*. *Hamathecium* comprising long, wide, globose to ovoid, thin-walled, branched, septate, paraphyses, slightly constricted at septa, narrowing and tapering towards the blunt apex. *Asci* 8-spored, unitunicate, long and narrow, with thin-walled pedicel, with cylindrical, thick-walled, swollen upper portion, apex flat, with J-, cylindrical, conspicuous, apical apparatus. *Ascospores* biserial, hyaline, allantoid, unicellular, with small, fat globules at each end, thin and smooth-walled. **Asexual morph:** Coelomycetous, *Libertella*-like. *Conidiomata* appearing as brownish yellow, watery, conidial rounded mass on white, mycelial clumps. *Pycnidia* superficial, solitary or aggregated, subconical, globose to subglobose, shiny, surface smooth, yellow, dark brown to black. *Peridium* thick, comprising brown, thick-walled cells of *textura angularis*. *Conidiophores* branched, arising from

pseudoparenchymatous cells or interwoven hyphae. *Conidiogenous cells* in dense palisades, cylindrical, straight or curved, apically distorted or bearing annellations. *Conidia* filiform, curved or rarely straight, with flattened base and blunt apex, hyaline.

Notes: *Diatrype* comprises mainly saprobes on decaying wood. A few species are reported as pathogens forming cankers on forest trees. Species in this genus are quite resistant to harsh conditions. The asexual morph of *Diatrype* is reported as a libertella-like fungus (Adamčíková et al. 2011).

Diatrype disciformis (Hoffm.) Fr., Summa veg. Scand., Section Post. (Stockholm): 385 (1849)

Facesoffungi number: FoF 00691; Fig. 25.

Saprobic on wood with bark. **Sexual morph:** *Stromata* 1.5–2 mm wide, scattered on host, erumpent to superficial, orbicular, disc-like, somewhat convex, arising through cracks in bark epidermis, edges of cracks remaining as pointed, angular parts, with numerous perithecia immersed in a single stroma, ostioles opening in the central region of the disc and appearing as black spots, margin of the disk thick, black, composed of an outer, dark brown, small, tightly packed, thin parenchymatous cell layer and inner, yellowish white, large, loosely packed, parenchymatous cell layer. *Ascomata* 620–760 μm high, 265–360 μm diam. (\bar{x} = 345 \times 675 μm , n = 20), perithecial, immersed in stromatic tissues, aggregated, globose to subglobose, narrowing towards the apex and very narrow at the base of ostiolar canal, pale brown, thin-walled, ostiolate. *Ostiolar canal* 60–105 μm high, 85–140 μm wide (\bar{x} = 80 \times 105 μm , n = 20), immersed in only dark outer layer of stromata, short, compressed, apex wider than base, periphysate, ostiolar opening covered with carbonaceous, black cells. *Periphyses* hyaline, filamentous, short, curved towards the cavity. *Peridium* 20–30 μm wide (\bar{x} = 25 μm , n = 20), thin, comprising an outer layer of 5–7 layers of brown, thick-walled cells of *textura angularis* and a thin, inner strata of 7–10 layers of hyaline, thick-walled cells of *textura angularis*. *Hamathecium* comprising 70–75 μm long, 1–2 μm wide (\bar{x} = 72 \times 1.8 μm , n = 20), globose to ovoid, thin-walled, branched, septate paraphyses, slightly constricted at septa, narrowing and tapering towards the blunt apex. *Asci* 75–115 μm long (\bar{x} = 95 μm , n = 20), 8-spored, unitunicate, with very long, narrow, thin-walled pedicel, with cylindrical, thick-walled, swollen upper portion, 30–40 \times 5–6 μm (\bar{x} = 34 \times 5.4 μm , n = 20), apex flat, with J-, cylindrical, conspicuous, apical apparatus. *Ascospores* 5–9 \times 1.5–2 μm (\bar{x} = 6.5 \times 1.7 μm , n = 20), biserial, hyaline, allantoid, unicellular, thin-walled, with small, fat globules at each end, smooth-walled. **Asexual morph:** Undetermined.

Culture characters: Fast growing, reaching 4 cm within 7 days on MEA, when incubated at 18 °C, circular, with smooth margin, fibrous, with sparse arial mycelium, white.

Material examined: ITALY, Province of Forlì-Cesena [FC], Santa Sofia Corniolino, on branch of *Ostrya carpinifolia*

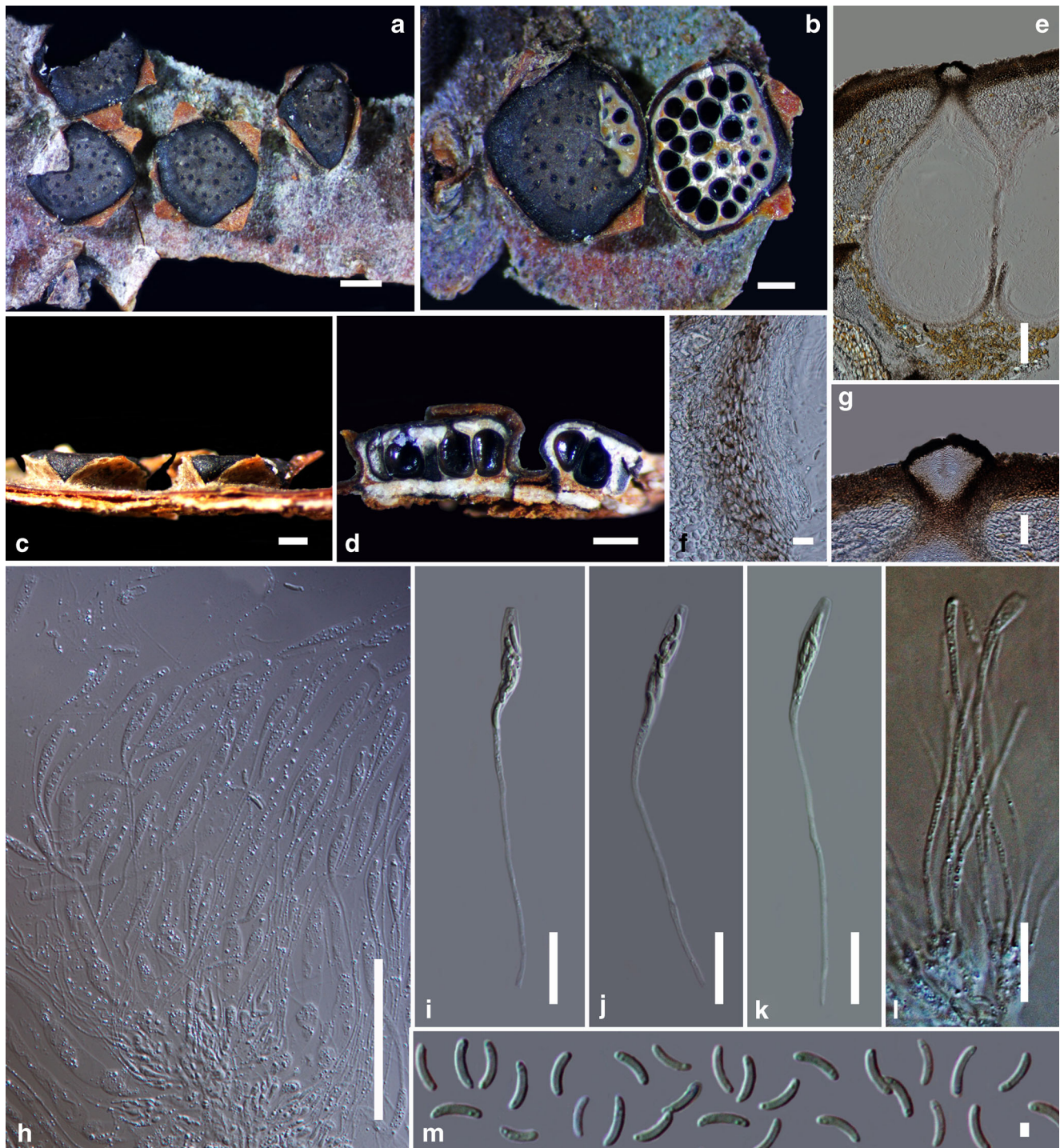


Fig. 25 *Diatrype disciformis* (reference specimen) **a** Stromata on substrate. **b** Horizontal section of stroma. **c** Side view of stroma. **d** Vertical cross section of stroma. **e** Cross section of ascomata. **f** Peridium. **g** Ostiolar chamber filled with paraphyses. **h** Asci

arrangement in hamothecium. **i–k** Asci. **l** Paraphyses. **m** Ascospores. Scale bars: a=1 mm, b–d=500 μ m, e, i–l=100 μ m, g=50 μ m, f, m=10 μ m

Scop. (*Betulaceae*), 14 November 2013, Erio Camporesi, IT 1516 (MFLU 15–0722, **reference specimen designated here**); living culture, MFLUCC 15–0538, ICMP. *Ibid.* MFLU 15–0722bis, **duplicate of reference specimen**).

Notes: *Diatrype disciformis* is the generic type of *Diatrype* and represents the family *Diatrypaceae*. During our field survey, we collected *D. disciformis* associated with a branch of *Ostrya carpinifolia* from Italy. We obtained herbarium

specimens of *D. disciformis* from NY herbarium (NY305625, NY305627 and NY305626) and compared the morphological characters. The morphology of our fresh collection was similar to that of herbarium specimens. However, we could not obtain the holotype specimen. Hence, we designate this as a reference specimen (sensu Ariyawansa et al. 2014). The asexual morph of *Diatrype disciformis* is reported as *Libertella*-like, however we did not observe this in culture (Adamčíková et al. 2011).

Eutypa Tul. & C. Tul., Select. fung. carpol. (Paris) 2: 52 (1863)

Facesoffungi number: FoF 00703

Saprobic on decaying wood and pathogenic on living plants causing dieback and cankers. **Sexual morph:** *Stromata* scattered, erumpent to immersed, arising through cracks in bark epidermis, several ascomata immersed in a single stromata, ostioles opening to outer surface of stroma, comprising an outer, black, small, tightly packed, thin parenchymatous cell layer and inner, whitish-yellow to dark yellow, comprising of loosely packed, parenchymatous cells. *Ascomata* perithecial, immersed in stromatic tissues, aggregated, globose to subglobose, narrowing towards the apex, brown, thin-walled, ostiolate, papillate. *Papilla* short, erumpent to immersed, conical, apex wider than base, periphysate. *Peridium* comprising an outer layer of brown, thick-walled cells of *textura angularis* and inner, hyaline, thick-walled layer of cells of *textura angularis*. *Hamathecium* comprising long, wide, septate, hyaline paraphyses, slightly constricted at septa, and narrowing and tapering towards the apex. *Asci* 8-spored, unitunicate, long, narrow, with thin-walled pedicel, with cylindrical, thick-walled, swollen upper portion, apex flat, with J-, cylindrical, conspicuous apical apparatus. *Ascospores* biseriate or crowded, hyaline, allantoid, unicellular, thin-walled, with small, fat globules at the ends, smooth-walled. **Asexual morph:** Coelomycetous. *Conidiomata* appearing as brownish-yellow, watery, bubble-like, rounded, conidial masses. *Pycnidia* superficial, solitary or aggregated, subconical, globose to subglobose, shiny, with smooth surface, yellow, dark brown to black. *Peridium* thick, comprising brown, thick-walled, cells of *textura angularis*. *Conidiophores* branched, arising from pseudoparenchymatous cells or interwoven hyphae. *Conidiogenous cells* cylindrical, in dense palisades, straight or curved, apically distorted or bearing annellations. *Conidia* hyaline, filiform, curved or rarely straight, with flattened base and blunt apex.

Notes: *Eutypa* comprises pathogens and saprobes and is typified by *Eutypa lata* (Pers.) Tul. & C. Tul. *Eutypa lata* is a serious pathogen on grapes forming cankers (Rolshausen et al. 2004). *Eutypa* species are also very common on decaying wood. However, the relationship between saprobic and pathogenic species is not clarified.

Eutypa flavovirens (Pers.) Tul. & C. Tul., Select. fung. carpol. (Paris) 2: 57 (1863)

Facesoffungi number: FoF 00692; Figs. 26 and 27.

Saprobic on decaying wood with bark. **Sexual morph:** *Stromata* 1–1.5 mm wide, scattered on host, erumpent, arising through the cracks in bark epidermis, cracks angular, with numerous ascomata immersed in a single stromata, ostioles opening to outer surface, appearing as black spots, comprising an outer, dark brown to black, small, tightly packed, thin parenchymatous cell layer and inner, dark yellow, large, comprising of loosely packed, parenchymatous cells. *Ascomata* 295–430 μm high, 120–210 μm diam., (\bar{x} = 330 \times 180 μm , $n=20$), perithecial, immersed in stromatic tissues, aggregated, globose to subglobose, narrowing towards the apex and very narrow at the base of papilla, pale brown, thin-walled, ostiolate, papillate. *Papilla* 70–90 μm wide, 85–120 μm high (\bar{x} = 70 \times 105 μm , $n=20$), short, immersed in only dark outer layer of stromata, conical, apex wider than base, periphysate. *Peridium* 11–16 μm wide (\bar{x} = 13 μm , $n=20$), comprising an outer, brown, thick-walled, strata of 6–8 layers of cells of *textura angularis* and inner, hyaline, thick-walled, strata of 4–6 layers of cells of *textura angularis*. *Hamathecium* comprising 3.5–5 μm wide (\bar{x} = 4.5 μm , $n=20$), long, septate, paraphyses, slightly constricted at septa, and narrowing and tapering towards the apex. *Asci* 140–210 \times 9.5–13 μm (\bar{x} = 170 \times 10.5 μm , $n=20$), 8-spored, unitunicate, with narrow, long, thin-walled pedicel, with cylindrical, thick-walled, swollen upper portion, apex flat, with J-, cylindrical, 3.5–8.5 μm high, (\bar{x} = 5.6 μm , $n=20$), conspicuous apical apparatus. *Ascospores* 7–11 \times 1.5–2.5 μm (\bar{x} = 8.3 \times 2.1 μm , $n=20$), biseriate, hyaline, allantoid, unicellular, thin-walled, with small, fat globules at ends, smooth-walled. **Asexual morph:** *Mycelial clumps* erect, white, floccose on culture. *Conidiomata* 0.7–1.3 mm diam., appearing as brownish yellow, watery, bubble-like, rounded, conidial masses forming from mycelial clumps. *Pycnidia* superficial, solitary or aggregated, subconical, globose to subglobose, shiny, with smooth surface, yellow, dark brown to black. *Peridium* thick, comprising brown, thick-walled, cells of *textura angularis*. *Conidiophores* 4.5–5.5 μm high, 2–2.5 μm wide (\bar{x} = 4.9 \times 2.4 μm , $n=20$) branched, arising from pseudoparenchymatous cells or interwoven hyphae. *Conidiogenous cells* 9.5–13.5 μm high, 2–3 μm wide (\bar{x} = 11.5 \times 2.4 μm , $n=20$), cylindrical, in dense palisades, straight or curved, apically distorted or bearing annellations. *Conidia* 30–40 \times 1–2 μm (\bar{x} = 34 \times 1.4 μm , $n=20$), filiform, curved or rarely straight, with flattened base and blunt apex, hyaline.

Culture characters: Fast growing reaching 4 cm within 7 days on MEA, when incubated at 25 °C, circular, flat, with diffuse margin, white, and becoming yellowish-white, bright yellow to dull yellow with age.

Material examined: THAILAND, Chiang Rai Province, Muang District, near Bandu, Baan Khuakhae, at 31 M. (19° 59' 52.05" N; 99° 49' 25.15" E), on decaying twigs, 15 November 2012, K.D. Hyde, CHUNI006 (MFLU15–0741,

reference specimen designated here); living culture, MFLUCC 13–0625, ICMP.

Notes: Fungal taxa in *Eutypa* are saprobes and some cause serious cankers of forest trees (Trouillas et al. 2011). *Eutypa flavovirens* was collected from northern Thailand and the *Libertella*-like asexual morph formed in culture. *Eutypa flavovirens* is morphologically distinct since it has yellow stromatic tissues. There is no LSU sequence data available for *Eutypa flavovirens* in GenBank. A BLAST search of ITS sequence data of this *Eutypa flavovirens* strain indicated similarity to our *Eutypa flavovirens* (D13M, AJ302429; Identities=545/572 (95 %), Gaps=12/572 (2 %)). The morphological characters of sexual and asexual morph of *Eutypa flavovirens* are similar to those of previous studies (Glawe and Rogers 1982; Carmaran et al. 2006; Trouillas et al. 2011) in both morphology and phylogeny. However the specimen collected in Thailand may not be identical to the species which was previously collected in Europe.

Graphostromataceae M.E. Barr et al., Mycotaxon 48: 533 (1993)

Facesoffungi number: 00624

Saprobic on trunks, branches, and twigs of members belonging to several genera of deciduous trees. **Sexual morph:** *Stromata* widely effuse, irregular in outline, with two layered ectostroma and entostroma, ectostroma develops first, young ectostroma surface buff, with matted mycelium of yellow hyphae, ectostroma develops beneath, cinnamon in colour, hard and brittle, composed of dark hyphae intermixed with suberized cells of the periderm, pulvinate in the centre. *Ascomata* monostichous, immersed in diatrypoid configuration in entostroma, globose, but compressed, bottle-shaped, more rarely pyriform or obpyriform, varying in size with, black, opaque, carbonaceous, doliiform perithecial embedded necks. *Peridium* comprising hyaline, multi-layered, thin, indistinct, flattened cells, about 10 μm wide. *Hamathecium* comprising few, sparse, elongate, tapering, thin-walled paraphyses. *Asci* unitunicate, 8-spored, fusiform to narrowly clavate, rounded to subtruncate at the apex, with J+ apical apparatus. *Ascospores* 1-celled, hyaline, multiseriately arranged, suballantoid, tapering at both ends, thin-walled. **Asexual morph:** nodulisporium-like (Barr et al. 1993)

Type genus: Graphostroma Piroz., Can. J. Bot. 52 (10): 2131 (1974)

Graphostroma Piroz., Can. J. Bot. 52 (10): 2131 (1974)

Facesoffungi number: 00704

Saprobic on trunks, branches, and twigs of members of several genera of deciduous trees. **Sexual morph:** *Ectostroma* cinnamon in colour in young stromata, hard and brittle, composed of dark hyphae with periderm cells, at maturity ectostromatic crust separates exposing the entostromatic “disc”, with ostioles, dark cinnamon to chestnut brown, pulvinate in the centre, with a thin, sterile, fimbriate margin. *Ascomata* more or less monostichous, compressed globose,

Fig. 26 *Diatrype disciformis* (reference specimen). **a, b** Stromata on substrate. **c** Horizontal section of stroma. **d** Vertical section of stroma. **e** Ostiolar chamber with periphyses. **f** Cross section of ascomata. **g** Paraphyses. **h** Peridium. **i–m** Asci. **n** Ascospores. **o** Culture from above. **p** Culture from below. Scale bars: a, b=500 μm , c=1 mm, d=200 μm , e=50 μm , f=100 μm , g–n=10 μm

bottle-shaped, more rarely pyriform, or obpyriform, varying in size from specimen to specimen. *Peridium* hyaline, composed of indistinct, tangentially flattened cells. *Hamathecium* comprising hyaline, very thin-walled, inconspicuous narrowly ventricose paraphyses, 3-septate, tapering gradually to a pointed apex. *Asci* 8-spored, unitunicate, clavate, subsessile to short-stalked apex rounded to subtruncate, with a minute J+ apical apparatus. *Ascospores* overlapping biseriately, hyaline, suballantoid, tapered at both ends, inequilateral, thin-walled, with longitudinal germ-slit. **Asexual morph:** nodulisporium-like. *Conidiogenous cells* thin-walled, often roughened at the base, apex swollen into a clavate or globose vesicle, dilute straw coloured towards the base, hyaline above, bearing up to 12 small, inconspicuous denticles, arising singly from the apex or sides of more or less erect mycelial hyphae, or in whorls of three to five from apices of erect hyphae, *Conidia* pyriform to turbinate, rounded above, hyaline, 1-celled, strongly attenuated towards a minute thickened and refractive basal scar, containing a single, large guttule.

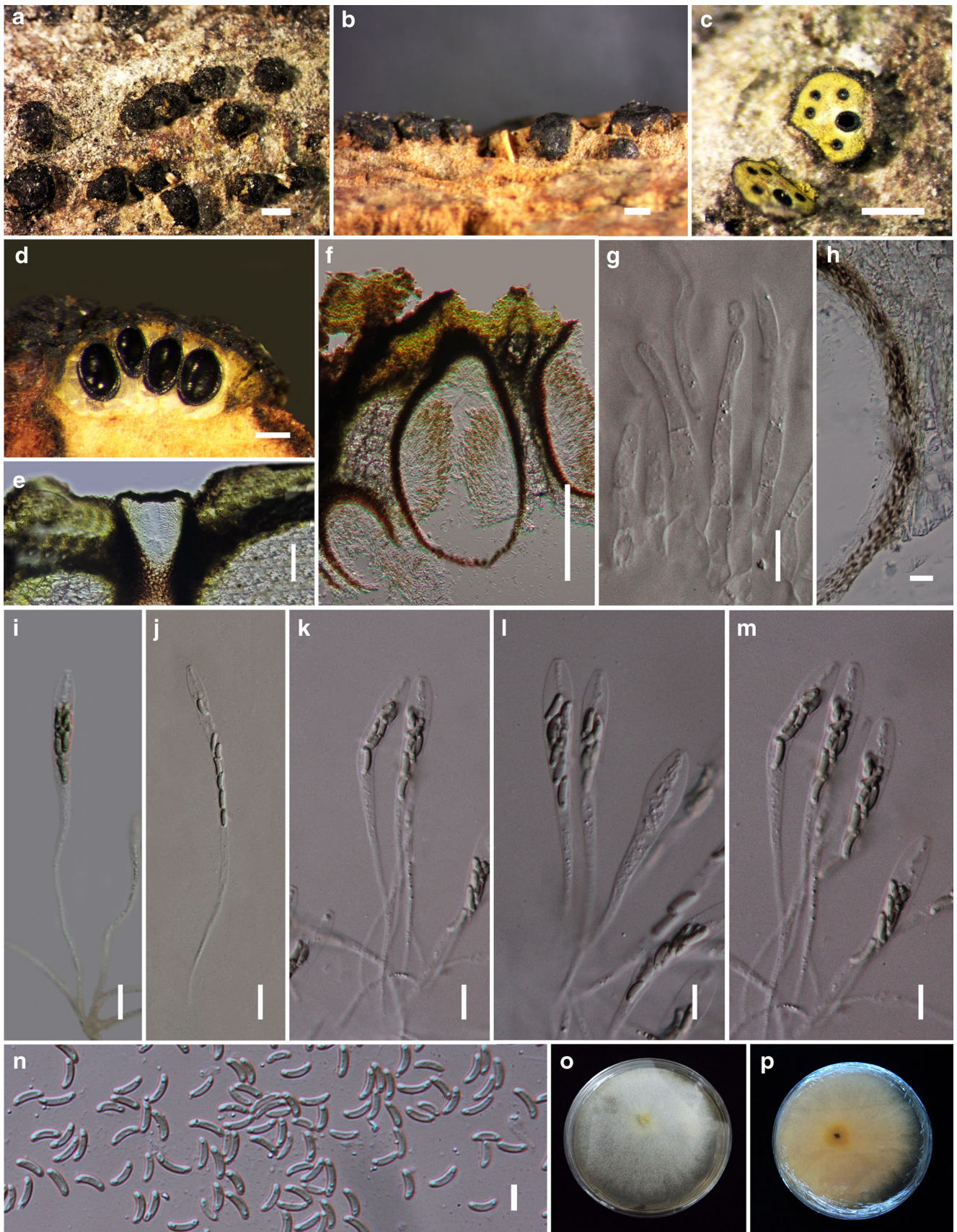
Type species: Graphostroma platystoma (Schwein.) Piroz., Can. J. Bot. 52 (10): 2131 (1974)

Basionym: *Diatrype platystoma* (Schwein.) Berk., Grevillea 4 (no. 31): 95 (1876)

Facesoffungi number: FoF 00711; Fig. 28.

Notes: Pirozynski (1974) observed a North American species resembling *Diatrype stigma* (Hoffm.) Fr. and placed it in a new monotypic genus *Graphostroma*, as *G. platystoma* (Schwein.) Piroz. Pirozynski (1974) observed an association between *Graphostroma* and a nodulisporium-like sp. in herbarium specimens and in culture which was identical to most of the conidial states of *Hypoxylon*. Therefore Pirozynski (1974) placed *Graphostroma platystoma* in *Xylariaceae*. Barr and Boise (1985) positioned *G. platystoma* as atypical in *Xylariaceae* and in Barr et al. (1993) introduced a new monotypic family for *Graphostroma* based on the combination of its nodulisporium-like conidial state and diatrypaceous sexual morph with allantoid ascospores. In the present phylogenetic analysis *Graphostroma platystoma* clusters together with the species belongs to *Hypoxylaceae* (Fig. 1), while in Maharachchikumbura et al. (2015) *Graphostromataceae* was placed between *Xylariaceae* and *Diatrypaceae*.

The current, preliminary phylogeny based on rDNA data raises some doubt as to whether the status of the *Graphostromataceae*, as a separate family, will be supported by molecular data. The species *G. platystoma* is defined by having a sexual morph similar to that of *Diatrypaceae*, while



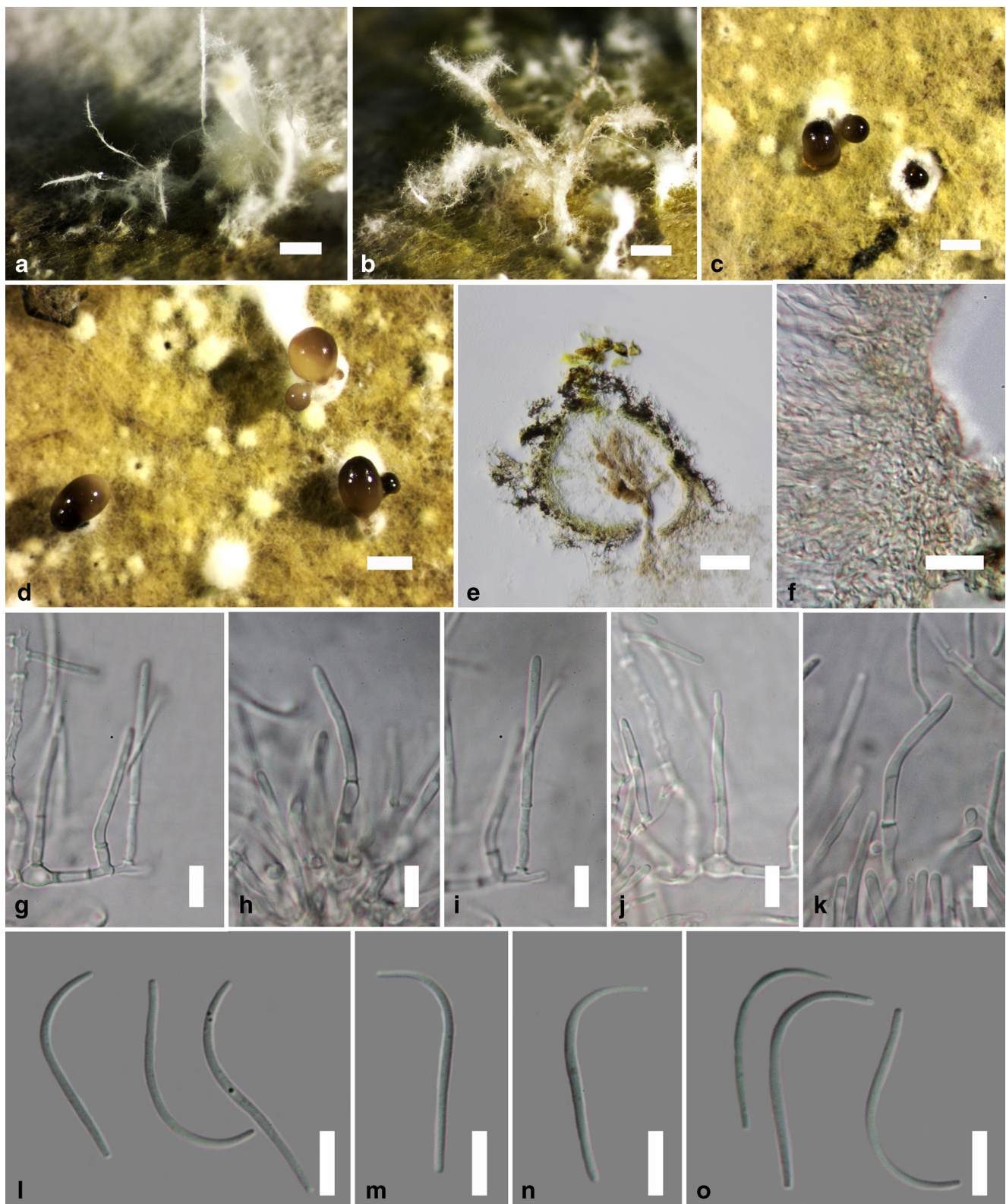
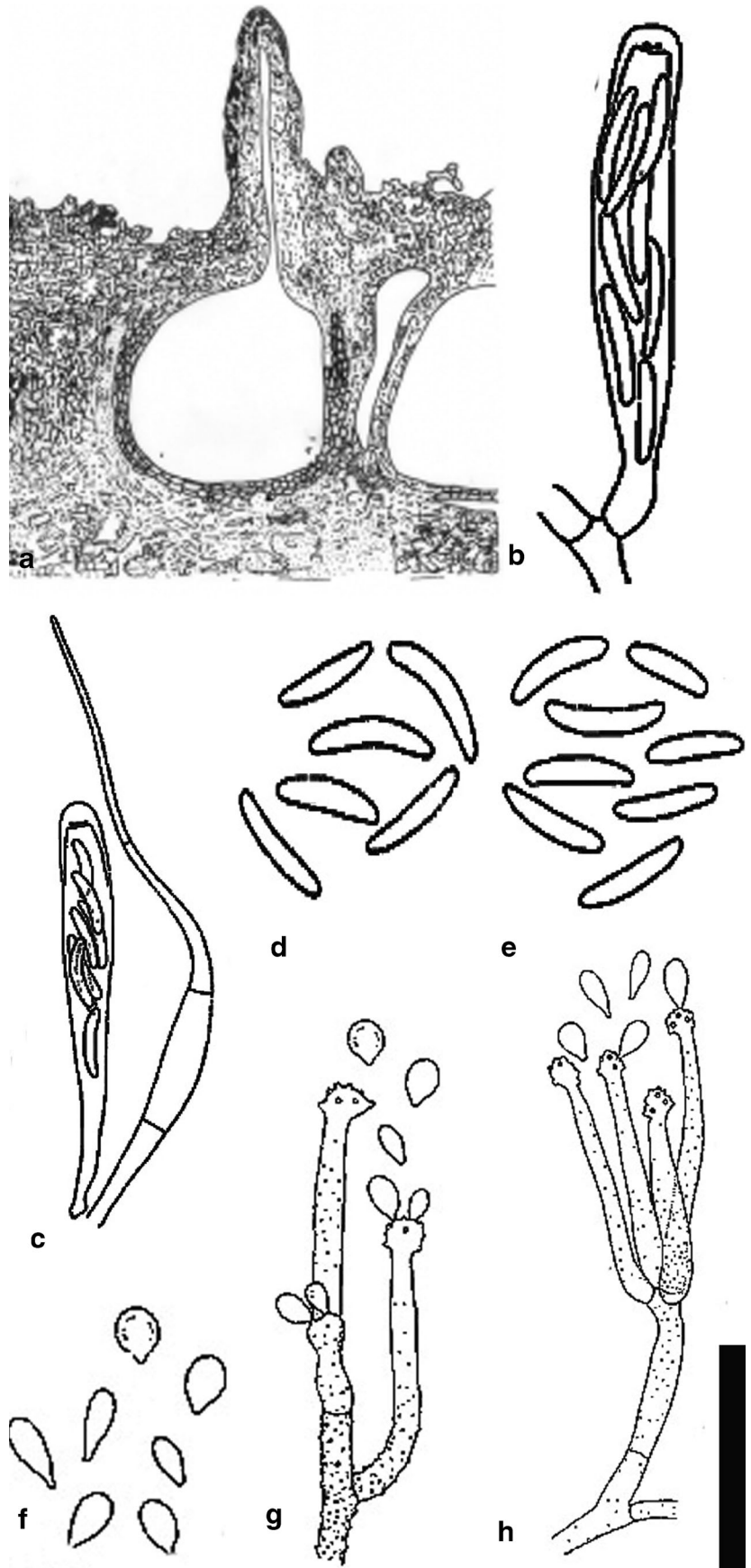


Fig. 27 Asexual morph of *Eutypa flavovirens* (MFLU 15–0741) **a, b** Aerial clumps formed by mycelium. **c, d** Conidiomata on MEA. **e** Cross section of conidioma. **f** Peridium. **g–k** Conidia attached to conidiophores. **l–o** Conidia. Scale bars: **a–d**=1 mm, **e**=100 μ m, **f**=50 μ m, **g–o**=10 μ m

showing the characteristic asexual morph of the hypoxylid *Xylariaceae*. In the concept of Barr, which heavily relied on

the spore morphology, the family was therefore regarded as intermediate between *Diatrypaceae* and *Xylariaceae*. On the

Fig. 28 *Graphostroma platystoma* (redrawn from Pirozynski 1974). **a** Ascomata in cross section. **b** Ascus and paraphyses from DAOM 127673. **c** Ascus from DAOM 75729. **d** Ascospores from DAOM 36086. **e** Ascospores from DAOM 65174. **f** Conidia. **g** Conidiophores and conidia from DAOM 134022. **h** Conidiophores and conidia from DAOM 36091. Scale bars: b–f=20 μ m



other hand, it has become clear that phylogenetic relationships within the *Xylariaceae* are corroborated by the type of asexual morph, and the current study clearly revealed a rather distant relationship of *Graphostroma* with *Diatrypaceae*. Morphologically similar xylariaceous genera with bipartite stromata such as *Biscogniauxia*, *Camillea* and *Obolarina* will need to be studied in detail to verify this hypothesis, using a multigene genealogy.

Hyponectriaceae Petr., *Annl. mycol.* 21 (3/4): 305 (1923)

Saprobic on dead plant matter. **Sexual morph:** Appearing as black, shiny spots on host surface or small black lines arising from cracks in bark. *Pseudostromata* present or lacking, if present, superficial, forming clypeus over the ascomata. *Ascomata* solitary or aggregated, immersed, erumpent or rarely somewhat superficial, globose to ovoid, upright or horizontal, brown to black. *Papilla* short, ostiolate with or without periphyses. *Peridium* comprising two layers, outer layer of brown, cells of *textura angularis*, inner layer of hyaline cells of *textura angularis*, in some genera cells are of *textura globosa*. *Hamathecium* of sparse, septate, paraphyses, tapering towards the apex, often deliquescing at maturity. *Asci* 8-spored, unitunicate, oblong, cylindrical or ellipsoidal, short pedicellate, with a J+ or J- apical apparatus. *Ascospores* overlapping biseriate, or fasciculate, hyaline, yellow to light brown, fusoid, isthmoid, elongate filiform, obovoid, or oblong, asymmetric or symmetric, unicellular or septate, smooth-walled or verruculose, with or without a mucilaginous sheath. **Asexual morph:** Undetermined.

Type genus: *Hyponectria* Sacc., *Michelia* 1 (no. 2): 250 (1878)

Notes: *Hyponectriaceae* was introduced by Petrak (1923) to accommodate both *Hyponectria* and *Anisostomula*. Seventeen genera were included into the family *Hyponectriaceae* by Hawksworth et al. (1995). Most genera were, however, excluded from the family by Hyde et al. (1998), while *Palmomyces* and *Charonectria* were added (Hyde et al. 1998; Rossman et al. 1999). In addition to *Hyponectria*, this family comprises of *Apiothyrium*, *Arecomyces*, *Arwidssonia*, *Cesatiella*, *Chamaeascus*, *Discosphaerina*, *Exarmidium*, *Frondicola*, *Micronectria*, *Pellucida*, *Physalospora*, *Phragmitensis*, *Pseudomassaria*, *Rachidicola* and *Xenothecium* (Wang and Hyde 1999; Sivanesan and Shivas 2002). This is a problematic family and it is not clear if it belongs in *Xylariales*. The type species *Hyponectria buxi* (DC.) Sacc. needs recollecting and sequencing as the sequence data in GenBank may be inaccurate (Jaklitsch and Voglmayr 2012). The other genera in this family should also be recollected and sequenced to establish affinities. In this paper we include 17 genera in *Hyponectriaceae*.

Type species: *Hyponectria buxi* (DC.) Sacc.

Hyponectria buxi (DC.) Sacc., *Michelia* 1 (no. 2): 250 (1878)

≡ *Sphaeria buxi* DC., in de Candolle & Lamarck, *Fl. franç.*, Edn 3 (Paris) 6: 146 (1815) Fig. 29.

Saprobic on leaves of *Buxus* sp. *Ascomata* immersed, depressed globose, visible as orange to brown dots on the host surface, coriaceous, ostiolate, solitary or mostly gregarious. *Ostirole* aperiphysate. *Peridium* one strata of 2 layers of cells *textura angularis* with thickened brown walls around ostirole. *Paraphyses* not observed. *Asci* 8-spored, unitunicate, cylindrical-clavate to clavate, short pedicellate, with an indistinct, J- apical apparatus. *Ascospores* overlapping biseriate or obliquely uniseriate, hyaline, ellipsoidal or oblong, straight or inequilateral, 1-celled, contents minutely guttulate, lacking a sheath.

Material examined: UK, Surrey, Mickleham, on leaves of *Buxus* sp., 1927, E.W. Mason no. 365 (IMI 16895).

Iodosphaeriaceae O. Hilber, in Hilber & Hilber, *The Genus Lasiosphaeria and Allied Taxa* (Kelheim): 7 (2002)

Facesoffungi number: FOF 00849; Fig. 30.

Saprobic on host surface. **Sexual morph:** *Ascomata* superficial, solitary, black, and easily removed from the substrate, *ascomata* covered with dark brown, setae-like hairs, comprising agglutinated mycelial strands, with a stellate arrangement, arising from cells at the perithecial surface. *Ostirole* pore-like, periphysate. *Peridium* comprising outer angular, pigmented, brown cells, inner cells flattened, hyaline. *Hamathecium* comprising numerous, hypha-like, septate, flexuose, paraphyses, slightly tapering towards the apex. *Asci* 8-spored, unitunicate, narrowly clavate, short-pedicellate or apedicellate, apically rounded, with a J+ subapical ring. *Ascospores* biseriate, allantoid, unicellular, hyaline, smooth-walled, lacking sheaths or appendages. **Asexual morph:** ceratosporium-like conidia have been observed on the surface of perithecia, but may not be related.

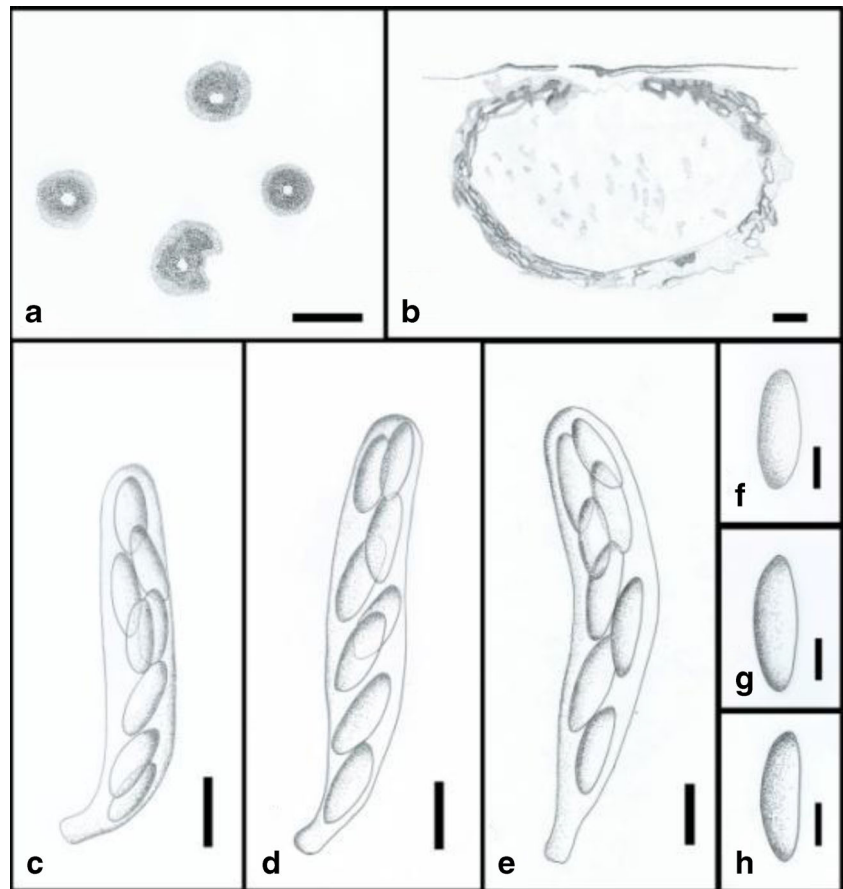
Notes: The family *Iodosphaeriaceae* was introduced by Hilber and Hilber (2002) to accommodate the genus *Iodosphaeria*. The genus is unique in the order *Amphisphaeriales* as it has superficial *ascomata* covered with dark brown, setae-like hairs, comprising agglutinated mycelial strands, with a stellate arrangement. Li et al. (2015b) introduced a new species, *Iodosphaeria tongrenensis* Li et al., bringing the total no. of species in the genus to nine. Li et al. (2015b) provided molecular data that showed this taxon clustered in *Amphisphaeriaceae sensu stricto* and in this study (Fig. 1) we confirm its distinctness as a family.

Type: *Iodosphaeria* Samuels et al., *Mycotaxon* 28 (2): 486 (1987)

Type species: *Iodosphaeria phyllophila* (Mouton) Samuels et al., *Mycotaxon* 28 (2): 486 (1987)

Material examined: NEW ZEALAND: Kaipara Harbour, Mt Auckland, Atuanui State Forest; *Cyathea dealbata*, November 1973, K.D. Hyde, GJS73-260 (PDD 32622, holotype).

Fig. 29 *Hyponectria buxi* (redraw from plate in Wang and Hyde (1999), IMI 16895) **a** Ascomata on host substrate. **b** Section of ascoma. **c–e** Asci. **f–h** Ascospores. Scale bars: a–b=40 μ m, c–h=16 μ m



Notes: When Samuels et al. (1987) introduced the genus *Iodosphaeria* they deposited a specimen collected in New Zealand in PDD and this was used in this study to illustrate the family.

Lopadostomaceae Daranagama & K.D. Hyde, *fam. nov.*

Index fungorum number: IF551174; *Facesoffungi number:* FoF 00071

Saprobic on dead wood. **Sexual morph:** *Pseudostromata* (for *Lopadostoma*) immersed to erumpent, visible as darkened areas, densely gregarious, scattered, compact. *Stromata* (for *Creosphaeria*) erumpent to nearly superficial, with abrupt margins, containing one to few perithecia, frequently coalescent in linear rows, dull black, waxy, roughened, flattened at the top, inconspicuous perithecial mounds. *Ascomata* multi-perithecial, single to multi-layered, arranged in a cluster, with long ostiolar necks (for *Lopadostoma*), with ostiolar canal lined with whitish material (for *Creosphaeria*). *Ostioles* umbilicate or at the same level as stromatal surface. *Peridium* amorphous, comprising dark brown to black cells. *Asci* (4–)8-spored, cylindrical, pedicellate, apically rounded, with a J+ apical apparatus. *Ascospores* uniseriate or partly biseriata, oblong, at first hyaline, turning light brown to nearly black, narrowly ellipsoid, smooth-walled, with full length germ slit.

Asexual morph: Libertella-like. *Conidiomata* convoluted or multi-loculate, with black pycnidial wall. *Conidiophores* di- or trichotomously branched, stipes yellow, above hyaline, smooth-walled, arranged in dense palisade. *Conidiogenous cells* terminal, cylindrical, smooth-walled, bearing conidial secession scars. *Conidia* hyaline, falcate, strongly curved to semicircular, unicellular.

Type: *Lopadostoma* (Nitschke) Traverso, Fl. ital. crypt., Pars 1: Fungi. Pyrenomycetae. Xylariaceae, Valsaceae, Ceratostomataceae 1 (2): 169 (1906)

Basionym: *Anthostoma* subgen. *Lopadostoma* Nitschke, Pyrenomyc. Germ. 1: 121 (1867)

Notes: One of the hallmarks of most xylariaceous taxa are the hyphomycetous asexual morphs. There are, however, certain exceptions where taxa produce coelomycetous asexual morphs that have affinities with other families. In our phylogenetic analysis *Lopadostoma* was placed outside *Xylariaceae* with *Creosphaeria sassafras* (Schwein.) Y.M. Ju et al. and appears as a separate monophyletic group. The same placement was also observed by Jaklitsch et al. (2014). *Lopadostoma* and *Creosphaeria* are not very similar in morphology and Ju et al. (1993) believe they should represent two different genera. Jaklitsch et al. (2014) revised the genus

Lopadostoma and also reported a *Libertella* asexual morph. *Creosphaeria* was introduced by Theissen (1910) with having soft, light coloured stromata. Petrini and Müller (1986) reported a *Libertella* asexual morph from culture. Ju et al. (1993) observed the same type of conidia in the sexual morph. *Lopadostoma* and *Creosphaeria* form separate monophyletic groups, in a distinct, but previously unrecognized evolutionary line. Thus we introduce a new family, *Lopadostomaceae*, in the order *Xylariales*, to accommodate *Lopadostoma* and *Creosphaeria*. *Creosphaeria* may later require its own family following more collections.

Lopadostoma (Nitschke) Traverso, Fl. ital. crypt., Pars 1: Fungi. Pyrenomycetae. Xylariaceae, Valsaceae, Ceratostomataceae 1 (2): 169 (1906)

Facesoffungi number: FoF 00706

Saprobic on outer surface of wood and branches. **Sexual morph:** *Pseudostromata* subglobose to conical, pustulate or widely effuse, immersed, erumpent from bark, surrounded by a narrow, black, carbonized encasement visible as “black line”, containing one to many groups of perithecia, ectostromatic disc visible, surrounded by blackened bark surface visible as a darkened area. *Ectostromatic disc* discrete to fused, convex or pulvinate, flattened or raised, dark brown, grey or black, smooth or tubercular. *Ostiole* inconspicuous and umbilicate, rarely convex, shiny black, or distinctly projecting and cylindrical. *Ascomata* clustered in valsoid groups, single to double layers or rarely multi-layers, subglobose or flask-shaped. *Peridium* amorphous, comprising dark brown to black cells, with convergent ostiolar necks. *Hamathecium* comprising numerous, long, apically free, rarely branched paraphyses. *Asci* 8-spored, unitunicate, cylindrical, pedicellate, with a globose to ellipsoid, J+ apical apparatus, containing a lower flat ring. *Ascospores* unicellular, oblong to narrowly ellipsoid, at first hyaline, becoming pale brown and finally dark to blackish brown at maturity, smooth-walled, germ slit straight through entire spore length, with 2 large guttules when immature and a narrow hyaline epispore. **Asexual morph:** Coelomycetous, *Conidiophores* libertella-like, hyaline, rarely branched. *Conidia* unicellular, hyaline, falcate, with acute upper end and narrowly truncate lower end, curvature varying according to the species (Jaklitsch et al. 2014).

Type species: Lopadostoma turgidum (Pers.) Traverso, Fl. ital. crypt., Pars 1: Fungi. Pyrenomycetae. Xylariaceae, Valsaceae, Ceratostomataceae 1 (2): 170 (1906)

Basionym: Sphaeria turgida Pers., Observ. mycol. (Lipsiae) 1: 17 (1796)

Facesoffungi number: FoF00708; Fig. 31.

Notes: Lopadostoma turgidum was lectotypified by Lu and Hyde (2000), which turned out to be invalid because the selected material was not from the original collection. Hence, Jaklitsch et al. (2014) observed Persoon’s original material (which is impossible to observe without actually going to L)

Fig. 30 *Iodosphaeria phyllophila* (holotype) **a** Herbarium packet. **b** Herbarium material. **c, d** Ascomata on the host substrate. **e** Section of ascoma. **f** Peridium. **g** Ceratosporium conidia seen from the surface of perithecia. **h–i** J+ subapical ascus ring in Melzer’s reagent. **j–m** Asci (m stained in Melzer’s reagent). **n–q** Ascospores. Scale bars: c=1 mm, d=500 µm, e=50 µm, f=10 µm, g=20 µm, h–i=5 µm, j–m=10 µm, n–q=5 µm

and epitypified *Lopadostoma turgidum* with a fresh collection.

Material examined: AUSTRIA, Niederösterreich, Gaaden, 3 December 2011, H. Voglmayr (WU 32085, **epitype**).

Melogrammataceae G. Winter [as ‘Melogrammeae’], Rabenh. Krypt.-Fl., Edn 2 (Leipzig) 1.2: 797 (1886)
Facesoffungi number: FoF 00840

Saprobic on woody plants. **Sexual morph:** *Stromata* solitary, scattered or aggregated in lines, superficial, erumpent from bark, pulvinate or discoid, soft textured, internally comprising reddish-brown, pseudoparenchymatous cells, apex papillate with black ostiole. *Ascomata* perithecial, sometimes confluent, immersed, globose, medium, dark brown to black, ostiole periphysate. *Peridium* comprising rows of cells, brown externally, hyaline internally. *Hamathecium* of septate, hyaline, paraphyses. *Asci* 8-spored, unitunicate, clavate or fusoid, straight, curved or sigmoid, short pedicellate, with shallow, nonamyliod, apical ring. *Ascospores* hyaline or brown, filiform, straight or cylindrical or falcate, 0–3-septate, end cells slightly entirely lighter or only at their tips, end narrowly rounded to subacute, with a smooth narrow hyaline perispore, often with one large guttule in each cell, wall smooth. **Asexual morph:** Coelomycetous. *Conidiophores* long, cylindrical, stiffly upright, septate, verticillate and whorled or not. *Conidiogenous cells* holoblastic, proliferating sympodially, hyaline, thin. *Conidia* elongate, falcate.

Type: Melogramma Fr., Summa veg. Scand., Section Post. (Stockholm): 386 (1849)

Type species: Melogramma campylosporium Fr., Summa veg. Scand., Section Post. (Stockholm): 386 (1849)

Notes: Melogramma was introduced by Fries (1849), with *Melogramma campylosporium* as the type species. The family *Melogrammataceae* was introduced by Winter (1884–1886) to accommodate *Botryosphaeria*, *Endiothia*, *Valsaria* and *Melogramma*. This family is characterized by pulvinate or discoid stromata, with papillate black ostiolar dots, fusoid, falcate, curved or sigmoid asci, and often strongly curved ascospores (Jaklitsch and Voglmayr 2012).

Melogramma campylosporium Fr., Summa veg. Scand., Section Post. (Stockholm): 386 (1849)

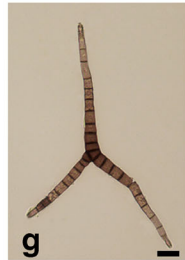
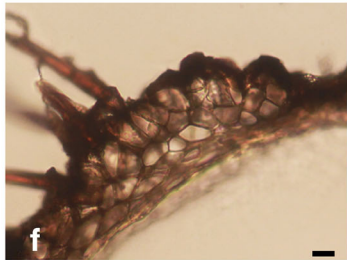
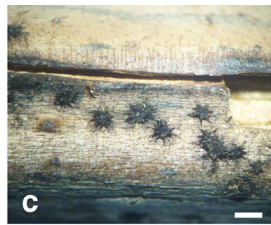
Facesoffungi number: FoF 00841, Fig. 32

Basionym: Sphaeria melogramma (Bull.) Pers., Syn.meth. fung. (Göttingen) 1:13 (1801).

Possible synonyms (see Index Fungorum 2015)

Saprobic on dead shoots of *Carpinus betulus* L. **Sexual morph:** *Stromata* 545–694 µm high, 1047–1668 µm diam.,

PDD 32622 **Herbarium PDD**
Landcare Research, Auckland, New Zealand
Iodosphaeria phyllophila (Mouton) Samuels, E. Müll. & Petrini
1987
Association: *Cyathea dealbata* NZ Area: Auckland
Country: New Zealand
Locality: Kaipara Harbour, Mt Auckland, Aituanui State Forest
Collector: G.J. Samuels No.: GJS 73-260 Date: 1973/11/17
Determiner: G.J. Samuels



solitary, scattered or aggregated in lines, superficial, erumpent from bark, pulvinate or discoid, soft textured, reddish-brown, internally comprising pseudoparenchymatous cells, apex papillate with black ostioles. *Ascomata* perithecial, (138–) 163–287 (–297) μm high \times (73–) 135–278 (–284) μm diam. (\bar{x} = 225 \times 206 μm , n = 10), sometimes confluent, immersed, globose, dark brown to black, ostiolate. *Ostiole* 54–72 μm diam., with periphyses. *Peridium* 16–42 μm wide, comprising two layers, outer layer, composed of dark brown to dark cells of *textura angularis* to *prismatica*, inner layer hyaline, with thin-walled cells. *Hamathecium* of 3–4 μm diam., septate, paraphyses. *Asci* (82–) 93–119 (–132) \times (10–) 11–14 (–15) μm (\bar{x} = 106 \times 13 μm , n = 30), 8-spored, unitunicate, clavate or fusoid, straight, curved or sigmoid, short pedicellate, with shallow, J-apical ring. *Ascospores* (23.5–) 33–42 (–46) \times (3.5–) 4–5 (–6) (\bar{x} = 37.6 \times 4.7 μm , n = 50), young ascospores hyaline, straight and 0–1-septate, mature ascospores brown, falcate, often strongly curved, 3-septate, end cells slightly entirely lighter or only at their tips, ends narrowly rounded to subacute, with a smooth, narrow, hyaline perispore; often with one large guttule in each cell, smooth-walled.

Material examined: AUSTRIA, Styria, Graz, distr. Mariatrost, on the north-facing hillside below the church, clearing, 47°06'29"N, 15°29'32"E, MTB 8858/4, c. 440 m alt.; 5 November 2006, C. Scheuer #5321 (S, F123341).

Pseudomassariaceae Senan. & K.D. Hyde, **fam. nov.**

Index fungorum number: IF551208; **Facesoffungi number:** FoF 00843

Saprobic on recently dead twigs attached to the trees, appearing as black dots, below small raised areas of bark, opening through long fissures. **Sexual morph:** *Ascomata* perithecial, scattered, solitary or aggregated, immersed, depressed globose to ellipsoid, coriaceous, black, ostiolate, papillate. *Ostiolar papilla* short, cylindrical, wide at the apex, periphysate. *Peridium* comprising strongly compressed, narrow, light to medium brown, thin-walled cells of *textura angularis*. *Hamathecium* comprising numerous, apically narrow, basally wide, hyaline paraphyses. *Asci* 8-spored, unitunicate, clavate to fusoid, short pedicellate, apically rounded, with J+, or J– apical ring. *Ascospores* biseriate or partially uniseriate, hyaline, broadly ellipsoid, oblong or narrowly clavate, mostly apiosporous, with a rounded to subconical, small, lower cell or equally uniseptate, straight or curved, thick-walled, smooth-walled. **Asexual morph:** Hyphomycetous, *Setae* erect, dark brown, straight to flexuous, arising from superficial hyphae, branched at base, subcylindrical, tapering to obtuse apex, 3–7-septate, basal cell slightly swollen. *Conidiophores* subcylindrical to setiform, with radially lobed basal cells, pale brown, smooth, arising from superficial mycelium, straight to flexuous, 1–10-septate. *Conidiogenous cells* terminal or lateral, polyblastic, subcylindrical to somewhat clavate, pale brown, smooth, with 1–4 denticulate loci. *Conidia* lageniform, distal end free,

Fig. 31 *Lopadostoma turgidum* (epitype). **a** Herbarium specimen. **b** Pseudostromata in face view. **c** Ectostromatic disc. **d, e** Transverse pseudostroma sections. **f, g** Vertical pseudostroma sections. **h** Apical ring bluing in Melzer's reagent. **i** Peridium. **j** Paraphyses. **k–o** Asci. **p, r, s** Ascospores showing germ slit. **q** Ascospore. Scale bars: **b** = 500 μm , **c–e** = 200 μm , **f–g** = 100 μm , **h, j** = 10 μm , **l** = 20 μm , **k–o** = 50 μm , **p–s** = 5 μm

truncate, rostrate at proximal end, pale brown, with a subhyaline transverse band at equatorial zone, smooth, guttulate, aseptate.

Notes: *Pseudomassaria* was introduced by Jaczewski (1894) to accommodate *Sphaeria chondrospora*. This genus has been synonymised under *Aplacodina*, *Apiospora* and *Apiosporella* (Barr 1964). Hyde et al. (1998) however, assigned this genus to family *Hyponectriaceae* introducing a new species as *Pseudomassaria huwerae*. Lumbsch and Huhndorf (2010) also listed *Pseudomassaria* under *Hyponectriaceae* as did Maharachchikumbura et al. (2015). Combined gene analysis herein (Fig. 1), show the taxonomic placement of *Pseudomassaria* different from *Hyponectriaceae*. This result confirms the taxonomic placement suggested by Jaklitsch and Voglmayr (2012). The asexual morph of *Pseudomassaria carolinensis* M.E. Barr & Hodges was reported as *Beltraniella portoricensis* (F. Stevens) Piroz. & S.D. Patil (Hodges and Barr 1971). All species of *Pseudomassaria* species do not have similar morphological characters and phylogenetically they do not cluster together. *Leiosphaerella* also shows molecular and morphological similarities with *Pseudomassaria* (Jaklitsch and Voglmayr 2012). Single gene sequence analyses of ITS and LSU regions in Jaklitsch and Voglmayr (2012) indicate a separate taxonomic grouping for the *Pseudomassaria*, *Leiosphaerella* clade. Therefore in this study we introduce a new family *Pseudomassariaceae* to accommodate *Leiosphaerella* and *Pseudomassaria*.

Type: *Pseudomassaria* Jacz., Bull. Herb. Boissier 2: 663 (1894)

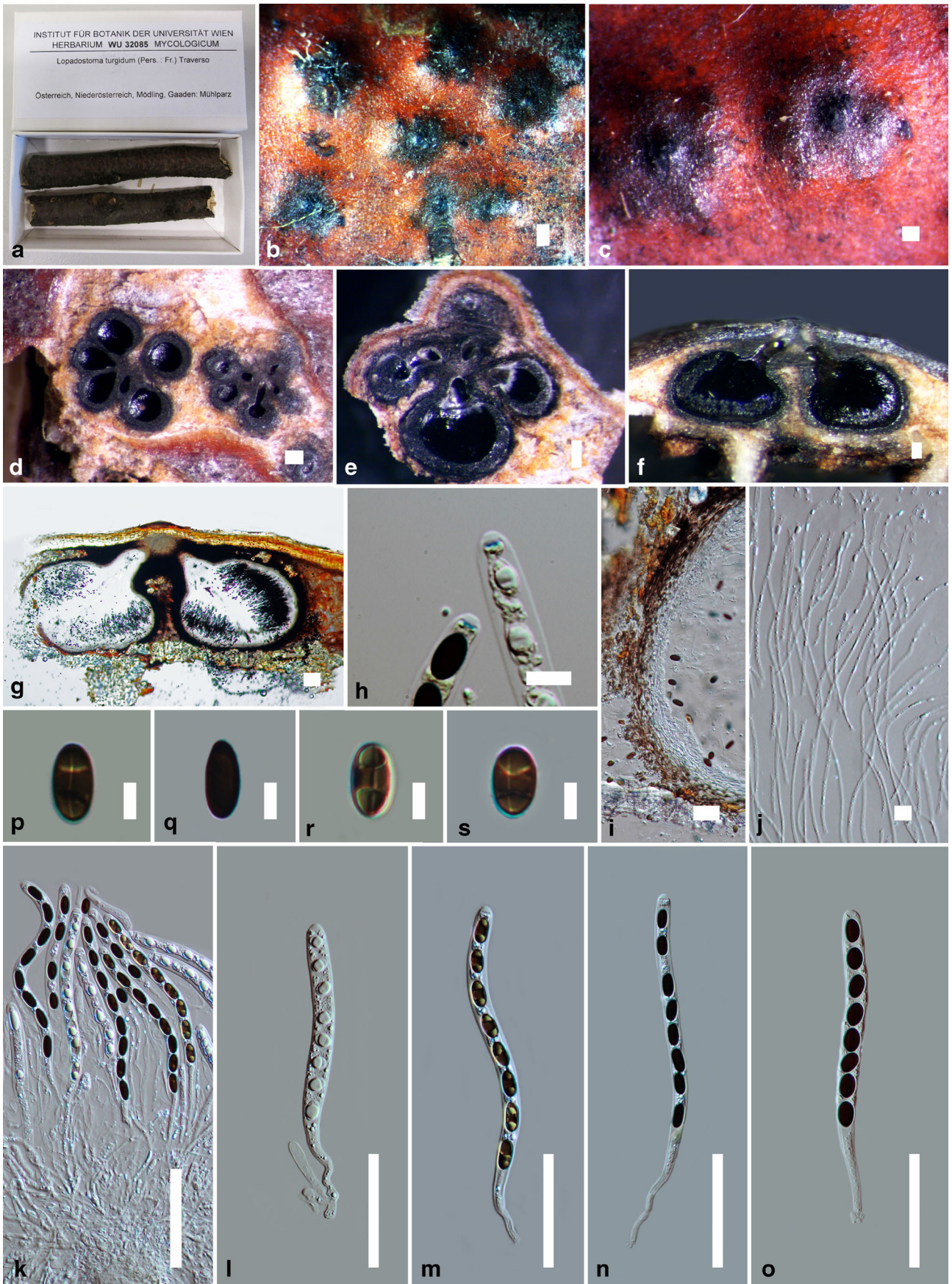
Type species: *Pseudomassaria chondrospora* (Ces.) Jacz., Bull. Herb. Boissier 2: 663 (1894)

≡ *Sphaeria chondrospora* Ces., Hedwigia 1: tab. 11, Fig. 2 (1855)

Pseudomassaria Jacz., Bull. Herb. Boissier 2: 663 (1894)

Facesoffungi number: FoF 00844

Saprobic on dead twigs attached to trees, appearing as black dots, below small bumps on the bark. **Sexual morph:** *Ascomata* perithecial, scattered, solitary or aggregated, immersed, depressed globose, coriaceous, black, ostiolate, papillate. *Ostiolar papilla* short, cylindrical, wide at the apex, even with the bark surface, periphysate. *Peridium* comprising narrow, compressed, light brown, thin-walled, cells of *textura angularis* at the base and thick-walled, light brown to hyaline, isodiametric cells around the ostiole. *Hamathecium* comprising numerous, apically narrow, basally wide, hyaline



paraphyses. *Asci* 8-spored, unitunicate, clavate to fusoid, short pedicellate, apically rounded, with a J+ or J- apical ring. *Ascospores* biseriate or partially uniseriate, hyaline, broadly ellipsoid, oblong or narrowly clavate, apiosporous with a rounded to subconical small lower cell, straight or curved, thick-walled, smooth-walled. **Asexual morph:** Hyphomycetous, *Setae* erect, dark brown, straight to flexuous, arising from superficial hyphae, branched at base, subcylindrical, tapering to obtuse apex, 3–7-septate, basal cell slightly swollen. *Conidiophores* subcylindrical to setiform, with radially lobed basal cells, pale brown, smooth, arising from superficial mycelium, straight to flexuous, 1–10-septate. *Conidigenous cells* terminal or lateral, polyblastic, subcylindrical to somewhat clavate, pale brown, smooth, with 1–4 denticulate loci. *Conidia* pale brown, lageniform to rhomboid, distal end free, proximal end rostrate, with a subhyaline transverse band at equatorial zone, smooth-walled, guttulate, aseptate.

Pseudomassaria chondrospora (Ces.) Jacz., Bull. Herb. Boissier 2: 663 (1894).

Facesoffungi number: FoF 00845; Fig. 33.

Saprobic on dead twigs of *Tilia cordata* Mill., appearing as black spots, with long fissures on the host surface. **Sexual morph:** *Ascomata* 610–625 μm high, 765–800 μm diam., (\bar{x} = 620 \times 775 μm , $n=20$) solitary or aggregated, scattered, immersed, depressed globose to ellipsoid, brown, short papillate, ostiolate. *Ostiole* short, cylindrical, wide at the apex, even with the bark surface, inner layer of ostiole covered with hyaline, paraphyses. *Peridium* 25–45 μm wide, (\bar{x} = 45 μm , $n=20$), comprising 5–7 layers of narrow, compressed, light brown, thin-walled cells of *textura angularis* at the base and thick-walled, light brown to hyaline, isodiametric cells around the ostiole. *Hamathecium* comprising 10–17 μm wide (\bar{x} = 12 μm , $n=20$), septate, branched paraphyses. *Asci* 200–250 \times 70–80 μm (\bar{x} = 226 \times 77 μm , $n=20$), 8-spored, unitunicate, broadly ellipsoidal, clavate to fusoid, short pedicellate, apex rounded, with an indistinct, J- apical apparatus. *Ascospores* 65–100 \times 20–35 μm (\bar{x} = 82 \times 26.5 μm , $n=20$), biseriate or partly obliquely uniseriate, hyaline, broadly ellipsoid, oblong or clavate, apiosporous, with a rounded to subconical, small lower cell, straight or rarely curved, thick-walled, smooth-walled, granulate. **Asexual morph:** Undetermined.

Culture characters: Cultures growing on MEA reaching 1 cm. diam. at 18 °C, after 10 days. Slow growing, irregular colony, margin cream yellow, central region gray and tightly adpressed to the media, outer region woolly, serrate to smooth margin.

Material examined: ITALY, Province of Forlì-Cesena, Premilcuore, Fiumicello, on branch of *Tilia cordata*, 24 April 2013, Erio Camporesi, IT 1200 (MFLU 15–0729, **reference specimen designated here**); living culture, MFLUCC

Fig. 32 *Melogramma campylosporum* (S, F123341). **a** Herbarium packet. **b** Host. **c, d, f** Stromata on wood surface. **e** Paraphyses of ascomata. **g** Peridium. **h–l** *Asci*. **m** Paraphyses. **n–q** *Ascospores*. Scale bars: c, d, f=500 μm , e, g–m=30 μm , n–q=15 μm

15–0545, ICMP. *Ibid.* MFLU 15–0729bis, MFLU 15–0729tris.

Notes: *Pseudomassaria chondrospora* is the generic type of *Pseudomassaria*. However we could not locate the type material of *Pseudomassaria chondrospora* and there is no information of host and locality. However, Jaklitsch and Voglmayr (2012) illustrated and described the *Pseudomassaria chondrospora* (WU 31321) collected from twigs of *Tilia platyphyllos* and we compared morphological characters of our collection with that illustration. As well as Mega blast search results for LSU of our strain gives closest match as *Pseudomassaria chondrospora* (PC1, JF440982; Identity=1055/1097 (96 %), Gaps=20/1097 (1 %)). Hence considering both morphology and phylogeny and lacking of information about host and locality, we designate our collection as a reference specimen of *P. chondrospora* (sensu Ariyawansa et al. 2014).

Pseudomassaria corni (Sowerby) Arx, Ber. schweiz. bot. Ges. 62: 349 (1952)

Basionym: *Sphaeria corni* Sowerby, Col. fig. Engl. Fung. Mushr. 3: pl. 370 (1803)

Facesoffungi number: FoF 00846; Fig. 34

Saprobic on dead twigs of *Cornus sanguine* L., appearing as black, shiny, dots on host surface. **Sexual morph:** *Ascomata* 195–240 μm high, 280–315 μm diam., (\bar{x} = 222 \times 299 μm , $n=20$), solitary or aggregated in groups, scattered, immersed, globose, brown, ostiolate. *Ostiole* short, wide, cylindrical. *Peridium* comprising two stratum, outer 5–6 layers of dark brown, cells of *textura globulosa*, inner 1–2 layers of narrow, compressed, hyaline to light brown, thin-walled, cells of *textura angularis*. *Hamathecium* comprising very few, hyaline, septate paraphyses. *Asci* 55–80 \times 12–15 μm (\bar{x} = 67 \times 13 μm , $n=20$), 8-spored, unitunicate, clavate to fusiform, short pedicellate, apex rounded with indistinct, J- apical apparatus. *Ascospores* 16.5–17.5 \times 6–7.5 μm (\bar{x} = 17 \times 6.5 μm , $n=20$), biseriate to multiseriate, hyaline, oblong or clavate, ends pointed, unicellular, thick-walled, smooth-walled. **Asexual morph:** Undetermined.

Culture characters: Cultures growing on MEA at 18 °C, after 14 days reaching 2 cm, with circular, yellowish white, colonies, tightly adpressed to the media, woolly, loosely arranged, margin smooth.

Material examined: ITALY, Province of Forlì-Cesena [FC], Santa Sofia, Camposonardo, on *Cornus sanguine*, 5 May 2013, Erio Camporesi, IT 1219 (MFLU 15–0728, **reference specimen designated here**), living culture, MFLUCC 15–0544=ICMP. *Ibid.* MFLU 15–0728bis, MFLU 15–0728tris, **paratypes**).

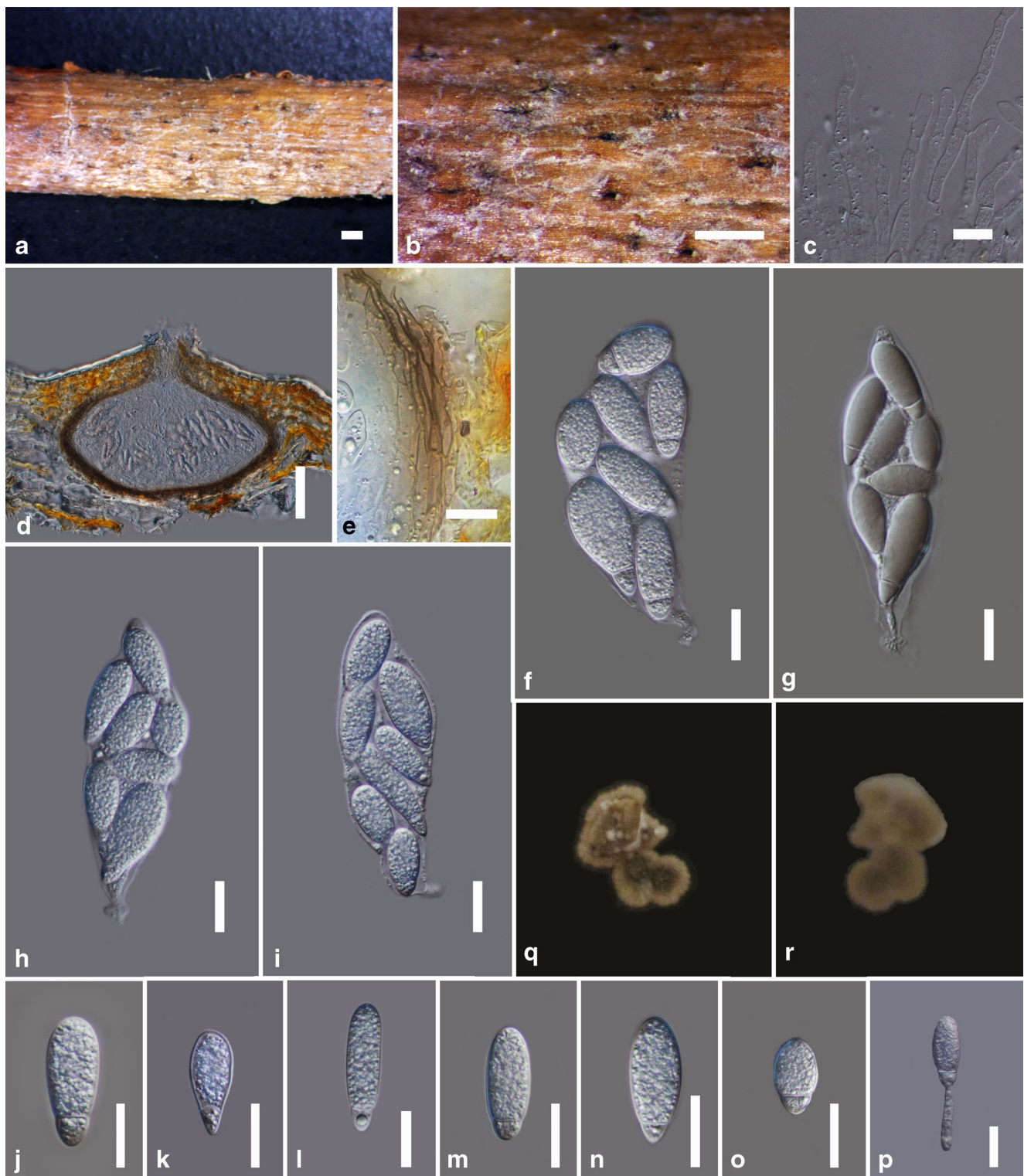


Fig. 33 *Pseudomassaria chondrospora* (reference specimen). **a, b** Appearance of ascomata on host substrate. **c** Paraphyses. **d** Cross section of ascoma. **e** Peridium. **f–i** Asci. **j–p** Ascospores. **q** Culture from upper surface. **r** Culture from lower surface. Scale bars: a, b=500 μ m, d=100 μ m, e, e–p=10 μ m

Vialaeaceae P.F. Cannon, Mycol. Res. 99 (3): 368 (1995)

Facesoffungi number: FoF 00686

Biotrophic, parasitic or endophytic on dead plant matter, often on dead twigs attached to trees. **Sexual morph:**

Pseudostroma (pseudoclypeus) absent or if present, immersed, ellipsoidal, as slightly raised black dots on substrate. *Ascomata* perithecial, solitary or aggregated, immersed, globose to subglobose, coriaceous, ostiolate, with immersed,

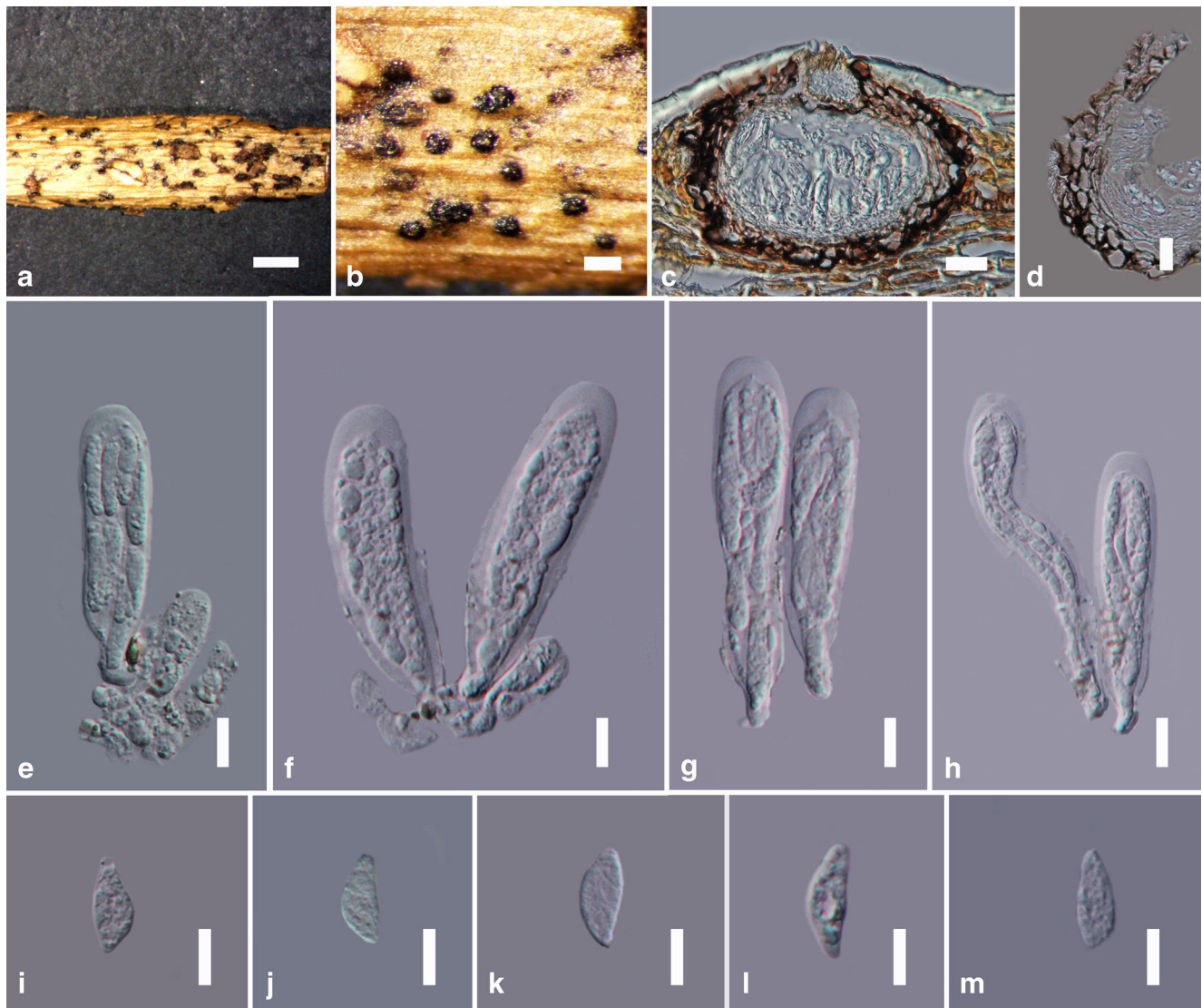


Fig. 34 *Pseudomassaria corni* (reference specimen) **a, b** Ascomata on substrate. **c** Cross section of ascoma. **d** Peridium. **e–h** Asci. **i–m** Ascospores. Scale bars: a=500 μ m, b=200 μ m, c=20 μ m, d–m=10 μ m

periphysate, ostiolar canal, sometime converging and fusing into the centre of the pseudostroma and opening through a common ostiole, black to brown. *Papilla* long, sometimes distal end curving towards the substrate or immersed ostiolar canal. *Periphyses* hyaline, filamentous. *Peridium* comprising several layers of slightly flattened, strongly melanized, thick-walled cells of *textura globulosa* or *textura angularis* with peridial pores between cells. *Hamathecium* comprising few, filiform, rarely branched, septate, hyaline, paraphyses sometimes apically swollen and shorter than asci. *Asci* 8-spored, unitunicate, cylindrical, apex rounded, short pedicellate, apex obtuse or truncate, with a J+ sub-apical ring. *Ascospores* biseriolate, triseriolate to fasciculate, sometimes weakly helically coiled, 1–3-septate, hyaline, with two fusiform end cells, tapering gradually to acute ends and towards the central portion, joined by a narrow, long isthmus. **Asexual morph:**

Ceolomycetous. *Conidiomata* pycnidia, superficial, solitary, scattered, globose, with slimy, shining spore mass and basal mycelium forming thick, black strands. *Conidiophores* erect, branched, septate, hyaline. *Conidiogenous cells* phialidic, integrated, in small whorls, lageniform to cylindrical, hyaline. *Conidia* oblong to ellipsoidal, one-celled, hyaline smooth-walled, with a truncate abscission scar.

Type: Vialaea Sacc., Bull. Soc. mycol. Fr. 12: 66 (1896)

Notes: Vialaeaceae was used by Schrantz (1960) as “Vialaeacees” and formally established as *Vialaeaceae* by Cannon (1995). This is a monotypic family comprising *Vialaea* (Maharachchikumbura et al. 2015). Fungal members of this family are endophytes or weak pathogens causing cankers on young twigs and on older branches of trees (Senanayake et al. 2014).

Vialaea Sacc., Bull. Soc. mycol. Fr. 12: 66 (1896)

Facesoffungi number: FoF 000011

Biotrophic, parasitic or *endophytic* in twigs of trees, eventually saprobic. **Sexual morph:** *Pseudostromata* lacking or if present, immersed in host tissues, with brown to black tissues around immersed neck. *Ascomata* perithecial, immersed, solitary or aggregated in circular groups with ostioles converging in their centre, globose or subglobose, coriaceous, somewhat flattened, black to brown. *Ostiolar canal* elongate, dark brown to black, periphysate. *Peridium* composed of several layers of slightly flattened, strongly melanized, thick-walled cells of *textura globulosa* or *textura angularis* with peridial pores between cells. *Hamathecium* comprising poorly developed, thin-walled, hyaline, septate, paraphyses, shorter than the asci. *Asci* 8-spored, unitunicate, cylindrical, sometimes tapering towards the apex or base, short pedicellate or sessile, thin-walled except at the apex, apex obtuse or truncate, subapical ring, J+, subconical. *Ascospores* biseriolate, triseriate to fasciculate, sometimes weakly helically coiled, 1–3-septate, hyaline, with two fusiform end cells, joined by a narrow, long isthmus. **Asexual morph:** Coelomycetous, *Conidiomata* pycnidial, superficial, solitary, globose. *Conidiophores* erect, branched, septate, hyaline. *Conidiogenous cells* enteroblastic, annelidic, proliferating percurrently to produce small, hyaline, ellipsoidal conidia. *Conidia* oblong to fusiform, one-celled, hyaline and smooth-walled.

Vialaea mangiferae Senan. & K.D. Hyde, Sydowia 66 (1): (2014); Fig. 35

Notes: This species was introduced in Senanayake et al. (2014) and we illustrate both sexual and asexual morph here.

Material examined: THAILAND, Chiang Rai Province, Muang District, near Bandu, Baan Khuakhae, at 31 M. 17, (19° 59' 52.05" N; 99° 49' 25.15" E), on twigs of *Mangifera indica*, 15 November 2012, K.D. Hyde, CHUNI001 (MFLU 13–0342, **holotype**).

Notes: *Vialaea* was introduced and is typified by *Vialaea insculpta* (Fr.) Sacc. (Saccardo 1896) and placed in *Amphisphaeriaceae* (*Xylariales*) based on the J+ apical ring (Shoemaker et al. 2013). Cannon (1995) excluded *Vialaea* from *Amphisphaeriaceae* and proposed a new family, *Vialaeaceae*, for *Vialaea* species, based on the stromata, ascomata and ascal characteristics, as well as nutritional strategy as a weak pathogen. *Vialaea* comprises of *V. insculpta* (Fr.) Sacc., *V. minutella* Petr., and *Vialaea mangiferae* Senanayake & K.D. Hyde (Senanayake et al. 2014). *Vialaea bambusae* Hara and *V. ingae* Rehm were excluded from the genus by Cannon (1995). The above placements were based on morphology and LSU gene sequences analysis has also shown that *Vialaeaceae* is a distinct family in the order *Xylariales* (Shoemaker et al. 2013; McTaggart et al. 2013; Senanayake et al. 2014; Maharachchikumbura et al. 2015).

Xylariaceae Tul. & C. Tul. [as 'Xylariei'], Select. fung. carpol. (Paris) 2: 3 (1863)

Index fungorum number: IF81528, *Facesoffungi* number: FoF00070

Saprobic, pathogenic, parasitic or *endophytic* in wood, leaves and fruits, dung inhabitants, and associated with insect vectors. **Sexual morph:** *Stromata* extremely variable in size, shape and colour, erect or applanate or effused–pulvinate or sometimes rudimentary, arising singly or aggregated, with 1 to many ascomata, ostiolate, with or without extractable stromatal pigments, bipartite or unipartite. *Ascomata* variable in size and shape, globose-pyriform, embedded in the stroma, single or multi-layered. *Hamathecium* comprised of hyphoid, filamentous, septate paraphyses embedded in a gelatinous matrix. *Asci* 4–8-spored, unitunicate, cylindrical to clavate, pedicellate, apically rounded, with or without a J+ or J– apical apparatus or with apical thickenings. *Ascospores* uniseriate-biseriate (except for the genus *Phylacia*), brown to black, rarely hyaline, 1–2-celled, variously-shaped, mostly with a germ slit. *Perispore* dehiscent or lacking smooth or with patterns. **Asexual morph:** Two major types of asexual morph reported are nodulisporium-like and geniculosporium-like as defined by Bitzer et al. (2008), featuring hyaline to light brown, smooth, branched conidiophores bearing hyaline, roughened or smooth, ellipsoidal conidia. Several other hyphomycetous and coelomycetous genera have been linked to *Xylariaceae* (Crous et al. 2014).

Type: *Xylaria* Hill ex Schrank, Baier. Fl. (München) 1: 200 (1789).

Type species: *Xylaria hypoxylon* (L.) Grev., Fl. Edin.: 355 (1824)

Possible synonymy: See Index Fungorum (2015)

Notes: The family *Xylariaceae* was introduced by Tulasne and Tulasne (1863) using the term "Xylariei". The rank was not certain as it did not address the family concept (Stadler et al. 2014). Numerous studies have since contributed to the knowledge of the family (i.e., Dennis 1957, 1961; Læssøe et al. 1989; Miller 1961; Ju and Rogers 1996) and recent studies have revised the family using ultra-structural data of ascal and ascospore characters. Chemotaxonomic data have also played an important role in the identification and characterization of the stromatic *Xylariaceae* (Whalley and Edwards 1995; Bitzer et al. 2008; Stadler et al. 2001). Ju and Rogers (1996) used stromatal pigments to characterize *Hypoxylon*, while Stadler et al. (2014) used a polyphasic taxonomic approach in their world monograph of *Daldinia*.

Dennis (1961) was the first author to attempt the segregation of the *Xylariaceae* into three subfamilies, "Hypoxylodeae", "Thamnomycetideae" and "Xylarioideae". However, this segregation was still based on generic concepts that heavily relied on stromatal macromorphology, disregarding the asexual states, and does in no way relate to the modern concepts of the family. In addition, the subfamilies were not validly published (cf. Bitzer et al. 2008), and the "Thamnomycetideae" sensu Dennis later proved untenable

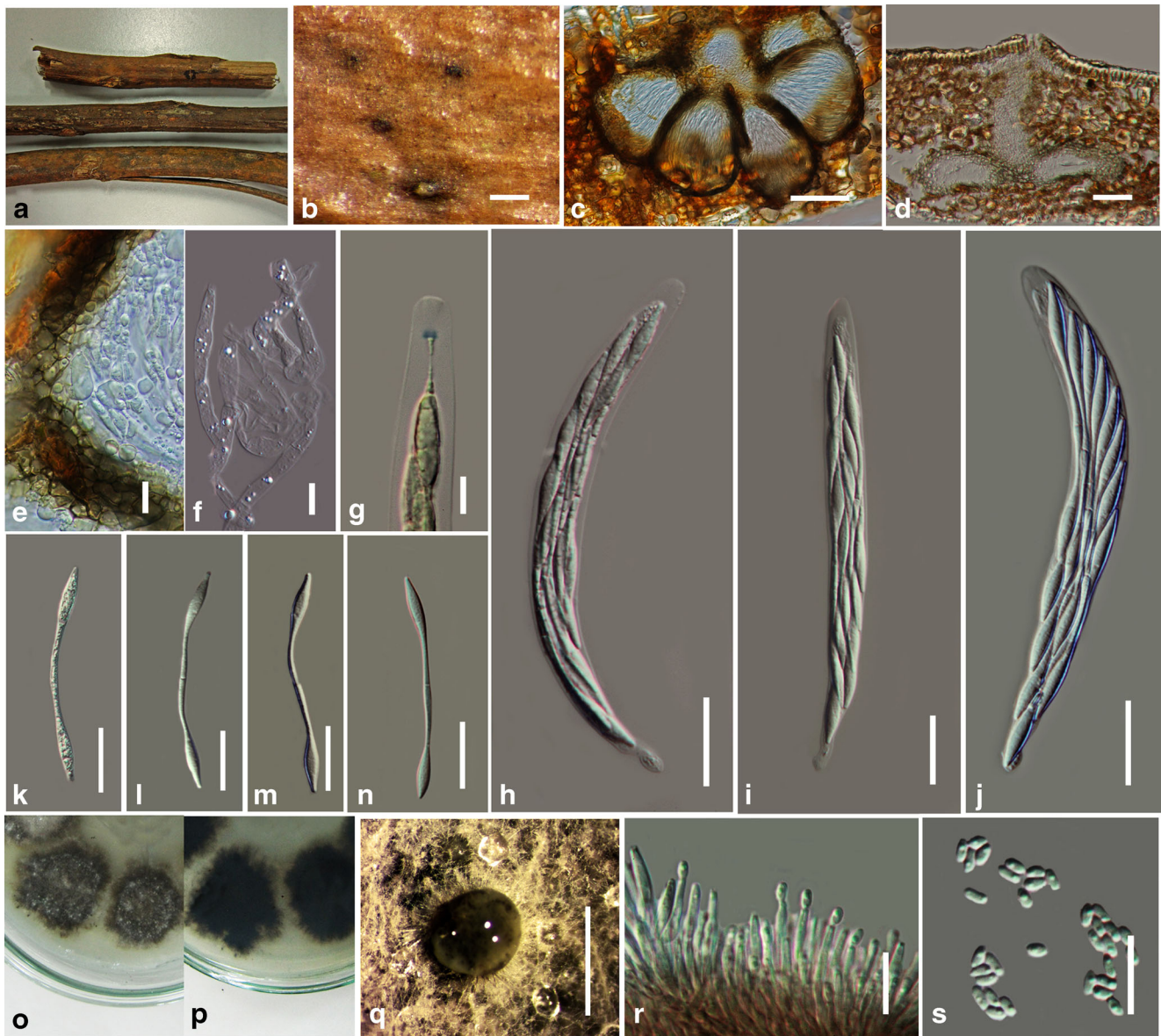


Fig. 35 *Vialaea mangiferae* (holotype). **a** Herbarium specimen. **b** Appearance of ascomata on substrate. **c** Horizontal cross section of ascomata. **d** Vertical cross section of ascomata. **e** Peridium. **f** Paraphyses. **g** J+, subapical apparatus of ascus. **h–j** Asci. **k–n**

Ascospores. **o** Surface view of culture on MEA. **p** Reverse view of culture on MEA. **q** Conidiomata. **r** Conidia attached to conidiogenous cells. **s** Conidia. Scale bars: **b**=200 μ m, **c**=100 μ m, **d**=200 μ m, **f**, **g**=50 μ m, **h**, **n**=20 μ m, **q**=1 mm, **r**, **s**=10 μ m

as it was found out by a polyphasic approach that the affinities of *Thamnomycetes* s. str. are with *Daldinia* and allies whereas other species of *Thamnomycetes* are related to *Xylaria* (Stadler et al. 2010b). Nevertheless, some authors have used the remaining “subfamilies” in recent work, discriminating the taxa with “nodulisporium-like anamorphs” sensu Ju and Rogers (1996) (i.e., the hypoxylid Xylariaceae) from those with “geniculosporium-like anamorphs” (i.e., *Xylaria* and allies).

These subfamilies have been used in subsequent studies (Daranagama et al. 2014, 2015; Hsieh et al. 2005, 2010; Stadler et al. 2010a, c, 2013; Tang et al. 2009). Several polythetic and molecular phylogenetic studies (Daranagama et al. 2015; Maharachchikumbura et al. 2015; Stadler et al.

2010c) have indicated the possible need for the separation of “Hypoxylidae” and “Xylariidae” as separate families. However, molecular data are so far only available for a small fraction of the existing species and no reliable data are available for several genera. Therefore, the above classification is widely based on a combination of molecular data and morphological features relating to the type of asexual morph (cf. Stadler et al. 2013).

Xylaria Hill ex Schrank, Baier. Fl. (München) 1: 200 (1789).

Facesoffungi number: FoF00696

Saprobic on dead wood. **Sexual morph:** *Stromata* extremely variable in size and shape, simple to branched from

the base, nearly sessile or arising from long rooted stipes, whitish when immature, gradually turning silvery grey and eventually black, longitudinally furrowed delimiting narrow strips, perithecial contours most often inconspicuous in well-developed stromata, leathery, black, interior solid, homogeneous, white to cream coloured, with a slightly darker core, stipes cylindrical to strap-like, black, with a hairy-tomentose broadened base. *Ascomata* subglobose, immersed to slightly exposed. *Ostioles* raised-discoid, grey brown to black, often with a low conical papilla at the center. *Hamathecium* comprising sparse, hypha-like, hyaline, septate paraphyses. *Asci* unitunicate, (6–) 8-spored, cylindrical, long pedicellate, usually with a J+, tubular, apical apparatus. *Ascospores* overlapping uniseriate in the ascus, ellipsoid-inequilateral, with narrowly to broadly rounded ends, medium brown, smooth-walled, some with a fugacious cellular appendage usually disappearing at maturity, usually with two large guttules, with a conspicuous straight germ slit, 1/2–4/5 of spore-length on the flattened side. **Asexual morph:** *Geniculosporium* or geniculosporium-like. (Ju and Rogers 1996; Stadler et al. 2014).

Type species: Xylaria hypoxylon (L.) Grev., Fl. Edin.: 355 (1824) (Fournier et al. 2011; Persoh et al. 2009; Stadler et al. 2014)

= *Clavaria hypoxylon* L., Sp. pl. 2: 1182 (1753)

Notes: *Xylaria* is the largest and the type genus in the family *Xylariaceae* with more than 700 epithets listed in Index Fungorum (2015). Most *Xylaria* species are characterised by massive stromata which can varied in colour, shape and size based on the location, cylindrical asci with apical apparatus and dark ascospores unique to the family as well as their geniculosporium-like asexual morphs (Ju and Rogers 1996; Stadler et al. 2013). Stromata of most of the known *Xylaria* species occur on decayed dicotyledonous wood, fewer on monocotyledons, fruits, seeds and fallen leaves. Interestingly, a number of *Xylaria* species that comprise the subgenus *Pseudoxylaria* are associated with termite nests mainly of macrotermitine termites, rather than plants. They form a monophyletic clade in an otherwise polyphyletic mega-genus (Hsieh et al. 2010).

Hypoxyloideae

Hypoxyloideae or hypoxyloid *Xylariaceae* have nodulisporium-like asexual morphs (Ju and Rogers 1996). The genus *Nodulisporium* was introduced by Preuss (1849), and is typified by *Nodulisporium ochraceum* Preuss. Stadler et al. (2013) stated that *N. ochraceum* may be associated with *Hypoxylon howeanum* Peck. There are 27 generic names listed in Stadler et al. (2013) which have been included in the subfamily *Hypoxyloideae*.

Xylarioideae

The subfamily *Xylarioideae* has conidiogenous structures resembling those of *Geniculosporium* (Ju and Rogers 1996; Stadler et al. 2013). Chesters and Greenhalgh (1964)

introduced *Geniculosporium* with *Geniculosporium serpens* Chesters & Greenh. as the type species (which is actually the asexual state of *Nemania serpens*. hence the name is now obsolete). Stadler et al. (2013) have listed 38 asexual and sexual genera that can be included in the subfamily *Xylarioideae*.

The phylogeny of the *Xylariaceae* is currently being examined in a separate study, using morphological and chemotaxonomic data and a multi-gene genealogy. Therefore, no detailed information is being provided in the current paper.

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