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Preliminary classification of Leotiomycetes

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Abstract

Leotiomycetes is regarded as the inoperculate class of discomycetes within the phylum Ascomycota. Taxa are mainly characterized by asci with a simple pore blueing in Melzer's reagent, although some taxa have lost this character. The monophyly of this class has been verified in several recent molecular studies. However, circumscription of the orders, families and generic level delimitation are still unsettled. This paper provides a modified backbone tree for the class Leotiomycetes based on phylogenetic analysis of combined ITS, LSU, SSU, TEF, and RPB2 loci. In the phylogenetic analysis, Leotiomycetes separates into 19 clades, which can be recognized as orders and order-level clades. Leotiomycetes include 53 families (*Ascodichaenaceae, Amicodiscaceae* fam. nov., *Amorphothecaceae, Arachnopezizaceae, Ascocorticiaceae, Calloriaceae, Cenangiaceae, Chaetomellaceae, Chlorociboriaceae, Chlorospleniaceae* fam. nov., *Bryoglossaceae* fam. nov., *Cochlearomycetaceae, Cordieritidaceae, Cyttariaceae, Deltopyxidaceae* fam. nov., *Dermateaceae, Discinellaceae* fam. nov., *Drepanopezizaceae, Erysiphaceae, Gelatinodiscaceae, Godroniaceae, Hamatocanthoscyphaceae* fam. nov., *Helicogoniaceae, Helotiaceae, Hemiphacidiaceae, Heterosphaeriaceae, Hyaloscyphaceae, Hydrocinaceae* fam. nov., *Hyphodiscaceae* fam. nov., *Lachnaceae, Lahmiaceae, Lauriomycetaceae, Leotiaceae, Leptodontidiaceae, Lichinodiaceae, Loramycetaceae, Marthamycetaceae, Medeolariaceae, Mitrulaceae, Mollisiaceae, Neocrinulaceae, Neolauriomycetaceae, Pezizellaceae, Phacidiaceae, Ploettnerulaceae, Rhytismataceae, Rutstroemiaceae, Sclerotiniaceae, Solenopeziaceae* fam. nov., *Thelebolaceae, Triblidiaceae, Tympanidaceae* and *Vibrisseaceae*) and 14 family-level clades (*Alatospora-Miniancora* clade, *Aquapoterium-Unguicularia* clade, *Bulgariella* clade, *Coleophoma-Parafabraea* clade, *Colipila* clade, *Corticifraga-Calloriopsis* clade, *Epicladonia-Epithamnolia* clade, *Flagellospora* clade, *Gelatinomyces* clade, *Micraspis* clade, *Patellariopsis* clade, *Phialocephala urceolata* clade, *Peltigeromyces* clade and *Trizodia* clade). We briefly discuss the phylogenetic placements of these families and family-level clades. We provide an outline of the genera and the families of Leotiomycetes and a table summarising sexual morph characters of all

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the families/family-level clades of Leotiomycetes. Nine new families are introduced and we provide descriptions and illustrations of 50 Leotiomycetes taxa including six new genera and 22 new species, from collections made in China, Italy, Thailand, Russia, UK and Uzbekistan. Small scale phylogenetic analyses using concatenated datasets of five loci (rDNA, TEF and RBP2) are provided, where the backbone tree is insufficient to confirm the phylogenetic placement of our collections. This paper contributes to a more comprehensive update and improved identification of Leotiomycetes based on available literature and our collections.

Key words – 37 new taxa – Apothecial ascomycetes – Ascus amyloidity – Multi-gene analysis – Monophyly

Introduction

Eriksson & Winka (1997) introduced the class Leotiomycetes to accommodate inoperculate discomycetes. The traditional concept of Leotiomycetes includes only apothecial ascomycetes with inoperculate, unitunicate asci that open by apical perforation or pore to release their ascospores (Dennis 1968, Korf 1973, Nannfeldt 1932, Pfister & Kimbrough 2001). Therefore, Leotiomycetes are often referred to as the "inoperculate discomycetes". Previously this class included a wide range of taxa (Korf 1973, Spooner 1987), but modern molecular-based studies have removed some groups to establish a more natural classification (Wang et al. 2006a, b, Baral et al. 2015, Pärtel 2016). This class includes 12 orders, 44 families and around 580 genera, excluding new taxa introduced here (Ekanayaka et al. 2017, Jaklitsch et al. 2016, Wijayawardene et al. 2018).

The ascomata of Leotiomycetes are diverse and mostly apothecial. However, *Erysiphaceae*, *Myxotrichaceae*, and some *Thelebolaceae* and *Rutstroemiaceae* produce cleistothecial ascomata (Blackwell et al. 2006, de Hoog et al. 2005, Gernandt et al. 2001, Reid 1986, Galán et al. 2015) and some *Hyaloscyphaceae*, *Loramycetaceae* and Thelebolales form perithecial ascomata (Ingold & Chapman 1952, Digby & Goos 1987, Ranzoni 1956, Jaklitsch et al. 2016). Apothecial morphology is also diverse. For example, Helotiales apothecia are cupulate and brightly coloured, mostly covered with excipular hairs; Cyttariales produce compound, globose apothecia and Triblidiales and some Rhytismatales produce hysteracious apothecia; Lahmiales, Leotiales and some Rhytismatales taxa have clavate apothecia; and Medeolariales include immersed, reduced apothecia (Spooner 1987, Korf 1973, Baral et al. 2015, Ekanayaka et al. 2017). Most Leotiomycetes produce inoperculate asci although some Thelebolales produce operculate asci (Brummelen & Kristiansen 1998, Cain & Kimbrough 1969, Brummelen 1977).

Leotiomycetes is an ecologically diverse group, most are saprobes of a wide variety of substrates, such as *Helotiaceae*, *Lachnaceae* and *Hyaloscyphaceae* on dead plant material and Thelebolales on dung or as endophytes (Wang et al. 2006a, b, Jaklitsch et al. 2016). Some, such as Medeolariales, *Sclerotiniaceae*, Erysiphales, some Helotiales and some Rhytismatales are important plant pathogens (Takamatsu et al. 2015, Lantz et al. 2011, Wang et al. 2006a, b). The class also includes endophytes, mycorrhizae, fungal parasites, root symbionts, and wood rot fungi (Wang et al. 2006a, b, Jaklitsch et al. 2016). Most Leotiomycetes taxa are described from the temperate Northern Hemisphere, but some members in Helotiales, and Rhytismatales show a broader geographic distribution (Ekanayaka et al. 2017, Wang et al. 2006a, b, McLaughlin & Spatafora 2015).

Although there are many recent phylogenies on Leotiomycetes (Hustad & Miller 2011, Johnston et al. 2014, Baral et al. 2015, Pärtel 2016, Pärtel et al. 2017), many unresolved issues remain within the class. The familial and order-level classification is phylogenetically poorly understood, especially in the order Helotiales which is highly polyphyletic (Wang et al. 2006a, b, Pärtel 2016, Jaklitsch et al. 2016). Therefore, the present study aims to clarify the taxonomic uncertainty of Leotiomycetes orders and families. By putting this data together into a single article, we provide a working document that can be criticised and improved. We therefore provide discussion on their morphology, and elaborate on their systematic arrangements. Furthermore, here we recognize several clades based on the topology in our phylogenetic analyses and they probably

will be new families or orders in the near future. Although some clades have distinct characters, we did not observe stable phylogenetic placements for those clades in our phylogenetic analyses. Therefore, we have not introduced these taxa in the present study, but here we name them as family-level and order-level clades. With more data these clades may be resolved in the future.

Material & methods

Sample collection specimen examination and deposition

Collections of Leotiomycetes were made in Thailand, China, UK, Italy, Russia and Uzbekistan from 2012 to 2017. Macroscopic and microscopic characters of the specimens were recorded. A Motic SMZ-168 stereo microscope was used to observe the structure of the apothecia. Sections of apothecia were made with a razor blade, mounted in water or 5% KOH and preserved in lacto-glycerol on a glass slide. A Nikon ECLIPSE 80i compound microscope was used to observe microscopic characters. Photomicrography was carried out with a Canon 450D digital camera fitted to the microscope. Measurements of apothecia, paraphyses, asci and ascospores were made from material mounted in water and the mean values are used in the descriptions. Measurements were made with the Taro soft (R) Image Frame Work v. 0.9.7 program and images used for figures were processed with Adobe Photoshop CS6 software (Adobe Systems). The specimens are deposited in the Mae Fah Luang University Herbarium (MFLU), Chiang Rai, Thailand and in the Herbarium of Cryptogams of Kunming Institute of Botany, Chinese Academy of Sciences (KUN-HKAS). Faces of fungi numbers and Index Fungorum numbers were registered as described in Jayasiri et al. (2015) and Index Fungorum (2019).

DNA extraction, PCR and sequencing

Genomic DNA was extracted directly from apothecia using a Plant DNA Rapid Extraction Kit (Bio Teke Corporation, Beijing, China). Polymerase chain reactions (PCR) for this study were carried out using five gene regions: NS1 and NS4 for the nuclear ribosomal small subunit (SSU) (White et al. 1990), LROR and LR5 (Vilgalys & Hester 1990) for the nuclear ribosomal large subunit (LSU), ITS4 and ITS5 (White et al. 1990) for internal transcribed spacer (ITS), TEF1-728F and TEF1-986R (Carbone & Kohn 1999) for translation elongation factor 1-alpha (TEF1-α) and fRPB2-5F and fRPB2-7cR (Liu et al. 1999) for RNA polymerase II (RPB2). The PCR mixtures (25 μL) contained ddH_2O (11 μL), PCR Master Mix (TIANGEN Co., China) (11 μL; 2×), DNA template (1 μL), each primer (1 μL; 10 μM). PCR amplification conditions for all regions consisted an initial denaturation step of 5 min at 94 °C, 35 cycles consisted of denaturation at 94 °C for 1 minute, annealing at 53 °C for 50 seconds and elongation at 72 °C for 3 minutes and final extension step of 7 minutes at 72 °C. The PCR products were viewed on 2% agarose electrophoresis gels, stained with Ethidium bromide. PCR products were sent to a commercial sequencing provider (Tao Yang, Beijing, China).

Sequence alignment and phylogenetic analysis

Newly generated sequences were subjected to a standard BLAST search of GenBank for primary identification and the newly generated sequences are deposited in GenBank (Supplementary Table 1).

Back-bone tree for Leotiomycetes

Sequence data from five loci (ITS, LSU, SSU, RPB2 and TEF) of 482 strains belonging to representative Leotiomycetes species along with the out-group taxa *Ophiocordyceps irangiensis* (OSC 128578) and *Cryptosporella hypodermia* (AFTOL ID 2124), were downloaded from GenBank (Supplementary Table 1). For each gene, the newly generated sequences and representatives from GenBank were aligned using MAFFT v. 7 (http://mafft.cbrc.jp/alignment/server/index.html) (Katoh et al. 2017) and manually adjusted in BioEdit v. 7.0.4 (Hall 2004) where necessary. The individual datasets were concatenated into a

combined dataset using FaBox (1.41) (Villesen 2007). Ambiguously aligned regions were excluded and gaps were treated as missing data.

GTR+ G +I substitution model was selected as the model of evolution, based on the results from MrModeltest 2.2 (Nylander 2004). Maximum likelihood phylogenetic analyses were performed in CIPRES webportal (Miller et al. 2010) using RAxML-HPC2 Workflow on XSEDE (8.2.9) tool (Stamatakis 2014). The bootstrap analysis for each ML tree was performed with 1000 thorough bootstrap replicates with the same parameter settings. Posterior probabilities (PP) (Rannala & Yang 1996; Zhaxybayeva & Gogarten 2002) were determined by Markov chain Monte Carlo sampling (MCMC) in CIPRES webportal (Miller et al. 2010) using MrBayes on XSEDE (Huelsenbeck & Ronquist 2000). Four simultaneous Markov chains were run for 50, 000, 000 generations and trees were sampled every 1000th generation. The MCMC heated chain was set with a "temperature" value of 0.2. The distribution of loglikelihood scores was examined to determine stationary phase for each search and to decide if extra runs were required to achieve convergence, using the program Tracer 1.5 (Rambaut & Drummond 2009). All sampled topologies beneath the asymptote (38%) were discarded as part of a burn-in procedure, while the remaining trees were used for calculating posterior probabilities in the majority rule consensus tree.

Sub-trees for new Leotiomycetes collections during the study

Sequences from GenBank were downloaded according to their relevance. Sequence alignments, combined dataset preparation and maximum likelihood phylogenetic analyses were performed as described above.

The resulting trees were viewed with FigTree v.1.4.0 (Rambaut 2006, 2009, http://tree.-bio.ed.ac.uk/software/figtree/). Maximum likelihood bootstrap values (MLBP) equal or greater than 50% and Bayesian posterior probabilities (BYPP) values equal or greater than 0.9 are given above the nodes.

Phylogeny

The phylogenetic relationships of Leotiomycetes were investigated based on analysis of LSU, SSU, ITS, TEF and RPB2 sequence data. The combined alignment of 482 taxa included 4575bp (LSU-1-573, SSU-574-1464, ITS-1465-2502, TEF-2503-3613, RPB2-3614-4575). The best scoring RAxML tree with a final likelihood value of -181075.223865 is presented (Fig. 1). The matrix had 3686 distinct alignment patterns, with 60.88% of undetermined characters or gaps. Estimated base frequencies were as follows; A = 0.252, C = 0.228, G = 0.269, T = 0.251; substitution rates AC = 1.501780, AG = 2.986334, AT = 1.409516, CG = 0.891646, CT = 6.126022, GT = 1.000000; gamma distribution shape parameter α = 0.432398. Compressed overview of the phylogram generated from maximum likelihood analysis of combined LSU, SSU, ITS, TEF and RPB2 sequence data for taxa of Leotiomycetes families is also provided (Fig. 2). Seventeen sub-trees to represent the exact phylogenetic placement of our new Leotiomycetes collections are also included within this section.

According to the phylogenetic tree for Leotiomycetes, we identified 19 clades, which can be recognized as orders/order-level clades. The phylogenetic placements of these clades are briefly discussed below.

Clade 1:

LAURIOMYCETALES: *Lauriomycetaceae*

This is the most basal clade of Leotiomycetes and includes the single family *Lauriomycetaceae*. Its basal position was also noted by Hernandez-Restrepo et al. (2017).

Clade 2:

CHAETOMELLALES: *Chaetomellaceae, Marthamycetaceae*

The families *Chaetomellaceae* and *Marthamycetaceae* formed a monophyletic clade, which can be recognized as the order Chaetomellales. Pärtel (2016) showed the close phylogenetic

relationship of *Chaetomellaceae* and *Marthamycetaceae*. Although, both of these families formed well supported monophyletic clades within our phylogenetic analysis, their sister relationship is not statistically well-supported.

Clade 3:

***Trizodia-Calloriopsis* clade: *Trizodia* clade, *Corticifraga* clade**

This clade includes the genera *Trizodia, Spirosphaeria*, *Calloriopsis* and *Corticifraga*.

Clade 4:

"HELICOGONIALES": *Helicogoniaceae*

Previously the family *Helicogoniaceae* was classified in order Phacidiales but in our study it forms an independent clade.

Clade 5:

PHACIDIALES: *Phacidiaceae*

The family *Phacidiaceae* formed a monophyletic clade close to "Helicogoniales" clade. Previously, this order included three families: *Helicogoniaceae, Phacidiaceae* and *Tympanidaceae*. According to our phylogenetic analysis these three families do not form monophyletic clades. Johnston et al. (2014) and Pärtel (2016) also showed the polyphyly of these families based on their phylogenetic analyses.

Clade 6:

***Micraspis* clade**

Micraspis acicula, which was formerly placed under *Tympanidaceae*, formed a separate clade close to *Phacidiaceae*.

Clade 7:

***Flagellospora* clade**

Flagellospora curvula formed a close phylogenetic affinity to Leotiales.

Clade 8:

LEOTIALES: *Cochlearomycetaceae, Gelatinomyces* clade, *Leotiaceae, Tympanidaceae*

This clade includes the families *Cochlearomycetaceae*, *Gelatinomyces*, *Leotiaceae* and *Tympanidaceae*. Pärtel (2016) also showed the close phylogenetic relationship of *Leotiaceae* and *Tympanidaceae* based on a five gene phylogeny.

Clade 9:

LICHINODIALES: *Epithamnolia-Epicladonia* clade, *Lichinodiaceae*

This clade includes *Epithamnolia-Epicladonia* clade and *Lichinodiaceae*.

Clade 10:

THELEBOLALES: *Thelebolaceae, Alatospora- Miniancora* clade

This clade includes the family *Thelebolaceae* and *Alatospora-Miniancora* clade. It forms a monophyletic clade that is sister to Lichinodiales. A similar phylogenetic placement, based on a five gene analysis was recorded by Pärtel (2016).

Clade 11:

Neocrinulaceae

This family formed an unstable affiliation closer to *Leptodontidiaceae*, but this phylogenetic association is not statistically supported.

Clade 12:

Leptodontidiaceae

Leptodontidiaceae nested between *Neocrinulaceae* and Rhytismatales clades. This is moderately supported in our phylogenetic analysis.

Clade 13:

RHYTISMATALES: *Calloriaceae, Pezizellaceae, Rhytismataceae*

This clade includes the families *Rhytismataceae, Pezizellaceae, Calloriaceae.*

Clade 14:

Hamatocanthoscypha-Hyphodiscus clade: *Hyphodiscaceae, Hamatocanthoscyphaceae*

This clade includes two sub-clades, which includes the genera formerly belonging to Helotiales.

Clade 15:

MEDEOLARIALES: *Ascocorticiaceae, Ascodichaenaceae, Dermateaceae, Coleophoma-Parafabraea* clade, *Medeolariaceae*

The families *Medeolariaceae, Ascodichaenaceae*, *Dermateaceae* and *Coleophoma-Parafabraea* grouped in a clade that sister to "Sclerotiniales". Individually these familial clades are not well-supported. Members in *Ascocorticiaceae* do not have available sequence data in GenBank for DNA based comparisons. However, this group of species show similar morphology to Medeolariales taxa and therefore, we place this family under Medeolariales.

Clade 16:

"SCLEROTINIALES": *Cenangiaceae, Chlorociboriaceae, Hemiphacidiaceae, Neolauriomycetaceae, Rutstroemiaceae* and *Sclerotiniaceae*

This clade includes the families *Sclerotiniaceae, Hemiphacidiaceae, Cenangiaceae, Rutstroemiaceae* and *Chlorociboriaceae*, which were previously classified under Helotiales. In our phylogenetic analysis, these families formed a monophyletic clade close to Medeolariales. Pärtel (2016) also suggested that *Sclerotiniaceae, Hemiphacidiaceae, Cenangiaceae* and *Rutstroemiaceae*, form a monophyletic group separate from other Helotiales and named this clade as "Sclerotiniales". Our results agree with those of Pärtel (2016).

Clade 17:

CYTTARIALES: *Cordieritidaceae, Cyttariaceae, Deltopyxidaceae*

The families *Cordieritidaceae, Cyttariaceae* and *Deltopyxidaceae* formed a monophyletic clade sister to Erysiphales.

Clade 18:

ERYSIPHALES: *Erysiphaceae, Amorphothecaceae*

The family *Erysiphaceae* and *Amorphothecaceae* formed a monophyletic clade sister to Cyttariales.

Clade 19:

HELOTIALES: *Amicodiscaceae, Aquapoterium-Unguicularia* clade, *Arachnopezizaceae, Bryoglossaceae, Bulgariella* clade, *Chlorospleniaceae, Colipila* clade, *Discinellaceae, Drepanopezizaceae, Gelatinodiscaceae, Godroniaceae, Helotiaceae, Heterosphaeriaceae, Hyaloscyphaceae, Hydrocinaceae, Lachnaceae, Loramycetaceae, Mitrulaceae, Mollisiaceae, Patellariopsis* clade, *Ploettnerulaceae, Phialocephala urceolata* clade, *Peltigeromyces* clade, *Solenopeziaceae, Vibrisseaceae*

This clade includes 25 families/family-level clades, which are classified under Helotiales.

Figure 1 – Maximum likelihood phylogenetic tree inferred from 482 taxa of Leotiomycetes based on combined LSU, SSU, ITS, TEF and RPB2 sequence data. MLBP values ≥50% are given as the first set of numbers and BYPP ≥0.90 values as the second set of numbers above the nodes. Strain/culture numbers are given after the taxon names. The tree is rooted with *Ophiocordyceps irangiensis* (OSC 128578) and *Cryptosporella hypodermia* (AFTOL ID 2124). Orders/order-level clades are named in left and families/family-level clades are named in rignt. Newly generated sequences are in blue bold and new families/family-level clades and orders/order-level clades are in red.

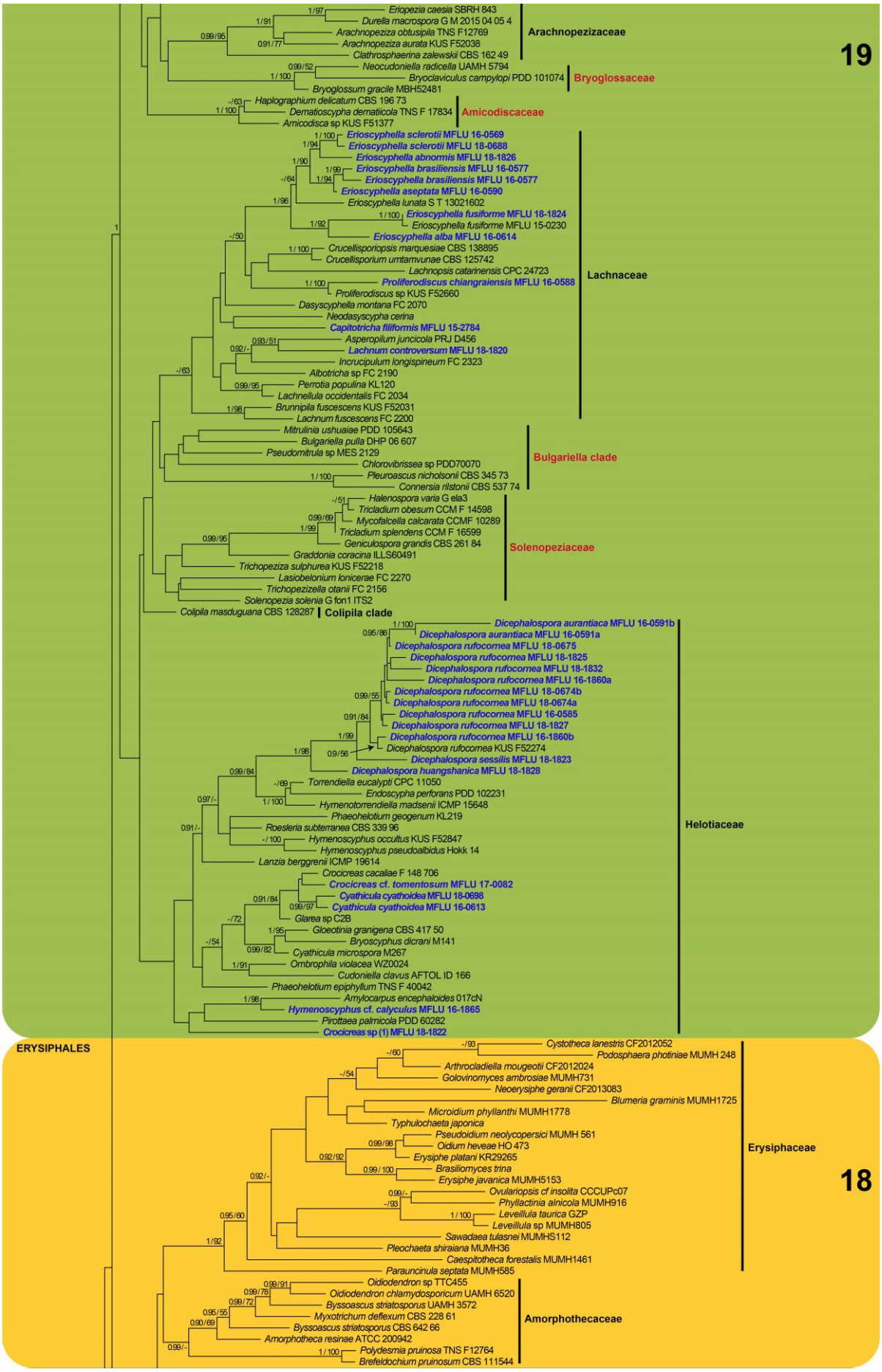

Figure 1 – Continued.

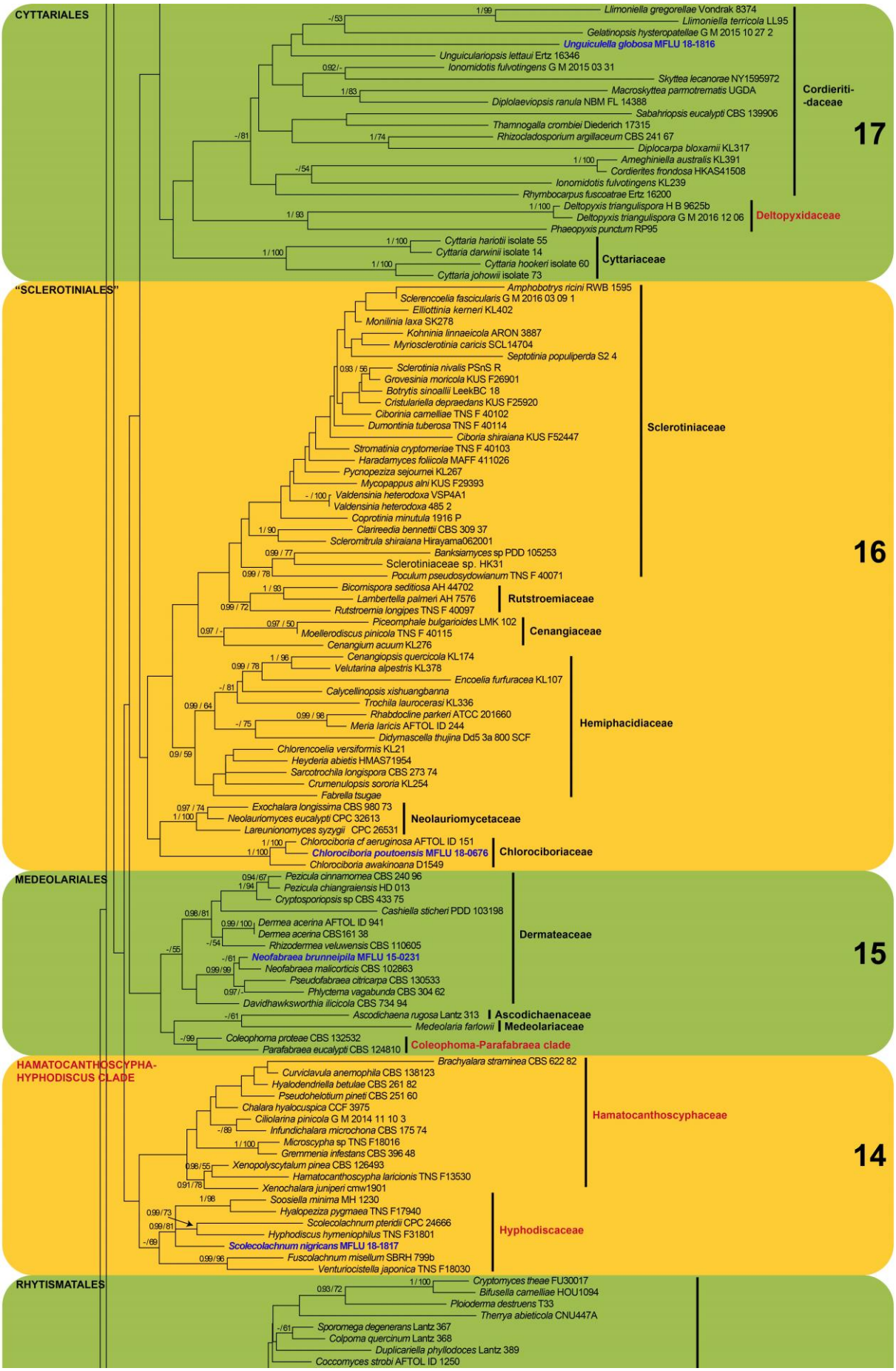

Figure 1 – Continued.

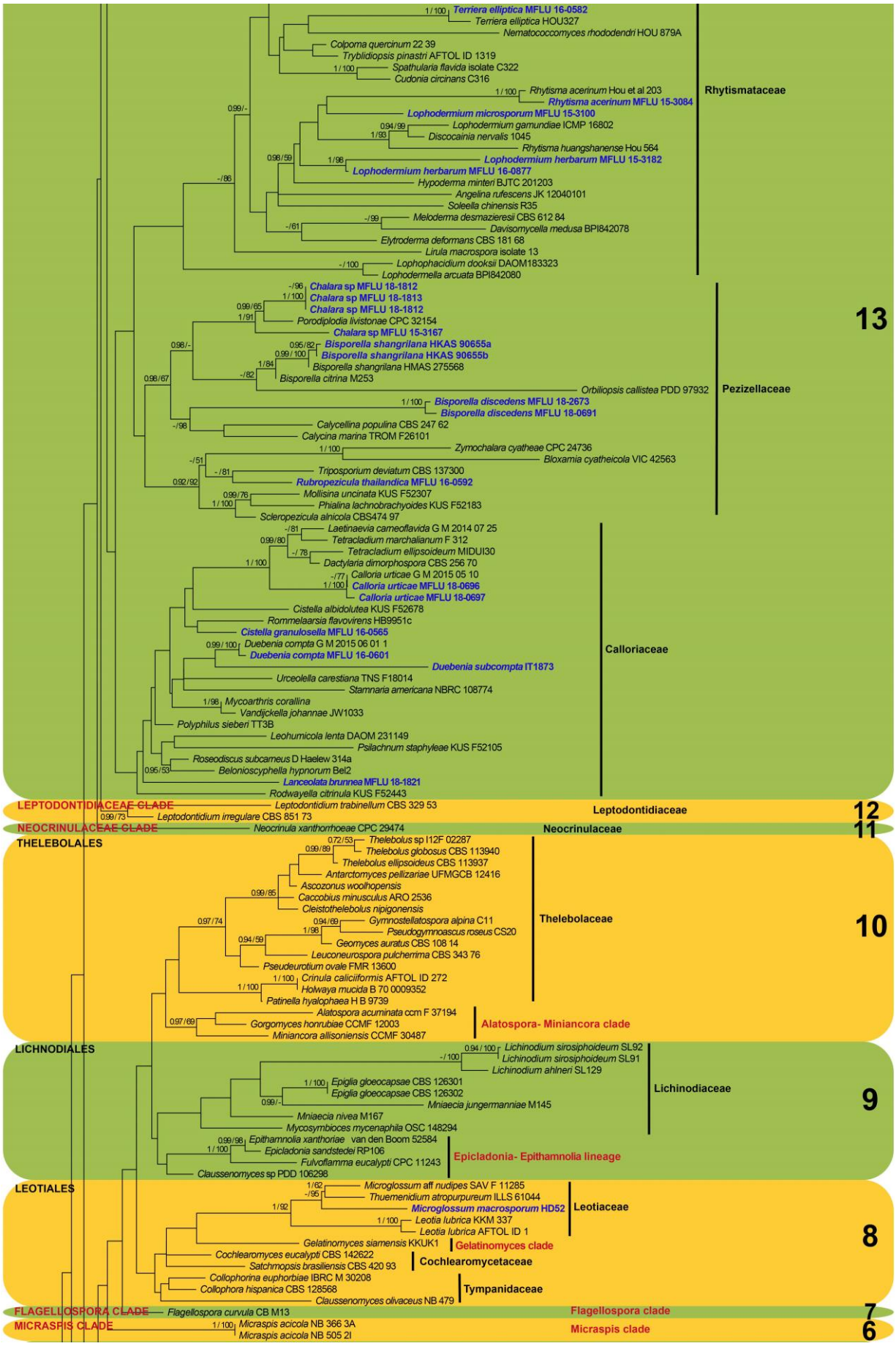

Figure 1 – Continued**.**

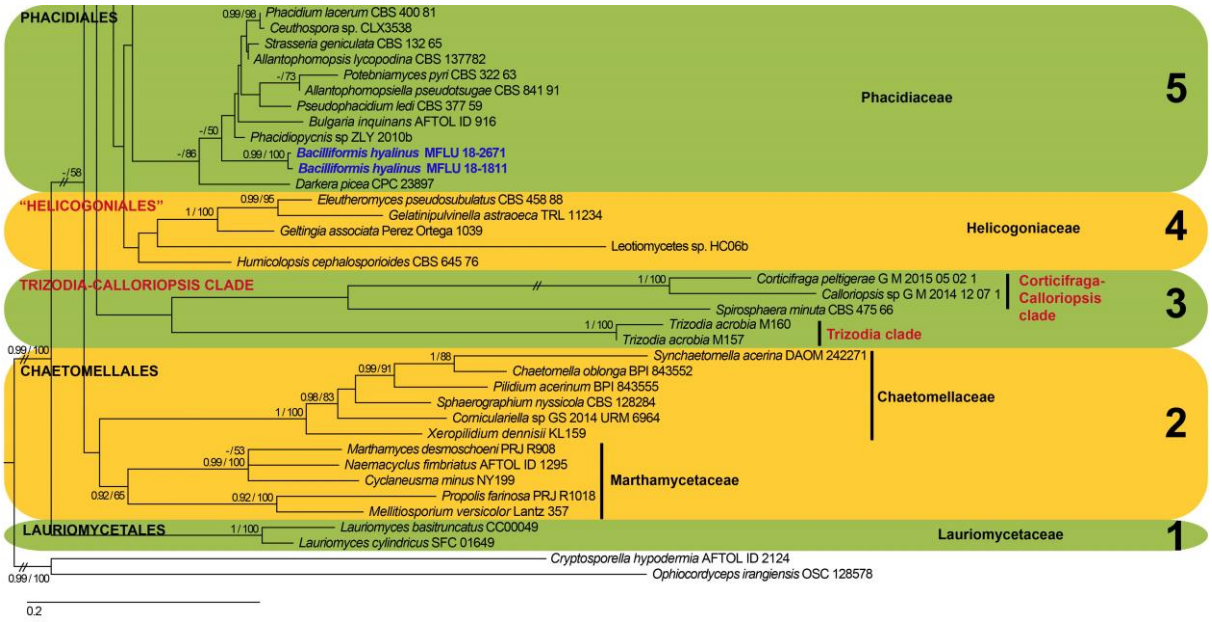

Figure 1 – Continued.

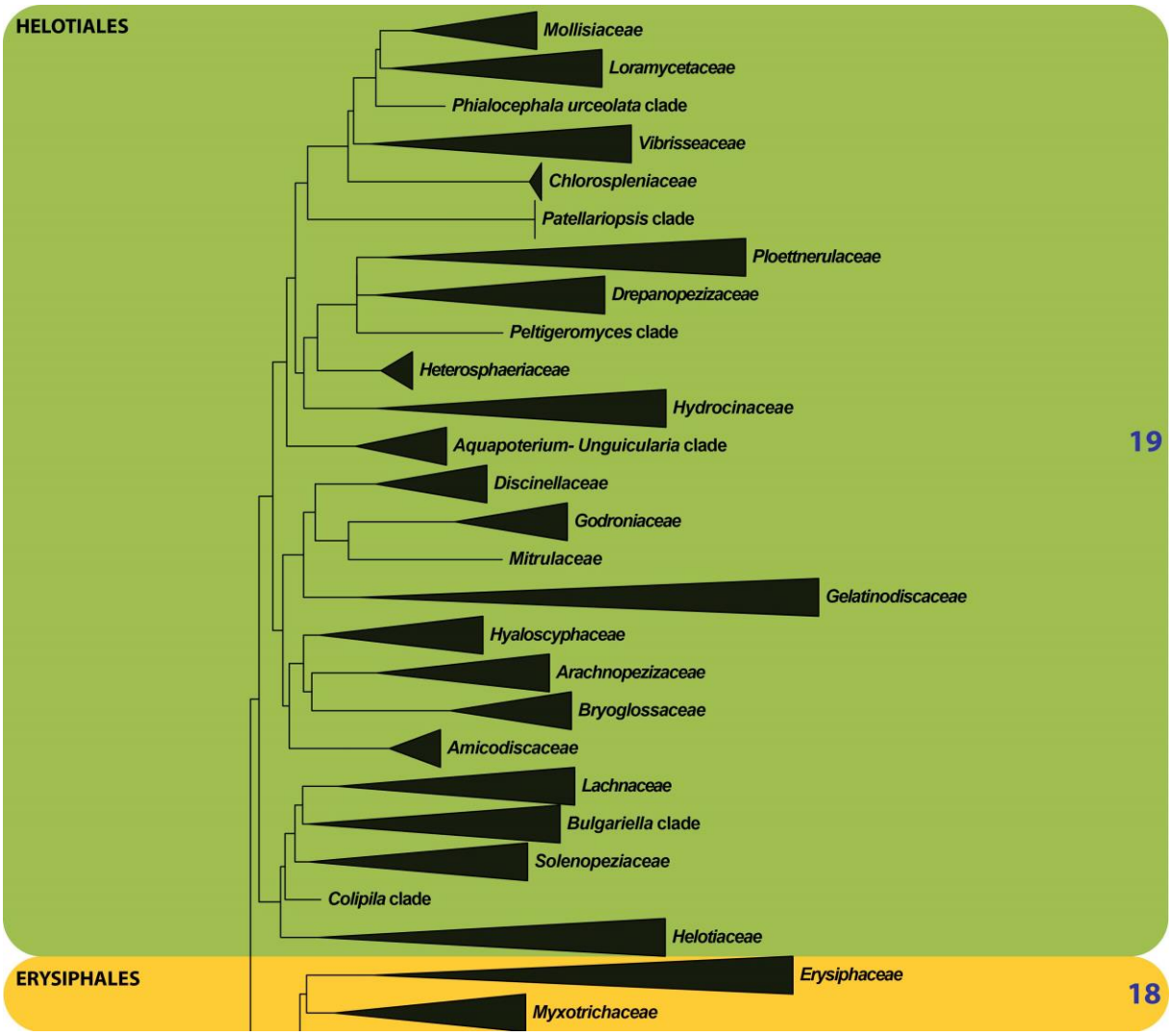

Figure 2 – Compressed overview of the phylogram generated from maximum likelihood analysis of combined LSU, SSU, ITS, TEF and RPB2 sequence data for taxa of Leotiomycetes.

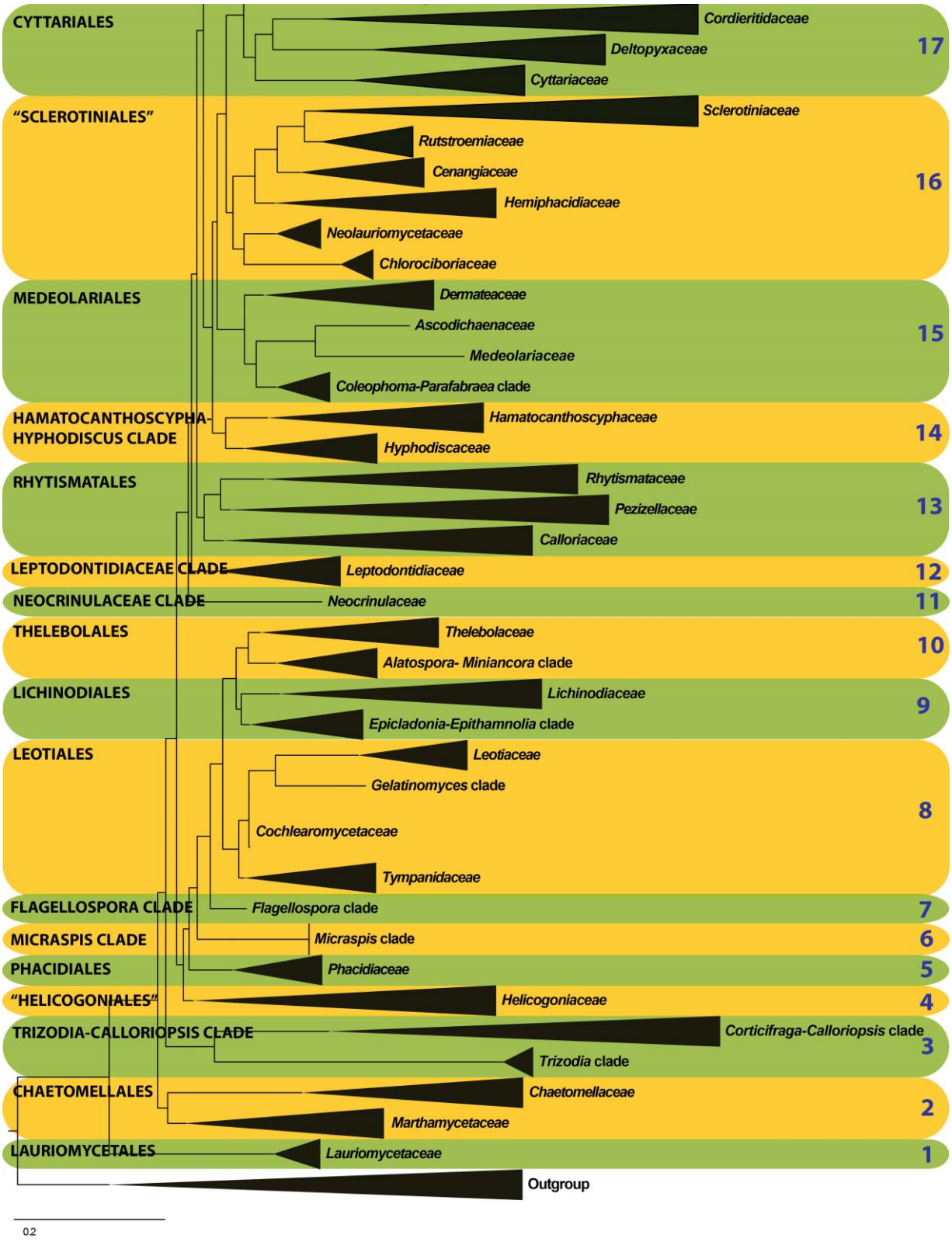

Figure 2 – Continued.

Taxonomy

Various arrangements for the class Leotiomycetes have been developed, first based on morphology (e.g. Nannfeldt 1932, Korf 1973, Hawksworth et al. 1983 and Spooner 1987) and more recently using phylogenetic evidence (e.g. Baral et al. 2015, Johnston et al. 2014, Pärtel et al. 2017, Hustad & Miller 2011). The most recent arrangement of Leotiomycetes includes the classification of Wijayawardene et al. (2018) and is followed here, with modifications.

Table 1 The outline of genera within Leotiomycetes

Order/Order-level clade	**Family/Family-level clade**	**Genera**
Chaetomellales	*Chaetomellaceae*	*Chaetomella, Corniculariella, Hainesia, Pilidium, Sphaerographium, Synchaetomella, Xeropilidium*
	Marthamycetaceae	*Cyclaneusma, Marthamyces, Mellitiosporiella, Mellitiosporium, Naemacyclus, Phragmiticola, Propolina, Propolis*
Cyttariales	*Cyttariaceae*	*Cyttaria*
	Cordieritidaceae	*Ameghiniella, Austrocenangium, Cordierites, Diplocarpa, Diplolaeviopsis, Gelatinopsis, Hamalocanlhoscypha, Ionomidotis, Llimoniella, Midotiopsis, Macroskyttea, Phaeangella, Rhymbocarpus, Rhizocladosporium, Skyttea, Skyttella, Sabahriopsis, Thamnogalla, Unguicularіopsis, Unguiculella*
	Deltopyxidaceae	*Deltopyxis, Phaeopyxis*
Erysiphales	*Amorphothecaceae*	*Amorphotheca, Brefeldochium, Byssoascus, Myxotrichum, Oidiodendron, Polydesmia*
	Erysiphaceae	*Arthrocladiella, Blumeria, Brasiliomyces, Caespitotheca, Cystotheca, Erysiphe, Golovinomyces, Leveillula, Microidium, Neoerysiphe, Oidiopsis, Oidium, Ovulariopsis, Parauncinula, Pseudoidium, Phyllactinia, Pleochaeta, Podosphaera, Queirozia, Sawadaea, Takamatsuella, Typhulochaeta*
Flagellospora clade	*Flagellospora* clade	*Flagellospora*
"Helicogoniales"	*Helicogoniaceae*	*Eleutheromycella, Eleutheromyces, Gelatinipulvinella, Geltingia, Helicogonium, Humicolopsis*
Hamatocanthoscypha-Hyphodiscus clade	*Hamatocanthoscyphaceae*	*Brachyalara, Chalara, Ciliolarina, Curviclavula, Gremmenia, Hamatocanthoscypha, Hyalodendriella, Infundichalara, Microscypha, Pseudohelotium, Xenochalara, Xenopolyscytalum,*
	Hyphodiscaceae	*Fuscolachnum, Hyalopeziza, Hyphodiscus, Soosiella, Scolecolachnum, Venturiocistella*
Helotiales	*Arachnopezizaceae*	*Arachnopeziza, Arachnoscypha, Austropezia, Eriopezia, Durella*
	Amicodiscaceae	*Amicodisca, Dematioscypha, Haplographium*
	Aquapoterium- Unguicularia clade	*Aquapoterium, Unguicularia*
	Bryoglossaceae	*Bryoclaviculus, Bryoglossum, Neocudoniella*
	Bulgariella clade	*Pleuroascus, Connersia, Chlorovibrissea, Pseudomitrula, Mitrulinia, Bulgariella*
	Chlorospleniaceae	*Chlorosplenium*
	Colipila clade	*Colipila*
	Discinellaceae	*Articulospora, Acidea, Cladochasiella, Discinella, Fontanospora, Gyoerffyella, Lemonniera, Naevala, Pezoloma, Tetrachaetum*

Table 1 Continued.

Order/Order-level clade	Family/Family-level clade	Genera
Helotiales	*Drepanopezizaceae*	*Blumeriella, Diplocarpon, Drepanopeziza, Felisbertia, Leptotrochila, Marssonina, Pseudopezicula, Spilopodiella, Spilopodia, Thedgonia*
	Gelatinodiscaceae	*Ascotremella, Ascocoryne, Chloroscypha, Didymocoryne, Neobulgaria, Phaeangellina, Skyathea, Dimorphospora, Helicodendron*
	Godroniaceae	*Ascocalyx, Atropellis, Godronia, Gremmeniella, Grovesiella*
	Helotiaceae	*Amylocarpus, Ascoconidium, Asterocalyx, Bryoscyphus, Chaetoscypha, Crocicreas, Cudoniella, Cyathicula, Dicephalospora, Endoscypha, Glarea, Helicocentralis, Hymenoscyphus, Hymenotorrendiella, Lanzia, Muscicola, Mytilodiscus, Ombrophila, Phaeohelotium, Pirottaea, Pithyella, Pseudoniptera, Roesleria, Roeslerina, Symphyosirinia, Tatraea, Torrendiella, Discorehmia, Eubelonis, Calycella, Gloeotinia, Xylogramma*
	Heterosphaeriaceae	*Heterosphaeria*
	Hyaloscyphaceae	*Ambrodiscus, Aeruginoscyphus, Dimorphotricha, Echinula, Glutinomyces, Graddonidiscus, Grahamiella, Hegermila, Hyaloscypha, Incrupila, Meliniomyces, Olla, Polaroscyphus, Proprioscypha, Protounguicularia, Psilocistella, Parachnopeziza, Rhyzoscyphus, Scytalidium, Thindiomyces, Unguiculariella, Mycoarthris, Hyphopeziza, Curviclavula, Crucellisporiopsis, Clathrosphaerina, Arbusculina, Hyalodendriella*
	Hydrocinaceae	*Filosporella, Hydrocina, Varicosporium, Xerombrophila, Clathrosporium*
	Lachnaceae	*Albotricha, Asperopilum, Belonidium, Brunnipila, Capitotricha, Crucellisporiopsis, Crucellisporium, Dasyscyphella, Erioscyphella, Incrucipulum, Lachnellula, Lachnum, Lachnopsis, Neodasyscypha, Perrotia, Proliferodiscus, Tubolachnum*
	Loramycetaceae	*Acidomelania, Loramyces, Obtectodiscus*
	Mitrulaceae	*Mitrula*
	Mollisiaceae	*Bulbomollisia, Cystodendron, Discocurtisia, Mollisia, Neotapesia, Niptera, Nipterella, Phialocephala, Pseudonaevia, Pyrenopeziza, Sarconiptera, Scutobelonium, Scutomollisia, Trimmatostroma, Tapesia, Variocladium*
	Patellariopsis clade	*Patellariopsis*
	Peltigeromyces clade	*Peltigeromyces*
	Phialocephala urceolata clade	*Phialocephala*
	Ploettnerulaceae	*Cylindrosporium, Cadophora, Collembolispora, Dennisiodiscus, Lasiomollisia, Mastigosporium, Mycochaetophora, Nothophacidium, Oculimacula, Ploettnerula, Pseudopeziza, Peltigeromyces, Rhynchosporium, Rhexocercosporidium, Ypsilina*

Table 1 Continued.

Order/Order-level clade	Family/Family-level clade	Genera
Helotiales	*Solenopeziaceae*	*Geniculospora Tricladium, Graddonia, Mycofalcella, Halenospora, Trichopeziza, Lasiobelonium, Trichopezizella, Solenopezia*
	Vibrisseaceae	*Acephala, Cheirospora, Diplococcium, Fuscosclera, Gorgoniceps, Leucovibrissea, Pocillum, Strossmayeria, Vibrissea*
Lahmiales	*Lahmiaceae*	*Lahmia*
Leptodontidiaceae clade	*Leptodontidiaceae*	*Leptodontidium*
Lauriomycetales	*Lauriomycetaceae*	*Lauriomyces*
Leotiales	*Cochlearomycetaceae*	*Cochlearomyces, Satchmopsis*
	Gelatinomyces clade	*Gelatinomyces*
	Leotiaceae	*Geocoryne, Leotia, Microglossum, Thuemenidium*
	Tympanidaceae	*Aotearoamyces, Claussenomyces, Collophora, Collophorina, Durandiella, Gelatinosporium, Myriodiscus, Pragmopora, Tympanis*
Lichinodiales	*Lichinodiaceae*	*Mniaecia, Mycosymbioces, Epiglia, Lichinodium*
	Epicladonia-Epithamnolia clade	*Epicladonia, Epithamnolia, Fulvoflamma*
Medeolariales	*Ascocorticiaceae*	*Ascocorticium, Ascocorticiellum, Ascosorus*
	Ascodichaenaceae	*Ascodichaena, Delpinoina*
	Coleophoma-Parafabraea clade	*Coleophoma, Parafabraea*
	Dermateaceae	*Cashiella, Dermea, Neofabraea, Pezicula, Pseudofabraea, Phlyctema, Rhizodermea, Verkleyomyces, Schizothyrioma, Davidhawksworthia*
	Medeolariaceae	*Medeolaria*
Micraspis clade	*Micraspis* clade	*Micraspis*
Neocrinulaceae clade	*Neocrinulaceae*	*Neocrinula*
Phacidiales	*Phacidiaceae*	*Allantophomopsiella, Allantophomopsis, Bulgaria, Ceuthospora, Darkera, Phacidium, Phacidiopycnis, Potebniamyces, Pseudophacidium, Starbaeckia, Strasseria*
Rhytismatales	*Calloriaceae*	*Aivenia, Belonioscyphella, Calloria, Chaetonaevia, Cistella, Dactylaria, Diplonaevia, Duebenia, Eupropolella, Hyalacrotes, Iridinea, Laetinaevia, Leohumicola, Loricella, Micropodia, Mycoarthris, Naeviella, Naeviopsis, Ploettnera, Polyphilus, Psilachnum, Stamnaria, Rodwayella, Roseodiscus, Rommelaarsia, Tetracladium, Urceolella, Vandijckella*
	Pezizellaceae	*Allophylaria, Antinoa, Bisporella, Bloxamia, Calycellina, Calycina, Micropeziza, Mollisina, Mollisinopsis, Moserella, Orbiliopsis, Phaeoscypha, Phialina, Poculinia, Porodiplodia, Scleropezicula, Tripospórium, Velutaria, Xiambola, Zymochalara*

Table 1 Continued.

Order/Order-level clade	Family/Family-level clade	Genera
Rhytismatales	*Rhytismataceae*	*Angelina, Apiodiscus, Bifusella, Bifusepta, Bivallium, Bonanseja, Canavirgella, Cavaraella, Ceratophacidium, Cerion, Coccomyces, Colpoma, Criella, Cryptomyces, Cudonia, Davisomycella, Didymascus, Discocainia, Duplicaria, Duplicariella, Elytroderma, Gelineostroma, Haplophyse, Heufleria, Hypoderma, Hypodermella, Hypodermellina, Hypohelion, Irydyonia, Isthmiella, Laquearia, Lasiostictella, Lirula, Lobularia, Lophodermella, Lophodermium, Lophophacidium, Macroderma, Meloderma, Moutoniella, Mycomelanea, Myriophacidium, Nematococcomyces, Neococcomyces, Neophacidium, Nothorhytisma, Nymanomyces, Parvacoccum, Phaeophacidium, Ploioderma, Propolidium, Pseudorhytisma, Pseudotrochila, Pureke, Rhytisma, Soleella, Spathularia, Sporomega, Terriera, Therrya, Triblidiopsis, Tridens, Virgella, Vladracula, Xyloschizon, Zeus*
"Sclerotiniales"	*Cenangiaceae*	*Cenangium, Moellerodiscus, Piceomphale*
	Chlorociboriaceae	*Chlorociboria*
	Hemiphacidiaceae	*Cenangiopsis, Calycellinopsis, Chlorencoelia, Crumenulopsis, Didymascella, Encoelia, Fabrella, Heyderia, Hysterostegiella, Korfia, Meria, Rhabdocline, Sarcotrochila, Trochila, Velutarina*
	Neolauriomycetaceae	*Exochalara, Neolauriomyces, Lareunionomyces*
	Rutstroemiaceae	*Bicornispora, Dencoeliopsis, Lambertella, Rutstroemia, Neometulocladosporiella*
	Sclerotiniaceae	*Amphobotrys, Botrytis, Banksiamyces, Ciboria, Ciborinia, Clarireedia, Coprotinia, Cudoniopsis, Cristulariella, Dumontinia, Elliottinia, Grovesinia, Haradamyces, Kohninia, Martininia, Monilinia, Mycopappus, Myrioconium, Myriosclerotinia, Ovulinia, Phaeosclerotinia, Poculum, Pseudociboria, Pycnopeziza, Redheadia, Scleromitrula, Sclerencoelia, Sclerotinia, Seaverinia, Septotinia, Streptotinia, Stromatinia, Valdensia, Valdensinia*
Thelebolales	*Alatospora- Miniancora* clade	*Alatospora, Gorgomyces, Miniancora*
	Thelebolaceae	*Antarctomyces, Alatospora, Ascozonus, Ascophanus, Caccobius, Cleistothelebolus, Coprobolus, Crinula, Geomyces, Gorgomyces, Gymnostellatospora, Holwaya, Leptokalpion, Leuconeurospora, Miniancora, Neelakesa, Patinella, Pseudascozonus, Pseudeurotium, Pseudogymnoascus, Ramgea, Thelebolus*
Trizodia-Calloriopsis clade	*Trizodia* clade	*Trizodia*
	Corticifraga-Calloriopsis clade	*Corticifraga, Calloriopsis, Spirosphaera*
Triblidiales	*Triblidiaceae*	*Huangshania, Pseudographis, Triblidium*

Table 1 Continued.

Order/Order-level clade	Family/Family-level clade Genera
Leotiomycetes genera *incertae sedis*	*Adelodiscus*, *Aquadiscula*, *Ascluella*, *Ascoclavulina*, *Benguetia*, *Bioscypha*, *Bulgariopsis*, *Callerascus*, *Capillipes*, *Capricola*, *Cejpia*, *Cenangiumella*, *Chlorospleniella*, *Chondroderris*, *Ciliella*, *Coleosperma*, *Coronellaria*, *Crumenella*, *Cryptohymenium*, *Dawsicola*, *Dermateopsis*, *Dictyonia*, *Didonia*, *Echinodiscus*, *Episclerotium*, *Erikssonopsis*, *Gloeopeziza*, *Godroniopsis*, *Grimmicola*, *Helotiella*, *Hemiglossum*, *Hymenobolus*, *Hyphoscypha*, *Hysteronaevia*, *Hysteropezizella*, *Involucroscypha*, *Jacobsonia*, *Lasseria*, *Livia*, *Masseea*, *Melanopeziza*, *Melanormia*, *Metapezizella*, *Mycosphaerangium*, *Obconicum*, *Obscurodiscus*, *Ocotomyces*, *Otwaya*, *Parencoelia*, *Patinellaria*, *Pezolepis*, *Pezomela*, *Phaeofabraea*, *Phragmonaevia*, *Phyllopezis*, *Physmatomyces*, *Pleoscutula*, *Podophacidium*, *Polydiscidium*, *Polydiscina*, *Potridiscus*, *Pseudolachnum*, *Pseudopeltis*, *Pseudotryblidium*, *Psilophana*, *Psilothecium*, *Pubigera*, *Rhizocalyx*, *Riedera*, *Sambucina*, *Schnablia*, *Sclerocrana*, *Sinofavus*, *Sorokina*, *Sorokinella*, *Stilbopeziza*, *Tovariella*, *Trichohelotium*, *Waltonia*, *Woodiella*, *Xeromedulla*, *Zugazaea*, *Bagnisimitrula*, *Themisia*, *Scutulopsis*, *Sageria*, *Rhizothyrium*, *Radotinea*, *Algincola*, *Apiculospora*, *Pteromyces*, *Patinellaria*, *Pachydisca*, *Monochaetiellopsis*, *Microdiscus*, *Merodontis*, *Libartania*, *Lemalis*, *Larissia*, *Grovesia*, *Discomycella*, *Cryptopezia*, *Criserosphaeria*, *Cornuntum*, *Comesia*, *Chloroepilichen*

Table 2 Comparison of major morphological characteristics of the families of Leotiomycetes (Orders and order-level clades are grey highlighted)

Family	Ascomata	Excipulum/ Peridium	Paraphyses	Asci	Ascospores
Chaetomellales					
Chaetomellaceae	Apothecial, sessile to substipitate, erumpent initially develop beneath epidermis, and covered with hairs or setae	Ectal excipulum *textura angularis* to *globulosa* or *textura prismatica* to *porrecta* cells, medullary excipulum *textura prismatica* to *porrecta* cells	Filiform, apically branched	8-spored, cylindric-clavate, non-amyloid, arising from croziers	Ellipsoid to fusoid, hyaline, aseptate
Marthamycetaceae	Apothecial, rounded to elongated, semi-immersed, opening by irregular splits in epihymenium or median longitudinal split with adhering host tissue	Ectal excipulum mostly reduced or *textura angularis* or *oblita* cells, medullary excipulum *textura oblita* cells	Filiform, densely septate, frequently anastomosing	8-spored or multi-spored, cylindrical to sub-cylindrical or clavate, non-amyloid or rarely amyloid, arising from croziers	Ellipsoid to cylindrical or filiform, straight or curved, septate, sometimes muriform, hyaline, sometimes with gelatinous sheath or gelatinous caps at each apex

Table 2 Continued.

Family	Ascomata	Excipulum/ Peridium	Paraphyses	Asci	Ascospores
Cyttariales					
Cyttariaceae	Apothecial, many apothecia immersed in a sterile fleshy-gelatinous stroma	Not clear	Simple filiform	8-spored, amyloid	Subglobose to ovoid, aseptate, smooth to rugulose, at first hyaline to yellowish and later becoming pigmented
Cordieritidaceae	Apothecial, discoid, cupulate, funnel-shaped or ear shaped, sessile or stipitate, sometimes arising from common base or from branched stipes with a dark stroma, sometimes covered with hairs	Ectal excipulum *textura globulosa-angularis* or *textura prismatica-intricata* cells, medullary excipulum *textura prismatica-intricata* or *textura epidermoidea* cells	Cylindrical, clavate or lanceolate, apically slightly swollen and gelatinized, septate	8-spored, non-amyloid, arising from croziers	Ellipsoid to fusoid or rod-shaped, straight or sometimes curved, hyaline or olivaceous-brown, 0–3-septate
Deltopyxidaceae	Apothecial, cupulate to discoid, sessile to substipitate	Ectal excipulum *textura prismatica–globulosa-angularis* cells, medullary excipulum *textura globulosa-angularis-prismatica* cells	Filiform, clavate-capitate, apically slightly swollen and covered with gell sheath, septate	64−spored, clavate-fusoid, non-amyloid, opening by a large slit-like pore, arising from croziers	Slightly to strongly triangular, guttulate
Erysiphales					
Amorphothecaceae	Cleistothecial or Apothecial, cleistothecia globose, sometimes with funnel- shaped apical outgrowths, apothecia cupulate-turbinate, sessile, covered with hairs	Peridium thick-walled brown hyphae with appendages. Excipulum *textura angularis*	Filiform, branched at the apices	8-spored, sub-clavate to globose or cylindric-clavate, sometimes amyloid, arising from croziers, sometimes evanescent	Ellipsoid to fusoid, navicular or lenticular, hyaline, smooth or striate, hyaline, 0–3-septate

Table 2 Continued.

Family	Ascomata	Excipulum/ Peridium	Paraphyses	Asci	Ascospores
Erysiphales					
Erysiphaceae	Cleistothecial (chasmothecial), globose	Peridium *textura angularis* sells	Absent	2–8-spored, globose to broadly clavate, open by rupturing at the apices	Subglobose to ellipsoid, aseptate, hyaline to yellowish, without a sheath
Flagellospora clade					
Flagellospora clade	Perithecial, subglobose with conspicuously papillate ostiole	Peridium *textura angularis* cells	Filiform, cylindrical to capitate, straight, unbranched, densely septate	8-spored, cylindrical	Ellipsoid to fusiform, 1-septate, guttulate, smooth, hyaline
Helotiales					
Amicodiscaceae	Apothecial, cupulate, sessile or sub-stipitate, margins covered by hairs	Ectal excipulum *textura angularis* or *textura prismatica* cells, medullary excipulum loosely arranged hyphae	Filiform, cylindrical, septate, simple	8-spored, amyloid, sometimes arising from croziers	Ellipsoid to fusoid, aseptate, guttulate, lemon-yellow pigmented
Aquapoterium-Unguicularia clade	Apothecial, cupulate receptacle, sessile or stipitate, sometimes margins covered with short cylindrical hairs	Ectal excipulum *textura prismatica* cells or a single layer of parallel hyphae with enlarged, globose apices, medullary excipulum reduced or composed of loosely arranged hyphae	Filiform, hyaline, obtuse to clavate at apex, septate, smooth-walled, simple or branched	8-spored, amyloid or non-amyloid, cylindric-clavate	Ellipsoid to clavate-cylindric, hyaline, smooth-walled, 0–1-septate, surrounded by a gelatinous sheath
Arachnopezizaceae	Apothecial, covered by hairs	Ectal excipulum *textura angularis* to *prismatica* cells, medullary excipulum *textura prismatica* to *textura oblita* cells	Cylindrical, hyaline	8-spored, cylindric-clavate, amyloid, arising from croziers	Ellipsoid to fusoid, 0–7-septate

Table 2 Continued.

Family	Ascomata	Excipulum/ Peridium	Paraphyses	Asci	Ascospores
Helotiales					
Bryoglossaceae	Apothecial, clavate to capitate or cupulate to turbinate, long stipitate, gelatinous	Ectal excipulum *textura porrecta* cells, medullary excipulum *textura intricata* cells	Filiform, swollen at the apex	8-spored, amyloid or non-amyloid, arising from croziers	Ellipsoid to fusoid, straight, aseptate, guttulate
Bulgariella clade	Apothecial or rarely cleistothecial, cupulate, discoid, turbinate or capitate, sessile or stipitate, margins and flanks are covered with hairs	Ectal excipulum is composed *textura angularis*, *textura prismatica* or *textura oblita* cells, medullary excipulum is composed of cells of *textura intricata* or *textura oblita* cells	Filiform, lanceolate or cylindrical	8-spored, cylindric-clavate, amyloid or non-amyloid, sometimes arising from croziers	Globose, ellipsoid to filiform, septate or aseptate, hyaline or brownish, guttulate
Chlorospleniaceae	Apothecial, cupulate or discoid, sessile or substipitate	Ectal excipulum *textura angularis* cells, medullary excipulum *textura intricata* cells	Filiform, septate	8-spored, cylindric-clavate, amyloid	Ellipsoid to fusoid, hyaline and smooth walled
Colipila clade	Apothecial cupulate, covered by long cylindrical hairs	Ectal excipulum and medullary excipulum *textura prismatica* cells	Dimorphic, sub-cylindrical and not exceed the length of asci, or broadly lanceolate and exceed the length of asci	8-spored, cylindric–clavate, amyloid, arising from croziers	Ellipsoid to fusoid
Discinellaceae	Apothecial, discoid to cupulate, circular, gelatinous, sometimes covered with hairs	Ectal excipulum *textura prismatica* or *textura porrecta* cells, medullary excipulum *textura intricata* to *prismatica* cells	Filiform, branched at the apices	8-spored, cylindrical, amyloid or non-amyloid, sometimes arising from croziers	Ellipsoid, aseptate, hyaline, without sheath
Drepanopezizaceae	Apothecial, cupulate, sessile, mostly immersed	A thin layer of *textura angularis* cells,	Apically slightly swollen, straight	4–8- spored, non-amyloid	Ellipsoid to fusoid, 0–2-septate

Table 2 Continued.

Family	Ascomata	Excipulum/ Peridium	Paraphyses	Asci	Ascospores
Helotiales					
Gelatinodiscaceae	Apothecial, cupulate or discoid, some are tremelloid, form cerebriform masses which each lobule contains a turbinate apothecium	Ectal excipulum *textura prismatica* to *textura angularis* to *globulosa* cells, medullary excipulum *textura oblita* to *textura porrecta* or *textura intricata* cells	Filiform, cylindrical, apically swollen, guttulate	8-spored, amyloid, arising from croziers	Ellipsoid to fusoid, hyaline, yellowish or brownish, smooth, with a gelatinous sheath, guttulate, 0–5-septate
Godroniaceae	Apothecial, urceolate, discoid or cupulate, mostly stromatic, erumpent, sometimes covered with hairs	Ectal excipulum *textura prismatica* to *angularis* cells, medullary excipulum *textura epidermoidea*, *prismatica* to *porrecta* cells	Filiform or lanceolate, simple or branched, sometimes slightly swollen at the apex	8-spored, cylindric-clavate, amyloid or non-amyloid	Fusoid, hyaline, septate, guttulate
Helotiaceae	Apothecial, cupulate, discoid, capitate to clavate, turbinate or globose, sessile or stipitate, margins and flanks smooth or covered with hairs	Ectal excipulum *textura prismatica*, *intricata*, *globulosa-angularis*, or *toblita* cells, medullary excipulum *textura intricata* or *porrecta* cells	Cylindrical, septate or aseptate, hyaline to yellowish, guttulate	4–8-spored, cylindric-clavate, amyloid or non-amyloid, sometimes arising from croziers	Ellipsoid, fusoid or filiform, 1–3-septate, rarely ornamented
Heterosphaeriaceae	Apothecial, discoid, black, sessile, erumpent, gelatinous	Ectal excipulum *textura angularis* cells, medullary excipulum *textura porrecta* cells	Clavate contains many guttules	8-spored, amyloid, arising from croziers	Aseptate, ellipsoid to fusoid, without gel sheath
Hyaloscyphaceae	Apothecial, cupulate or discoid, sessile or substipitate, sometimes covered with hairs	Ectal excipulum *textura globulosa* cells, medullary excipulum *textura porrecta*, *intricata* to *oblita* cells	Filiform, septate, branched, slightly swollen at the apices	8-spored, cylindric-clavate, amyloid, arising from croziers	Ellipsoid to fusoid, aseptate or septate, hyaline
Hydrocinaceae	Apothecial, cupulate, sessile or substipitate	Ectal excipulum *textura globulosa* cells, medullary excipulum *textura porrecta*, *intricata* or *oblita* cells	Filiform, septate, branched, slightly swollen at the apices	8-spored, cylindric-clavate, amyloid, arising from croziers	Ellipsoid to fusoid, aseptate or septate, hyaline

Table 2 Continued.

Family	Ascomata	Excipulum/ Peridium	Paraphyses	Asci	Ascospores
Helotiales					
Lachnaceae	Apothecial, cupulate or discoid, sessile or stipitate, margins and flanks are covered with hairs	Ectal excipulum *textura angularis, prismatica* or *oblita* cells, medullary excipulum *textura intricata* or *textura oblita* cells	Filiform, lanceolate or rarely cylindrical	8-spored, cylindric-clavate, amyloid or non-amyloid, sometimes arising from croziers	Globose, ellipsoid to filiform or allantoid, septate or aseptate, hyaline, guttulate
Loramycetaceae	Apothecial or perithecial, apothecia cupulate or pulvinate, perithecia sub-globose	Ectal excipulum *textura prismatica*, *angularis* or *globulosa* cells, medullary excipulum *textura prismatica* cells	Filiform, septate, unbranched, sometimes apically swollen and pigmented	8-spored, cylindric-clavate, amyloid or non-amyloid	Fusiform, septate, sometimes with terminal appendages and gel sheath
Mitrulaceae	Apothecial, clavate, stipitate	Ectal excipulum *textura porrecta* cells, medullary excipulum *textura intricata* cells	Filiform, cylindrical, with yellow carotenoid droplets	8-spored, cylindric-clavate, arising from croziers	Fusoid to ellipsoid, straight or curved
Mollisiaceae	Apothecial, discoid covered by hairs,	Ectal excipulum *textura globulosa* to *angularis* cells, medullary excipulum *textura prismatica* cells	Cylindrical or lanceolate, apically swollen, guttulate	8-spored, amyloid, cylindric clavate, mostly arising from croziers	Ellipsoid to long-filiform, 0–7-septate, guttulate
Patellariopsis clade	Apothecial, discoid, sessile	Ectal excipulum *textura globulosa* to *angularis* cells, medullary excipulum interwoven refractive hyphae	filiform, branched and pigmented at the apices	8-spored, cylindric-clavate, amyloid	Ellipsoid to fusoid, hyaline, 3-7-septate
Peltigeromyces clade	Apothecial, cartilaginous, thin, with a large variety of lobes	Records are not available for micro morphological characters	–	–	–
Phialocephala urceolata clade	Sexual morphs are not recorded	–	–	–	–

Table 2 Continued.

Family	Ascomata	Excipulum/ Peridium	Paraphyses	Asci	Ascospores
Helotiales					
Ploettnerulaceae	Apothecial, cupulate, discoid or urn-shaped, sessile or sub-stipitate, sometimes covered with pigmented hairs	Ectal excipulum *textura globulosa* to *angularis* cells, medullary excipulum *textura prismatica* cells	Filiform, cylindrical or lanceolate, guttulate	8-spored, conical apex, amyloid	Ellipsoid to long-filiform, 0–3-septate, guttulate
Solenopeziaceae	Apothecial cupulate, discoid or pulvinate, sessile or stipitate, sometimes covered with hyaline, whitish, yellow or brown, non-bristle like hairs	Ectal excipulum *textura angularis*, *textura prismatica* or *textura oblita* cells, medullary excipulum *textura intricata* or *textura oblita* cells	Filiform, lanceolate or cylindrical	8-spored, cylindric-clavate, amyloid or non-amyloid, sometimes arising from croziers	Globose, ellipsoid to fusiform, septate or aseptate, guttulate
Vibrisseaceae	Apothecial, cupulate or clavate, sessile to stipitate	Ectal excipulum *textura angularis* to *globulosa* cells, medullary excipulum reduced or *textura oblita* cells	Filiform, apically slightly swollen, sometimes branched	8-spored, cylindric-clavate, long stipitate, sometimes amyloid, arising from croziers	Filiform, 3–24-septate, partly fragmenting
Helicogoniaceae clade					
Helicogoniaceae	Absent, forms only naked on ascogenous hyphae or apothecial semiglobose to pulvinate, gelatinous	Ectal excipulum of *textura prismatica* to *angularis* to *porrecta*, medullary excipulum not clear	Filiform, simple	8-spored, cylindric-clavate, amyloid or non-amyloid, opening by an apical slit	Subglobose to ellipsoid to fusoid
Hyphodiscus- chalara clade					
Hyphodiscaceae	Apothecial, cupulate or discoid, sessile or short stalked, sometimes gelatinized and covered with hairs	Ectal excipulum *textura angularis*, *intricata* or *prismatica* cells, medullary excipulum *textura intricata* to *angularis* cells	Filiform, septate, slightly enlarged at the apices	8-spored, cylindric-clavate, amyloid or non-amyloid, sometimes arising from croziers	Ellipsoid, hyaline, 0–3-septate

Table 2 Continued.

Family	Ascomata	Excipulum/ Peridium	Paraphyses	Asci	Ascospores
Hyphodiscus- chalara clade					
Hamatocanthoscyphaceae	Apothecial, cupulate or discoid receptacle, sessile, rarely stipitate, erumpent	Ectal excipulum reduced or *textura intricata* or *prismatica* cells, medullary excipulum *textura intricata* or *prismatica* cells	Filiform, slightly swollen at the apices	8-spored, non-amyloid, cylindric-clavate, sometimes arising from croziers	Ellipsoid to fusoid, hyaline, 0–1-septate
Lahmiales					
Lahmiaceae	Apothecial, turbinate, stipitate, black, closed at immature stage and open by irregular radial splits at maturity	Ectal excipulum *textura epidermoidea* cells, medullary excipulum *textura epidermoidea* cells	Densely septate, unbranched, slightly swollen at apices	8-spored, cylindric-clavate, non-amyloid, arising from croziers, bitunicate but non-fissitunicate	Crescent-shaped, hyaline, 1–4-septate
Lauriomycetales					
Lauriomycetaceae	Do not form Sexual morphs	–	–	–	–
Leptodontidiaceae clade					
Leptodontidiaceae	Sexual morphs are not recorded	–	–	–	–
Leotiales					
Cochlearomycetaceae	Do not form sexual morphs	–	–	–	–
Gelatinomyces clade	Apothecial, aggregated (but well separated) in a single stroma, pale grey to dark coloured, soft gelatinous, globose or pulvinate when young, discoid to cupulate with maturity, sessile	Exciple dark and gelatinous	Simple, branched	Multi-spored, cylindrical, tapered at the base, non-amyloid	Minute, hyaline, globose to ovoid, smooth-walled
Leotiaceae	Apothecial, clavate, turbinate to applanate, sessile to long stipitate with subglobose to ellipsoid to fusoid fertile part, sometimes gelatinous	Ectal excipulum *textura intricata* or *textura porrecta* cells, medullary excipulum *textura intricata* cells	Filiform, hyaline, sometimes apically slightly swollen and/or branched, straight to slightly curved, aseptate	8-spored, mostly amyloid, arising from croziers	Ellipsoid to fusoid, rarely vermiform, guttulate, aseptate, hyaline

Table 2 Continued.

Family	Ascomata	Excipulum/ Peridium	Paraphyses	Asci	Ascospores
Leotiales					
Tympanidaceae	Apothecial, discoid, turbinate or pulvinate, solitary or aggregated in an stroma, often slightly gelatinous, sessile or stipitate, erumpent or superficial	Ectal excipulum *textura globulosa* to *textura oblita*, *textura prismatica* or *textura intricata* cells, medullary excipulum *textura intricata* cells	Filiform, cylindrical to capitate, straight, unbranched, densely septate	4–8-spored, cylindric-clavate, mostly non-amyloid, rarely amyloid, arising from croziers	Globose, ellipsoid, fusiform or sub-cylindrical, sometimes slightly curved, hyaline, 0–21-septate, guttulate, smooth, hyaline
Lichinodiales					
Epicladonia-Epithamnolia clade	Do not form Sexual morphs	–	–	–	–
Lichinodiaceae	Apothecial cupulate, turbinate or pulvinate	Excipulum pigmented, tightly arranged hyphae or *textura intricata*	Cylindrical or filiform, septate, sometimes apically swollen and pigmented	8-spored, cylindrical-clavate, non-amyloid, arising from croziers	Ellipsoid to pyriform or globose to subglobose, hyaline
Medeolariales					
Ascodichaenaceae	Apothecial, round to elongate hysterioid, opening by a stellate fissure, carbonaceous	Excipulum reduced or *textura angularis* to *globulosa* cells	Filiform, simple, slightly apically swollen	4–8-spored, broad clavate-cylindric, non-amyloid	Ellipsoid to oblong, 0–1-septate, hyaline, granulate
Ascocorticiaceae	Apothecial, effuse, irregular in shape, whitish-greyish or ochraceous, pruinose film	Excipulum strongly reduced	Simple, unbranched	4–16-spored, cylindric-clavate, inamyloid, with or without croziers	Cylindric-ellipsoid or vermiform, 0–11-septate, hyaline, eguttulate
Medeolariales					
Coleophoma-Parafabraea clade	Apothecial, turbinate, sessile to sub-sessile, short-stalked, covered by setae-like structures	Excipulum reduced or *textura angularis* to *globulosa* cells	Cylindrical, slender, wider at base, septate, apex round, hyaline to pale brown	8-spored, clavate to cylindrical-clavate, short-stipitate	Fusoid to ellipsoid, in-equilateral, ends rounded, straight or slightly curved, aseptate, thin-walled, hyaline, guttulate

Table 2 Continued.

Family	Ascomata	Excipulum/ Peridium	Paraphyses	Asci	Ascospores
Medeolariales					
Dermateaceae	Apothecial, cupulate to sub-spherical, urceolate or discoid, sessile or short stipitate	Ectal excipulum reduced or *textura angularis* to *globulosa* cells, medullary excipulum *textura angularis* cells	Filiform, apically slightly swollen, septate, branched	4–8-spored, cylindric-clavate, amyloid or non-amyloid, arising from croziers	Ellipsoid-oblong, hyaline, aseptate, sometimes with a delicate sheath, guttulate
Medeolariaceae	Apothecial, irregularly organized, reduced, erumpent in host tissue	Excipulum reduced or unclear	Filiform, simple, flexuous, septate below, brownish	8-spored, cylindric-clavate, non-amyloid	Fusiform to naviculate, with a dark outer wall layer with striations
Micraspis lineage					
Micraspis lineage	Apothecial, immersed within the substrate, elliptical, opening by a longitudinal slit or irregular split at central area of cover	Ectal excipulum dark coloured *textura angularis* cells, medullary excipulum light coloured *textura angularis* cells	Filiform, often branched at the tip	8-spored, cylindric-clavate, non-amyloid	Hyaline, elliptical to obviate, 3-septate
Neocrinulaceae clade					
Neocrinulaceae	Sexual morphs are not recorded	–	–	–	–
Phacidiales					
Phacidiaceae	Apothecial, discoid to cupulate, immersed, usually open by splitting into teeth or lobes with adhering host tissue	Ectal excipulum *textura angularis* cells, medullary excipulum is unclear or very thin	Filiform, cylindric or lanceolate, sometimes apically curled	4–8-spored, cylindric-clavate, mostly amyloid, arising from croziers	Ellipsoid, fusoid or cylindric-clavate, hyaline, aseptate, guttulate
Rhytismatales					
Calloriaceae	Apothecial, cupulate or rounded to elongated	Ectal excipulum *textura prismatica* or *angularis* to *globulosa* cells, medullary excipulum *textura prismatica* to *porrecta* cells	Filiform or lanceolate, apically slightly swollen, straight or flexuous, sometimes guttulate	8-spored, non-amyloid or amyloid, sometimes arising from croziers	Ellipsoid to fusoid, 0–3-sepatate, guttulate
Pezizellaceae	Apothecial, discoid to cupulate, sessile or stipitate, sometimes covered by hairs	Ectal excipulum reduced or *textura angularis*, *prismatica* or *oblita* cells, medullary excipulum *textura intricata*	Filiform or lanceolate, septate or aseptate	4–8-spored, amyloid or non-amyloid, cylindric-clavate, sometimes arising from croziers	Ellipsoid, allantoid to fusoid, 0–3-septate, guttulate

Table 2 Continued.

Family	Ascomata	Excipulum/ Peridium	Paraphyses	Asci	Ascospores
Rhytismatales					
Rhytismataceae	Apothecial, long-stipitate, clavate, capitate or spathulate apothecia or sessile, erumpent, circular, navicular or hysteriform, clypeate and opening by a longitudinal split or radial fissure	Ectal excipulum *textura angularis* or *textura porrecta* cells, medullary excipulum reduced or *textura intricata* to *prismatica* cells	Rarely absent, filiform, mostly aseptate, branched or unbranched, sometimes apically slightly swollen and strongly curved	4–8-spored, mostly non-amyloid, cylindric-clavate, arising from croziers	Ovoid, ellipsoid, clavate, sub-cylindrical, fusoid or filiform, hyaline, usually aseptate, apex slightly curved, base strongly tapered, sometimes apex partly covered by a gel cap
"Sclerotiniales"					
Cenangiaceae	apothecial, cupulate to discoid, sessile or short-stipitate	Ectal excipulum *textura angularis* to *globulosa* cells, medullary excipulum *textura intricata* cells	Filiform, septate, slightly swollen at the apex	8-spored, cylindric-clavate, amyloid, sometimes arising from croziers	Globose, ellipsoid to fusoid, 0–2-septate, hyaline
Chlorociboriaceae	Apothecial, cupulate to discoid, stipitate, arising from a basal stromatic mass, erumpent or superficial, blue green, exterior surface glabrous or with short septate hairs	Ectal excipulum *textura prismatica* or *textura intricata* cells, medullary excipulum *textura intricata* cells	Filiform, simple, slightly branched	8-spored, arising from croziers, cylindric-clavate, amyloid	Ellipsoid to fusoid, straight to slightly curved, hyaline, 0–3-septate
Hemiphacidiaceae	Apothecial, discoid to cupulate, sessile or stipitate, sometimes immersed in host tissue and opening by a lid or transversal cracks of the overlying host tissue	Ectal excipulum reduced or *textura globulosa-angularis* or *prismatica* cells, medullary excipulum *textura angularis* or *intricata* cells	Cylindrical or lanceolate, sometimes slightly swollen at the apices	2–8-spored, amyloid or non-amyloid, sometimes arising from croziers	Ellipsoid, fusoid, clavate or allantoid, 0–1-septate, hyaline or brown, sometimes with sheath
Neolauriomycetaceae	Do not form Sexual morphs	–	–	–	–

Table 2 Continued.

Family	Ascomata	Excipulum/ Peridium	Paraphyses	Asci	Ascospores
"Sclerotiniales"					
Rutstroemiaceae	Apothecial or cleistothecial. Apothecia cupulate to discoid, stipitate. Cleistothecia sub-globose	Ectal excipulum *textura prismatica* or *textura globulosa* cells, medullary excipulum *textura intricata* cells	Cylindrical	8-spored, cylindric-clavate, amyloid, rarely non-amyloid, sometimes arising from croziers	Ellipsoid to allantoid, hyaline, 0–4-septate
Sclerotiniaceae	Apothecial, cupulate to plane or pileate , stipitate, usually emerge from sclerotia	Ectal excipulum *textura globulosa* or *prismatica* cells, medullary excipulum *textura prismatica*, *intricata* cells or loosely arranged hyphae	Filiform, cylindrical, hyaline	2–8-spored, amyloid, rarely non-amyloid, sometimes arising from croziers	Ellipsoid, rarely fusoid or allantoid, smooth, hyaline, rarely warted, guttulate, often with sheath, 1–3-septate and budding microconidia
Thelebolales					
Thelebolaceae	Ascomata absent, apothecial or cleistothecial. When ascomata absent, asci formed directly on fertile hyphae. Apothecia turbinate, cylindrical, obconical, pulvinate, or cupulate, sessile or sub-stipitate, glabrous or with thin-walled, tapering hairs.	Without an exciple or peridium, when present ectal excipulum *textura globulosa-angularis*, *prismatica* or *textura porrecta* cells, medullary excipulum *textura porrecta*, *prismatica* cells or loosely arranged hyphae, peridium *textura globulosa-angularis* cells	Absent or when present filiform, sometimes apically swollen, straight to slightly curved, septate	4–1000-spored, ellipsoidal clavate to subglobose or broadly cylindrical, sessile, sometimes arising from croziers, non-amyloid, evanescent or opening by rupturing or operculate	Ellipsoid, fusoid to filiform, globose to ellipsoid or lunate, hyaline or brown, aseptate, rarely septate, sometimes guttulate, smooth-walled or ornamented, aseptate
Alatospora-Miniancora clade	Sexual morphs are not recorded	–	–	–	–
Triblidiales					
Triblidiaceae	Apothecial, discoid or hysterioid, sessile or sub-stipitate, closed at immature stage and open by a split or radial fissure	Ectal excipulum *textura angularis* cells	Apically slightly swollen, branched, hyaline, guttulate	4–8-spored, cylindric-clavate, non-amyloid, arising from croziers	Ellipsoid to fusiform, dictyo- to phragmosporous or muriform, thick-walled, smooth or warted, multiguttulate

Table 2 Continued.

Family	Ascomata	Excipulum/ Peridium	Paraphyses	Asci	Ascospores
Trizodia-Calloriopsis clade					
Trizodia clade	Apothecial, subglobose or turbinate, sessile to short-stipitate	Ectal excipulum *textura porrecta* cells, medullary excipulum not clear	Filiform, septate	8-spored, clavate, arising from croziers, amyloid	Ellipsoid to ovate to pyriform, smooth, aseptate, guttulate
Corticifraga-Calloriopsis clade	Apothecia, globose or pulvinate, sessile or sub-stipitate, sometimes developed within host and open by splitting into irregular lobes	Ectal excipulum reduced or *textura prismatic*, *angularis* or *globulosa* cells, medullary excipulum *textura prismatica* cells or loosely arranged hyphae	Filiform, apically slightly swollen, septate, unbranched or very rarely branched	4–8-spored, clavate or globose, non-amyloid, sometimes with small ocular chamber	Ellipsoid to fusoid or bacilliform, hyaline, septate

According to our phylogenetic analysis Leotiomycetes include 19 orders/order-level clades. Two additional orders are classified under Leotiomycetes order as *incertae sedis* based on morphological characteristics. The outline of all the genera and the families/family-level clades within Leotiomycetes are summarised in Table 1.

In this section we also provide short notes on each order/order-level clade and give a brief discussion on each family/family-level clade. This section also includes a table that summarizes the major sexual morph characteristics of Leotiomycetes families (Table 2).

Our collection includes members of the families *Cordieritidaceae*, *Chlorociboriaceae*, *Helotiaceae*, *Lachnaceae*, *Calloriaceae*, *Loramycetaceae*, *Ploettnerulaceae*, *Vibrisseaceae*, *Dermateaceae*, *Leptodontidiaceae*, *Phacidiaceae*, *Rhytismataceae* and *Pezizellaceae*. Morphological plates and detailed description with small scale phylogenetic analyses are provided for new collections.

CHAETOMELLALES

This order was introduced by Crous et al. (2017) and included a single family *Chaetomellaceae*. According to our phylogenetic analysis and a previous study (Pärtel 2016), we place *Marthamycetaceae* and *Corticifraga-Calloriopsis* clade under this order.

Chaetomellaceae Baral, P.R. Johnst. & Rossman

Facesoffungi number: FoF 05850

This family includes mainly plant pathogens or saprobes. Sexual morphs are not common. Ascomata are apothecial, sessile to substipitate, erumpent and initially developing beneath the epidermis and sometimes are covered by hairs or setae. Setae are cylindrical, apically subclavate, straight or sometimes strongly curled, smooth and thick-walled and septate. The ectal excipulum is composed of cells of *textura angularis* to *globulosa* or *textura prismatica* to *porrecta* and medullary excipulum is composed of *textura prismatica* to *porrecta*. Paraphyses are filiform and apically branched.

Asci are cylindric-clavate, 8-spored, non-amyloid and arising from croziers and ascospores are hyaline, ellipsoid to fusoid and aseptate (Pärtel et al. 2017, Jaklitsch et al. 2016). Asexual morphs are two synanamorphs. They are pycnidial and sporodochial. Pycnidia are brown to black, subglobose and walls are composed of cells of *textura angularis* and sporodochia are sessile to long-stalked and externally ochraceous to brown. Both conidiomata types of *Chaetomellaceae* are covered with smooth and scattered brown setae. Conidiogenesis is phialidic and conidia are cylindrical to sometimes ellipsoidal, straight to curved, often with pointed ends and 0–1-septate (Decock et al. 2005, Verkley 2001, 2002, Fiuza et al. 2015, Pärtel et al. 2017, Oliveira et al. 2014).

Notes – Most of the taxa included in this family are asexual morphs (Decock et al. 2005, Verkley 2001, 2002, Rossman et al. 2004, Fiuza et al. 2015). When both asexual and sexual morphs present, they are often covered with setae (Jaklitsch et al. 2016). Some of the *Chaetomellaceae* are weak parasites, which cause leaf spot disease and also attack fruits (Johnston et al. 2014).

Marthamycetaceae Baral, Lantz, Hustad et al.

Facesoffungi number: FoF 05851

Taxa of this family are saprobic on dead plant material or rarely pathogenic (DiCosmo et al. 1983, Giordano & Gonthier 2011, Raymundo et al. 2016). They are mainly distributed in tropical and subtropical regions (Johnston 2006, Raymundo et al. 2016). Ascomata are apothecial and mainly characterised by rounded to elongated receptacles. Apothecia are semi-immersed and the epihymenium splits into irregular lobes or to a median longitudinal split. The hymenium is white, cream or blue-green-grey, rarely yellow or orange-rose and sometimes covered by a clypeus. The ectal excipulum is mostly reduced and sometimes composed of hyaline to dark brown *textura angularis* or *oblita* and the medullary excipulum is composed of cells of *textura oblita*. The interscal tissue is composed of both densely septate, frequently anastomosing, filiform, branched paraphyses and periphysiods. Asci are cylindrical to sub-cylindrical or clavate, mostly 8-spored and rarely multi-spored, the apex is rounded or conical, non-amyloid or rarely with an amyloid ring and arise from croziers. Ascospores are ellipsoid to cylindrical or filiform, septate, straight or curved, sometimes muriform, hyaline and sometimes covered with gelatinous sheath or gelatinous caps at each end (Hunter et al. 2016, DiCosmo et al. 1983, Johnston 2006, Raymundo et al. 2016, Jaklitsch et al. 2016). Asexual morphs are mainly unknown (Jaklitsch et al. 2016).

Notes – This family was previously classified in Rhytismatales based on its morphology (Jaklitsch et al. 2016). However, Jaklitsch et al. (2016) opined that the family does not phylogenetically relate to *Rhytismataceae*. Hustad & Miller (2011) and Lantz et al. (2011) showed its basal position within Leotiomycetes. In the phylogenetic analysis of Pärtel (2016), this family formed a monophyletic clade with *Cheatomellaceae*. Similarly, in our analysis it formed a basal clade, sister to *Cheatomellaceae*. Therefore, we place this family under the order Chaetomellales.

CYTTARIALES

This order introduced by Gamundí (1971) to accommodate the single family *Cyttariaceae*. In our phylogenetic analysis we observed a close relationship of *Cordieritidaceae* and *Deltopyxidaceae* within Cyttariales.

Cyttariaceae Speg.

Facesoffungi number: FoF 05852

This family includes obligate pathogens on *Nothofagus* spp. (Peterson & Pfister 2010). Ascomata are pitted apothecia immersed in a sterile fleshy-gelatinous stroma. Apothecia are characterised by simple filiform paraphyses, 8-spored, inoperculate and amyloid asci and uninucleate, subglobose to ovoid, smooth to rugulose ascospores, which are hyaline to yellowish at first, but later becoming pigmented (Mengoni 1986, Peterson et al. 2010). Asexual morphs are pycnidial, immersed, conidiogenous cells are monoblastic and conidia are small, hyaline and aseptate.

Notes – The family *Cyttariaceae* is host specific on *Nothofagus* spp. (and the segregate genera) and geographically restricted to southern South America (Argentina and Chile) and south-eastern Australasia and including Tasmania, and New Zealand (Peterson & Pfister 2010). This family is distinct from other Leotiomycetes taxa by producing compound apothecia, which have numerous apothecial cavities in a pear-shaped stroma (Peterson & Pfister 2010).

Deltopyxidaceae Ekanayaka & K.D. Hyde, ***fam. nov.***

Index Fungorum number: IF556270; Facesoffungi number: FoF 05853

Type genus – *Deltopyxis*

Saprobic on dead plant material or *lichenicolous*. **Sexual morph:** *Ascomata* apothecial cupulate to discoid, sessile to substipitate. *Margins* more or less distinct or crenulate, pustulate. *Ectal excipulum* composed of cells of *textura prismatica globulosa-angularis*. *Medullary excipulum* composed of slightly gelatinized cells of *textura globulosa-angularis-prismatica*. *Paraphyses* filiform, clavate-capitate, sometimes apically slightly swollen and covered with gell sheath, septate, branched or unbranched. *Asci* 8–64 spored, clavate or sub-cylindrical, non-amyloid, opening by a large slit-like pore, arising from croziers. *Ascospores* ellipsoid to ovoid or slightly to strongly triangular, guttulate, budding to form cylindrical to ellipsoid phialoconidia. **Asexual morphs:** *Conidiomata* pycnidial, peridium composed of light brown cells of *textura globulosa*. *Conidiophores* subglobose to obpyriform, with a short to long neck. *Conidiogenesis* phialidic. *Conidia* rod-shaped, straight to slightly curved, eguttulate.

Notes – The family contains the two genera, *Phaeopyxis* with five species and *Deltopyxis* with a single species (Baral & Marson 2012). These genera were formerly classified under Helotiales genera *incertae sedis*. In our phylogenetic analysis this new family formed a monophyletic clade sister to *Cordieritidaceae* with the strong statistical support (93%- MLBP and 1- BYPP) (Fig. 1). However, the sister relationship is not statistically supported.

Cordieritidaceae (Sacc.) Sacc.

Facesoffungi number: FoF 05854

Taxa are saprobic on dead plant material or lichenicolous (Pérez-Ortega et al. 2011, Kocourková & Knudsen 2009, Baral & Marson 2001, Ertz & Diederich 2006, Huhtinen & Spooner 2005, Pärtel et al. 2017). Ascomata are apothecial. Apothecia are discoid, cupulate, funnel-shaped or ear-shaped, sessile or stipitate and sometimes arising from common base or from branched stipes and with a dark stroma. The margins and flanks are sometimes covered with hairs. Hairs are cylindrical, straight or curved with tapered and hooked apices, sometimes septate, hyaline or brownish and smooth or thick-walled. The ectal excipulum is composed of pigmented cells of *textura globulosa-angularis* or *textura prismatica-intricata* and medullary excipulum is composed of cells of *textura prismatica-intricata* or *textura epidermoidea*. Paraphyses are cylindrical or clavate, sometimes lanceolate, apically slightly swollen and gelatinized and septate. Asci are 8-spored, non-amyloid and arising from croziers. Ascospores are ellipsoid to fusoid or rod-shaped, straight or sometimes curved, hyaline or olivaceous-brown and 0–3-septate (Diederich et al. 2010, Matocec et al. 2005, Pérez-Ortega et al. 2011, Kocourková & Knudsen 2009, Baral & Marson 2001, Ertz & Diederich 2006, Jaklitsch et al. 2016, Huhtinen & Spooner 2005, Pärtel et al. 2017, Diederich & Coppins 2014, Etayo et al. 2015, Diederich & Etayo 2000, 2004). Asexual morphs are coelomycetous, stromatic, multilocular, phialidic and holoblastic. Conidia are ellipsoid or triangular and hyaline to dark brown (Jaklitsch et al. 2016, Diederich & Coppins 2014).

Notes – Considering the unique ionomidotic reaction (solubility of excipular pigments in KOH) of most *Cordieritidaceae* taxa, Jaklitsch et al. (2016) suggested a separate phylogenetic position away from other Helotiales. In our phylogeny this family grouped within Cyttariales.

Unguiculella globosa Ekanayaka & K.D. Hyde, ***sp. nov.***

Index Fungorum number: IF556271; Facesoffungi number: FoF 05855; Fig. 4.

Etymology – refers to the globose ascospores

Holotype – MFLU 18-1816

Saprobic on dead stems. **Sexual morph:** *Apothecia* 300–700 × 160–200 µm, arising singly, sessile, slightly erumpent, yellowish white. *Receptacle* cupulate. *Disc* concave. *Hairs* 14–18 × 2.5–4 µm ($\bar{x}$ = 16.3 × 2.8 µm, n = 30) cylindric with curved acute tips, septate, walls usually thin, hyaline. *Ectal excipulum* 25–35 µm ($\bar{x}$ = 27.8 µm, n = 10) in lower flanks, composed of thin-walled, light brown to hyaline cells of *textura angularis* to *prismatica*. *Medullary excipulum* 70–80 µm ($\bar{x}$ = 77.6 µm, n = 10) in lower flanks, composed of thin-walled, hyaline cells of *textura epidermoidea*. *Hymenium* hyaline. *Paraphyses* 1.8–2.2 µm wide ($\bar{x}$ = 2.1 µm, n = 20), numerous, filiform, obtuse at the apex, septate, not exceeding the asci in length, smooth, guttulate. *Asci* 36–54 × 4–6.5 µm ($\bar{x}$ = 45 × 5 µm, n = 30), 8-spored, unitunicate, cylindrical, obtuse at the apex, non-amyloid, stipitate base, arising from croziers. Ascospores 3–4 µm ($\bar{x}$ = 3.6 µm, n = 40) diam., 1-seriate, globose, hyaline, guttulate. **Asexual morph:** Undetermined.

Material examined – China, Yunnan Province, Kunming, Kunming Institute of Botany, Botanical Garden, 14 April 2016, A.H. Ekanayaka, HC03 (MFLU 18-1816).

GenBank accessions – LSU- MK591972, ITS- MK584946, SSU- MK585044, TEF- MK714027, RPB2- MK614727

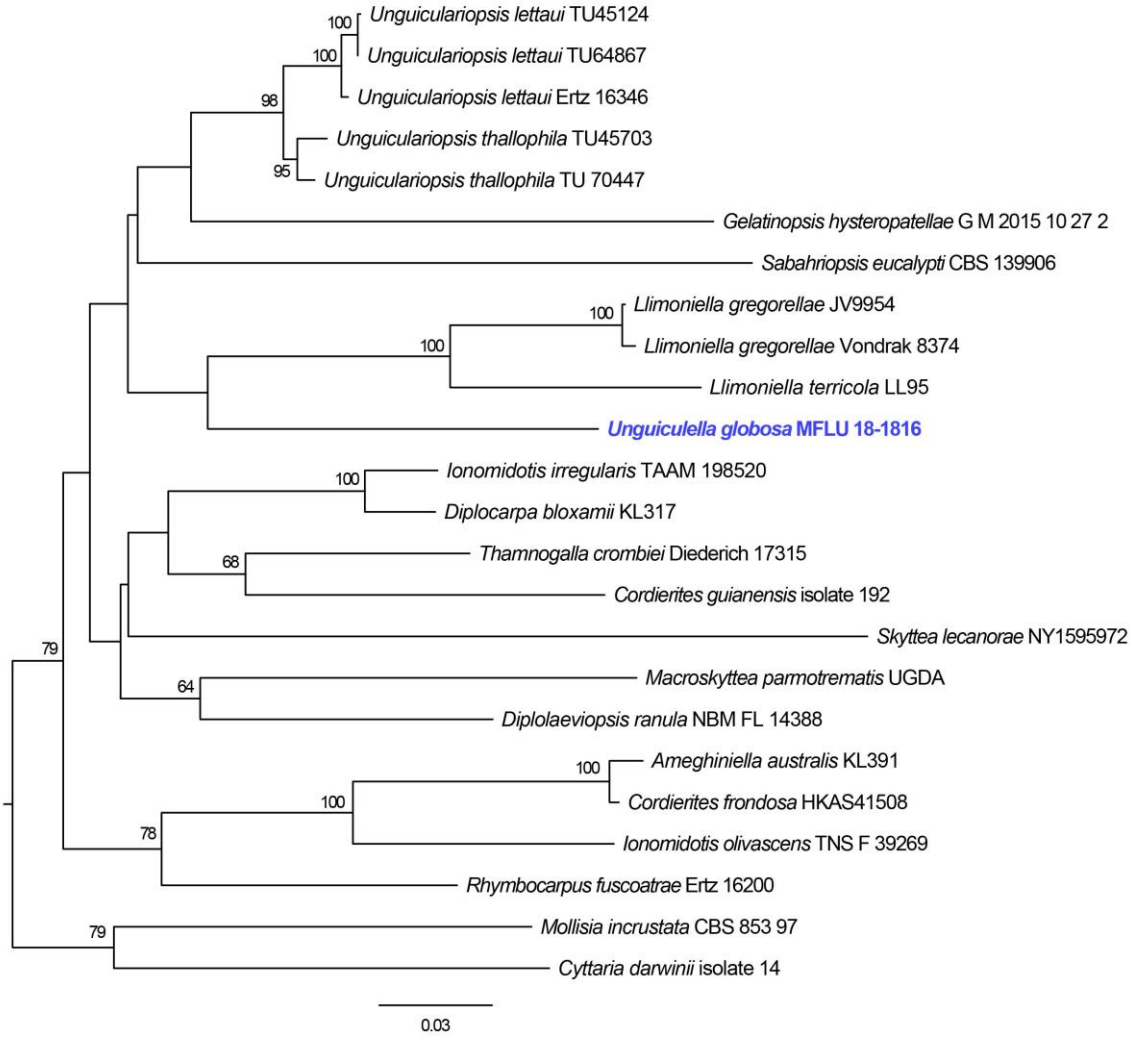

Figure 3 – Phylogram generated from maximum likelihood analysis of sequences of *Cordieritidaceae* based on ITS, LSU, SSU sequence data. MLBP values ≥50% are given near the nodes. Strain/culture numbers are given after the taxon names. The tree is rooted with *Mollisia incrustata* (CBS 853 97) and *Cyttaria darwinii* (isolate 14).

Notes – According to the phylogenetic analysis of *Cordieritidaceae* (Fig. 3), our new collection from China formed a branch sister to *Llimoniella* clade but with poor statistical support

(MLBP-41%). The SSU region of our collection shows similarity to that of *Unguiculariopsis lettaui* (TU64867) (971/1003-97% with 3 gaps) from Estonia. The LSU region of our collection is similar to that of *Unguiculariopsis thallophila* (Diederich 16944) (790/864-91% with 2 gaps) from Luxembourg.

Our collection also shows similarities to the genus *Unguiculella* (Spooner 1987, Huhtinen & Spooner 2005). *Unguiculella* species are characterized by curved hairs. Similar morphology can be observed in the genera *Hamalocanlhoscypha* and *Unguiculariopsis,* which are phylogenetically related to *Cordieritidaceae* (Fig. 3). However, the hairs of *Unguiculariopsis* are slightly thicker (Spooner 1987) and those in *Hamalocanlhoscypha* have blunt apices (Matocec et al. 2005).

Unguiculella globosa is characterized by cupulate, yellowish white apothecia, hairs with curved acute tips, cylindric, septate paraphyses, cylindric-clavate asci and, globose ascospores. It is similar to *U. tityrii*, however, *U. tityrii* has ellipsoid ascospores (Huhtinen & Spooner 2005). This is the first molecular data for the genus *Unguiculella*.

ERYSIPHALES

This order was introduced by Warming (1884) to accommodate the single family *Erysiphaceae*. In our analysis *Erysiphaceae* and *Amorphothecaceae* formed a monophyletic clade sister to Cyttariales. Both *Erysiphaceae* and *Amorphothecaceae* produce cleistothecial ascomata.

Erysiphaceae Tul. & C. Tul.

Facesoffungi number: FoF 05856

Members of this family are obligate biotrophic parasites of vascular plants (Takamatsu 2004, Takamatsu et al. 2015). Ascomata are cleistothecial. Cleistothecia are chasmothecial, globose and solitary or aggregated. The peridium is thin-layered and composed of cells of *textura angularis* with appendages. The interscal tissue is absent. Asci are globose to broadly clavate, bitunicate but apically unitunicate, 2- to 8-spored and ascospores released by rupturing at the apices. Ascospores are aseptate, subglobose to ellipsoid, hyaline to yellowish and without a sheath (Braun 1981, Jones et al. 2014, Jaklitsch et al. 2016). Asexual morphs are hyphomycetous. Conidiophores arise from superficial hyphae. Conidia mature singly or in chains and are basipetal, aseptate, hyaline, thin-walled and ellipsoid to fusoid (Braun 1981, Jaklitsch et al. 2016).

Notes – This family differs from other Leotiomycetes (except *Amorphothecaceae*) mainly by producing cleistothecial ascomata and bitunicate but apically unitunicate asci (Braun 1981, Jaklitsch et al. 2016). Furthermore, this family includes obligate biotrophic parasites of vascular plants. They cause the diseases, powdery mildews on aerial parts such as leaves, shoots and stems and fruits and cannot be cultured on artificial media (Takamatsu et al. 2015, Sharifi et al. 2014, Glawe 2006). *Erysiphaceae* taxa cause considerable damage to many crop plants including Grapevine, *Eucalyptus*, Rubber, cucumber, tomato, onion, pepper and potato (Glawe 2006, Sharifi et al. 2014, Jones et al. 2014, Cho et al. 2018, Liyanage et al. 2017).

Amorphothecaceae Parbery

= *Myxotrichaceae* Locq. ex Currah

Facesoffungi number: FoF 05857

Taxa are saprobic on dead wood in terrestrial habitats or rarely lichenicolous (Tsuneda & Currah 2004, Huhtinen & Santesson 1997). Ascomata are cleistothecial or rarely apothecial (Tsuneda & Currah 2004, Huhtinen & Santesson 1997). Cleistothecia are characterized by globose, sometimes funnel-shaped apical outgrowths. The peridium is composed of thick-walled brown hyphae with appendages. Asci are 8-spored, sub-clavate to globose, arising from croziers and sometimes evanescent. Ascospores are hyaline, fusoid, ellipsoid, navicular or lenticular and with smooth or striate walls (Tsuneda & Currah 2004). Apothecia are sessile and characterized by cupulate-turbinate receptacle. The flanks and margins are covered with hairs. The ectal excipulum is composed of cells of *textura angularis*. Paraphyses are filiform and branched at the apices. Asci are 8-spored, cylindric-clavate and amyloid. Ascospores are hyaline, ellipsoid to fusoid and 1–3-

septate (Huhtinen & Santesson 1997, Verkley 2005). Asexual morphs are hyphomycetous or sporodochial, dendritic arthroconidial and acropetal-blastic. Conidia dehisce rhexolytically, arise in chains or solitary on conidiogenous cells, globose, ellipsoid, fusoid or cylindrical, 0–4-septate, hyaline or brown and smooth-walled (Arx 1971, Tsuneda & Currah 2004, Seifert et al. 2007, Huhtinen & Santesson 1997, Verkley 2005, Calduch et al. 2004).

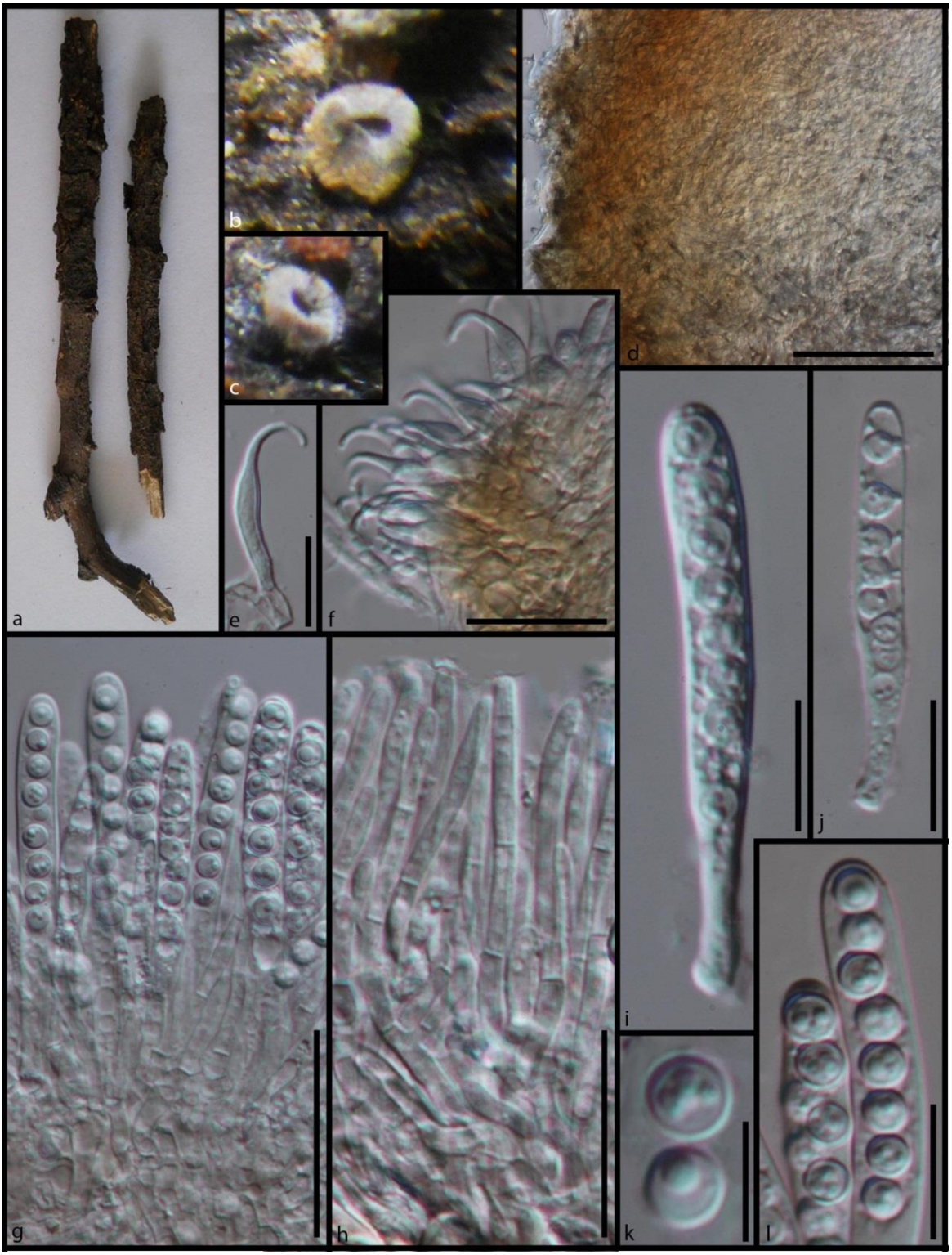

Figure 4 – Morphology of *Unguiculella globosa* (MFLU 18-1816 holotype) a Substrate. b, c Apothecia on wood. d Part of the excipulum at lower flanks. e, f Apically curved hairs. g, i, j Cylindrical asci. h Septate paraphyses. k Globose ascospores. l Asci apex with ascospores. Scale bars: d = 100 µm, g, h = 50 µm, e, f = 20 µm, i, j, l = 10 µm, k = 5 µm.

Notes – Our phylogenetic analysis shows a close relationship of the families *Myxotrichaceae* and *Amorphothecaceae*. The same phylogenetic affinities of these families were also reported in Seifert et al. (2007). Therefore, considering the result of our phylogenetic analysis and previous literature, we synonymize *Myxotrichaceae* under the older name *Amorphothecaceae*.

FLAGELLOSPORA CLADE

The genus *Flagellospora* was introduced by Ingold (1942). This genus was previously classified in *Nectriaceae* (Sordariomycetes) (Jaklitsch et al. 2016) and later in Leotiales (Wijayawardene et al. 2018). However, some taxa of *Flagellospora* are related to Leotiomycetes (Baschien et al. 2013). In our study the generic type of *Flagellospora*, *Flagellospora curvula* (CB-M13) formed a separate clade sister to *Thelebolaceae* and *Tympanidaceae* clades.

Flagellospora clade

Facesoffungi number: FoF 05858

Taxa are saprobic. Ascomata are perithecial and subglobose by shape with conspicuously papillate ostiole. The peridium is composed of cells of *textura angularis*. Paraphyses are filiform, cylindrical to capitate, straight, unbranched and densely septate. Asci are 8-spored and cylindrical. Ascospores are ellipsoid to fusiform, 1-septate, guttulate, smooth and hyaline (Ranzoni 1956). Asexual morphs are hyphomycetous. Conidiophores are branched and conidiogenesis is phialidic. Conidia are ellipsoid to cylindrical or sigmoid, hyaline and aseptate (Ranzoni 1956, Jooste & Merwe 1990).

Notes – *Flagellospora* is an aquatic hyphomycetes genus. Most of the aquatic hyphomycetes grow sub-merged but sporulate aerially by conidiophores that extend to the surface of the water. However, *Flagellospora* grow and sporulate on completely submerged, decaying leaves and wood of various angiosperms and their conidia are released beneath the water surface (Ranzoni 1956).

Flagellospora is a polyphyletic genus (Baschien et al. 2013). According to the phylogenetic analysis provided by Baschien et al. (2013), some *Flagellospra* spp clustered within *Thelebolaceae* while some are in a separate clade sister to *Thelebolaceae* clade. To stabilize the phylogenetic placement of this genus further studies are required with a wider range of taxa.

"HELICOGONIALES" CLADE

The family *Helicogoniaceae* was introduced by Baral et al. (2015) and classified within Phacidiales. Our phylogeny revealed that *Helicogoniaceae* and *Phacidiaceae* are polyphyletic and both families form independent clades close to each other. Hence, we suggest that this could be a new order in the class Leotiomycetes. However, this requires further collections and more sequence data to stabilize the position of this clade within Leotiomycetes.

Helicogoniaceae Baral

Facesoffungi number: FoF 05859

Taxa are fungicolous, lichenicolous or saprobic and mainly found in temperate regions. Some taxa in this family do not form ascomata, such as the genus *Helicogonium* which forms only naked asci on ascogenous hyphae. Some taxa (e.g. *Gelatinipulvinella, Geltingia*) form apothecial ascomata which are characterised by semi-globose to pulvinate receptacle, gelatinous ectal excipulum is composed of cells of *textura prismatica* to *angularis* to *porrecta* and with unclear medullary excipulum. Paraphyses are filiform. Asci are 8-spored, cylindric-clavate, amyloid or non-amyloid and opening by an apical slit. Ascospores are subglobose to ellipsoid to fusoid and they frequently form ascoconidia by budding. Asexual morphs are hyphomycetous or pycnidial. Conidia are ellipsoid to fusoid and sometimes with appendages (Alstrup & Hawksworth 1990, Baral 1999, Baral & Marson 2001, Cain 1948, Hosoya & Otani 1995, White 1942, Suija et al. 2014, Adhikari et al. 2016).

Notes – Taxa of this family are distinct in producing much reduced ascomata and asci opening by a split (Jaklitsch et al. 2016).

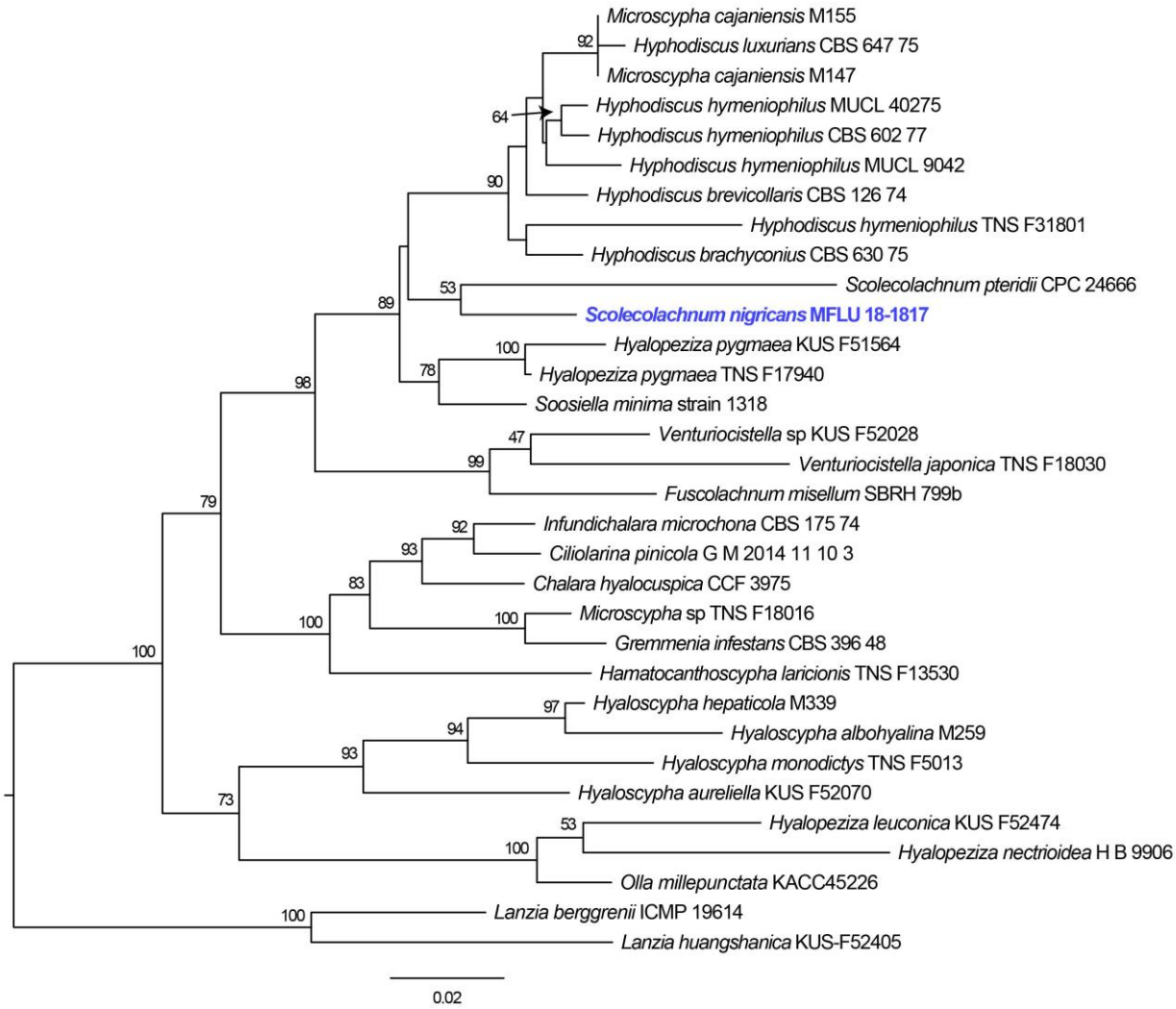

Figure 5 – Phylogram generated from maximum likelihood analysis of sequences of selected helotilian taxa based on ITS, LSU sequence data. MLBP values ≥50% are given near the nodes. Strain/culture numbers are given after the taxon names. The tree is rooted with *Lanzia berggrenii* (ICMP 19614) and *Lanzia huangshanica* (KUS-F52405).

***HAMATOCANTHOSCYPHA-HYPHODISCUS* CLADE**

This clade includes two sub-clades previously regarded as helotilian taxa. It formed a monophyletic clade close to Medeolariales

Hyphodiscaceae Ekanayaka & K.D. Hyde, ***fam. nov.***

Index Fungorum number: IF556272; Facesoffungi number: FoF 05860

Type genus – *Hyphodiscus*

Saprobic on dead plant material. **Sexual morphs:** *Ascomata* apothecial, cupulate or discoid, sessile or short stalked, sometimes gelatinized. *Margins* covered with hairs. *Hairs* white or brownish, cylindrical, granulate, sometimes septate. *Ectal excipulum* composed cells of *textura angularis*, *intricata* or *prismatica*. *Medullary excipulum* composed of cells of *textura intricata* to *angularis*. *Paraphyses* hyaline, filiform, septate, slightly enlarged at the apices. *Asci* 8-spored, cylindric-clavate, amyloid or non-amyloid, sometimes arising from croziers. *Ascospores* hyaline, 0–3-septate, ellipsoid. **Asexual morphs:** *Conidiomata* hyphomycetous. *Conidiophores* borne on single or fasciculate hyphae. *Conidiogenous cells* phialidic. *Conidia* solitary, aseptate, sub-cylindrical to narrowly obovate, globose to turbinate or napiform, straight or slightly curved, hyaline.

Notes – In our phylogenetic analysis we observed a close phylogenetic relationship of the genera *Fuscolachnum*, *Hyalopeziza*, *Hyphodiscus*, *Scolecolachnum* and *Venturiocistella*. These genera were previously classified within *Hyaloscyphaceae* and the asexual genus *Soosiella* (Hosoya et al. 2010, Pärtel & Põldmaa 2011, Hujslová et al. 2014). They formed a monophyletic clade close to the family *Hamatocanthoscyphaceae* with statistical support of 69% (MLBP). Hujslová et al. (2014) reported the phylogenetic relationship of *Soosiella*, *Hyphodiscus* and *Myxotrichaceae*. Within the phylogenetic study of Guatimosim et al. (2016) *Hyphodiscus* and *Scolecolachnum* formed a well-supported monophyletic clade. By considering previous phylogenetic analyses and the phylogenetic placement in our analysis, we introduce the new family *Hyphodiscaceae*.

Scolecolachnum nigricans Ekanayaka & K.D. Hyde, ***sp. nov.***

Index Fungorum number: IF556273; Facesoffungi number: FoF 05861; Fig. 6.

Etymology – refers to the "blackish" apothecia

Holotype – MFLU 18-1817

Saprobic on dead stems. **Sexual morph:** *Apothecia* 250–300 × 150–200 µm, arising singly, sessile, slightly erumpent. *Receptacle* cupulate, black. *Disc* concave, black. *Hairs* 50–65 × 4–5 µm ($\bar{x}$ = 60 × 4.5 µm, n = 30) cylindric, without a lumen, aseptate, walls granulate, blackish brown. *Ectal excipulum* 10–20 µm ($\bar{x}$ = 16 µm, n = 10) in lower flanks, composed of, thin-walled, light brown cells of *textura prismatica*. *Medullary excipulum* 30–40 µm ($\bar{x}$ = 36 µm, n = 10) in lower flanks, composed of, thin-walled, hyaline cells of *textura oblita*. *Hymenium* hyaline. *Paraphyses* 2–3.5 µm wide ($\bar{x}$ = 2.5 µm, n = 20), numerous, filiform, obtuse, aseptate, smooth, guttulate. *Asci* 50–60 × 10–15 µm ($\bar{x}$ = 58.5 × 12.5 µm, n = 30) arising from croziers, 8-spored, unitunicate, cylindric–clavate, conical apex, amyloid, sub-stipitate base, arising from croziers. Ascospores 10–18 × 2.5–3.5 µm ($\bar{x}$ = 16 × 3.1 µm, n = 40), 1–2-seriate, ellipsoid to fusoid, aseptate, hyaline, guttulate. **Asexual morph:** Undetermined.

Material examined – China, Yunnan Province, Kunming, Kunming Institute of Botany, Botanical Garden, 14 April 2016, A.H. Ekanayaka, HC06a (MFLU 18-1817).

GenBank accessions – LSU- MK591973, ITS- MK584975, SSU- MK585045

Notes – Our collection from China grouped sister to *Scolecolachnum pteridii* CPC 24666 from Brazil (Fig. 5), with poorly statistical support (53%). The ITS region of our collection is similar to that of *Hyalopeziza pygmaea* (KUS-F51564) (523/561-91% with 6 gaps), *Hyphodiscus hymeniophilus* (MUCL 40275) (465/498-93% with 3 gaps) and *Hyphodiscus brachyconius* (CBS 630.75) (469/505-93% with 4 gaps). The LSU region is similar to that of *Hyaloscypha aureliella* (KUS-F52070) (1029/1119-92% with 18 gaps) and *Hyphodiscus hymeniophilus* (MUCL 40275) (997/1094-91% with 26 gaps) and *Hyphodiscus brachyconius* (CBS 630.75) (990/1083-91% with 24 gaps).

The genus *Scolecolachnum* previously included a single species *Scolecolachnum pteridii* and characterised by whitish apothecia with smooth, hyaline hairs, filiform paraphyses, sub-cylindrical asci and filiform ascospores. Our collection differs from *Scolecolachnum pteridii* by having blackish brown apothecia, granulate short hairs, asci with croziers and ellipsoid to fusoid ascospores (Guatimosim et al. 2016).

Our new species is similar to the genus *Hyalopeziza*, especially *H. pygmaea* and *H. digitipila* by having small cupulate, blackish apothecia, granulate hairs, filiform paraphyses, cylindric-clavate asci with croziers, ellipsoid to fusoid ascospores. However, our species differs from *H. pygmaea* by having longer asci and ascospores (Huhtinen 1987a, 2001, Hosoya & Otani 1997) and from *H. digitipila* by not having stipitate apothecia and branched hairs (Huhtinen 1987a).

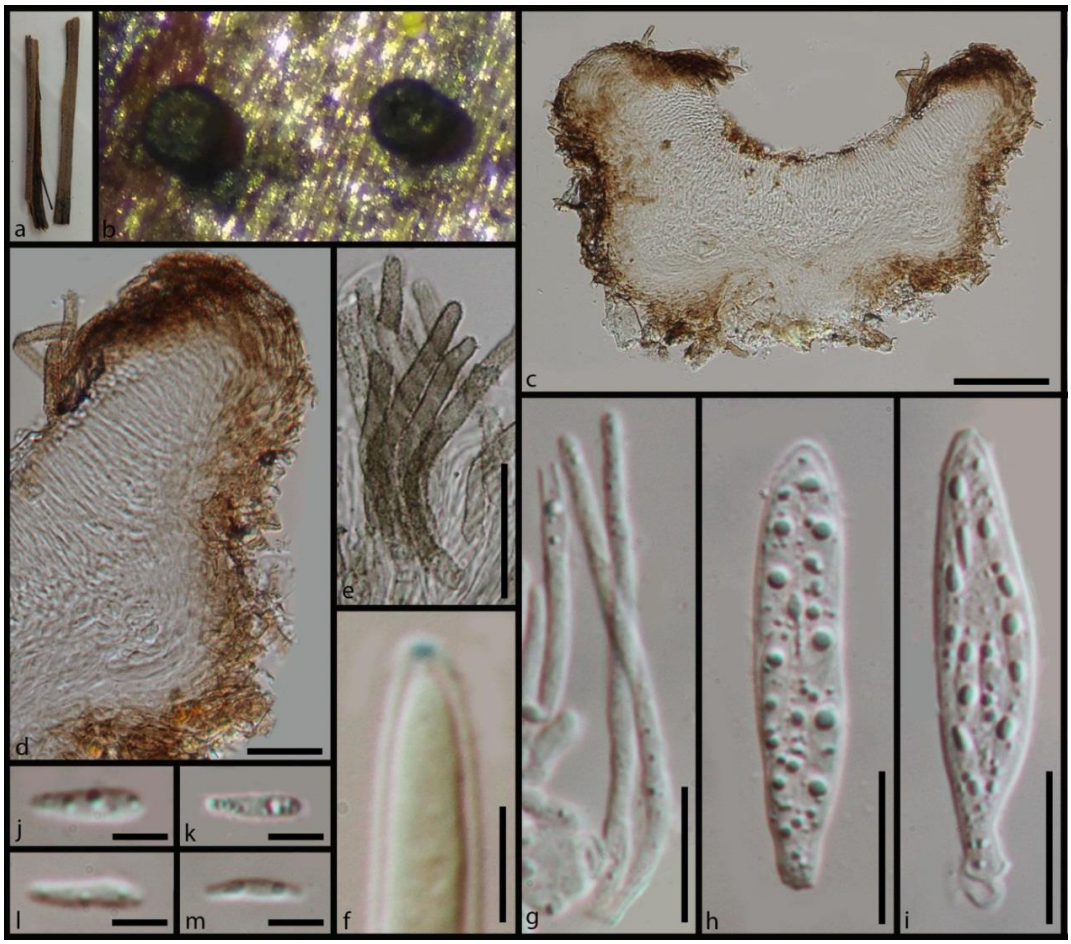

Figure 6 – Morphology of *Scolecolachnum nigricans* (MFLU 18-1817 holotype) a Substrate. b Rehydrated apothecia on wood. c Cross section of an apothecium. d Close up of the cross section of apothecium at margins. e Cylindrical hairs. f Amyloid ascus apex in Melzer's reagent. g Filiform paraphyses. h, i Cylindric-clavate asci. j–m Fusoid ascospores. Scale bars: c = 50 µm, d, e = 30 µm, g–i = 20 µm, f = 10 µm, j–m = 5 µm.

Hamatocanthoscyphaceae Ekanayaka & K.D. Hyde, ***fam. nov.***

Index Fungorum number: IF556274; Facesoffungi number: FoF 05862

Type genus – *Hamatocanthoscypha*

Saprobic or *parasitic*. **Sexual morphs:** *Ascomata* apothecial, cupulate or discoid, sessile, rarely stipitate, erumpent. *Ectal excipulum* reduced or composed of cells of *textura intricata* or *textura prismatica*. *Medullary excipulum* composed of cells of *textura intricata* or *textura prismatica*, paraphyses, filiform, slightly swollen at the apices. *Asci* 8-spored, non-amyloid, cylindric-clavate, sometimes arising from croziers. *Ascospores* ellipsoid to fusoid, hyaline, 0–1-septate. **Asexual morphs:** *Conidiomata* hyphomycetous, sporodochial. *Conidiogenesis* phialidic, proliferating sympodially. *Conidia* hyaline, ellipsoid, fusoid to cylindrical, 0–1-septate.

Notes – This family includes the genera previously classified under *Phacidiaceae*, *Hyaloscyphaceae*, *Pezizellaceae* and *Helotiales* genera *incertae sedis* (Kušan et al. 2014, Réblová et al. 2011, Koukol 2012, Wijayawardene et al. 2018). According to our phylogenetic analysis this family forms a separate clade sister to the *Hyphodiscaceae*.

In the phylogenetic analysis of Delgado et al. (2015) *Hyalodendriella* and *Curviclavula* grouped close to *Hyaloscyphaceae*, but in separate clades. Coetsee et al. (2000) showed that *Xenochalara* and *Chalara* are phylogenetically closely related. Genetic relatedness of the genera *Bloxamia* with *Zymochalara* and *Chalara* are reported by Hernandez-Restrepo et al. (2017) and Guatimosim et al. (2016). Within the phylogenetic analysis of Crous et al. (2014) *Gremmenia* was placed within *Pezizellaceae* even though it was classified in *Phacidiaceae* as reported in our study.

Therefore, considering previous literature and our phylogenetic results, here we introduce the new family *Hamatocanthoscyphaceae*.

HELOTIALES

The order Helotiales was introduced by Nannfeldt (1932) to include fungi with cupulate apothecia covered by long cylindrical hairs. According to the previous classification system this is the largest order of Leotiomycetes and includes 27 families (Wijayawardene et al. 2018). However, according to our phylogenetic analysis this order includes 25 families/family-level clades. Previous studies (Wang et al. 2006a, b, Hustad & Miller 2011, Pärtel 2016) also confirms its polyphyletic nature within Leotiomycetes.

Arachnopezizaceae Hosoya, J.G. Han & Baral

Facesoffungi number: FoF 05863

Taxa are saprobic on dead plant material. Ascomata are apothecial and characterized by a receptacle covered by hairs. The hymenium is flat. The ectal excipulum is composed of cells of *textura angularis* to *prismatica* and medullary excipulum is composed of cells of *textura prismatica* to *oblita*. Paraphyses are cylindrical and hyaline. Asci are cylindric-clavate, amyloid, arising from croziers and 8-spored. The ascospores are 0–7-septate and ellipsoid to fusoid (Jaklitsch et al. 2016, Wang 2009, Korf 1951, 1952, Huhtinen 1985, Inman et al. 1992, Quijada et al. 2017). Asexual morphs are not recorded.

Notes – We observed the close phylogenetic relationship of the genera *Durella* and *Unguicularia* within *Arachnopezizaceae* as suggested by Jaklitsch et al. (2016). Therefore, considering our phylogenetic results and previous literature, here we placed those genera under *Arachnopezizaceae*.

Drepanopezizaceae Bat. & H. Maia

Facesoffungi number: FoF 05864

Taxa are plant pathogenic (Dimova et al. 2014, Blechert & Debener 2005, Samuels et al. 1981, Spiers & Hopcroft 1998, Pearson et al. 1988). Ascomata are apothecial. Apothecia are cupulate, sessile and mostly immersed. The excipulum is a thin layer, composed of cells of *textura angularis*. Paraphyses are apically slightly swollen and straight. Asci are 4–8- spored, apex obtuse to conical and non-amyloid. Ascospores are ellipsoid to fusoid and aseptate or 1–2-septate (Samuels et al. 1981, Spiers & Hopcroft 1998, Korf et al. 1986). Asexual morphs are hyphomycetous, acervulus. Conidiogenesis is holoblastic. Conidia are sometimes two types, macroconidia are ellipsoid to fusoid and slight curved and microconidia are sometimes present and ellipsoid to bacilliform (Konig et al. 2009, Yoshikawa & Yokoyama 1992).

Notes – This is a highly plant pathogenic family within Leotiomycetes, which cause leaf spot, early defoliation, chlorosis and leaf and twig blight of various dicotyledons including poplars, leek, cherry, rose and grape (Dimova et al. 2014, Blechert & Debener 2005, Samuels et al. 1981, Spiers & Hopcroft 1998, Pearson et al. 1988, Lee et al. 2011, Rossman et al. 2018).

***Patellariopsis* clade**

Facesoffungi number: FoF 05865

Taxa are saprobic on dead plant material. Ascomata are apothecial and characterised by discoid receptacle. The ectal excipulum is composed of thick-walled cells of *textura globulosa* to *angularis* and medullary excipulum is composed of interwoven refractive hyphae. Paraphyses are filiform, branched and pigmented at the apices. Asci 8-spored, cylindric-clavate and amyloid. Ascospores are ellipsoid to fusoid, hyaline and 3–7-septate (Dennis 1974, Beaton & Weste 1978). Asexual morphs are hyphomycetous, periconia- like (Karunarathna et al. Pers comm).

Notes – The genus *Patellariopsis* was introduced by Dennis (1964) and currently includes five species.

Loramycetaceae Dennis ex Digby & Goos

Facesoffungi number: FoF 05866

Taxa are saprobic on dead plant material in fresh water habitats. Ascomata are apothecial or perithecial. The ectal excipulum is composed of cells of *textura angularis*, *globulosa* or *prismatica* embedded in an external gel and sometimes with vertically striate structures. The medullary excipulum is composed of cells of *textura prismatica*. Paraphyses are filiform, septate, unbranched, sometimes apically swollen and pigmented. Asci are cylindric-clavate, 8-spored and amyloid or non-amyloid. Ascospores are fusiform, septate and sometimes with terminal appendages and gel sheath (Ingold & Chapman 1952, Digby & Goos 1987). Asexual morphs are hyphomycetous and anguillospora-like. Conidiophores are simple or occasionally branched. Conidiogenous cells are hyaline and straight. Conidia are globose, sub-ellipsoid or sigmoid and hyaline (Walsh et al. 2014, Digby & Goos 1987).

Notes – According to our phylogenetic analysis we observed a close relationship of the genus *Acidomelania* with this family (Fig. 1). The same phylogenetic placement of *Acidomelania* is showed in the phylogeny of Walsh et al. (2014). Therefore, here we placed this genus under the family *Loramycetaceae*.

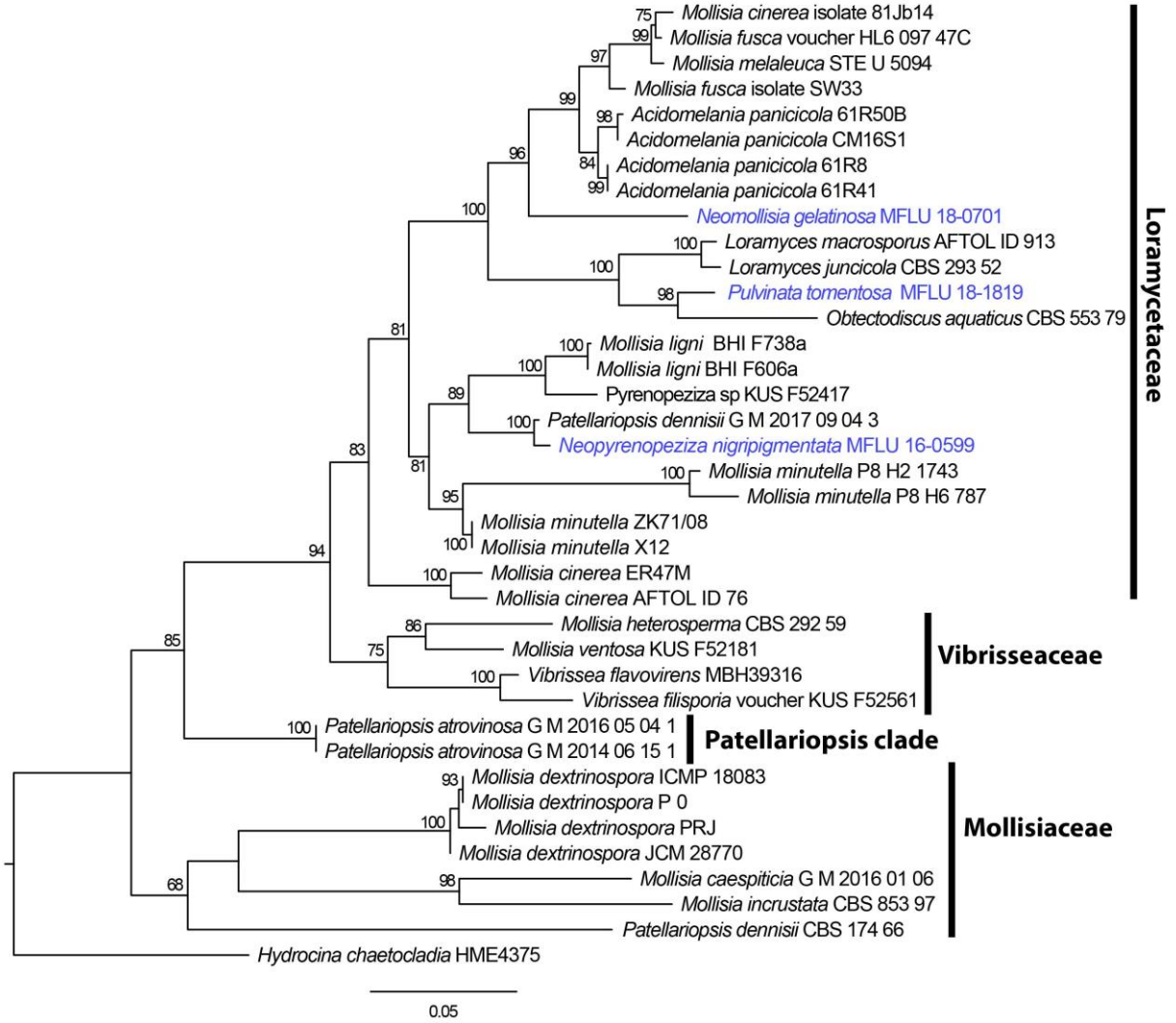

Figure 7 – Phylogram generated from maximum likelihood analysis of sequences of selected helotilian taxa based on ITS and LSU sequence data. MLBP values ≥50% are given near the nodes. Strain/culture numbers are given after the taxon names. The tree is rooted with *Hydrocina chaetocladia* (HME4375).

Pulvinata Ekanayaka & K.D. Hyde, ***gen. nov.***

Index Fungorum number: IF556275; Facesoffungi number: FoF 05867

Etymology – refers to the shape of apothecia: Pulvinate

Saprobic on dead stems. **Sexual morph:** *Apothecia* arising singly, sessile, slightly erumpent. *Receptacle* pulvinate. *Margins* raised, whitish. *Disc* convex. *Ectal excipulum* composed of thin-walled, light brown to hyaline cells of *textura angularis*. *Medullary excipulum* composed of, thin-walled, hyaline cells of *textura intricata*. *Hymenium* hyaline. *Paraphyses* numerous, filiform, obtuse and slightly swollen at the apex, aseptate, not exceeding the asci in length, smooth, aguttulate. *Asci* 8-spored, unitunicate, cylindric–clavate, conical at the apex, amyloid ring present at the ascus apex, stipitate base, arising from croziers. Ascospores 1–2-seriate, ellipsoid to fusoid, aseptate, hyaline, guttulate. **Asexual morph:** Undetermined.

Type species: ***Pulvinata tomentosa***

Pulvinata tomentosa Ekanayaka & K.D. Hyde, ***sp. nov.***

Index Fungorum number: IF556276; Facesoffungi number: FoF 05868; Fig. 8.

Etymology – refers to tomentose margins

Holotype – MFLU 18-1819

Saprobic on dead stems. **Sexual morph:** *Apothecia* 700–800 × 300–350 µm, arising singly, sessile, slightly erumpent. *Receptacle* pulvinate. *Margins* raised, whitish to brownish, tomentose. *Disc* convex. *Ectal excipulum* 15–20 µm ($\bar{x}$ = 18.3 µm, n = 10) in upper flanks, composed of, thin-walled, light brown to hyaline cells of *textura angularis*. *Medullary excipulum* 13–18 µm ($\bar{x}$ = 15 µm, n = 10) in upper flanks, composed of, thin-walled, hyaline cells of *textura intricata*. *Hymenium* hyaline. *Paraphyses* 2–3 µm wide ($\bar{x}$ = 2.6 µm, n = 20), numerous, filiform, obtuse and slightly swollen at the apex, aseptate, not exceeding the asci in length, smooth, aguttulate. *Asci* 65–80 × 4–5.5 µm ($\bar{x}$ = 72 × 4.9 µm, n = 30) 8-spored, unitunicate, cylindric–clavate, conical at the apex, amyloid ring present at the ascus apex, stipitate base, arising from croziers. Ascospores 8–12 × 2–3 µm ($\bar{x}$ = 10.2 × 2.5 µm, n = 40), 1–2-seriate, ellipsoid to fusoid, aseptate, hyaline, guttulate. **Asexual morph:** Undetermined.

Material examined – UK, Hampshire, Hedge End, on herbaceous stem, 3 March 2016, E.B.G. Jones, GJ239a (MFLU 18-1819).

GenBank accessions – LSU- MK591965, ITS- MK584938, SSU- MK585026, RPB2- MK373054

Notes – Our collection from UK grouped with *Obtectodiscus aquaticus* (CBS 553.79) sister to *Loramyces* clade with strong statistical support of 98% (Fig. 7). The ITS data of our collection is similar to that of *Loramyces macrosporus* (CBS 235.53) (431/462-93% with 6 gaps), *Loramyces juncicola* (CBS 293.52) (428/460-93% with 6 gaps) and *Obtectodiscus aquaticus* (CBS 553.79) (535/586-91% with 26 gaps). The LSU region shows similarity to that of *Loramyces macrosporus* (CBS 235.53) (847/857-99% with 1 gap) and *Loramyces juncicola* (CBS 293.52) (848/862-98% with 7 gaps). Considering genetic differences and based on the guidelines for introducing new taxa provided by Jeewon and Hyde (2016), we introduce the new genus *Pulvinata* here.

Our new genus is similar to the genera *Obtectodiscus* and *Loramyces* in having filiform paraphyses, long cylindrical asci and ellipsoid to fusoid ascospores, but differs in having pulvinate apothecia (*Obtectodiscus* and *Loramyces* produce cupulate apothecia), paraphyses with slightly swollen apices, amyloid asci and aseptate ascospores without appendages (Müller et al. 1979, Digby & Goos 1987).

Our collection is similar to *Tapesia* in having whitish to brownish apothecia cylindric-clavate, amyloid asci and ellipsoid to fusoid ascospores, but differs in having pulvinate apothecia and long stipitate asci (Gminder 2006, 2012).

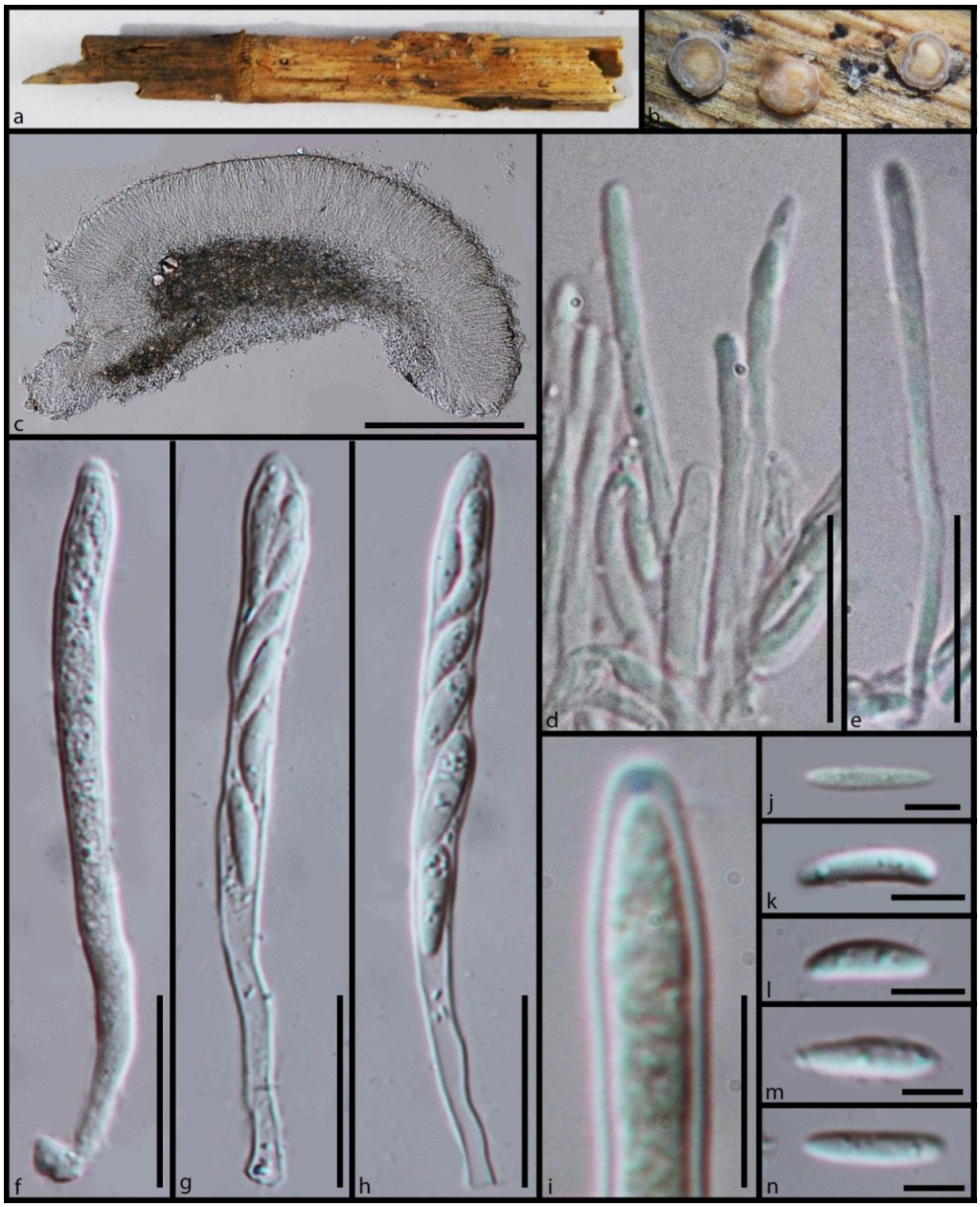

Figure 8 – Morphology of *Pulvinata tomentosa* (MFLU 18-1819 holotype) a Substrate. b Apothecia on wood. c Cross section of an apothecium. d, e Cylindrical paraphyses. f–h Cylindric-clavate asci. i Apex of the asci with the plug blueing in Melzer's reagent. j–n Fusoid ascospores. Scale bars: c = 100 µm, d–h = 20 µm, i = 10 µm, j–n = 5 µm.

Neopyrenopeziza Ekanayaka & K.D. Hyde, ***gen. nov.***

Index Fungorum number: IF556277; Facesoffungi number: FoF 05869

Etymology – refers to the similarity with the genus *Pyrenopeziza*.

Saprobic on dead stems. **Sexual morph:** *Apothecia* arising singly or in small groups, sessile, erumpent, pulvinate, black. *Receptacle* convex, disc and the margins are black. *Ectal excipulum* composed of highly pigmented cells of *textural angularis to prismatica* with vertically striate structures. *Medullary excipulum* composed of cells of *textura prismatica*. *Hymenium* hyaline. *Paraphyses* filiform, obtuse, enlarged and pigmented towards the apex, branched, septate. *Asci* 8-spored, cylindric–clavate, conical at the apex, amyloid, short stipitate, arising from croziers. Ascospores hyaline, smooth walled, ellipsoid to fusoid, regularly 5-septate, distinctly more tapered towards the distal end. **Asexual morph:** Undetermined.

Type species: ***Neopyrenopeziza nigripigmentata***

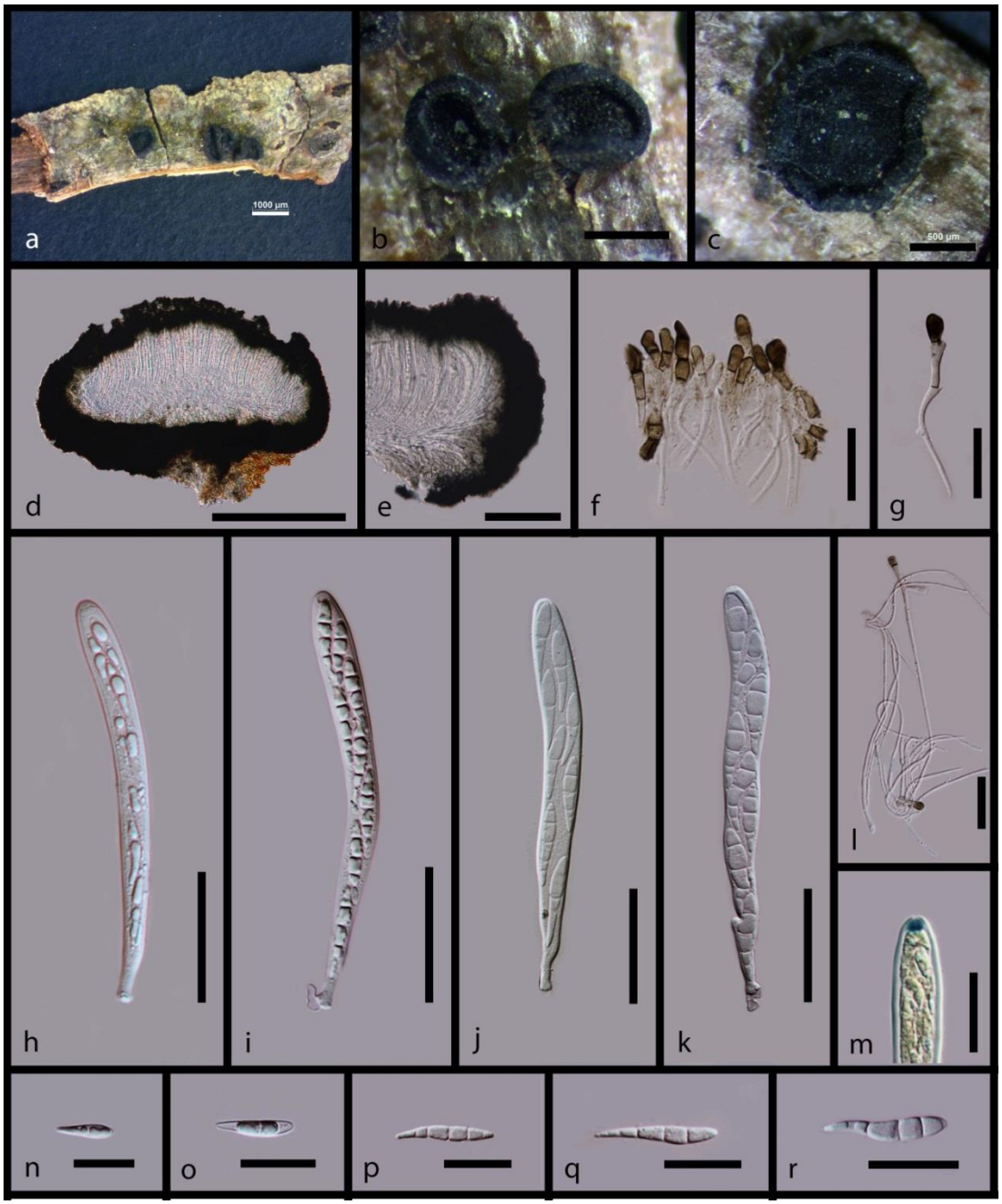

Figure 9 – Morphology of *Neopyrenopeziza nigripigmentata* (MFLU 16-0599 holotype) a Substrate. b Apothecia on wood. c Apothecium on bark. d Cross section of an apothecium. e Vertical section of the apothecium at margin. f Clavate hairs. g Clavate hair. h–k Cylindrical asci. l Septate and branched paraphyses. m Amyloid ring at the ascus apex. n–r Clavate ascospores. Scale bars: a = 1000, b, c = 500 µm, d = 400 µm, e = 100 µm, f, g = 25 µm, h–k = 40 µm, l = 30 µm, m = 50 µm, n–r = 25 µm.

Neopyrenopeziza nigripigmentata Ekanayaka & K.D. Hyde, ***sp. nov.***

Index Fungorum number: IF556278; Facesoffungi number: FoF 05870; Fig. 9.

Etymology – refers to the pigmented excipulum and paraphyses

Holotype – MFLU 16-0599

Saprobic on dead stems. **Sexual morph:** *Apothecia* 890–910 × 780–800 µm ($\bar{x}$ = 900 × 790 µm, n = 10) arising singly or in small groups, sessile, erumpent from the substrate, pulvinate, black when fresh. *Receptacle* convex, disc and the margins are black when fresh. *Ectal excipulum* 18–22 µm ($\bar{x}$ = 19 µm, n = 10) thick, black to bark brown pigmented cells of *textural angularis to*

prismatica, globose, granulate and pigmented apical cells form vertically striate structures. *Medullary excipulum* 24–33 µm ($\bar{x}$ = 26 µm, n = 10) composed of narrow, long, thin-walled, hyaline cells of *textura prismatica*. *Hymenium* hyaline. *Paraphyses* 1–2 µm wide ($\bar{x}$ = 1.4 µm, n = 20), numerous, filiform, obtuse, enlarged and pigmented towards the apex, branched, septate. *Asci* 120–160 × 9–14 µm ($\bar{x}$ = 139 × 13 µm, n = 30) 8-spored, cylindric–clavate, conical at the apex, amyloid, short stipitate, arising from croziers. Ascospores 24.5–42 × 5–6 µm ($\bar{x}$ = 36 × 6 µm, n = 40), partially biseriate, lower spores are uniseriate, hyaline, smooth walled, ellipsoid to fusoid, regularly five septate, distinctly more tapered towards the distal end. **Asexual morph:** Undetermined.

Material examined – Italy, Arezzo Province, Papiano – Stia, on dead aerial branches of *Crataegus* sp., 14 May 2014, Erio Camporesi, IT1871 (MFLU 16-0599).

GenBank accessions – LSU- MK592001, ITS- MK584981, SSU- MK585057

Notes – According to our phylogeny study, our strain IT1871 from Italy clustered with *Patellariopsis dennisii* (G.M-2017-09-04-3) sister to *Mollisia ligni* clade with strong statistical support of 100% (Fig. 7).

The ITS data of our collection is similar to that of *Patellariopsis dennisii* (G.M.2017-09-04.3) (539/546-99% with 0 gaps) and *Mollisia ligni* (BHI-F738a) (502/558-90% with 14 gaps). The LSU region is similar to that of *Loramyces macrosporus* (CBS 235.53) (807/824-98% with 2 gaps) and to *Patellariopsis atrovinosa* (G.M. 2016-05-04.1) (784/831-94% with 9 gaps). According to the guidelines for introducing new taxa provided by Jeewon & Hyde (2016), herein we introduce the new genus *Neopyrenopeziza* here.

The genus *Neopyrenopeziza* is similar to the genera *Pyrenopeziza* and *Mollisia* in having blackish, pulvinate apothecia with vertically striate structures on the excipular surface, cylindric-clavate, amyloid asci and ellipsoid to fusoid ascospores (Rawlinson et al. 1978, Hütter 1958, Gremmen 1958, Schüepp 1959, Crous et al. 2017, Gminder 2012). However, *Neopyrenopeziza* differs in having paraphyses with pigmented apices and clavate ascospores with tapered ends. Moreover, *Neopyrenopeziza* differs from *Patellariopsis* in having pulvinate receptacle and pigmented excipulum (Dennis 1974, Beaton & Weste 1978).

Our phylogeny shows that, the genera *Patellariopsis* and *Mollisia* are polyphyletic.

Furthermore, *Patellariopsis dennisii* (G.M.2017-09-04.3) clustered with our new strain while *Patellariopsis dennisii* (CBS 174 66) clustered with taxa of Mollisiaceae. Therefore, we suggest the genera *Patellariopsis* and *Mollisia* require further phylogenetic analyses to establish their generic limitations.

Neomollisia Ekanayaka & K.D. Hyde, ***gen. nov.***

Index Fungorum number: IF556279; Facesoffungi number: FoF 05871

Etymology – refers to the similarity with the genus Mollisia.

Saprobic on dead stems. **Sexual morph:** *Apothecia* arising singly, sessile, slightly erumpent, rounded to irregular in shape. *Receptacle* pulvinate. *Disc* convex. *Ectal excipulum* composed of blackish cells of *textura angularis*. *Medullary excipulum* composed of hyaline cells of *textura prismatica*. *Hymenium* hyaline and embedded in a thick gel. *Paraphyses* numerous, filiform, obtuse and slightly swollen at the apex, septate, sometimes exceeding the asci in length, smooth, aguttulate. *Asci* arising from croziers, 8-spored, unitunicate, cylindric–clavate, conical and amyloid apex, stipitate base. Ascospores 1–2-seriate, fusoid, aseptate, hyaline, guttulate. **Asexual morph:** Undetermined.

Type species: ***Neomollisia gelatinosa***

Neomollisia gelatinosa Ekanayaka & K.D. Hyde, ***sp. nov.***

Index Fungorum number: IF556280; Facesoffungi number: FoF 05872; Fig. 10.

Etymology – refers to the gelatinized hymenium

Holotype – MFLU 18-0701

Saprobic on dead stems. **Sexual morph:** *Apothecia* 0.5–1 mm diam., arising singly, sessile, slightly erumpent, rounded to irregular in shape. *Receptacle* pulvinate. *Margins* ash, raised and inrolled. *Disc* convex. *Ectal excipulum* 30–35 µm ($\bar{x}$ = 32.8 µm, n = 10) in lower flanks, composed of, thin-walled, blackish cells of *textura angularis*, apical cells form vertically striate structures. *Medullary excipulum* 18–28 µm ($\bar{x}$ = 24 µm, n = 10) in lower flanks, composed of, thin-walled, hyaline cells of *textura prismatica*. *Hymenium* hyaline, gelatinized. *Paraphyses* 2–3.5 µm wide ($\bar{x}$ = 3.1 µm, n = 20), numerous, filiform, obtuse and slightly swollen at the apex, gelatinized, septate, sometimes exceeding the asci in length, smooth, aguttulate. *Asci* 38–43 × 4–4.5 µm ($\bar{x}$ = 41.4 × 4.1 µm, n = 30), 8-spored, unitunicate, cylindric–clavate, conical and amyloid apex, stipitate base, arising from croziers. Ascospores 8–11 × 2–2.5 µm ($\bar{x}$ = 9.2 × 2.2 µm, n = 40), 1–2-seriate, fusoid, aseptate, hyaline, guttulate. **Asexual morph:** Undetermined.

Material examined – Russia, Rostov region, Shakhty City District, former sand quarry "Belyy Fyodor", meadow, saprobic on dead stems of *Solidago gigantea* Aiton (*Asteraceae*), 11 June 2017, Timur S. Bulgakov, T-1700 (MFLU 18-0701).

GenBank accessions – LSU- MK591960, ITS- MK585004, SSU- MK585021, TEF- MK637043, RPB2- MK358463

Notes – According to our study, strain MFLU 18-0701 from Russia formed a separate clade within Loramycetaceae sister to the *Acidomelania* clade with strong statistical support of 96% (Fig. 7).

The LSU region of our collection shows similarity to that of *Hymenoscyphus vitellinus* (CBS 139.24) (869/878-99% with 2 gaps), *Acidomelania panicicola* (CBS 137156) (750/758-99% with 1 gap) and *Mollisia cinerea* (CBS 128349) (869/879(99% with 2 gaps). The ITS data of our collection is similar to that of *Mollisia cinerea* (BHI-F197a) (741/796-93% with 11 gaps) and *Mollisia melaleuca* (CBS 589.84) (635/662-96% with 3 gaps). Therefore, according to the guidelines for introducing new taxa provided by Jeewon & Hyde (2016), here we introduce the new genus *Neomollisia* here.

The genus *Neomollisia* is similar to the genera *Neopyrenopeziza*, *Pyrenopeziza* and *Mollisia* by having blackish, pulvinate apothecia with vertically striate structures on the excipular surface, cylindric-clavate, amyloid asci and ellipsoid to fusoid ascospores (Rawlinson et al. 1978, Hütter 1958, Gremmen 1958, Schüepp 1959, Crous et al. 2017, Gminder 2012). However, *Neomollisia* differs in having raised and enrolled margins and a gelatinized hymenium.

Heterosphaeriaceae Rehm

Facesoffungi number: FoF 05873

Taxa are saprobic on dead plant material. Ascomata are apothecial. Apothecia are discoid, black, sessile, erumpent and gelatinous. The ectal excipulum is composed of cells of *textura angularis* and medullary excipulum is composed of cells of *textura porrecta*. Paraphyses are filiform, clavate and contain many guttules. Asci are 8-spored, amyloid and arising from croziers. Ascospores are aseptate, ellipsoid to fusoid and without gel sheath (Leuchtmann 1987). Asexual morphs are synanamorphic, hyphomycetous acervulus and ceolomycetous. Conidiomata are discoid. Conidia are ellipsoid to fusoid with pointed ends, hyaline and aseptate (Leuchtmann 1987).

Notes – According to our phylogenetic analysis this family formed a well-supported clade close to *Drepanopezizaceae* and *Hydrocinaceae* (Fig. 1). *Heterosphaeriaceae* taxa are similar to *Drepanopezizaceae* from their ascospores and conidia morphologies (Jaklitsch et al. 2016).

Heterosphaeria linariae (Rabenh.) Rehm

Facesoffungi number: FoF 05874; Fig. 12

Saprobic on dead stems. **Sexual morph:** *Apothecia* 0.5–1 × 0.3–0.6 mm, arising singly, sessile, slightly erumpent, subsphaerical, black. *Receptacle* cupulate. *Margins* cover the hymenium at the beginning and split into lobes at maturity. *Disc* concave. *Ectal excipulum* 17–22 µm ($\bar{x}$ = 20.3 µm, n = 10) in lower flanks, composed of, thin-walled, black cells of *textura angularis*.

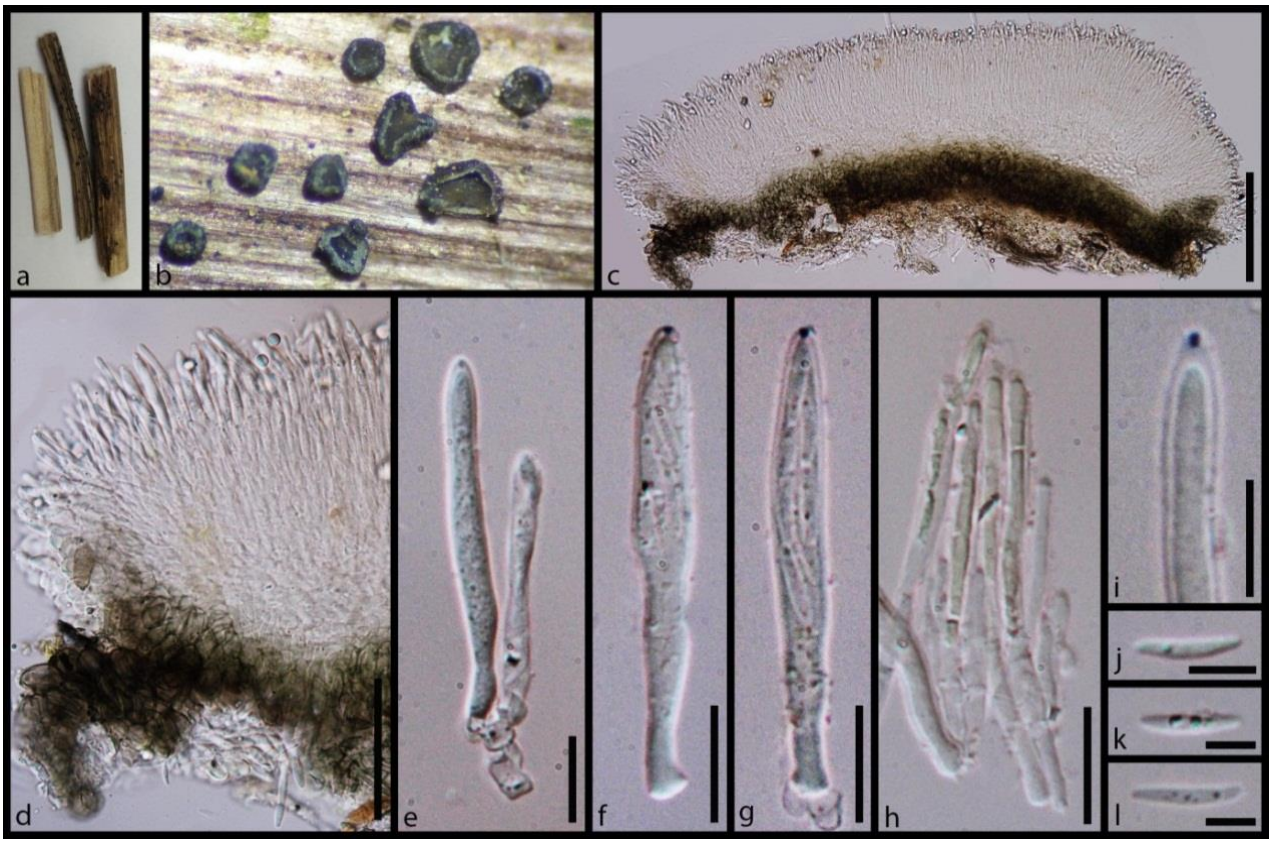

Figure 10 – Morphology of *Neomollisia gelatinosa* (MFLU 18-0701 holotype) a Substrate. b Apothecia on wood. c Cross section of an apothecium. d Close up of the cross section of apothecium at margins. e–g Cylindric-clavate asci. h Septate paraphyses. i Amyloid ascus apex (in Melzer's reagent). j–l Fusoid ascospores. Scale bars: c = 100 µm, d = 50 µm, e–g = 10 µm, h = 15 µm, i = 5 µm, j–l = 5 µm.

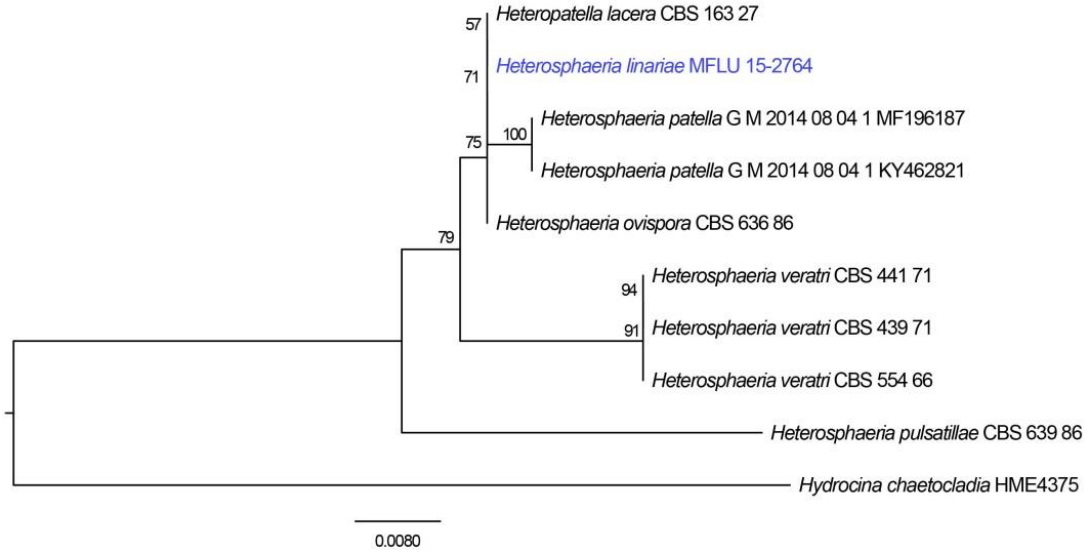

Figure 11 – Phylogram generated from maximum likelihood analysis of sequences of *Heterosphaeria* based on ITS and LSU sequence data. MLBP values ≥50% are given near the nodes. Strain/culture numbers are given after the taxon names. The tree is rooted with *Hydrocina chaetocladia* (HME4375).

Medullary excipulum 40–47 µm ($\bar{x}$ = 43 µm, n = 10) in lower flanks, composed of, thin-walled, hyaline cells of *textura porrecta*. *Hymenium* hyaline. *Paraphyses* 1.8–2 µm wide ($\bar{x}$ = 1.9 µm, n = 20), numerous, filiform, obtuse and slightly enlarged at the apex, aseptate, exceeding the asci in length, smooth, guttulate. *Asci* 35–50 × 4.5–6 µm ($\bar{x}$ = 43 × 5 µm, n = 30) arising from croziers, unitunicate, cylindric, apex conical, stipitate base, arising from croziers. Ascospores not observed. **Asexual morph:** Undetermined.

Material examined – Russia, Arkhangelsk region, Akhangelsk City, Maimaksansky City District, floodplain meadow, saprobic on dead stem of *Linaria vulgaris* Mill. (Plantaginaceae), 3 May 2015, Gennady V. Okatov, T-597 (MFLU 15-2764).

GenBank accessions – LSU- MK591955, ITS- MK585000, SSU-MK585014, TEF-MK637042, RPB2- MK343131

Notes – Our collection from Russia grouped with *Heteropatella lacera* (CBS 163 27) (Fig. 11). The ITS and LSU data of our collection shows 100% similarity to that of *Heteropatella lacera* (CBS 163.27) (ITS: 532/532-100%, LSU: 689/689-100%).

Heteropatella is a ceolomycetous genus which is the sexual morph of *Heterosphaeria*. *Heterosphaeria linariae* is the sexual morph of *Heteropatella lacera* (Grove 1937).

There is a single strain available for *Heterosphaeria ovispora* (CBS 636.86) in GenBank and only LSU region available for this strain. This *Heterosphaeria ovispora* (CBS 636.86) strain is 100% similar to that of our strain and to *Heteropatella lacera* (CBS 163.27). Considering the descriptions of *Heterosphaeria linariae* (Rehm 1888) and *Heterosphaeria ovispora* (Leuchtmann 1987), we suggest that both of these species are the same. Morphology of our collection is similar to the descriptions of *Heterosphaeria linariae* (Rehm 1888) and *Heterosphaeria ovispora* (Leuchtmann 1987), except having smaller asci. However, in our collection we did not observe ascospores and the ascomata are always closed. Therefore, the asci may still be immature.

Mitrulaceae Rchb.

Facesoffungi number: FoF 05875

Saprobic on dead plant material in shallow water habitats (Redhead 1977). Ascomata are apothecial. Apothecia are clavate and stipitate. The hymenium is white to flesh-pinkish or yellow-orange. The ectal excipulum is composed of cells of *textura porrecta* and medullary excipulum is composed of cells of *textura intricata*. Paraphyses are filiform, cylindrical and with yellow carotenoid droplets. Asci are 8-spored, cylindric-clavate and arising from croziers. Ascospores are fusoid to ellipsoid and straight or curved (Redhead 1977, Wang et al. 2005). Asexual morphs are not recorded.

Notes – This genus was formerly placed in *Geoglossaceae* based on its clavate apothecia (Redhead 1977). According to phylogenetic relationships it is currently placed within Leotiomycetes (Wang et al. 2005).

Gelatinodiscaceae S.E. Carp.

Facesoffungi number: FoF 05876

Taxa are saprobic, endophytic or endophytic (Shoji 1985, Seaver 1938, Johnston & Park 2010). Ascomata are apothecial. Apothecia are mostly cupulate or discoid; some are tremelloid and form cerebriform masses which each lobule contains a turbinate apothecium. The ectal excipulum is composed of cells of *textura prismatica* to *textura angularis* to *globulosa* and sometimes gelatinized and medullary excipulum is composed of cells of *textura oblita* to *textura porrecta* or *textura intricata* and sometimes gelatinized. Paraphyses are filiform, cylindrical, apically swollen and guttulate. Asci are 8-spored, amyloid and arising from croziers. Ascospores are ellipsoid to fusoid, hyaline, yellowish or brownish, smooth, with a gelatinous sheath, guttulate and 0–5-septate (Seaver 1938, Johnston & Park 2010, Huhtinen 1987b, Beaton & Weste 1976, Baral et al. 2012, Johnston & Park 2010). Asexual morphs are sporodochial. Conidia are aseptate, hyaline and subglobose (Seaver 1938, Johnston & Park 2010).

Notes – This family produce small gelatinized apothecia. In our study this family formed a monophyletic clade close to *Mitrulaceae*. The genera *Helicodendron* and *Dimorphospora* were previously classified under *Helotiaceae* (Wijayawardene et al. 2018). Sri-indrasutdhi et al. (2015) showed these genera are genetically related to *Gelatinodiscaceae*. Therefore, here we included *Helicodendron* under *Gelatinodiscaceae*.

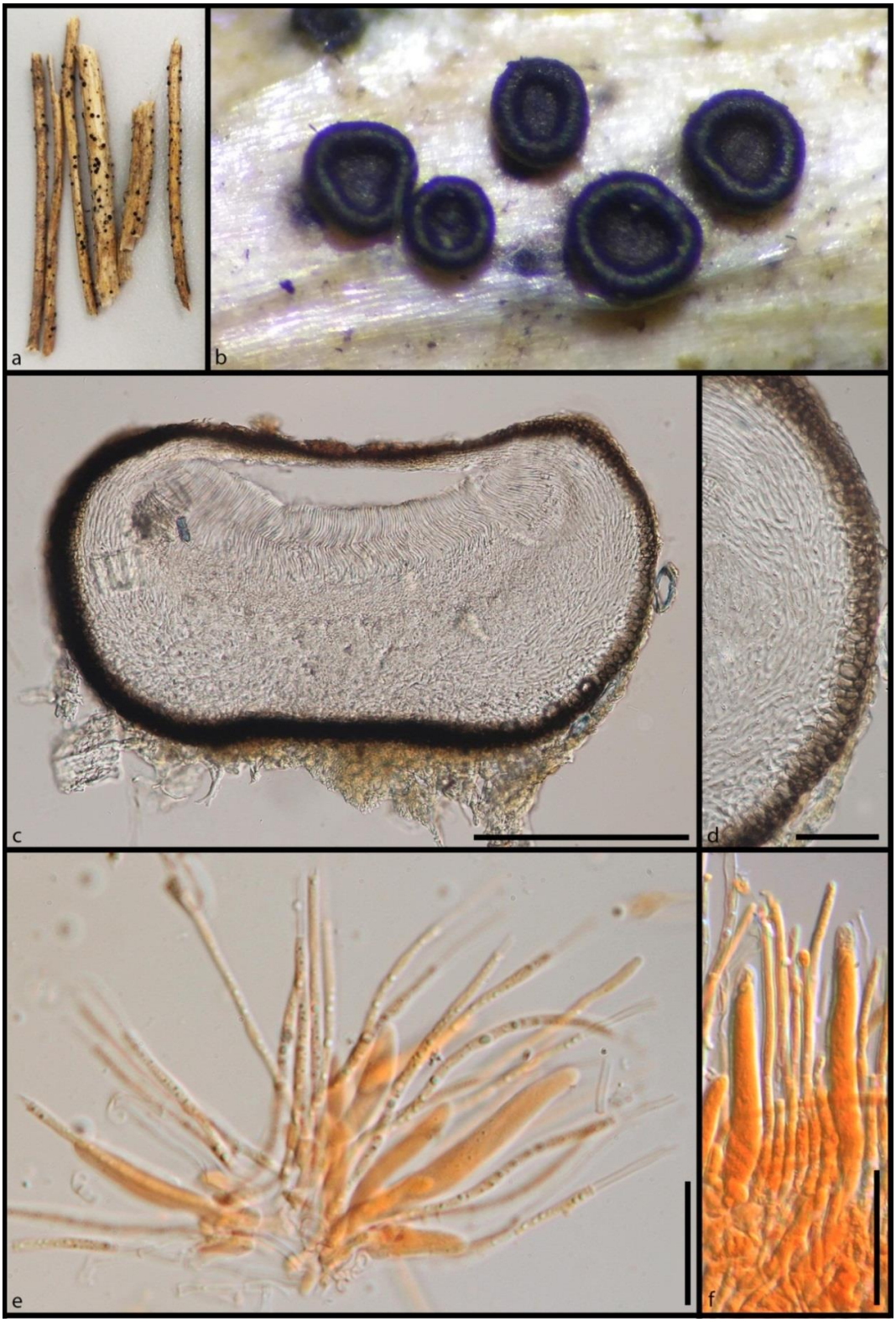

Figure 12 – Morphology of *Heterosphaeria linariae* (MFLU 15-2764) a Substrate. b Apothecia on wood. c Cross section of an apothecium. d Close up of the cross section of apothecium at flanks. e, f Asci and paraphyses in Congo red. Scale bars: c = 500 µm, d = 50 µm, e–f = 20 µm.

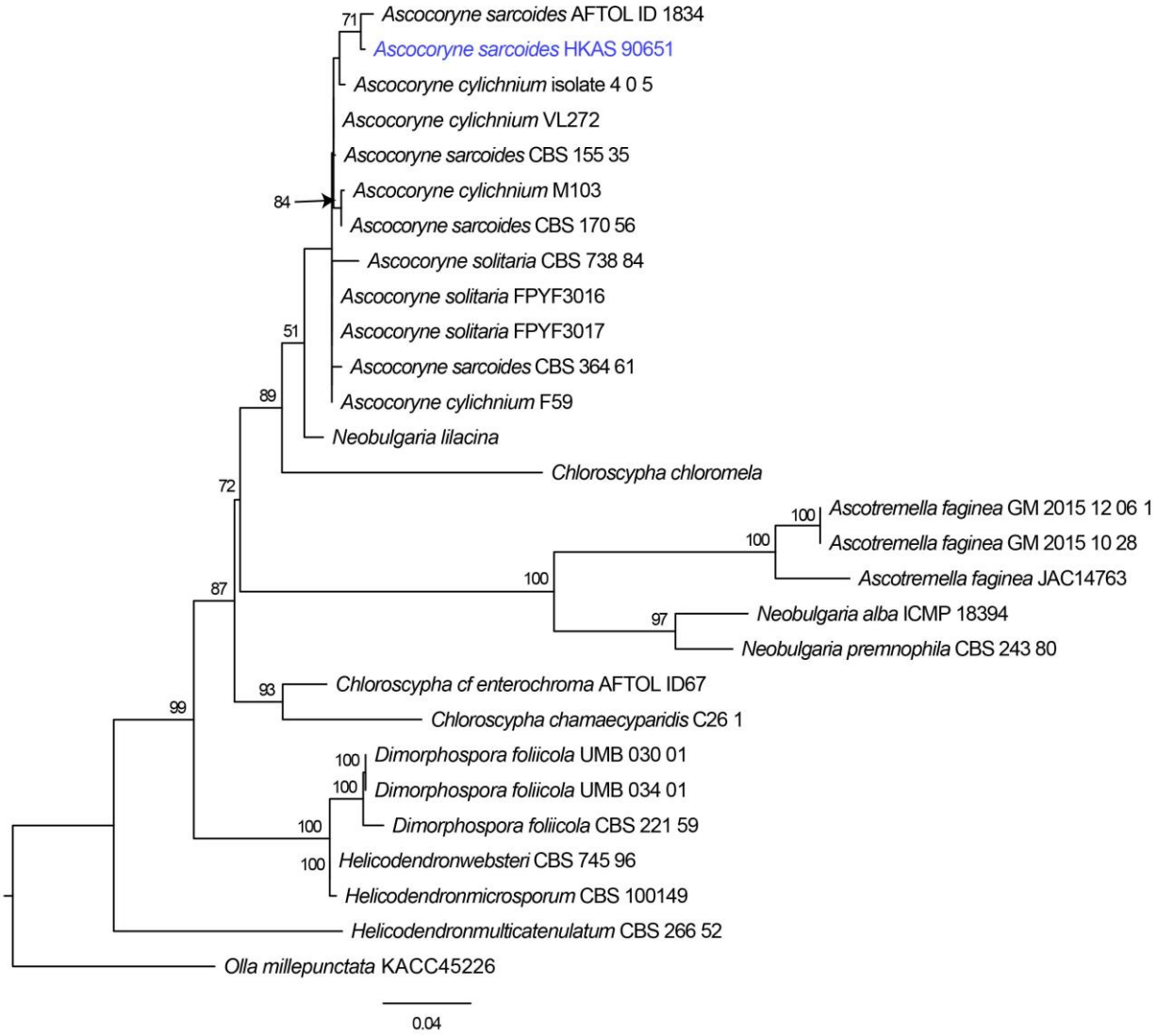

Figure 13 – Phylogram generated from maximum likelihood analysis of sequences of *Gelatinodiscaceae* based on ITS and LSU sequence data. MLBP values ≥50% are given near the nodes. Strain/culture numbers are given after the taxon names. The tree is rooted with *Olla millepunctata* (KACC45226).

Ascocoryne sarcoides (Jacq.) J.W. Groves & D.E. Wilson

Facesoffungi number: FoF 05877; Fig. 14

Saprobic on dead stems. **Sexual morph:** *Apothecia* 2–3 × 1–1.5 mm, arising in clusters, sessile. *Receptacle* discoid, purple to black. *Disc* concave, black. *Ectal excipulum* 16–22 µm ($\bar{x}$ = 20.3 µm, n = 10) in lower flanks, composed of, thin-walled, light brown to hyaline cells of *textura angularis*. *Medullary excipulum* 80–100 µm ($\bar{x}$ = 90 µm, n = 10) in lower flanks, composed of, thin-walled, hyaline cells of *textura intricata*. *Hymenium* hyaline. *Paraphyses* 2–3.2 µm ($\bar{x}$ = 2.5 µm, n = 20) wide at tips, numerous, filiform, obtuse and swollen at the apex, aseptate, exceeding the asci in length, smooth, aguttulate. *Asci* 135–160 × 8–9 µm ($\bar{x}$ = 149.2 × 8.7 µm, n = 30) arising from croziers, 8-spored, unitunicate, cylindrical, apex rounded and amyloid, stipitate base, arising from croziers. Ascospores 15–25 × 4.5–6 µm ($\bar{x}$ = 21 × 5.6 µm, n = 40), 1–2-seriate, fusoid, 1–septate, hyaline. **Asexual morph:** Undetermined.

Material examined – China, Yunnan Province, Shangri-La, Da-cuo National Park, opposite of Bi-Ta Lake, alt. 3556m, 22 September 2015, Bo Li, HK04 (HKAS 90651).

GenBank accessions – LSU- MK591999, ITS- MK584973, SSU- MK585054, TEF- MK637051, RPB2- MK614731

Notes – Our collection of *Ascocoryne sarcoides* from China grouped with *Ascocoryne sarcoides* (AFTOL ID 1834) with strong statistical support (71%) (Fig. 13). The ITS data of our collection shows 99% similarity to *Ascocoryne sarcoides* (CBS 155.35, CBS 170.56), *Ascocoryne cylichnium* (strain VL272) and *Ascocoryne solitaria* (CBS:738.84). The LSU region of our species is 99% similar to *Ascocoryne sarcoides* (CBS 364.61, CBS 407.69).

Our collection is similar to *Ascocoryne sarcoides* (Kuo 2013), however in our collection asci are slightly longer.

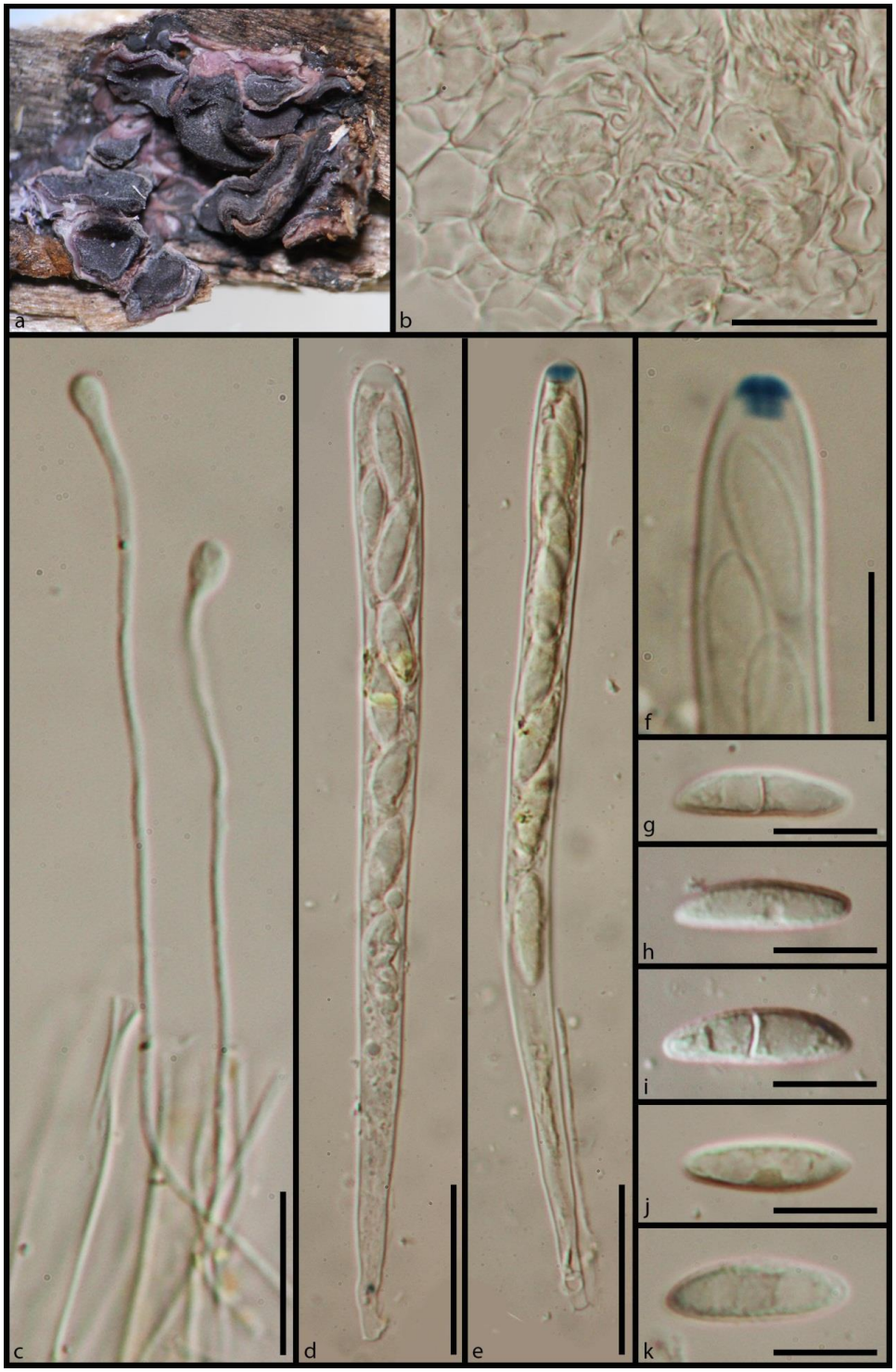

Figure 14 – Morphology of *Ascocoryne sarcoides* (HKAS 90651) a Apothecia on wood. b Ectal excipular cells. c Apically swollen paraphyses. d–e Cylindrical asci. f Amyloid apex. g–k Fusoid ascospores. Scale bars: b, c = 20 µm, d, e = 25 µm, f–k = 10 µm.

Mollisiaceae Rehm

Facesoffungi number: FoF 05878

Taxa are saprobic or plant pathogenic. Some form mycorrhizal associations. Ascomata are apothecial and characterized by discoid receptacle covered with hairs. The ectal excipulum is composed of cells of *textura globulosa* to *angularis* and medullary excipulum is composed of cells of *textura prismatica*. Paraphyses are filiform, cylindrical or lanceolate, apically swollen and guttulate. Asci are 8-spored, amyloid, cylindric clavate and mostly arising from croziers. Ascospores are 0–7-septate, ellipsoid to long-filiform and guttulate (Müller & Hütter 1963, Crous et al. 2007, Nannfeldt 1983, Graddon 1990, 1984, Gminder 2012, Prasher et al. 2003, Dennis 1962, Dennis and Spooner 1993). Asexual morphs are sporodochial. Conidiophores are hyaline to brown. Conidia are unicellular, ellipsoid or phragmosporous, hyaline or brown and also in chains (Sutton & Ganapathi 1978, Butin et al. 1996, Grünig et al. 2002).

Notes – This forms a sister clade with *Loramycetaceae*. Even the most of taxa of the family form a monophyletic clade, the genera classified within the family, especially *Mollisia* and *Trimmatostroma* are highly polyphyletic and need more phylogenetic analyses to resolve them.

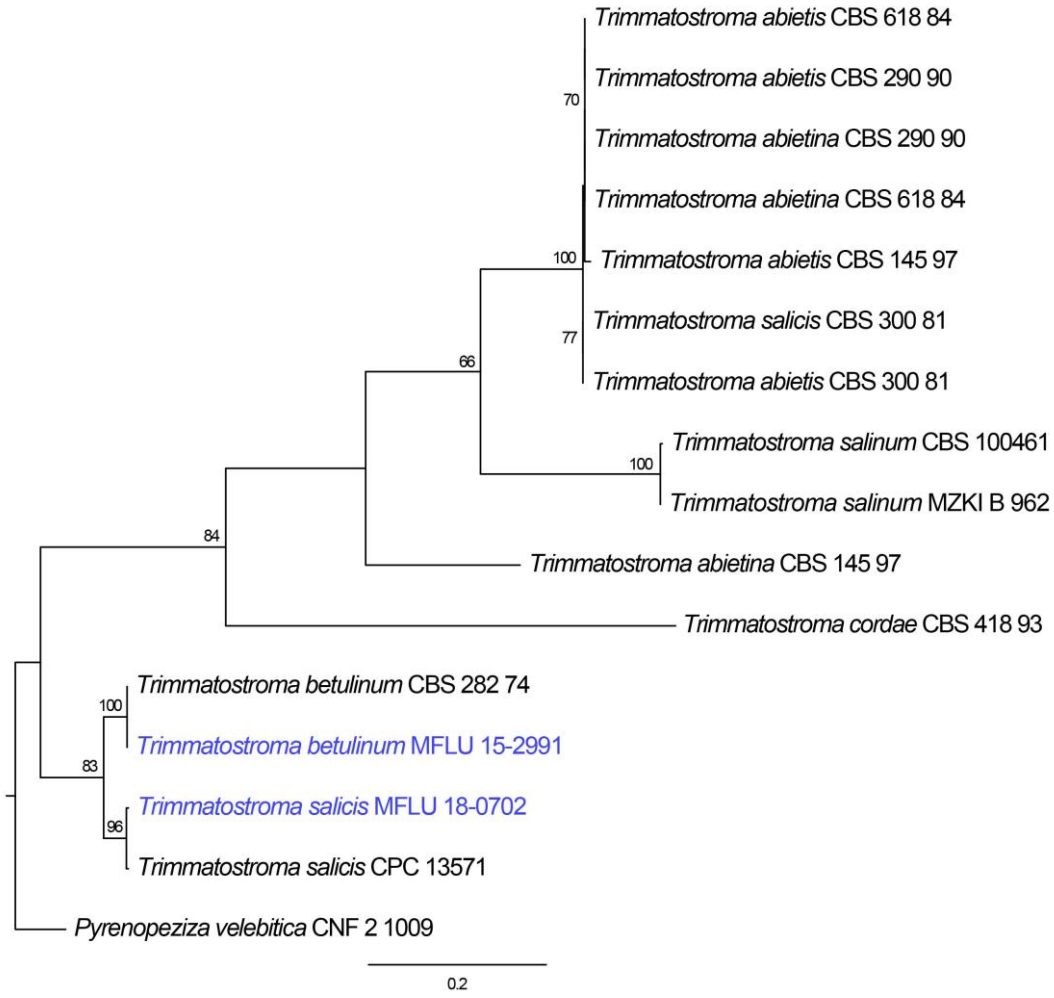

Figure 15 – Phylogram generated from maximum likelihood analysis of sequences of *Trimmatostroma* based on ITS sequence data. MLBP values ≥50% are given near the nodes. Strain/culture numbers are given after the taxon names. The tree is rooted with *Pyrenopeziza velebitica* (CNF 2 1009).

Trimmatostroma betulinum (Corda) S. Hughes

Facesoffungi number: FoF 05879; Fig. 16

Saprobic on dead twigs and branches. **Sexual morph:** Undetermined. **Asexual morph:** *Conidiomata* 0.5–1.5 mm wide, single or in groups, dark brown to black, immersed, acervular-sporodochial. *Conidiogenous cells* short, cylindrical, hyaline to light brown, micronematous, giving rise to long chains of conidia that disarticulate at the surface to form a grey black to brown powdery mass. *Conidia* 10–15 × 5–10 µm (x = 12.4 × 8.3 µm, n = 20), ellipsoid ovoid to globose or subglobose, sometimes forming irregular aggregations composed of 2–6 cells, light brown to dark brown.

Material examined – Russia, Rostov region, Krasnosulinsky District, Gornensky Zakaznik (protected landscape), saprobic on dead twigs and branches of *Betula pendula* Roth (*Betulaceae*), 28 June 2015, Timur S. Bulgakov, T-848 (MFLU 15-2991).

GenBank accessions – LSU- MK591956, ITS- MK584993, SSU- MK585016

Notes – Our collection from Russia grouped with *Trimmatostroma betulinum* (CBS 282 74) with strong statistical support (100%) (Fig. 15). The ITS data of our collection is 100% similar to that of *Trimmatostroma betulinum* (CBS 282.74) (745/745-100%). The LSU region of our strain is 99% similar to that of *Trimmatostroma betulinum* (CBS 282.74) (411/415-99% with no gaps). The characters of our collection are similar to *Trimmatostroma betulinum* (Hughes 1953). *Trimmatostroma salicis* is similar to *T. betulinum*. However, *T. salicis* differs in having more branched conidia than *T. betulinum* (Hughes 1953).

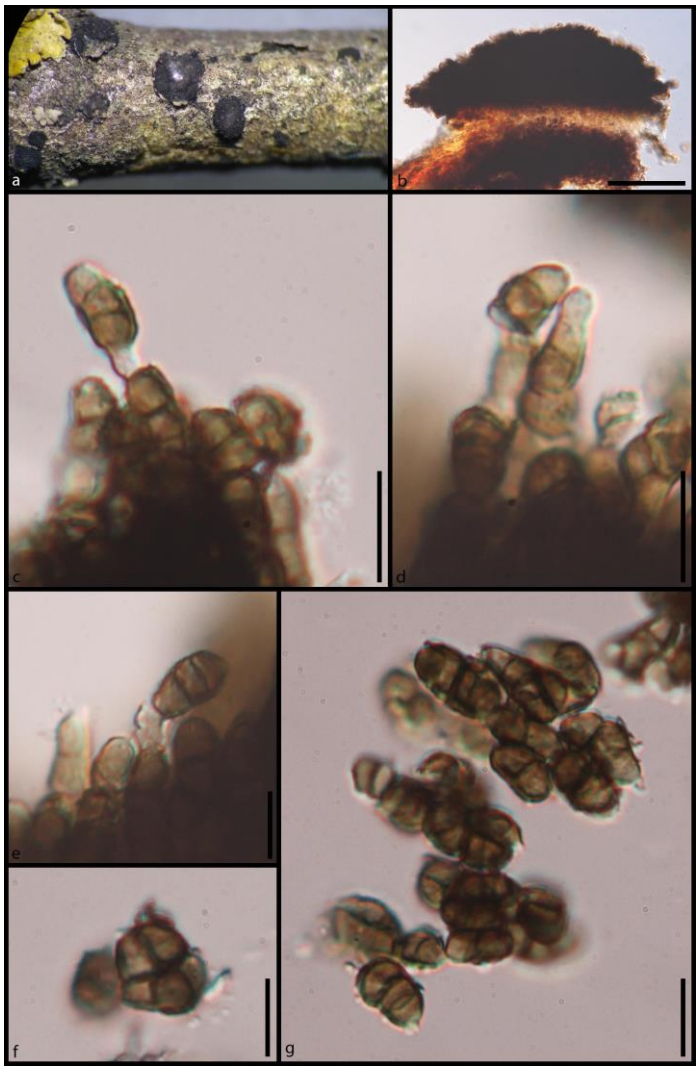

Figure 16 – Morphology of *Trimmatostroma betulinum* (MFLU 15-2991) a Conidiomata on substrate. b Cross section of conidioma. c–e Different stages of conidiogenesis. f, g Conidia at different stages. Scale bars: b = 100 µm, c, d = 25, e–g = 10 µm.

Trimmatostroma salicis Corda

Facesoffungi number: FoF 05880; Fig. 17

Saprobic on dead twigs and branches. **Sexual morph:** Undetermined. **Asexual morph:** Conidiomata 1–2 mm wide, single or in groups, dark brown to black, semi-immersed, acervular-sporodochial. *Conidiogenous cells* short, cylindrical, hyaline to light brown, micronematous, giving rise to long chains of conidia that disarticulate at the surface to form a grey black to brown powdery mass. *Conidia* 10–15 × 5–10 µm (x = 13.2 × 7.6 µm, n = 20), ellipsoid to fusoid or subglobose, pale brown to dark brown, arise in basipetal chains, simple to branched.

Material examined – Russia, Rostov region, Krasnosulinsky District, Gornensky Zakaznik (protected landscape), trees on the riverside of Kundryuchya River, saprobic or weak parasitic on dying twigs of *Salix alba* L. (*Salicaceae*), 21 May 2014, Timur S. Bulgakov, T75 (MFLU 18-0702).

GenBank accessions – ITS- MK584996

Notes – Our collection T75 from Russia grouped with *Trimmatostroma salicis* (CPC 13571) with strong statistical support (100%) (Fig. 15). The ITS data of our collection is 99% similar to *Trimmatostroma salicis* (CPC 13571) (649/656-99% with 3 gaps) and 95% to *Trimmatostroma betulinum* (CBS 282.74) (480/506-95% with 4 gaps). The morphology of our collection is in agreement with the description of *T. salicis* from Hughes (1953).

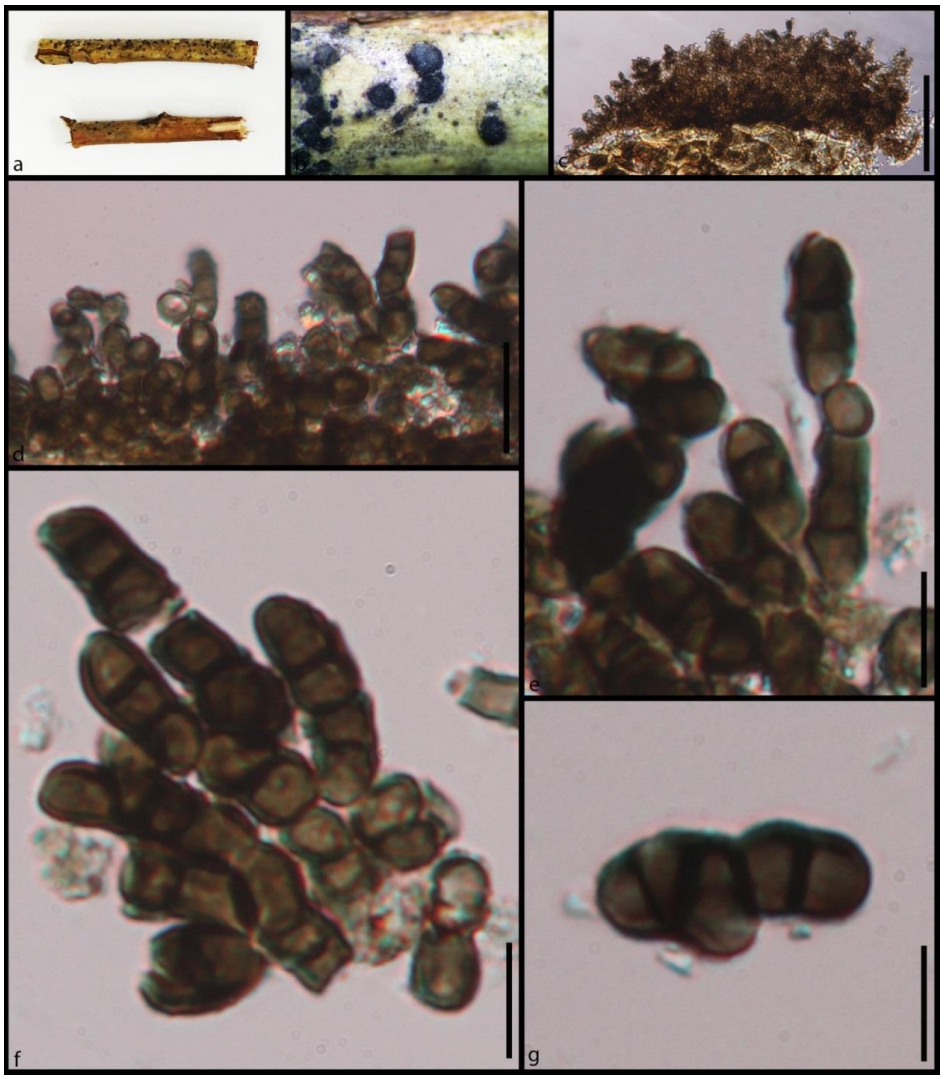

Figure 17 – Morphology of *Trimmatostroma salicis* (MFLU 18-0702) a Substrate. b Conidiomata on substrate. c Cross section of conidioma. d, e Different stages of conidiogenesis. f, g Conidia at different stages. Scale bars: c = 100 µm, d = 20, e–g = 10 µm.

Ploettnerulaceae Kirschst.

Facesoffungi number: FoF 05881

Taxa are saprobic or plant pathogenic (Matheis 1977, Vera & Murray 2016, Meyer & Luttrell 1986, 1987). Ascomata are apothecial. Apothecia are cupulate, discoid or urn-shaped and sessile or sub-stipitate. The margins are sometimes covered with pigmented hairs. The ectal excipulum is composed of pigmented cells of *textura globulosa* to *angularis* and medullary excipulum hyaline cells of *textura prismatica*. Paraphyses are filiform, cylindrical or lanceolate and guttulate. Asci are 8-spored, conical apex and amyloid. Ascospores are 0–3-septate, ellipsoid to long-filiform and guttulate (Matheis 1977, Vera & Murray 2016, Smerlis 1966, Meyer & Luttrell 1986). Asexual morphs are hyphomycetous or coelomycetous. Conidiophores are phialidic and hyaline to brown. Conidia are ellipsoid to rod-shaped or filiform with pointed apices and 0–1-septate (Walsh et al. 2018, Travadon et al. 2015, Gramaje et al. 2011, Marvanova & Barlocher 2001, Goncalves et al. 2012, Duarte et al. 2016, Gönczöl & Révay 2003, Goodwin 2002, King et al. 2013).

Notes – This family formed monophyletic well-supported clade with *Drepanopezizaceae*. According to our phylogenetic analysis, the genus *Rhynchosporium* showed a close relationship with this family. Similar phylogenetic placement of this genus shown in Pärtel (2016). Therefore, considering the results of our phylogeny and previous literature, we add *Rhynchosporium* to this family. Some taxa (e.g. *Cadophora*, *Oculimacula*) of this family are plant pathogens which cause stem rots, wood decay, trunk hypertrophy and bark cracks in economically important crops such as cereal, soybean and kiwifruit trees (Travadon et al. 2015).

Cadophora lacrimiformis Ekanayaka & K.D. Hyde, ***sp. nov.***

Index Fungorum number: IF556281; Facesoffungi number: FoF 05882; Fig. 19.

Etymology – refers to the tear-shaped ascospores

Holotype – MFLU 16-1486

Saprobic on dead stems. **Sexual morph:** *Apothecia* 300–500 × 140–300 µm, arising singly, sessile, slightly erumpent. *Receptacle* cupulate, black. *Disc* concave, black. *Ectal excipulum* 16–21 µm ($\bar{x}$ = 20.3 µm, n = 10) in lower flanks, composed of, thin-walled, light brown to hyaline cells of *textura angularis*. *Medullary excipulum* 7–8.5 µm ($\bar{x}$ = 7.6 µm, n = 10) in lower flanks, composed of, thin-walled, hyaline cells of *textura porrecta*. *Hymenium* hyaline. *Paraphyses* 2–4.5 µm wide ($\bar{x}$ = 3.4 µm, n = 20), numerous, filiform, obtuse and slightly swollen at the apex, septate, branched, smooth. *Asci* 65–95 × 8–11 µm ($\bar{x}$ = 77.4 × 9 µm, n = 30), 8-spored, unitunicate, cylindric–clavate, apex rounded and amyloid, short stipitate base, arising from croziers. Ascospores 10–12 × 4.5–6.5 µm ($\bar{x}$ = 11.5 × 5.6 µm, n = 40), 1–2-seriate, tear shape, fusoid to ellipsoid, one side is slightly wider than the other side, tear-shaped, sometimes 1-septate, hyaline, guttulate. **Asexual morph:** Undetermined.

Material examined – Russia, Rostov region, Shakhty City District, ruderalized steppe near Grushevka River, saprobic on dead stem of unidentified *Brassicaceae* herbal plant (perhaps, *Sisymbrium altissimum* L.), 18 February 2016, Timur S. Bulgakov, T-1191 (MFLU 16-1486).

GenBank accessions – LSU- MK591959, ITS- MK585003, SSU- MK585020

Notes – Our collection from Russia grouped with *Cadophora antarctica* (CBS 143035) and *Cylindrosporium concentricum* (CBS 157 35) with the statistical support of 61% (Fig. 18).

The ITS data of our collection shows 96% similarity to that of *Cadophora luteo-olivacea* (ICMP:18084) (623/649-96% with 5 gaps). The LSU data of our species shows 99% similarity to that of *Cadophora luteo-olivacea* (CBS 128576) (847/859-99% with 1 gap) and *Cadophora malorum* (CBS 260.32) (847/859-99% with 1 gap).

The genera *Cadophora* and *Cylindrosporium* are recorded as the asexual genera (Munkvold & Neely 1989, Khan et al. 2017, Travadon et al. 2015). Our collection is genetically close to *Cadophora* and *Cylindrosporium*. However, morphology of our collection is similar to sexual morph characteristics of the other genera within *Ploettnerulaceae* (Matheis 1977, Meyer & Luttrell 1986). Ascospores of our collection failed to germinate and we are unable to get the asexual morph of this species.

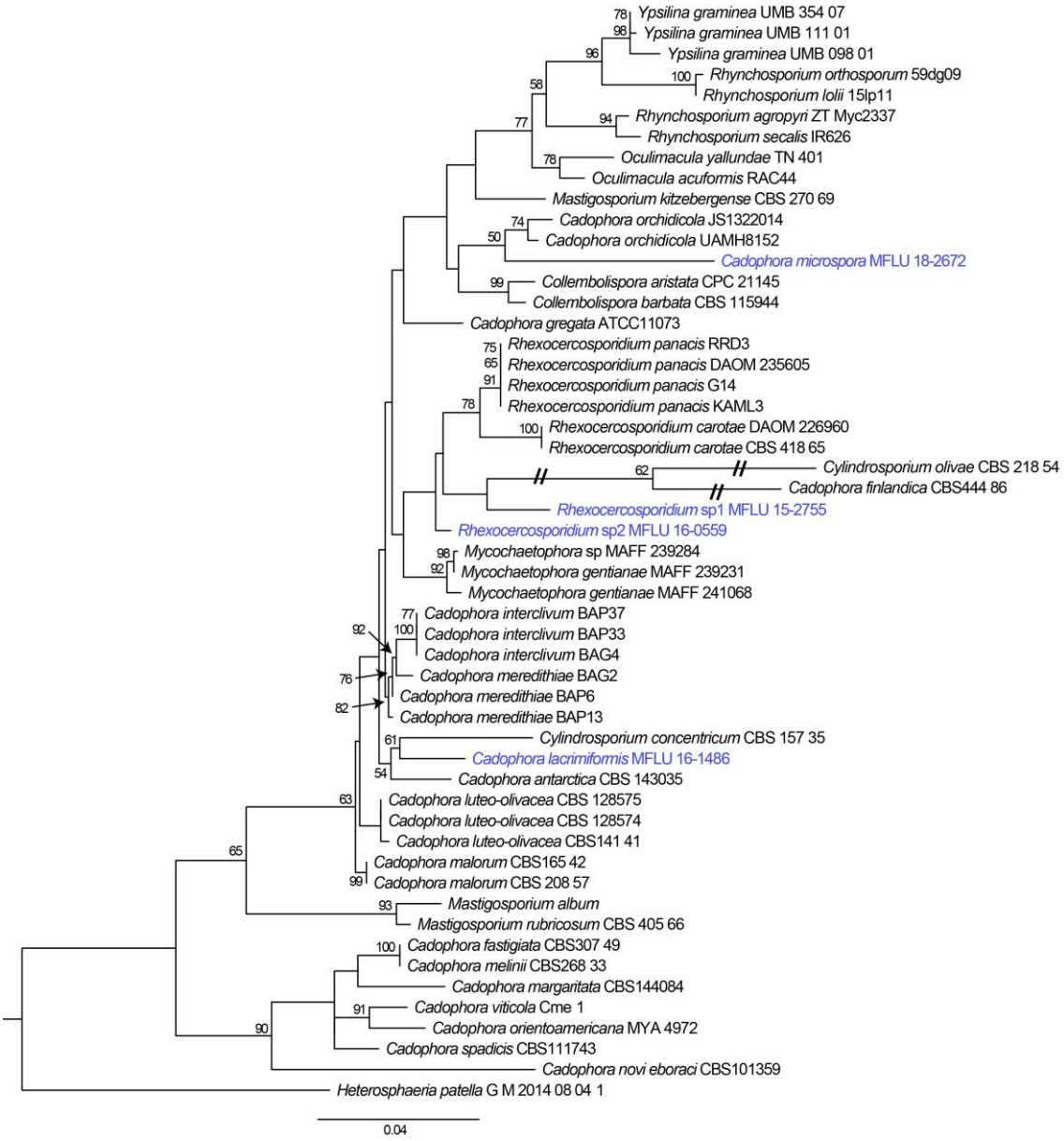

Figure 18 – Phylogram generated from maximum likelihood analysis of sequences of *Ploettnerulaceae* based on ITS sequence data. MLBP values ≥50% are given near the nodes. Strain/culture numbers are given after the taxa names. The tree is rooted with *Heterosphaeria patella* (G.M-2014-08-04-1).

Cadophora microspora Ekanayaka & K.D. Hyde, ***sp. nov.***

Index Fungorum number: IF556282; Facesoffungi number: FoF 05883; Fig. 20.

Etymology – refers to the small ascospores

Holotype – MFLU 18-2672

Saprobic on dead stems. **Sexual morph:** *Apothecia* 100–200 µm wide, arising singly or in small groups, sessile, erumpent from the substrate, black when fresh. *Receptacle* cupulate, disc concave, disc and the margins are black when fresh. *Ectal excipulum* 21–23 µm ($\bar{x}$ = 21.7 µm, n = 10) in margins and upper flanks, 3–5 cell layers deep, cell walls are thick, blackish cells of *textura globulosa*. *Medullary excipulum* 6–8 µm ($\bar{x}$ = 7.3 µm, n = 10) in upper flanks, composed of narrow, long, thin-walled, hyaline cells of *textura epidomoidea*. *Hymenium* hyaline. *Paraphyses* 1.2–1.8 µm wide ($\bar{x}$ = 1.5 µm, n = 20), numerous, filiform, branched, septate, hyaline, acute at the apex, not exceed asci in length. *Asci* 31–38 × 5–6 µm ($\bar{x}$ = 33.8 × 5.5 µm, n = 30) 8-spored,

unitunicate, cylindric–clavate, rounded or medium conical at the apex, amyloid, stipitate base, arising from croziers. Ascospores 6–10 × 1.5–3 µm ($\bar{x}$ = 8.1 × 2.3 µm, n = 40), multi-seriate, fusoid-clavate, aseptate, hyaline, with 2–3 guttules. **Asexual morph:** Undetermined.

Material examined – UK, Calbourne Stream, Isle of Wight, on *Apiaceae* stem, 11 May 2015, E.B.G. Jones, GJ 154b (MFLU 18-2672).

GenBank accessions – LSU- MK591966, ITS- MK584939, SSU- MK585027, RPB2- MK373055

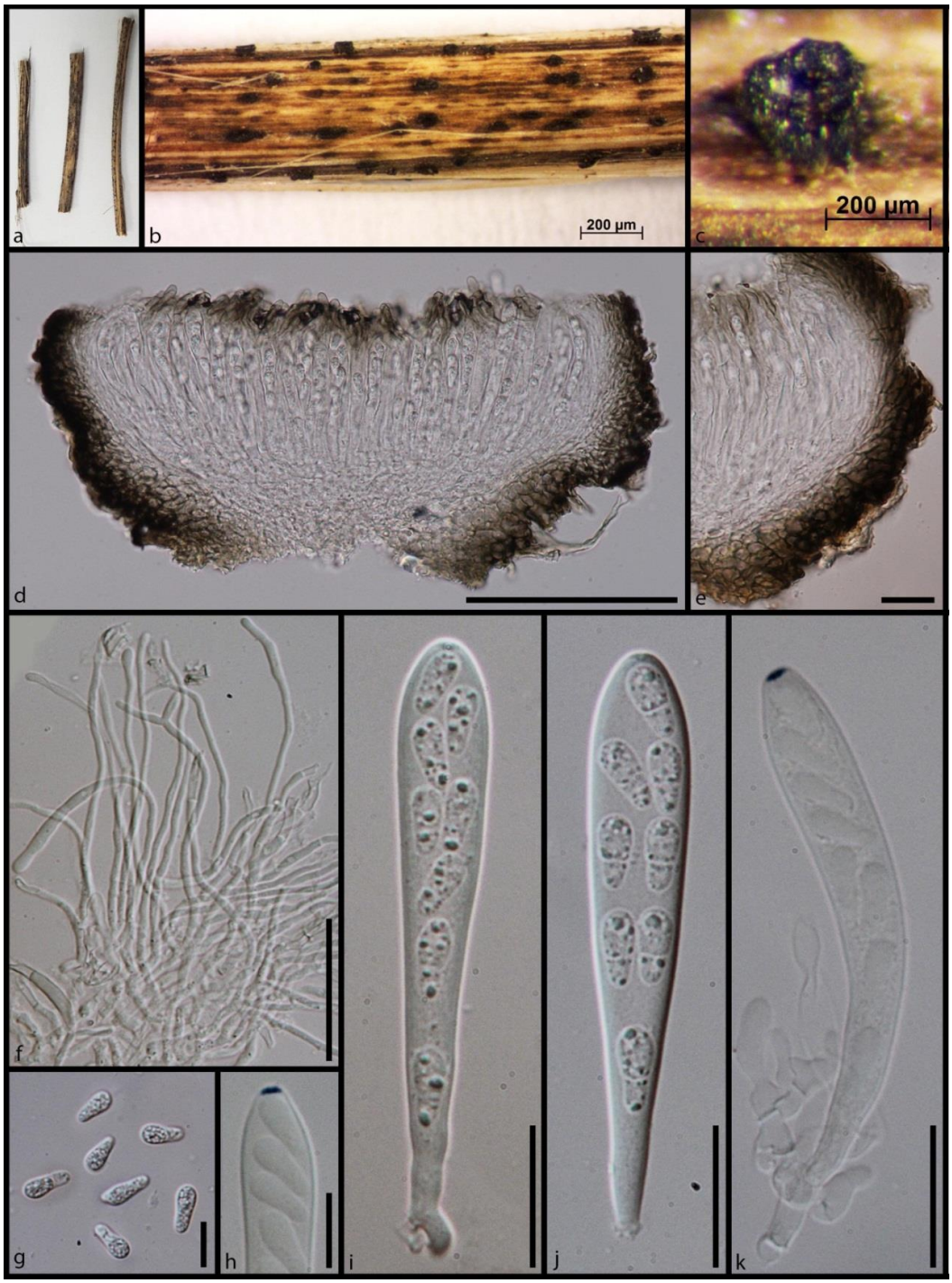

Figure 19 – Morphology of *Cadophora lacrimiformis* (MFLU 16-1486 holotype) a Substrate. b Apothecia on wood. c Apothecium on wood. d Cross section of an apothecium. e Close up of the cross section of apothecium at margins. f Apically swollen paraphyses. g Ascospores. h Amyloid ascus apex. i–k Cylindric-clavate asci. Scale bars: d = 100 µm, e, i–k = 20 µm, f = 30 µm, g–h = 10 µm.

Notes – Our collection from UK grouped with *Cadophora orchidicola* strains (JS1322014, UAMH8152) from Austria and Canada (Fig. 18) with poor statistical support (50%) and this clade forms a sister clade to *Collembolispora* clade.

The ITS region of our collection is similar to that of *Rhexocercosporidium panacis* (G14) (551/601-92% with 13 gaps), *Rhexocercosporidium* sp. (P1743) (549/602-91% with 15 gaps) and *Cadophora orchidicola* (JS1322014) (546/600-91% with 15 gaps). The LSU region of our collection is similar to *Mycochaetophora gentianae* (MAFF 239231) (1061/1150-92% with 20 gaps), *Rhexocercosporidium carotae* (MUT:4963) (1055/1151-92% with 25 gaps), *Pirottaea brevipila* (CBS 309.58) (1061/1151-92% with 22 gaps) and to *Pirottaea strigosa* (CBS 308.58) (1056/1156-91% with 25 gaps).

The genus *Pirottaea* is genetically related to the family *Helotiaceae*. However, morphology of our collection shows some similarity to the genus *Pirottaea* by having blackish apothecia, *textura globulosa* excipular cells, cylindric-clavate, amyloid asci (Dougoud et al. 2012). Moreover, some of the taxa currently placed in the genus *Pirottaea* were previously placed in the genus *Ploettnerula*, which is the type genus of *Ploettnerulaceae* (Dougoud et al. 2012). Furthermore, our phylogeny (Fig. 18) shows that the genus *Cadophora* is polyphyletic and *Cadophora orchidicola* may require a new generic name in near future.

Considering genetic relatedness here we keep our collection as a new species to *Cadophora*. A wide range of taxon sampling and sequence data from different genetic markers are required to stabilize the phylogeny of *Cadophora* spp.

***Rhexocercosporidium* sp1**

Facesoffungi number: FoF 05983; Fig. 21

Saprobic on conifers. **Sexual morph:** *Apothecia* 300–350 × 400–500 µm superficial, mostly solitary, black, closed when immature and opening by a radial split at the center of the disc at maturity. *Ectal excipulum* 60–65 µm ($\bar{x}$ = 63 µm, n = 10) wide, comprising with cells of *textura angularis*, outer cells are blackish while inner cells are hyaline. *Medullary excipulum* 8–12 µm ($\bar{x}$ = 11 µm, n = 10) in lower flanks, composed of, thin-walled, hyaline cells of *textura oblita*. *Peridium* 60–65 µm ($\bar{x}$ = 61 µm, n = 10) wide, comprising with dark brown cells of *textura angularis*. *Paraphyses* 1.5–2 µm wide ($\bar{x}$ = 2.4 µm, n = 20), numerous, filamentous, septate, obtuse apex. *Asci* 60–75 × 8–12 µm ($\bar{x}$ = 68 × 9 µm, n = 30) unitunicate, cylindrical, conical and non-amyloid apex, short stipitate, arising from croziers. *Ascospore* not observed. **Asexual morph:** Undetermined.

Material examined – Russia, Arkhangelsk region, Akhangelsk City, Maimaksansky City District, saprobic on dead stem of *Thalictrum flavum* L. (*Ranunculaceae*), 22 May 2015, Gennady V. Okatov, T-588 (MFLU 15-2755).

GenBank accessions – ITS- MK584999, SSU- MK585013

Notes – Our collection from Russia grouped with *Cadophora finlandica* and *Cylindrosporium olivae* (CBS 218 54) and these three strains formed a clade basal to *Rhexocercosporidium* clade (Fig. 18). The ITS region of our collection is similar to that of *Pirottaea senecionis* (CBS 307.58) (568/593-96% with 1 gap), *Cadophora* cf. *olivo-luteacea* (GPO_LL_01_G9) (565/590-96% with 1 gap) and *Pyrenopeziza ebuli* (CBS 328.58) (569/595-96% with 5 gaps), *Cadophora luteo-olivacea* (PhiK3II) (566/594-95% with 1 gaps) and *Rhexocercosporidium panacis* (DAOM 235605) (566/594-95% with 3 gaps).

The genus *Pyrenopeziza* genetically related to the family *Mollisiaceae* and *Pirottaea* to *Helotiaceae*. However, morphology of our collection shows some similarity to the genera *Pyrenopeziza* and *Pirottaea* by having blackish apothecia, *textura globulosa* excipular cells, cylindric-clavate, amyloid asci and ellipsoid to fusoid ascospores (Rawlinson et al. 1978, Hütter 1958, Gremmen 1958, Schüepp 1959, Crous et al. 2017, Gminder 2012, Dougoud et al. 2012).
However, in our collection we did not observe ascospores and the collection is immature. The collection did not mature after *in vitro* incubation. Therefore, here we name this collection as *Rhexocercosporidium* sp1.

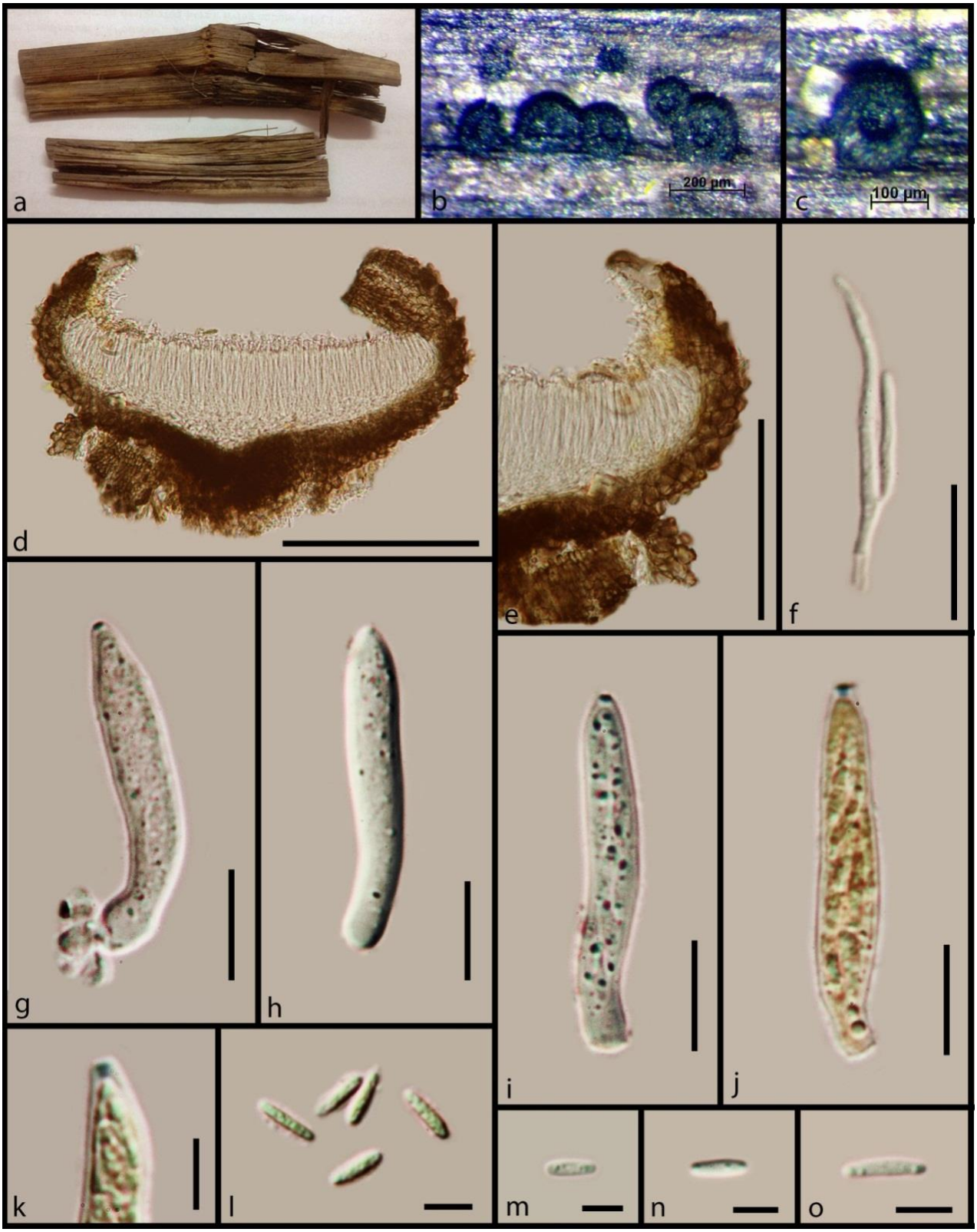

Figure 20 – Morphology of *Cadophora microspora* (MFLU 18-2672 holotype) a Substrate. b Apothecia on wood. c Apothecium on wood. d Cross section of an apothecium. e Vertical section of the apothecium at margin. f Aseptate, branched paraphyses. g–j Cylindrical asci. k Amyloid ring at apical apex. l–o Clavate ascospores. Scale bars: b = 200 µm, c = 100 µm, d = 70 µm, e = 60 µm, f–j = 10 µm, k–o = 5 µm.

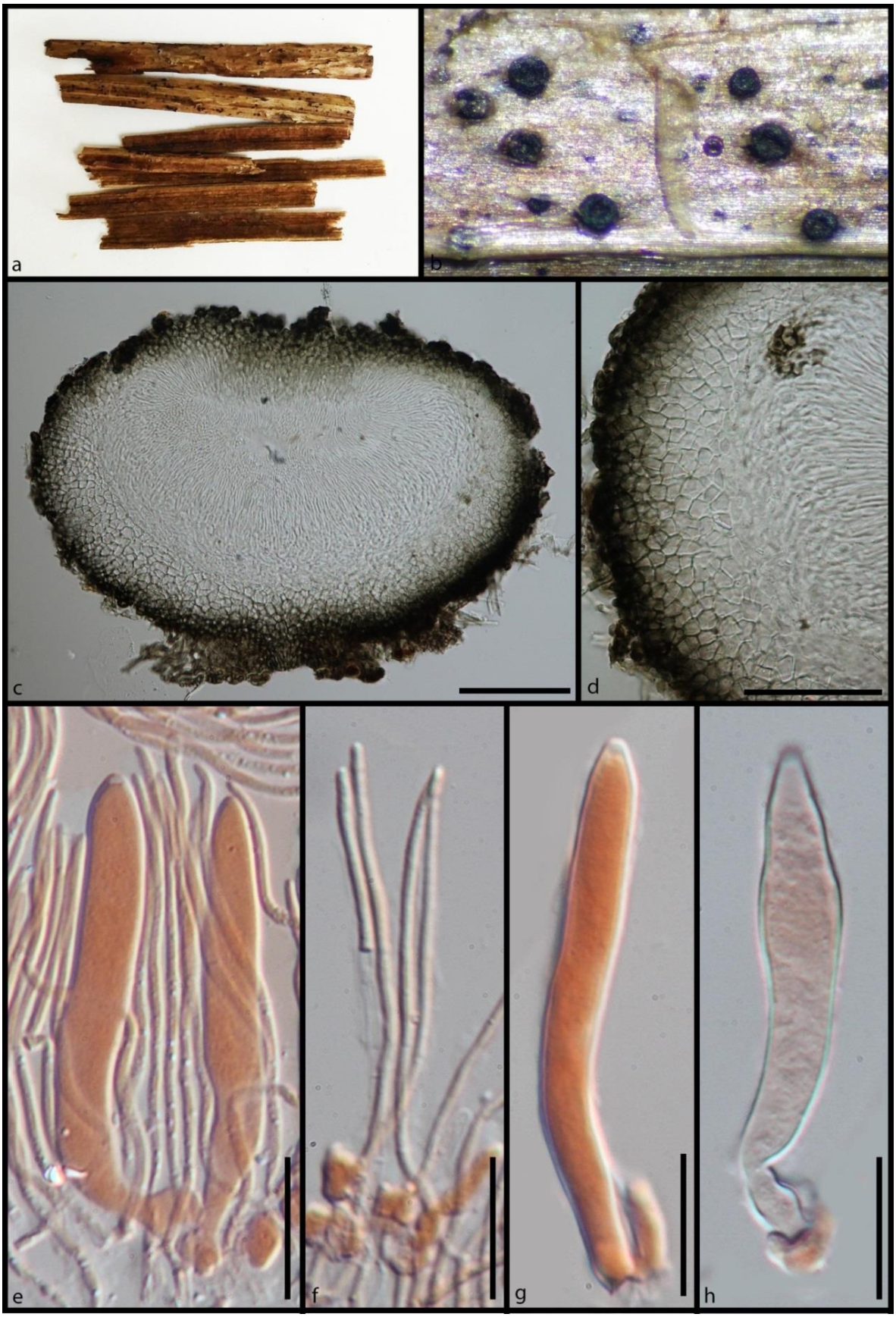

Figure 21 – Morphology of *Rhexocercosporidium* sp1 (MFLU 15-2755) a Substrate. b Mature apothecia on wood. c Cross section of an immature apothecium. d Close up of excipulum. e Part of hymenium showing asci and paraphyses. f Filiform paraphyses. g, h Short stipitate asci. Scale bars: c = 100 µm, d = 60 µm, e–h = 20 µm.

***Rhexocercosporidium* sp2**

Facesoffungi number: FoF 05984; Fig. 22

Saprobic on conifers. **Sexual morph:** *Apothecia* 222–228 × 738–743 µm ($\bar{x}$ = 225.9 × 741.5 µm, n = 10) superficial, mostly solitary, black or brown. *Receptacle* cupulate. *Disc* concave *Ectal excipulum* 40–45 µm ($\bar{x}$ = 43 µm, n = 10) wide at lower flanks, marginal cells are subglobose, flanks are comprising with dark brown cells of *textura angularis*. *Medullary excipulum* 10–15 µm ($\bar{x}$ = 12 µm, n = 10) wide at lower flanks, comprising with hyaline cells of *textura porrecta*. *Paraphyses* 2.2–2.8 µm wide ($\bar{x}$ = 2.4 µm, n = 20), numerous, filamentous, septate, swollen at the apices. *Asci* 47–52 × 4–4.5 µm ($\bar{x}$ = 49.6 × 4.3 µm, n = 30) 8-spored, unitunicate, cylindrical, apex conical and amyloid, base stipitate, croziers absent. *Ascospore* 6–9 × 2–3 µm ($\bar{x}$ = 8.5 × 2.7 µm, n = 40), ellipsoid, hyaline, non septate, smooth walled. **Asexual morph:** Undetermined.

Material examined – UK, New Forest, Hants, 24 November 2014, E. B. G. Jones, GJ073/UK01 (MFLU 16-0559).

GenBank accessions – LSU- MK591961, ITS- MK584945, SSU- MK585022, TEF- MK637048, RPB2- MK368612

Notes – Our collection from UK grouped basal to *Cadophora finlandica*-*Rhexocercosporidium* clade (Fig. 18). The ITS region of our collection is similar to that of *Pyrenopeziza ebuli* (CBS 328.58) (903/913-99% with 3 gaps), *Pirottaea brevipila* (CBS 309.58) (867/915-95% with 7 gaps), *Cadophora luteo-olivacea* (Clo0316) (836/893-94% with 3 gaps), *Rhynchosporium secalis* (isolate 763) (826/914-90% with 13 gaps) and *Rhynchosporium agropyri* (isolate 04CH-RAC-A.6.1) (823/914-90% with 14 gaps). The LSU data of our species shows similarity to that of *Cadophora luteo-olivacea* (CBS 128576) (846/854-99% with no gaps), *Cadophora malorum* (CBS 260.32) (846/854-99% with no gaps), *Pyrenopeziza lonicerae* (CBS 332.58) (846/854-99% with no gaps) and *Pyrenopeziza chamaenerii* (CBS 327.58) (846/854-99% with no gaps).

The genus *Cadophora* has morphological and genetic relationship with the genus *Pyrenopeziza* as described in the notes of above *Rhexocercosporidium* collection.

This collection distinct from other recorded sexual morphs of *Cadophora* and *Rhexocercosporidium* (present study) by having apically swollen paraphyses. However, the statistical support for the placement of this collection is low. Therefore, here we keep this collection as *Rhexocercosporidium* sp. 2 until we have more data to stabilize its phylogenetic position.

Vibrisseaceae Korf

Facesoffungi number: FoF 05884

Taxa are saprobic on dead plant material in aquatic and semi-aquatic environments. Ascomata are apothecial and characterized by sessile to stipitate, cupulate or clavate receptacle. The ectal excipulum is composed of hyaline to brown, thin- or thick-walled cells of *textura angularis* to *globulosa* and medullary excipulum reduced or composed of *textura oblita*. Paraphyses are apically slightly swollen, sometimes branched and filiform. Asci are 8-spored, cylindric-clavate, long stipitate, sometimes amyloid and arising from croziers. Ascospores are filiform, 3–24-septate and partly fragmenting (Sanchez 1967, Sánchez & Korf 1966, Beaton & Weste 1980, 1983, Almeida et al. 2015, Seaver 1946, De Notaris 1863, Hustad & Miller 2011, Iturriaga & Korf 1990). Asexual morphs are hyphomycetous, phialidic and acervulus. Conidiophores are straight, cylindrical, hyaline and sometimes branched. Conidiogenous cells are holoblastic or polytretic. Conidia are ellipsoid or irregular in shape and unicellular or up to 7-septate (Hernandez-Restrepo et al. 2017, 2012, Shenoy et al. 2010, Kirschner & Oberwinkler 2001, Goh et al. 1998, Goh & Hyde 1998, Legon 2012, Crous et al. 2015, Iturriaga & Israel 1985).

Notes – This family forms a monophyletic clade close to the family *Mollisiaceae*. According to our phylogenetic analysis we observed the close relationship of the genera *Acephala*, *Cheirospora*, *Diplococcium*, *Gorgoniceps* and *Strossmayeria* to *Vibrisseaceae*. Hustad & Miller (2011) also showed the similar phylogenetic placement of these taxa within their phylogenetic

analysis. Moreover Shenoy et al. (2010) showed that the *Diplococcium* and *Vibrissea* are genetically closely related. Within the phylogenetic analysis provided by Crous et al. (2015), the genera *Diplococcium*, *Acephala* and *Cheirospora* formed a monophyletic clade. Therefore, by considering the results our study and previous literature we placed the genera *Acephala*, *Cheirospora*, *Diplococcium*, *Gorgoniceps* and *Strossmayeria*, under the family *Vibrisseaceae*. Moreover, we removed *Chlorovibrissea* from this family as it is phylogenetically unrelated to *Vibrisseaceae* according to the results of our analyses and our results are in agreement with the results provided by Hustad & Miller (2011).

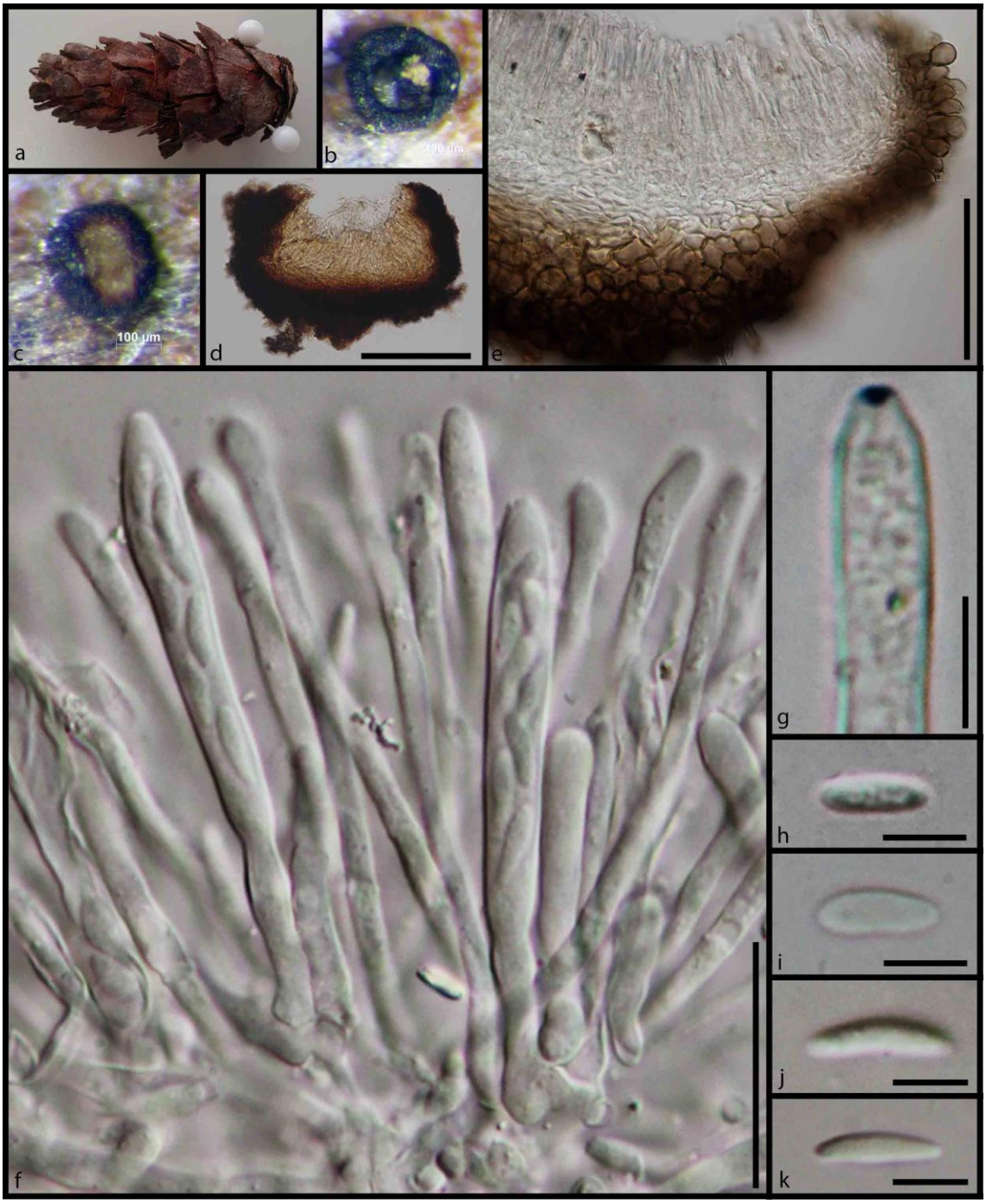

Figure 22 – Morphology of *Rhexocercosporidium* sp2 (MFLU 16-0559) a Substrate. b, c Mature apothecia on wood. d Cross section of an apothecium. e Close up of the excipulum. f Asci and paraphyses. g Amyloid apex in Melzer's reagent. h–k Ellipsoid ascospores. Scale bars: d = 100 µm, e = 70 µm, f = 20 µm, g = 10 µm, h–k = 5 µm.

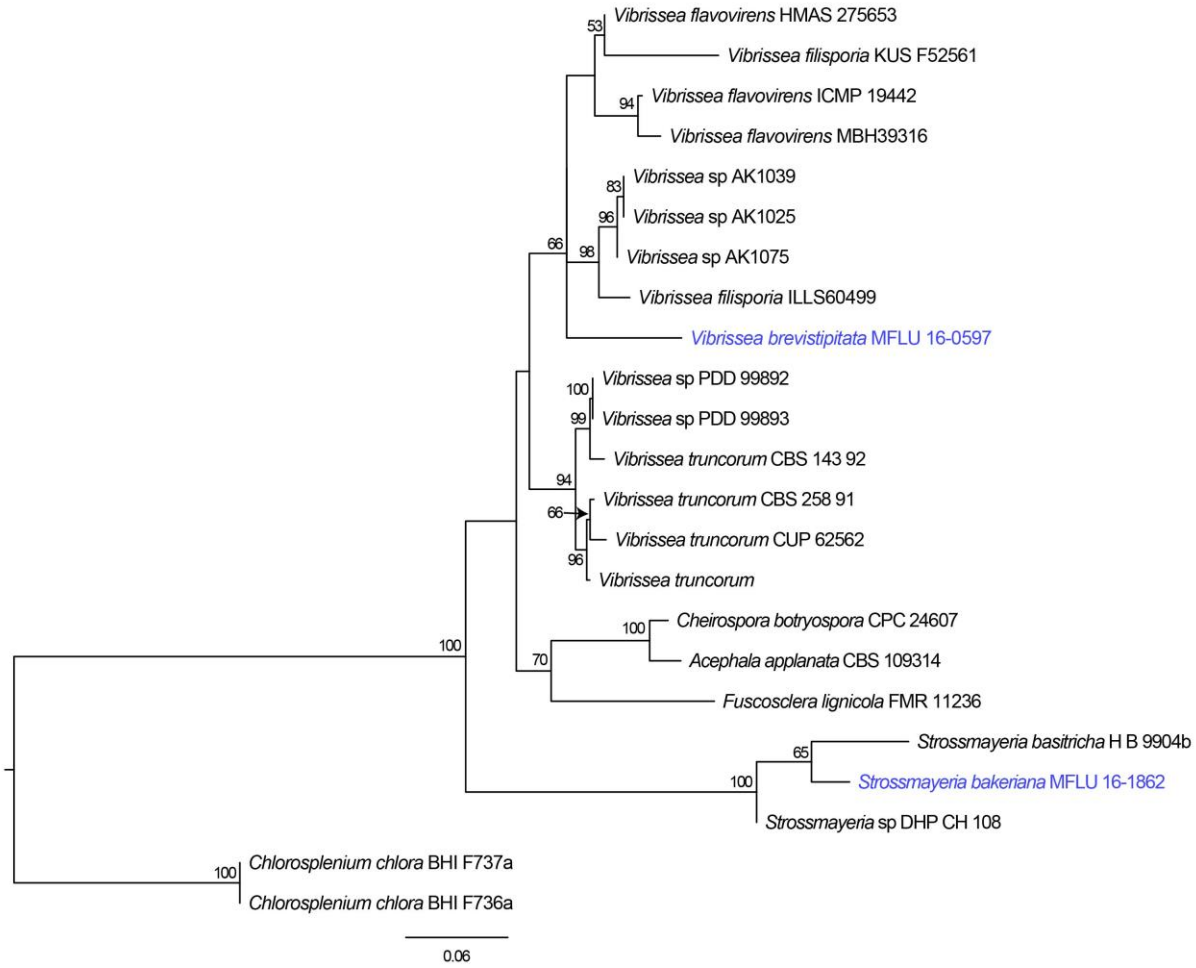

Figure 23 – Phylogram generated from maximum likelihood analysis of sequences of *Vibrissea* (*Vibrisseaceae*) based on ITS sequence data. MLBP values ≥50% are given near the nodes. Strain/culture numbers are given after the taxa. The tree is rooted with *Chlorosplenium chlora* (BHI F737a and BHI F736a).

Vibrissea brevistipitata Ekanayaka & K.D. Hyde, ***sp. nov.***

Index Fungorum number: IF556283; Facesoffungi number: FoF 05885; Fig. 24.

Etymology – Refers to short stipitate apothecia

Holotype – MFLU 16-0597

Saprobic on dead leaf. **Sexual morph:** *Apothecia* 300–400 × 400–460 µm, arising singly, stipitate. *Receptacle* cupulate, black when dry. *Disc* concave. *Ectal excipulum* 25–30 µm ($\bar{x}$ = 20.3 µm, n = 10) in lower flanks, composed of, thin-walled, brown cells of *textura angularis to globulosa*. *Medullary excipulum* 10–15 µm ($\bar{x}$ = 13 µm, n = 10) in lower flanks, composed of, thin-walled, hyaline cells of *textura oblita*. *Hymenium* hyaline. *Paraphyses* 3–5 µm wide ($\bar{x}$ = 3.8 µm, n = 20) at the apex, numerous, filiform, obtuse and slightly swollen at the apex, aseptate, exceeding the asci in length, smooth. *Asci* 150–200 × 5–10 µm ($\bar{x}$ = 184 × 8 µm, n = 30) 8-spored, unitunicate, cylindric–clavate, rounded apex, non-amyloid, tapered and long stipitate base, croziers absent. Ascospores 120–150 × 1.4–2 µm ($\bar{x}$ = 135 × 1.7 µm, n = 40), 1–2-seriate, fusoid, thread-like, aseptate, hyaline. **Asexual morph:** Undetermined.

Material examined – Italy, Forlì-Cesena Province [FC], Fiumicello di Premilcuore, on dead land leaf of Quercus sp., 10 February 2014, Erio Camporesi, IT1718 (MFLU 16-0597).

GenBank accessions – ITS- MK584980

Notes – Our collection of *Vibrissea* clustered basal to *Vibrissea filisporia- Vibrissea flavovirens* clade with statistical support of 66% (Fig. 23). The ITS data of our collection is similar

to that of *Vibrissea filisporia* (JLF2084) (517/557-93% with 4 gaps) and to *Vibrissea truncorum* (JLF2113) (513/558-92% with 5 gaps).

Our species is phylogenetically close to *V. filisporia*, but *V. filisporia* differs in having bluish-grey, yellow or ochraceous disc and septate paraphyses. *Vibrissea norvegica* is similar in having simple paraphyses, but differs in having shorter ascospores (Sanchez 1966). *Vibrissea sporogyra* differs in having branched paraphyses (Sanchez & korf 1966). *Vibrissea decolorans* differs in having amyloid asci (Sanchez 1966). *Vibrissea albofusca* differs in having long stipitate apothecia (Beaton & Weste 1983).

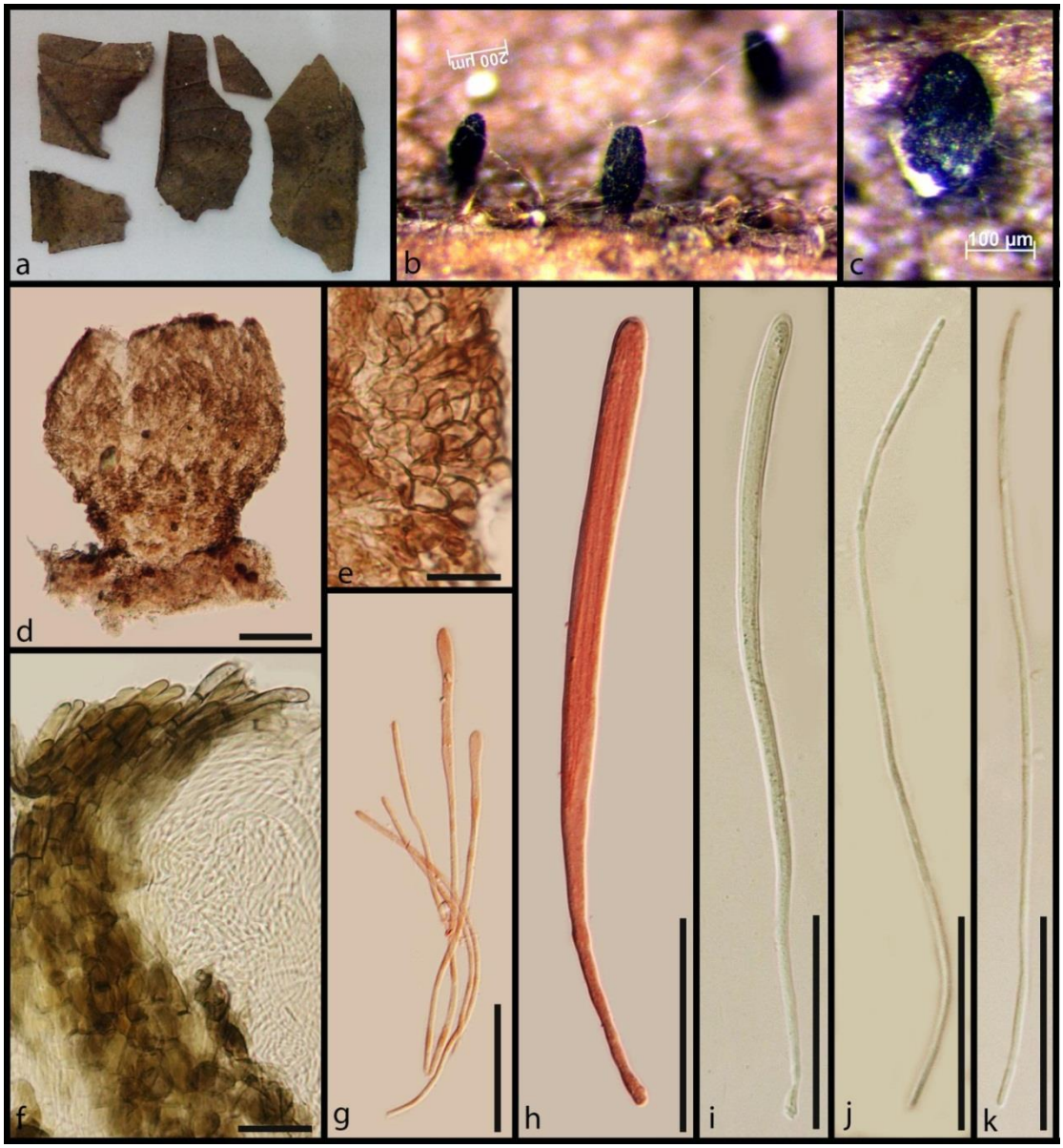

Figure 24 – Morphology of *Vibrissea brevistipitata* (MFLU 16-0597 holotype) a Substrate. b, c Apothecia on leaf surface. d Cross section of an apothecium. e Close up of the cross section of apothecium at flanks. f Close up of the cross section of apothecium at flanks. g Filiform paraphyses. h–i Cylindric-clavate asci. j–k Thread-like ascospores. Scale bars: d = 100 µm, e–f = 20 µm, g = 30 µm, h–i = 50 µm, j–k = 30 µm.

Strossmayeria bakeriana (Henn.) Iturr.

Facesoffungi number: FoF 05886; Fig. 25.

Saprobic on dead stems. **Sexual morph:** 408–434 × 170–200 µm ($\bar{x}$ = 425.7 × 198.3 µm, n = 10) *Apothecia* arising in small groups, sessile or sub-stipitate. *Receptacle* turbinate, disc convex

and whitish to brownish, margins crenulate. *Ectal excipulum* 16–22 µm ($\bar{x}$ = 20.3 µm, n = 10) in lower flanks, composed of, thin-walled, brown to hyaline cells of *textura prismatica*. *Medullary excipulum* 26–32 µm ($\bar{x}$ = 30 µm, n = 10) in lower flanks, composed of, thin-walled, hyaline cells of *textura prismatica*. *Hymenium* hyaline. *Paraphyses* 2.3–3.8 µm wide ($\bar{x}$ = 3.1 µm, n = 20), numerous, filiform, obtuse and slightly swollen at the apex, aseptate, not exceeding the asci in length, smooth, aguttulate. *Asci* 95–110 × 12.5–17 µm ($\bar{x}$ = 102 × 15 µm, n = 30) 8-spored, unitunicate, cylindric–clavate, conical at the apex, amyloid ring present at the ascus apex, stipitate base, croziers absent. Ascospores 27–44 × 3.5–5.6 µm ($\bar{x}$ = 34.5 × 4.6 µm, n = 40), 1–2-seriate, fusoid, 1–6 septate, hyaline with gelatinous sheath. **Asexual morph:** Undetermined.

Material examined – Thailand, Chiang Mai Province, Mushroom Research Center, on dead stems, 19 July 2015, A.H. Ekanayaka, H 1/HD032 (MFLU 16-1862).

GenBank accessions – LSU- MK591971, ITS- MK584964, SSU- MK585032, RPB2- MK614732

Notes – Our collection from Thailand grouped with *Strossmayeria basitricha* ILLS60498 with the statistical support of 65% (Fig. 23). The ITS data of our collection is similar to that of *Strossmayeria* sp. (DHP-CH-108) (355/365-97% with 3 gaps), *Strossmayeria basitricha* (H.B. 9904b) (537/571-94% with 10 gaps) and to *Durella connivens* (G.M. 2014-08-12) (495/552-90% with 14 gaps). The LSU data shows similarity to that of *Strossmayeria basitricha* (ANM 2055) (770/781-99% with 4 gaps).

Strossmayeria bakeriana is characterized by pale brown to grey, turbinate apothecia, clavate asci and hyaline, 5–7-septate ascospores with gel sheath. Morphology of our collection is similar to the description from Iturriaga & Korf (1990).

Chlorospleniaceae Ekanayaka & K.D. Hyde, ***fam. nov.***

Index Fungorum number: IF556284; Facesoffungi number: FoF 05887

Type genus – *Chlorosplenium*

Saprobic on well-decayed plant material. **Sexual morphs:** *Ascomata* apothecial, cupulate or discoid, sessile or substipitate, disc whitish, yellowish, greyish or greenish, receptacle yellow or greenish. *Ectal excipulum* composed of brownish cells of *textura angularis*. *Medullary excipulum* composed of thick hyaline cells of *textura intricata*. *Paraphyses* filiform, septate. *Asci* 8-spored, cylindric-clavate, amyloid. *Ascospores* ellipsoid to fusoid, hyaline and smooth walled. **Asexual morphs:** not recorded.

Notes – Previously most of the greenish inoperculate discomycetes were assigned to the genus *Chlorosplenium* (Dixon 1974). However, now many of them are synonymized to the genus *Chlorociboria* (Wang 2007). Currently around ten species are assigned to the genus *Chlorosplenium* (Index fungorum 2018, Jaklitsch et al. 2016). Within our phylogenetic analysis this genus formed a separate clade close to *Vibrisseaceae* and this clade is highly statistically supported (100%- MLBP and 1-BYPP). The sister relationship of new family with *Mollisiaceae-Vibrisseaceae* clade received the statistical support of 72% (MLBP).

Discinellaceae Ekanayaka & K.D. Hyde, ***fam. nov.***

Index Fungorum number: IF556285; Facesoffungi number: FoF 05888

Type genus – *Discinella*

Saprobic on dead plant material. **Sexual morphs:** *Ascomata* apothecial discoid to cupulate, circular in shape, gelatinous, margin smooth or sometimes covered with hairs. *Ectal excipulum* composed of gelatinous hyaline cells of *textura prismatica* or *textura porrecta*. *Medullary excipulum* composed of cells of *textura intricata* to *prismatica*. *Paraphyses* filiform, branched at the apices. *Asci* 8-spored, cylindrical, sometimes arising from croziers, amyloid or non-amyloid. *Ascospores* ellipsoid, aseptate, hyaline, without sheath. **Asexual morphs:** *Conidiomata* hyphomycetous, holoblastic. *Conidia* mostly hyaline, sometimes branched, filiform, globose, or fusoid some form dimorphic conidia.

Notes – According to our phylogenetic analysis, the genera *Discinella*, *Pezoloma*, *Gyoerffyella*, *Articulospora*, *Lemonniera* and *Naevala* formed a monophyletic well-supported clade (98%- MLBP support and 1-BYPP) sister to *Godroniaceae-Mitrulaceae* clade. However, the sister relationship is not statistically supported. Same phylogenetic placement of these genera is recorded in Baral et al. (2013a, b) and Sri-indrasutdhi et al. (2015). Therefore, considering the results of our phylogeny and previous literature, we introduce the new family.

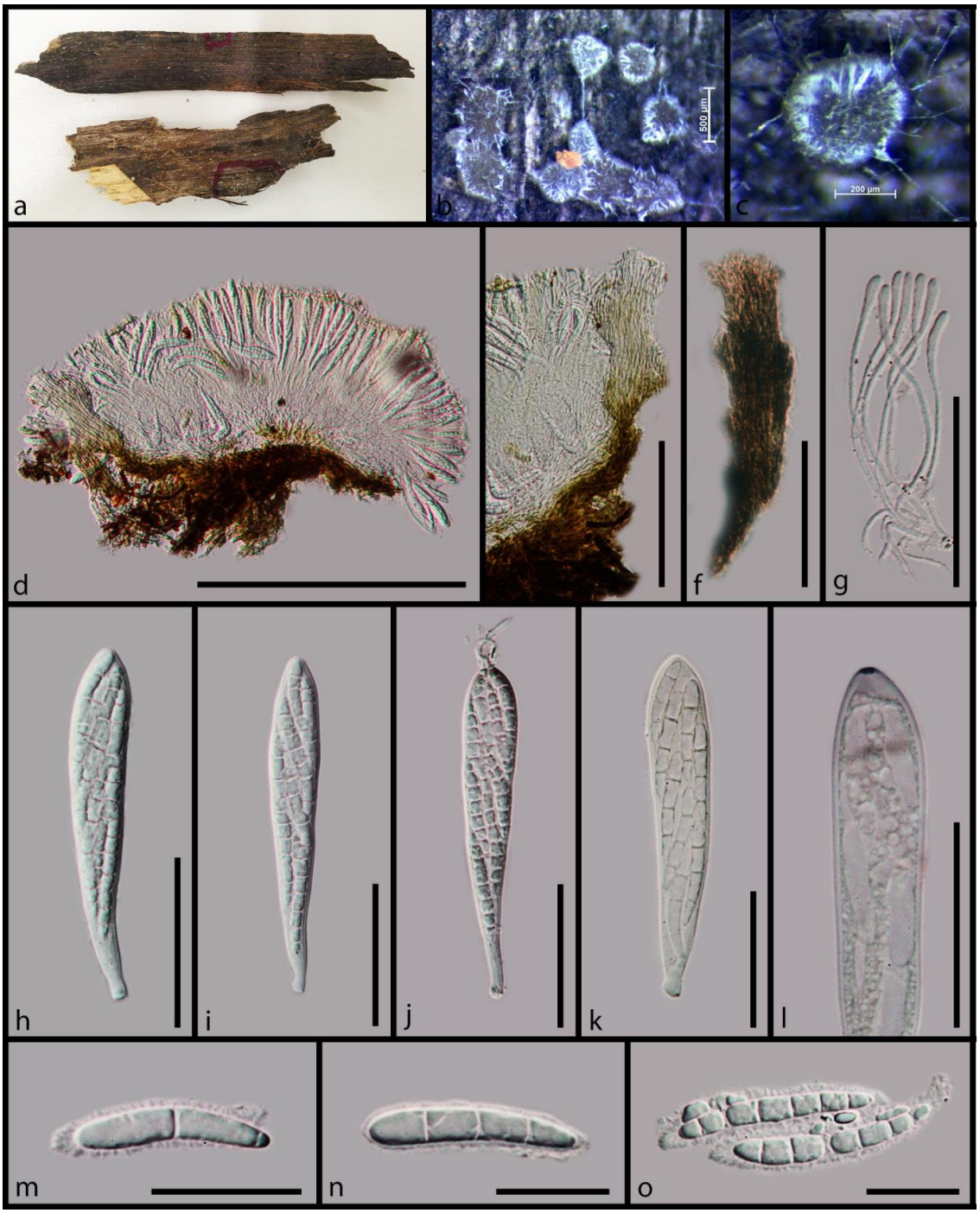

Figure 25 – Morphology of *Strossmayeria bakeriana* (MFLU 16-1862) a Substrate. b Apothecia on wood. c Apothecium on wood. d Cross section of an apothecium. e Close up of the cross section of apothecium at margins. f Pigmented excipular cells. g Cylindrical paraphyses. h–k Cylindric-clavate asci. l Apex of the asci with the plug blueing in Melzer's reagent. m–o Fusoid ascospores. Scale bars: b = 500 µm, c = 200 µm, d = 300 µm, e–f = 100 µm, g = 50 µm, h–l = 40 µm, m–o = 20 µm.

Godroniaceae Baral

Facesoffungi number: FoF 05889

Taxa are plant pathogenic (Groves 1968, Müller & Dorworth 1983, Jeger et al. 2017, Stromeng & Stensvand 2011, CABI 2017, Funk 1977). Ascomata are apothecial and characterized by urceolate, discoid or cupulate receptacle which is, mostly stromatic and erumpent. The margins are even or slightly lobed and sometimes covered with hairs. The ectal excipulum is composed of cells of *textura prismatica* to *angularis* and medullary excipulum is composed of *textura epidermoidea*, *prismatica* to *porrecta*. The hymenium is flat or slightly concave and blackish. Paraphyses are filiform, simple or branched, sometimes slightly swollen at the apex and sometimes lanceolate. Asci are 8-spored, cylindric-clavate and amyloid or non-amyloid. Ascospores are fusoid, hyaline, septate and guttulate (CABI 2017, Groves 1965, 1968, Stromeng & Stensvand 2011, Funk 1977). Asexual morphs are stromatic pycnidial and mostly associated with ascomata. Conidiogenesis is phialidic and conidia are ellipsoid to fusoid or vermiform, straight or curved, tapering towards the apices and septate (Groves 1965, 1968, Müller & Dorworth 1983, Jeger et al. 2017, Stromeng & Stensvand 2011, CABI 2017, Funk 1977, Sieber & Kowalski 1993).

Notes – *Godroniaceae* is a plant pathogenic family. In our phylogenetic analysis this family formed a monophyletic clade sister to *Arachnopezizaceae*. Taxa of this family are plant pathogenic which cause shoot blight and stem canker on vascular plants (Groves 1968, Müller & Dorworth 1983, Jeger et al. 2017, Stromeng & Stensvand 2011, CABI 2017, Funk 1977, Chastagner et al. 2017).

Hydrocinaceae Ekanayaka & K.D. Hyde, ***fam. nov.***

Index Fungorum number: IF556286; Facesoffungi number: FoF 05890

Type genus – *Hydrocina*

Saprobic on dead plant material in aquatic and terrestrial habitats. **Sexual morphs:** *Ascomata* apothecial cupulate, sessile or substipitate. *Ectal excipulum* composed of cells of *textura globulosa*. *Medullary excipulum* composed of cells of *textura porrecta- intricata-oblita*. *Paraphyses* filiform, septate, branched, slightly swollen at the apices. *Asci* 8-spored, cylindric-clavate, amyloid, arising from croziers. *Ascospores* ellipsoid to fusoid, aseptate or septate, hyaline. **Asexual morphs:** *Conidiomata* hyphomycetous. *Conidiophores* long, hyaline, simple or branched, filiform. *Conidiogenous cells* proliferate sympodial. *Conidia* filiform, branched, sometimes septate and fragment into microconidia.

Notes – This clade mostly includes many aquatic hyphomycetes. According to our phylogenetic analysis this family formed monophyletic clade close to *Heterosphaeriaceae*. The clade received strong statistical support (0.97- BYPP / 59- MLBP). However, the sister relationship between the new family and *Heterosphaeriaceae-Ploettnerulaceae* clade is not statistically supported. Baschien et al. (2013) also showed the close phylogenetic relationship of the genera *Hydrocina*, *Filosporella*, *Varicosporium* within Leotiomycetes. Therefore, considering previous literature and our results here we introduce the new family *Hydrocinaceae*.

Bryoglossaceae Ekanayaka & K.D. Hyde, ***fam. nov.***

Index Fungorum number: IF556287; Facesoffungi number: FoF 05891

Type genus – *Bryoglossum*

Saprobic on dead plant material or parasitic on bryophytes. **Sexual morphs:** *Ascomata* apothecial, clavate to capitate or cupulate to turbinate, long stipitate, gelatinous, hymenium flat or convex, yellowish. *Ectal excipulum* composed of cells of *textura porrecta*. *Medullary excipulum* composed of cells of *textura intricata*. *Paraphyses* filiform, swollen at the apex. *Asci* 8-spored, amyloid or non-amyloid, arising from croziers. *Ascospores* ellipsoid to fusoid, straight, aseptate, guttulate. **Asexual morphs:** not recorded.

Notes – Within our phylogenetic analysis, the genera *Bryoclaviculus*, *Bryoglossum* and *Neocudoniella* formed a monophyletic clade sister to *Godroniaceae*. The clade is supported by strong statistical support (1- BYPP / 100- MLBP). However, the sister relationship is not

statistically supported. Jaklitsch et al. (2016) also discussed the close genetic relationship of these genera within Helotiales. In here we introduce the new family *Bryoglossaceae* to accommodate the genera *Bryoclaviculus*, *Bryoglossum* and *Neocudoniella*.

Hyaloscyphaceae Nannf.

Facesoffungi number: FoF 05892

Taxa are saprobic on dead plant material. Ascomata are apothecial and rarely perithecial. Apothecia are cupulate to discoid and sessile or stipitate. The margins are covered by hairs and hairs are smooth or granulate, cylindrical, tapered to the apex, septate and straight to flexuous or hooked. The ectal excipulum is composed of cells of *textura angularis*, *prismatica* or *oblita* and medullary excipulum is composed gelatinous loosely arranged hyphae. Paraphyses are filiform, cylindrical or lanceolate, septate or aseptate and simple or branched. Asci are 4–8-spored, amyloid or non-amyloid and sometimes arising from croziers. Ascospores are globose, ellipsoid or fusoid, aseptate or 1–3-septate and guttulate (Jaklitsch et al. 2016, Baral et al. 2009, Han et al. 2011, Quijada et al. 2017). Asexual morphs are hyphomycetous. Conidiogenesis is phialidic or sporodochial. Conidia are aseptate, hyaline or brown, branched and muriform or in chains (Jaklitsch et al. 2016).

Notes – *Hyaloscyphaceae* formed a monophyletic clade close to *Arachnopezizaceae* within our phylogenetic analysis.

***Phialocephala urceolata* clade**

Facesoffungi number: FoF 05893

Taxa are endophytic or saprobic. Sexual morphs are not recorded. Asexual morphs are hyphomycetous. Conidiophores are hyaline to darkly pigmented, septate and mononematous. Conidiogenesis is phialidic and conidiogenous cells are flask to urn-shaped and each with a prominent cylindrical and hyaline collarette. Conidia are globose, pedicellate and single or adhering in small clusters at the phialide apex (Wang et al. 2009).

Notes – The genus *Phialocephala* is polyphyletic. In our phylogenetic analysis *P. urceolata* formed a separate clade while *P. scopiformis* clustered with other taxa in the family. Moreover Wang et al. (2009) discussed that *P. urceolata* differs from others in the genus by having curved, urn-shaped phialides and their irregular and sometimes sparse arrangement on the conidiophore axis.

***Peltigeromyces* clade**

Facesoffungi number: FoF 05894

Taxa are saprobic. Ascomata are apothecial, cartilaginous, thin, with a large variety of lobes (Möller 1901). Records are not available for micro morphological characters and for asexual morphs.

Notes – Previously this genus was classified under Helotiales genera *incertae sedis* (Wijayawardene et al. 2018). Pärtel (2016) suggested its position within *Ploettnerulaceae*. Within our phylogenetic analysis this genus formed a separate well supported clade close to *Ploettnerulaceae-Drepanopezizaceae* clade.

Amicodiscaceae Ekanayaka & K.D. Hyde, ***fam. nov.***

Index Fungorum number: IF556288; Facesoffungi number: FoF 05895

Type genus – *Amicodisca*

Saprobic on dead plant material. **Sexual morphs:** *Ascomata* apothecial, cupulate, sessile or sub-stipitate, margins covered by hairs. *Hairs* smooth, cylindrical, tapered to the apex, septate. *Ectal excipulum* composed of cells of *textura angularis* or *textura prismatica*. *Medullary excipulum* composed gelatinous loosely arranged hyphae. *Paraphyses* filiform, cylindrical, septate, simple. *Asci* 8-spored, amyloid, sometimes arising from croziers. *Ascospores* ellipsoid to fusoid, aseptate, guttulate, lemon-yellow pigmented. **Asexual morphs:** *Conidiomata* hyphomycetous, stromatic.

Conidiophores with hyaline to cinnamon-coloured glistening slimy heads, straight or flexuous, dark brown and thick-walled except at the apex. *Conidiogenous cells* terminal, cylindrical, proliferating sympodially. *Conidia* cylindrical to cylindric-ellipsoidal, hyaline, aseptate, thin- and smooth-walled.

Notes – The genera *Amicodisca* and *Dematioscypha* was previously assigned to *Hyaloscyphaceae*. However, Fehrer et al. (2019) showed the separate position of *Amicodisca* and *Dematioscypha* away from *Hyaloscyphaceae.* Moreover, in our phylogeny these two genera formed a monophyletic clade close to *Bryoglossaceae* in a clade supported by one of BYPP and 100% of MLBP. Therefore, considering previous literature and results of our study, we introduce the new family *Amicodiscaceae*.

***Aquapoterium- Unguicularia* clade**

Facesoffungi number: FoF 05985

Taxa are saprobic on dead plant material. Ascomata are apothecial and characterized by sessile or stipitate, cupulate receptacle. The margins are sometimes covered with short cylindrical hairs with pointed apices and basal lumen. The ectal excipulum is composed of cells of *textura prismatica* or a single layer of parallel hyphae with enlarged, globose apices and medullary excipulum reduced or composed of loosely arranged hyphae. Paraphyses are hyaline, filiform, obtuse to clavate at apex, septate, smooth-walled and simple or branched. Asci are 8-spored, amyloid or non-amyloid and cylindric-clavate. Ascospores are hyaline, smooth-walled, 0–1-septate, ellipsoid to clavate-cylindric and surrounded by a gelatinous sheath (Huhtinen 1985, Inman et al. 1992, Raja et al. 2008). Asexual morphs are not recorded.

Notes – *Unguicularia* previously placed in *Hyaloscyphaceae* and *Aquapoterium* is included to Helotiales genera *incertae sedis*. In our phylogeny these two genera formed a monophyletic, independent clade close to *Hydrocinaceae*. Similar phylogenetic position of *Aquapoterium* showed in the phylogeny of Raja et al. (2008). Therefore, regarding previous literature and results of our study, we placed these genera *Aquapoterium* and *Unguicularia* in a separate clade.

Helotiaceae Rehm

= *Roesleriaceae* Y.J. Yao & Spooner

Facesoffungi number: FoF 05896

Taxa are saprobic, endophytic or plant parasitic. Ascomata are apothecial and characterized by sessile or stipitate, cupulate, discoid, capitate to clavate, turbinate or globose receptacle. The margins and flanks are smooth or covered with hairs and hairs are brownish, smooth and septate or aseptate. The ectal excipulum is composed of cells of hyaline, rarely brown *textura prismatica*, *textura intricata*, *textura globulosa-angularis*, or *textura oblita* and medullary excipulum is composed of cells of *textura intricata* or *textura porrecta*. Paraphyses are sometimes absent and when present, they are cylindrical, septate or aseptate, hyaline to yellowish and guttulate. Asci are 4–8-spored, cylindric-clavate, amyloid or non-amyloid and sometimes arising from croziers. Asci are rarely opening by splitting or evanescent. Ascospores are ellipsoid, fusoid or filiform, 1–3-septate and rarely ornamented (Reid 1986, Sydow 1924, Jaklitsch et al. 2016, Zheng & Zhuang 2015, 2016, Chlebická & Konvalinková 2010, Yao & Spooner 1999, Johnston et al. 2014, Spooner 1987, Chlebická & Chlebicki 2007). Asexual morphs are hyphomycetous, sporodochial or synnematal. Macroconidia are holoblastic, hyaline, filiform or staurosporous, dark brown, in chains, bulbils or solitary on conidiophores and 3–5-septate. Microconidia are phialidic, rarely pigmented, multicellular and appendaged (Peláez et al. 2011, Jaklitsch et al. 2016).

Notes – This is one of the largest family of Leotiomycetes and phylogenetically highly controversial. Considering phylogenetic relationships according to the present study, the genera *Endoscypha*, *Torrendiella*, *Roesleria*, *Lanzia*, *Glarea*, *Crocicreas*, *Ombrophila*, *Amylocarpus* and *Pirottaea* which were phylogenetically unstable, clustered within *Helotiaceae*. Previous literature also showed the genetic relatedness of these genera within *Helotiaceae*, i.e. the hyphomycete genus *Glarea* clustered within *Helotiaceae* in the phylogeny of Peláez et al. (2011) and Johnston et al.

(2014) showed the phylogenetic placement of the genera *Cyathicula*, *Torrendiella*, *Roesleria*, *Glarea* within *Helotiaceae*.

Therefore, considering the result of our phylogenetic analysis and previous literature, in this treatment we placed these genera (*Endoscypha*, *Torrendiella*, *Roesleria*, *Lanzia*, *Glarea*, *Crocicreas*, *Ombrophila*, *Amylocarpus*, *Pirottaea*) within *Helotiaceae*. Moreover the family *Roesleriaceae* nested within *Helotiaceae*. Therefore, we synonymized the family *Roesleriaceae* under *Helotiaceae*.

***Crocicreas* sp1**

Fig. 27

Saprobic on dead stems. **Sexual morph:** *Apothecia* 150–200 × 300–400 µm, arising singly, stipitate. *Receptacle* cupulate, brown, smooth. *Disc* concave, brown. *Ectal excipulum* 15–20 µm ($\bar{x}$ = 18.3 µm, n = 10) in lower flanks, composed of, thin-walled, light brown to hyaline cells of *textura prismatica*. *Medullary excipulum* 30–38 µm ($\bar{x}$ = 30 µm, n = 10) in lower flanks, composed of, thin-walled, hyaline cells of *textura prismatica*. *Hymenium* hyaline. *Paraphyses* 1.2–1.7 µm wide ($\bar{x}$ = 1.5 µm, n = 20), numerous, filiform, obtuse, septate, smooth. *Asci* 55–75 × 4–6 µm ($\bar{x}$ = 68 × 5.2 µm, n = 30) 8-spored, unitunicate, cylindric–clavate, rounded apex, amyloid, stipitate base, croziers absent. Ascospores 2.5–3.5 × 1.8–2.3 µm ($\bar{x}$ = 2.9 × 2.1 µm, n = 40), 1–2-seriate, ellipsoid, aseptate, hyaline, aguttulate. **Asexual morph:** Undetermined.

Material examined – UK, Hampshire, Hedge End, on herbaceous stem, 3 March 2016, E.B.G. Jones, GJ232 (MFLU 18-1822).

GenBank accessions – LSU- MK591963, ITS- MK584944, SSU- MK585024

Notes – Our collection of *Crocicreas* sp. from UK grouped with *Crocicreas tomentosum* from Spain (Fig. 26). The ITS data of our collection is similar to that of *Crocicreas coronatum* (CBS 197.62) (486/555-88% with 9 gaps), *Cudoniella clavus* (ILLS:60488) (488/558-87% with 12 gaps), *Bisporella subpallida* (G.M. 2016-02-14) (488/561-87% with 13 gaps) and to *Hymenoscyphus scutula* (SAT132450) (484/557-87% with 10 gaps).

This new collection of *Crocicreas* sp. is different from *Crocicreas tomentosum* by having smooth receptacle and globose ascospores (Dennis 1975). However, our collection had few apothecia and seems young. Moreover, we did not observe free ascospores. Therefore, we keep our collection under the genus *Crocicreas* until we have more data to stabilize its taxonomic placement.

Crocicreas* cf. *tomentosum (Dennis) S.E. Carp.

= *Cyathicula tomentosa* Dennis

Facesoffungi number: FoF 05897; Fig. 28.

Saprobic on dead stems. **Sexual morph:** *Apothecia* 250–350 × 300–400 µm, arising singly, stipitate. *Receptacle* globlet to cupulate, tomentose. *Disc* concave. *Hairs* short-cylindric, septate, walls rough and granulate, brownish. *Ectal excipulum* 8–12 µm ($\bar{x}$ = 10.3 µm, n = 10) in upper flanks, composed of thin-walled, light brown to hyaline, cells of *textura oblita* to *prismatica*. *Medullary excipulum* 25–32 µm ($\bar{x}$ = 30 µm, n = 10) in upper flanks, composed of thin-walled, hyaline cells of *textura oblita* to *porrecta*, ectal excipular cells are wider than medullary excipular cells. *Hymenium* hyaline. *Paraphyses* 2–2.5 µm wide ($\bar{x}$ = 2.1 µm, n = 20), numerous, filiform, obtuse and slightly swollen towards the apex, aseptate or rarely septate, exceeding the asci in length, smooth, guttulate. *Asci* 50–65 × 5.5–7 µm ($\bar{x}$ = 55.6 × 5.8 µm, n = 30) arising from croziers, 8-spored, unitunicate, cylindrical, conical to obtuse and amyloid apex, stipitate base, arising from croziers. *Ascospores* 9–12 × 2–3.5 µm ($\bar{x}$ = 10.8 × 3.2 µm, n = 40), 1–2-seriate, ellipsoid to fusoid, aseptate, hyaline, guttules are present at both ends. **Asexual morph:** Undetermined.

Material examined – Uzbekistan, Tashkent, Bostanliq, Oqtoshsoy, Ugam Range, Western Tien Shan Mountains, on *Phlomoides* sp., 10 April 2016, Yusufjon Gafforov, UZ1 (MFLU 17-0082).

GenBank accessions – LSU- MK592008, ITS- MK584988, SSU- MK585062

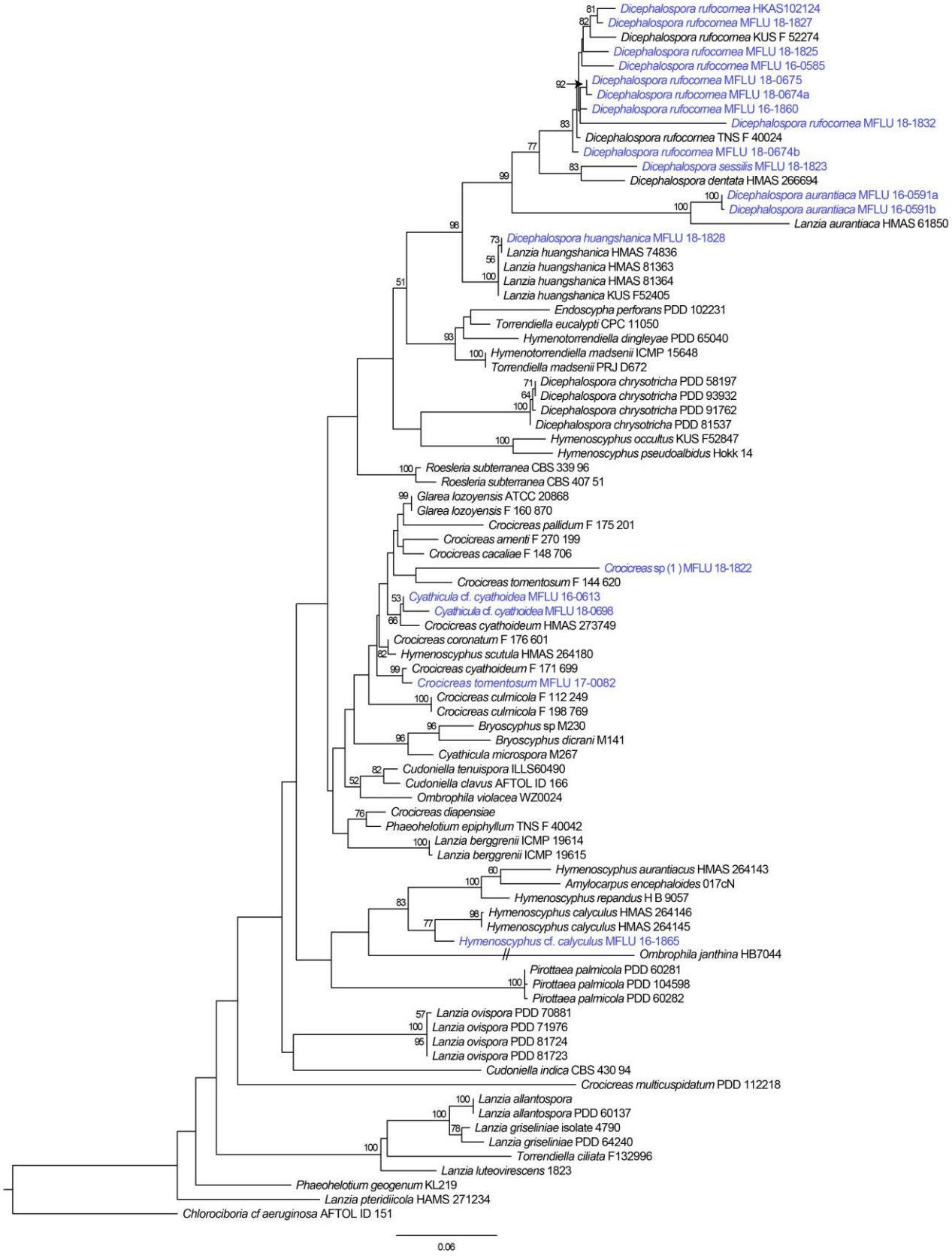

Figure 26 – Phylogram generated from maximum likelihood analysis of sequences of *Helotiaceae* based on ITS and LSU sequence data. MLBP values ≥50% are given near the nodes. Strain/culture numbers are given after the taxa. The tree is rooted with *Chlorociboria* cf. *aeruginosa* (AFTOL-ID 151).

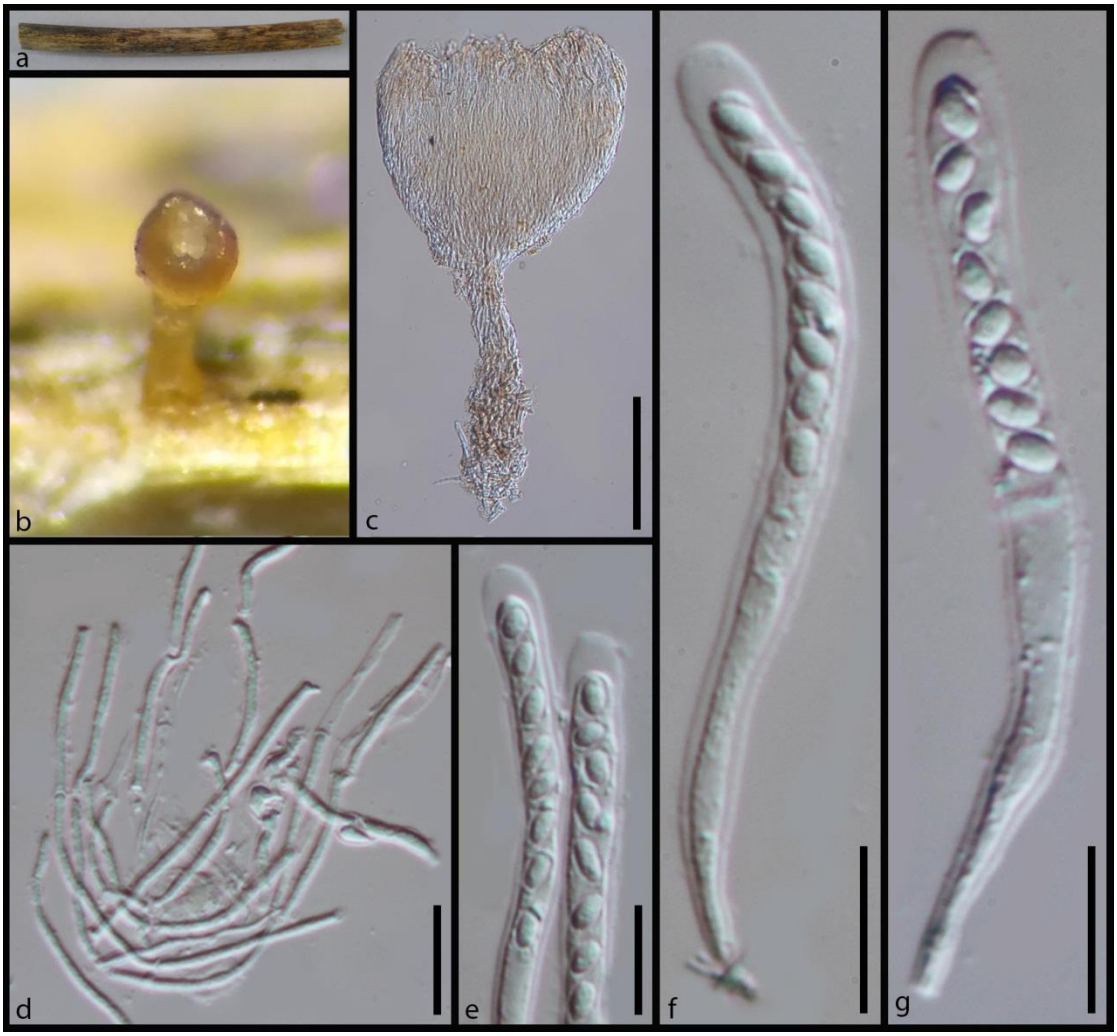

Figure 27 – Morphology of *Crocicreas* sp1 (MFLU 18-1822) a Substrate. b Apothecium on wood. c Cross section of an apothecium. d Cylindrical paraphyses. e Asci apices with ascospores. f, g Cylindric-clavate asci. Scale bars: c = 100 µm, d–g = 10 µm.

Notes – Our new collection grouped with *Cyathicula cyathoidea* (F-171, 699) with strong statistical support (99%) (Fig. 26). The ITS data of our collection is similar to that of *C. cyathoidea* (F-171,690) (461/461-100%), *C. cyathoidea* (F-171,699) (459/461-99% with no gaps). The LSU data of our isolate shows similarity to that of *Hymenoscyphus scutula* (isolate 5302) (823/835-99% with no gaps) and *Crocicreas coronatum* (CBS 197.62) (800/812-99% with no gaps), *Cudoniella clavus* (AFTOL-ID 166) (816/835-98% with no gaps) and *Cudoniella tenuispora* (ILLS60490) (815/835-98% with no gaps).

Our collection of *Cyathicula* from Uzbekistan is genetically the same as *Cyathicula cyathoidea* (F-171, 690) from Europe (Peláez et al. 2011), but it differs from the Chinese collection (HMAS:273749) (Zheng & Zhuang 2015) (Fig. 26). Morphology of our collection is similar to the description from Quijada et al. (2017) although our collection has smaller asci and ascospores. *Cyathicula cyathoidea* is the most commonly collected and widely distributed species of the genus (Carpenter 1981) and the fungus was first reported from China by Tai (1979) as *Phialea cyathoidea*. Therefore, we suggest that *Cyathicula cyathoidea* (F-171, 690) collection from Europe (Peláez et al. 2011) may require re-examination to confirm its identification.

Morphology of our collection is similar to the type description of *Crocicreas tomentosum* (Dennis 1975) except it has slightly smaller asci (*Crocicreas tomentosum* asci 60–80 × 5–7 µm). Considering these facts, we name our collection as *Cyathicula* cf. *tomentosum*.

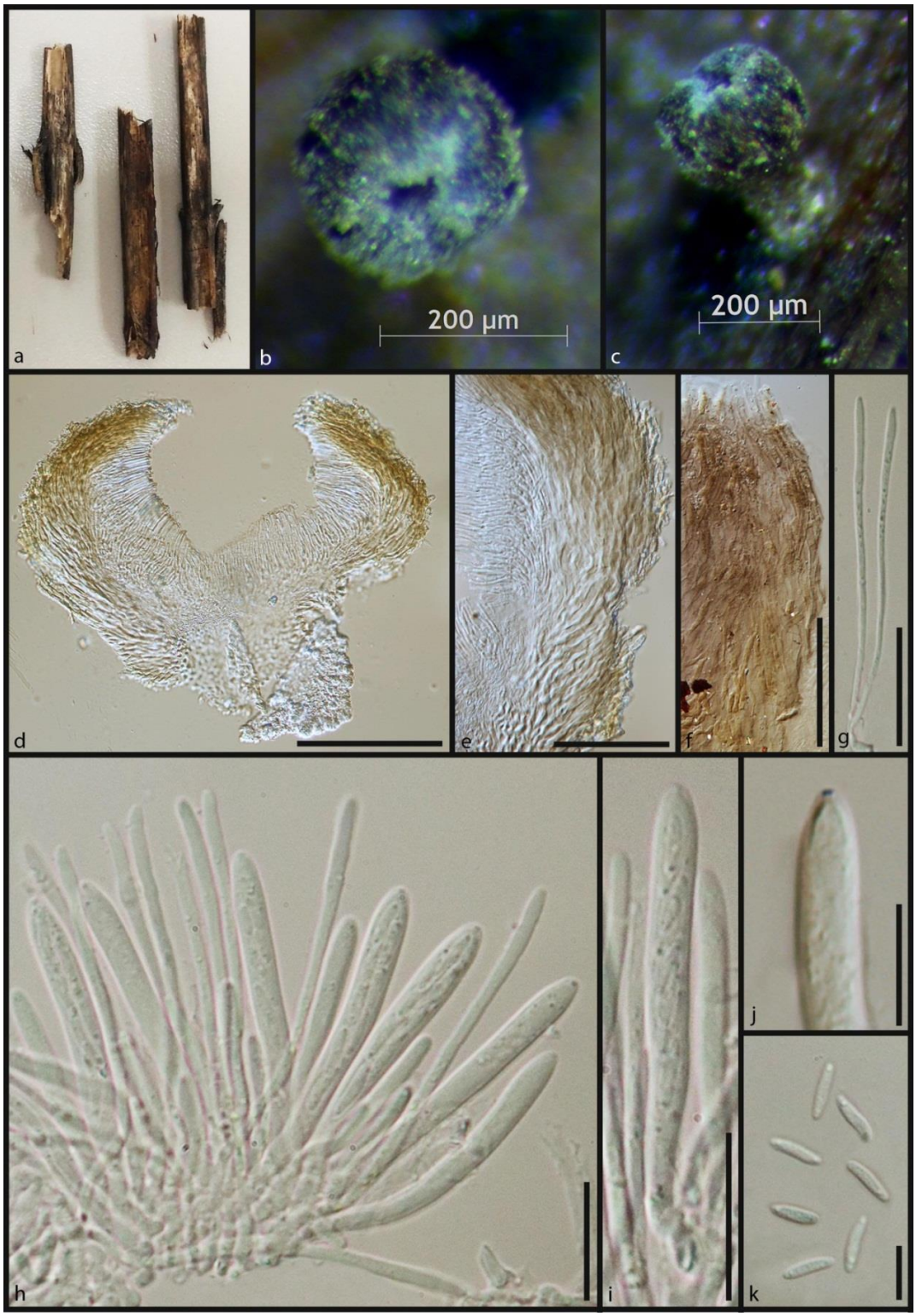

Figure 28 – Morphology of *Crocicreas* cf. *tomentosum* (MFLU 17-0082) a Substrate. b Apothecia on wood. c Apothecium on wood. d Cross section of an apothecium. e Close up of the cross section of apothecium at margins. f Brown pigmented hairs. g Aseptate paraphyses. h Asci and paraphyses. i Cylindrical asci. j Apex of the asci with the plug blueing in Melzer's reagent. k Fusoid ascospores. Scale bars: d = 100 µm, e = 30 µm, f = 50 µm, g–i = 20 µm, j–k = 10 µm.

Cyathicula cyathoidea (Bull.) Thüm.

= *Crocicreas cyanthoideum*

Facesoffungi number: FoF 05898; Fig. 29

Saprobic on dead stems. **Sexual morph:** *Apothecia* 300–700 × 160–200 µm, arising singly, stipitate. *Receptacle* globlet to cupulate, brownish with glassy appearance. *Disc* concave. *Ectal excipulum* 30–35 µm ($\bar{x}$ = 33.8 µm, n = 10) in lower flanks, composed of thin-walled, light brown to hyaline cells of *textura prismatica*. *Medullary excipulum* 45–55 µm ($\bar{x}$ = 47 µm, n = 10) in lower flanks, composed of thin-walled, hyaline cells of *textura intricata*. *Hymenium* hyaline. *Paraphyses* 1.5–2 µm wide ($\bar{x}$ = 1.8 µm, n = 20), numerous, filiform, obtuse, aseptate or rarely septate, smooth, guttulate. *Asci* 35–45 × 4–5.5 µm ($\bar{x}$ = 38.3 × 4.5 µm, n = 30), arising from simple septa, 8-spored, unitunicate, cylindrical, conical to rounded apex, amyloid, short-stipitate base, arising from croziers. *Ascospores* not observed. **Asexual morph:** Undetermined.

Material examined – Russia, Arkhangelsk region, Akhangelsk City, Maimaksansky City District, ruderalized floodplain meadow, saprobic on dead stems of *Cirsium arvense* (L.) Scop. (= *Cirsium setosum* (Willd.) Besser, *Asteraceae*), 22 May 2015, Gennady V. Okatov, T582 (MFLU 16-0613); Singleton, West Sussex, 5 April 2017, E.B.G. Jones, GJ349 (MFLU 18-0698).

GenBank accessions – MFLU 18-0698: LSU- MK591970, ITS- MK584943, SSU- MK585031, TEF- MK637047, RPB2- MK388217; MFLU 16-0613: LSU- MK591957, ITS- MK584998, SSU- MK585012, TEF- MK637041

Notes – Our collections of *Cyathicula* cf. *cyathoidea* from UK and Russia clustered with the Chinese collection of *C. cyathoidea* (HMAS 273749) (Zheng & Zhuang 2015) (Fig. 26). The clade of these three isolates is supported by 66% of statistical support.

The ITS region of Russian collection is similar to that of *Cyathicula cyathoidea* (HMAS:273737) (505/512-99% with no gaps), *Crocicreas coronatum* (CBS 197.62) (537/549-98% with 1 gap) and *Crocicreas coronatum* (HMAS:273735) (503/514-98% with 3 gaps). The ITS data of UK collection differs from the Russian collection by three base pairs. The LSU data of our Russian collection is similar to that of *Hymenoscyphus scutula* (isolate 5302) (879/885-99% with 2 gaps), *Crocicreas coronatum* (CBS 197.62) (876/882-99% with 2 gaps) and *Cudoniella clavus* (AFTOL-ID 166) (874/885-99% with 2 gaps). The LSU data of UK collection has five base pair differences from that of Russian collection.

Morphology of our collection is similar to the description provided by Quijada et al. (2017) although it has smaller asci. According to the key provided by Zheng & Zhuang (2015), our species is similar to *Cyathicula cyathoideum* from apothecial shape, size, and colour and asci amyloidity and size. However, we did not observe ascospores in any of our collections. Considering these facts, we name our collection as *Crocicreas cyanthoideum*.

Dicephalospora sessilis Ekanayaka & K.D. Hyde, ***sp. nov.***

Index Fungorum number: IF556289; Facesoffungi number: FoF 05899; Fig. 30.

Etymology – refers to sessile apothecia

Holotype – MFLU 18-1823

Saprobic on dead stems. **Sexual morph:** *Apothecia* 0.8–1 × 0.6–1 mm, arising singly, sessile, slightly erumpent. *Receptacle* cupulate, reddish orange. *Margins* smooth, magenta to reddish orange. *Disc* concave, magenta to orange. *Ectal excipulum* 40–50 µm ($\bar{x}$ = 44 µm, n = 10) in upper flanks, composed of thin-walled, yellowish to hyaline cells of *textura prismatica* to *intricata*. *Medullary excipulum* 90–115 µm ($\bar{x}$ = 102 µm, n = 10) in upper flanks, composed of thin-walled, yellowish to hyaline, gelatinized cells of *textura intricata*. *Hymenium* hyaline to yellowish. *Paraphyses* 1.5–3 µm wide ($\bar{x}$ = 1.8 µm, n = 20), numerous, filiform, obtuse, aseptate, exceeding the asci in length, smooth. *Asci* 130–140 × 15–20 µm ($\bar{x}$ = 134.4 × 16.3 µm, n = 30) 8-spored, unitunicate, cylindric-clavate, rounded apex, stipitate base, croziers absent. *Ascospores* 15–20 × 5–10 µm ($\bar{x}$ = 18.2 × 7 µm, n = 40), 1–2-seriate, ellipsoid to fusoid, pointed ends, sometimes with gelatinous cap, aseptate, hyaline to yellowish, guttulate. **Asexual morph:** Undetermined.

Material examined – China, Yunnan Province, Kunming, Kunming institute of botany, Botanical Garden, 24 May 2018, A.H. Ekanayaka, HC19 (MFLU 18-1823).

GenBank accessions – LSU- MK591974, ITS- MK584947, SSU- MK585047, TEF- MK714028, RPB2- MK577779

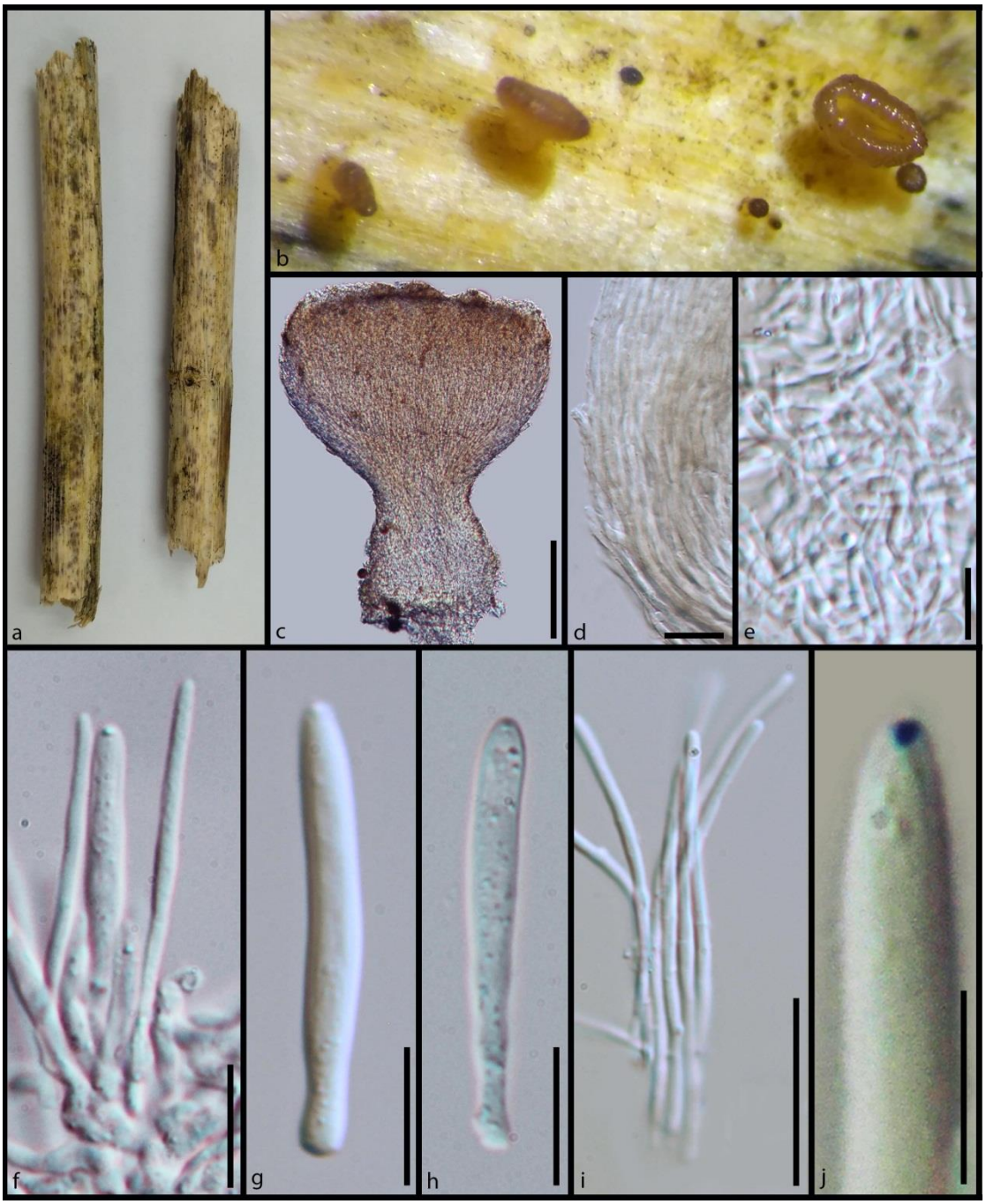

Figure 29 – Morphology of *Cyathicula cyathoidea* (MFLU 18-0698) a Substrate, b Rehydrated apothecia on wood, c Cross section of an apothecium, d Ectal excipular cells, e Medullary excipular cells, f Asci and paraphyses, g, h Cylindric-clavate asci, i Filiform paraphyses, j Amyloid ascus apex in Melzer's reagent. Scale bars: c = 200 µm, d, i = 20 µm, e–h = 10 µm, j = 5 µm.

Notes – Our Chinese collection HC19 grouped sister to *Dicephalospora dentata* HMAS 266694 with strong statistical support of 83% (Fig. 26). The ITS data of our species is similar to that of *Dicephalospora rufocornea* (TNS:F-40024) (517/554-93% with 17 gaps). LSU data of our collection shows 97% similarity to that of *Dicephalospora rufocornea* (TNS:F-40024) (1060/1097-97% with 8 gaps).

Dicephalospora sessilis is characterized by having sessile, cupulate, reddish orange apothecia, smooth margins, gelatinous excipulum, filiform paraphyses, cylindric-clavate asci and ellipsoid to fusoid ascospores with pointed ends. Our new species is phylogenetically close to *Dicephalospora dentata* and *D. rufocornea*. However, *D. dentata* differs from *D. sessilis* by having

dentate apothecial margins, longer asci and narrower ascospores and *D. rufocornea* differs in having stipitate apothecia (Spooner 1987, Liu et al. 2016). *Dicephalospora sessilis* is similar to *D. calochroa*, but differs in having smaller asci and ascospores (Spooner 1987).

Figure 30 – Morphology of *Dicephalospora sessilis* (MFLU 18-1823 holotype) a Substrate. b, c Apothecia on wood. d Cross section of an apothecium at margins. e Filiform paraphyses. f–g Cylindric-clavate asci. h–k Fusoid ascospores. Scale bars: d = 60 µm, f, g = 25 µm, h–k = 10 µm, e = 20 µm.

Dicephalospora rufocornea (Berk. & Broome) Spooner

Facesoffungi number: FoF 05900; Fig. 31

Saprobic on dead stems. **Sexual morph:** *Apothecia* 2–2.5 × 1.2–1.6 mm ($\bar{x}$ = 2.30 × 1.43 mm, n = 10) arising singly or in small groups, superficial, stipitate, red or reddish orange when fresh. *Receptacle* cupulate, disc concave and red, margins red or orange, smooth. *Stipe* red, central, medium to long in length. *Ectal excipulum* 27–32 µm ($\bar{x}$ = 29.7 µm, n = 10) wide at margins and flanks, composed of yellow colour cells in margins and hyaline cells in flanks of *textura prismatica*, marginal cells are elongated, arranged in rows, end with a swollen tip and secrete yellow colour pigment which can dissolve in KOH. *Medullary excipulum* 90–110 µm ($\bar{x}$ = 97 µm, n = 10) comprising hyaline cells of *textura epidomoidea*. *Hymenium* yellow. *Paraphyses* 0.9–2.1 µm wide ($\bar{x}$ = 1.5 µm, n = 20), numerous, filiform, septate. *Asci* 130–145 × 9–12 µm ($\bar{x}$ = 140 × 10.9 µm, n = 30), 8-spored, unitunicate, cylindrical, apex obtusely conical, inoperculate, faintly

amyloid, sessile base, croziers absent. *Ascospores* 25–40 × 3.1–5.2 µm ($\bar{x}$ = 31.8 × 4 µm, n = 40), 1–2-seriate, hyaline, smooth, aseptate, but containing row of large guttules, fusiform, often slightly curved, pointed tips capped with a small, obconical gelatinous collar. **Asexual morph:** Undetermined.

Material examined – Thailand, Chiang Rai Province, Doi Mae Salong, on dead stems, 22 June 2015, A.H. Ekanayaka, HD023 (MFLU 16-0585); Same collection details HD30Y (MFLU 18-0675), HD30b (MFLU 18-0674a), HD30M (MFLU 18-0674b); China, Yunnan Province, Kunming, December 2015, S.C. Karunarathna, NB205 (MFLU 16-1860); China, Honghe, Yunnan Province, 15 June 2018, Junfu Li, HC40 (MFLU 18-1827, HKAS102128); China, Jinghong, Xishuangbanna, Yunnan Province, 9 June 2018, Zeng Ming, HC38 (MFLU 18-1825, HKAS102126), HC36 (MFLU 18-1832, HKAS102124).

GenBank accessions – MFLU 16-0585: LSU- MK591984, ITS- MK584955, TEF- MK714021, RPB2- MK388222; MFLU 18-0675: LSU- MK591987, ITS- MK584961, TEF- MK714022, RPB2- MK614723; MFLU 18-0674a: ITS- MK584959, TEF- MK714023; MFLU 18-0674b: LSU- MK591989, ITS- MK584960, SSU- MK585039, TEF- MK689342; MFLU 16-1860: LSU- MK592011, ITS- MK584989, SSU- MK585064; MFLU 18-1827: LSU- MK591978, ITS- MK584978, SSU- MK585050, TEF- MK714031, RPB2- MK577781; MFLU 18-1825: LSU- MK591976, ITS- MK584949, SSU- MK585048, TEF- MK714030, RPB2- MK614729; MFLU 18-1832: ITS- MK584977, TEF- MK714029

Notes – Eight of our collections from China and Thailand clustered with *Dicephalospora rufocornea* complex (Fig. 26). The clade received high statistical support of 83%. Both ITS and LSU data of our collections are 99–98% similar to those of *Dicephalospora rufocornea* (TNS:F-40024, KUS-F52274 and HMAS 75518).

Dicephalospora rufocornea is characterized by yellowish to reddish orange apothecia, excipulum pigmented and pigments dissolved in KOH, cylindrical amyloid asci and fusoid ascospores with pointed tips capped with a small, obconical gelatinous collar. Our collections are similar to the description from Spooner (1987).

We observed slightly different morphologies among our collections, such as apothecial colour yellowish orange to bright red, Asci length varied from 70–140 µm, and ascospore length from 20–45 µm. More genetic markers with detailed morphological analyses are required to resolve this species complex.

Dicephalospora huangshanica (W.Y. Zhuan) W.Y. Zhuang & Z.Q. Zeng

= *Lanzia huangshanica* W.Y. Zhuang

Facesoffungi number: FoF 05901; Fig. 32

Saprobic on dead stems. **Sexual morph:** *Apothecia* 0.5–0.8 × 0.8–1.3 mm, arising singly, stipitate. *Receptacle* cupulate, yellowish to cream. *Disc* concave, magenta or dark red. *Margins* concolorous to disc. *Ectal excipulum* 25–35 µm ($\bar{x}$ = 27.4 µm, n = 10) in lower flanks, composed of thin-walled, yellowish cells of *textura prismatica* with globose tips. *Medullary excipulum* 70–90 µm ($\bar{x}$ = 80 µm, n = 10) in lower flanks, composed of thin-walled, yellow cells of *textura prismatica*. *Hymenium* hyaline. *Paraphyses* 1.8–3 µm wide ($\bar{x}$ = 2.5 µm, n = 20), numerous, filiform, obtuse and slightly swollen at the apex, aseptate, exceeding the asci in length, smooth. *Asci* 105–120 × 10–15 µm ($\bar{x}$ = 108 × 13 µm, n = 30) 8-spored, unitunicate, cylindric-clavate, rounded apex, amyloid, sub-stipitate base, croziers absent. *Ascospores* 20–25 × 4.5–5 µm ($\bar{x}$ = 23.7 × 4.6 µm, n = 40), multi-seriate, fusoid, aseptate, hyaline to yellowish, guttulate. **Asexual morph:** Undetermined.

Material examined – China, Yunnan Province, Honghe, 15 June 2018, Junfu Li, HC41 (MFLU 18-1828, HKAS102129).

GenBank accessions – LSU- MK591979, ITS- MK584979, SSU- MK585051, TEF- MK714032, RPB2- MK577782

Notes – Our new collection from China grouped with *Lanzia huangshanica* collections from China (HMAS 74836, HMAS 81363, HMAS 81364) and Korea (KUS F52405) (Fig. 26). The *L.*

huangshanica clade received strong statistical support of 100%. The ITS data of our collection is identical to that of *L. huangshanica* (HMAS 74836) and 99% to *L. huangshanica* (KUS-F52405) (475/477-99% with 1 gap). The LSU data is similar to *L. huangshanica* (KUS-F52405) (782/783-99% with no gaps).

Dicephalospora huangshanica is characterized by cupulate stipitate apothecia with yellowish to cream receptacle and magenta disc, filiform paraphyses slightly swollen at the apex, cylindric-clavate asci and fusoid ascospores (Zhuang 1995). Our new collection of *D. huangshanica*, collected from its type locality, phylogenetically confirmed its identification (Fig. 26). Morphological characters of our collection are in agreement with the description by (Zhuang 1995).

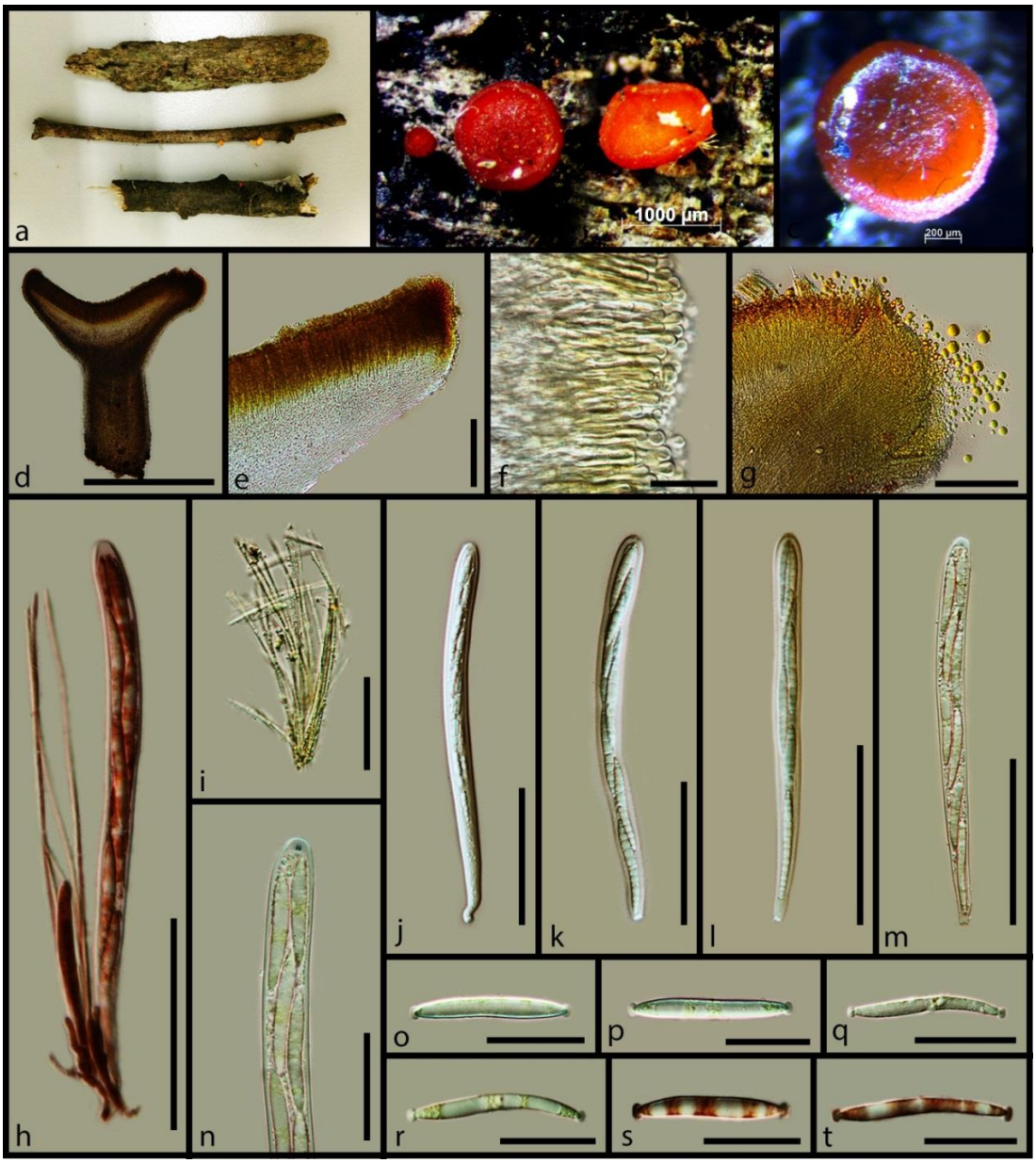

Figure 31 – Morphology of *Dicephalospora rufocornea* (MFLU 16-0585) a Substrate. b Apothecia on wood. c Apothecium on wood. d Cross section of an apothecium. e Close up of the cross section of apothecium at margins. f Marginal cells with swollen tips. g Pigments of marginal cells dissolving in KOH. h Bunch of asci and paraphyses in congo red reagent (immature asci arising from crozier). i Filiform paraphyses. j–m Cylindric-clavate asci (j-l in distilled water and m in Melzer's reagent). n Apex of the asci with the plug blueing in Melzer's reagent. o–t Fusiform ascospores. Scale bars: b–c = 200 µm, d = 1000 µm, e = 150 µm, f = 100 µm, g = 200 µm, h = 60 µm, i = 40 µm, j–m = 50 µm, n = 50 µm, o–t = 20 µm.

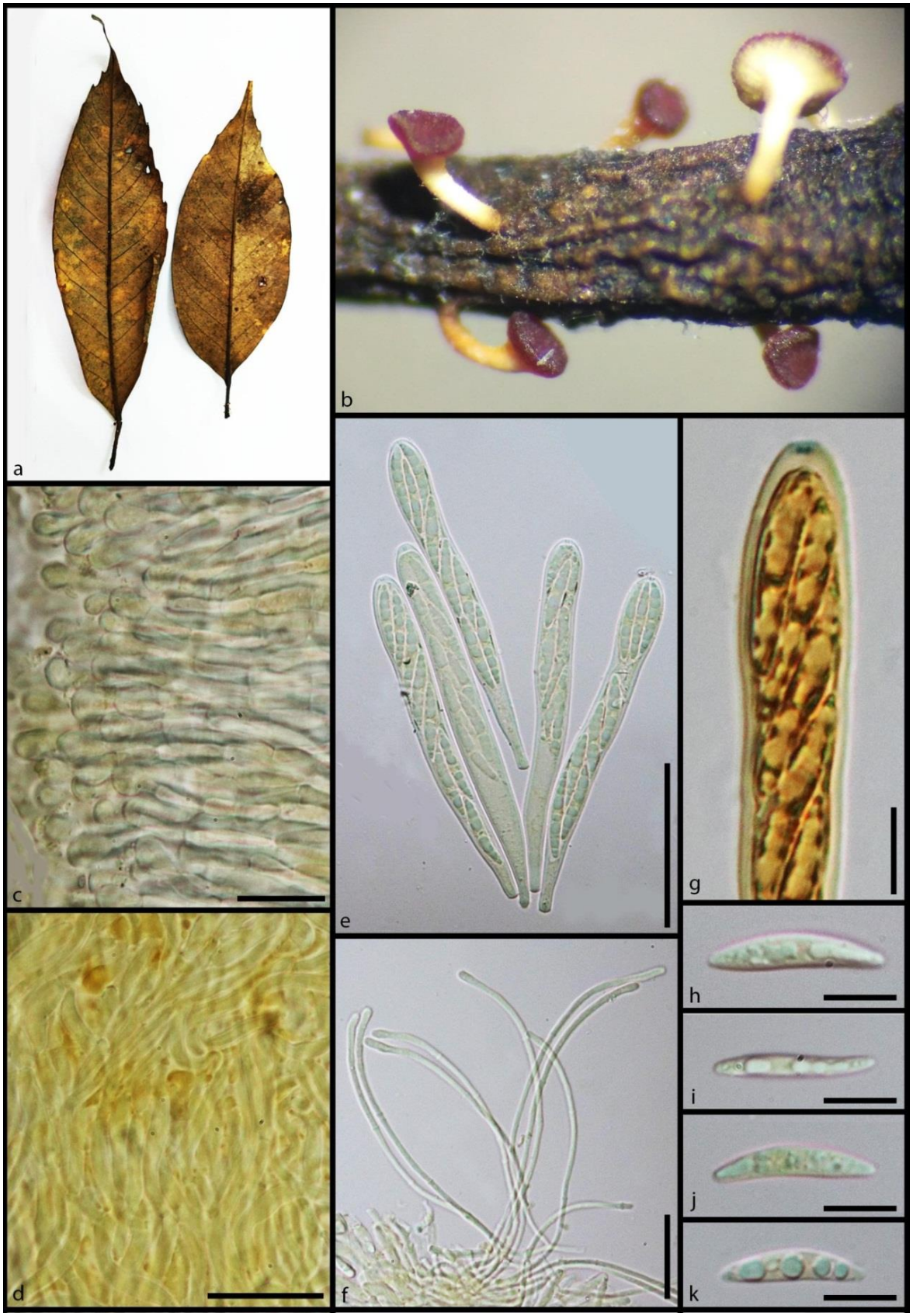

Figure 32 – Morphology of *Dicephalospora huangshanica* (MFLU 18-1828) a Substrate. b Apothecia on dead leaves. c Ectal excipular cells. d Medullary excipular cells. e Cylindric-clavate asci. f Filiform paraphyses. g Amyloid ascus apex. h–k Fusoid ascospores. Scale bars: c, d = 20 µm, e = 50 µm, f = 10 µm, h–k = 10 µm, g = 10 µm.

Dicephalospora aurantiaca (W.Y. Zhuan) W.Y. Zhuang & Z.Q. Zeng

Facesoffungi number: FoF 05902; Fig. 33

Saprobic on dead stems. **Sexual morph:** *Apothecia* 2–2.5 × 1.2–1.6 mm ($\bar{x}$ = 2.30 × 1.43 mm, n = 10), arising singly or in small groups, superficial, stipitate, yellow to orange when fresh. *Receptacle* cupulate, disc concave and yellow to orange, margins yellow to orange, smooth. *Stipe* light yellow, central, medium to long in length. *Ectal excipulum* 20–25 µm ($\bar{x}$ = 22.9 µm, n = 10) wide at lower flanks, composed of yellow cells of *textura prismatica*. *Medullary excipulum* 28–32 µm ($\bar{x}$ = 30 µm, n = 10) wide at lower flanks, comprising hyaline cells of *textura epidomoidea*. *Hymenium* yellow. *Paraphyses* 2.6–1.8 µm wide ($\bar{x}$ = 2.8 µm, n = 20), numerous, filiform, septate, apices are slightly swollen, exceed the asci in length. *Asci* 90–120× 7.9–8.9 µm ($\bar{x}$ = 96.1 × 8.4 µm, n = 30), 8-spored, unitunicate, cylindrical, apex obtusely conical, inoperculate, non-amyloid, short-stipitate, arising from croziers. *Ascospores* 23.3–27.2 × 3.1–4.2 µm ($\bar{x}$ = 25.4 × 3.6 µm, n = 40), uniseriate, hyaline, smooth, aseptate, but containing row of large guttules, fusiform, often slightly curved. **Asexual morph:** Undetermined.

Material examined – Thailand, Chiang Mai Province, Mushroom Research Center, on dead stems, 19 July 2015, A.H. Ekanayaka, HD030n, HD30a (MFLU 16-0591).

GenBank accessions – MFLU 16-0591b: ITS- MK584958, SSU- MK585038, TEF- MK714024, RPB2- MK614722; MFLU 16-0591a: LSU- MK591988, ITS- MK584962

Notes – Our collections of HD030n and HD030a grouped with a Chinese collection of *Dicephalospora aurantiaca* (HMAS 61850) with strong statistical support of 100% (Fig. 26). For *D. aurantiaca*, only ITS data available in GenBank and it is 94% (307/326-94% with 2 gaps) similar to ITS data of our collections. The LSU data of our species is 98% similar to that of *D. rufocornea* (TNS:F-40024) (930/949-98% with 8 gaps).

Dicephalospora aurantiaca is characterized by having bright yellow apothecia, non-amyloid cylindric-clavate asci and aseptate, fusoid ascospores. Morphology of our collection is similar to the description of *D. aurantiaca* by Zhuang & Liu (2007).

Hymenoscyphus* cf. *calyculus (Fr.) W. Phillips

Facesoffungi number: FoF 05903; Fig. 34

Saprobic on dead stems. **Sexual morph:** *Apothecia* 300–700 × 200–600 µm, arising singly, stipitate. *Receptacle* cupulate, yellowish brown when fresh and brown when dry. *Disc* concave. *Ectal excipulum* 25–35 µm ($\bar{x}$ = 28.3 µm, n = 10) in upper flanks, composed of thin-walled, light brown to hyaline cells of *textura prismatica*. *Medullary excipulum* 65–70 µm ($\bar{x}$ = 68 µm, n = 10) in lower flanks, composed of thin-walled, hyaline cells of *textura prismatica*. *Hymenium* hyaline. *Paraphyses* 1–2 µm wide ($\bar{x}$ = 1.7 µm, n = 20), numerous, filiform, obtuse, aseptate, smooth, aguttulate. *Asci* 80–95 × 5–7 µm ($\bar{x}$ = 84 × 5.7 µm, n = 30), 8-spored, unitunicate, cylindric-clavate, apex rounded to conical and amyloid, long-stipitate base, croziers absent. *Ascospores* 8.5–10 × 2.5–3.5 µm ($\bar{x}$ = 8.9 × 2.8 µm, n = 40), 1–2-seriate, fusoid to ellipsoid, aseptate, hyaline, guttulate. **Asexual morph:** Undetermined.

Material examined – Thailand, Chiang Mai Province, Mushroom Research Center, 18 July 2017, A.H. Ekanayaka, HD50 (MFLU 16-1865).

GenBank accessions – LSU- MK591991, ITS- MK584966

Notes – Our collection of *Hymenoscyphus calyculus* from Thailand grouped with the Chinese collection of *Hymenoscyphus calyculus* (Fig. 26). The ITS data of our specimen shows similarity to that of *H. calyculus* (isolate 5818) (460/484-95% with 6 gaps) and to *H. repandus* (H.B. 9057) (465/518-90% with 14 gaps). The LSU data is similar to that of *H. calyculus* (isolate 5818) (807/811(99% with no gaps) and *H. aurantiacus* (HMAS 264143) (791/811-98% with 3 gaps).

Our collection is similar to the description of *H. calyculus* by Phillips (1887) except it has smaller ascospores. Our collection has only a few apothecia and seems young; it did not show further growth in incubation.

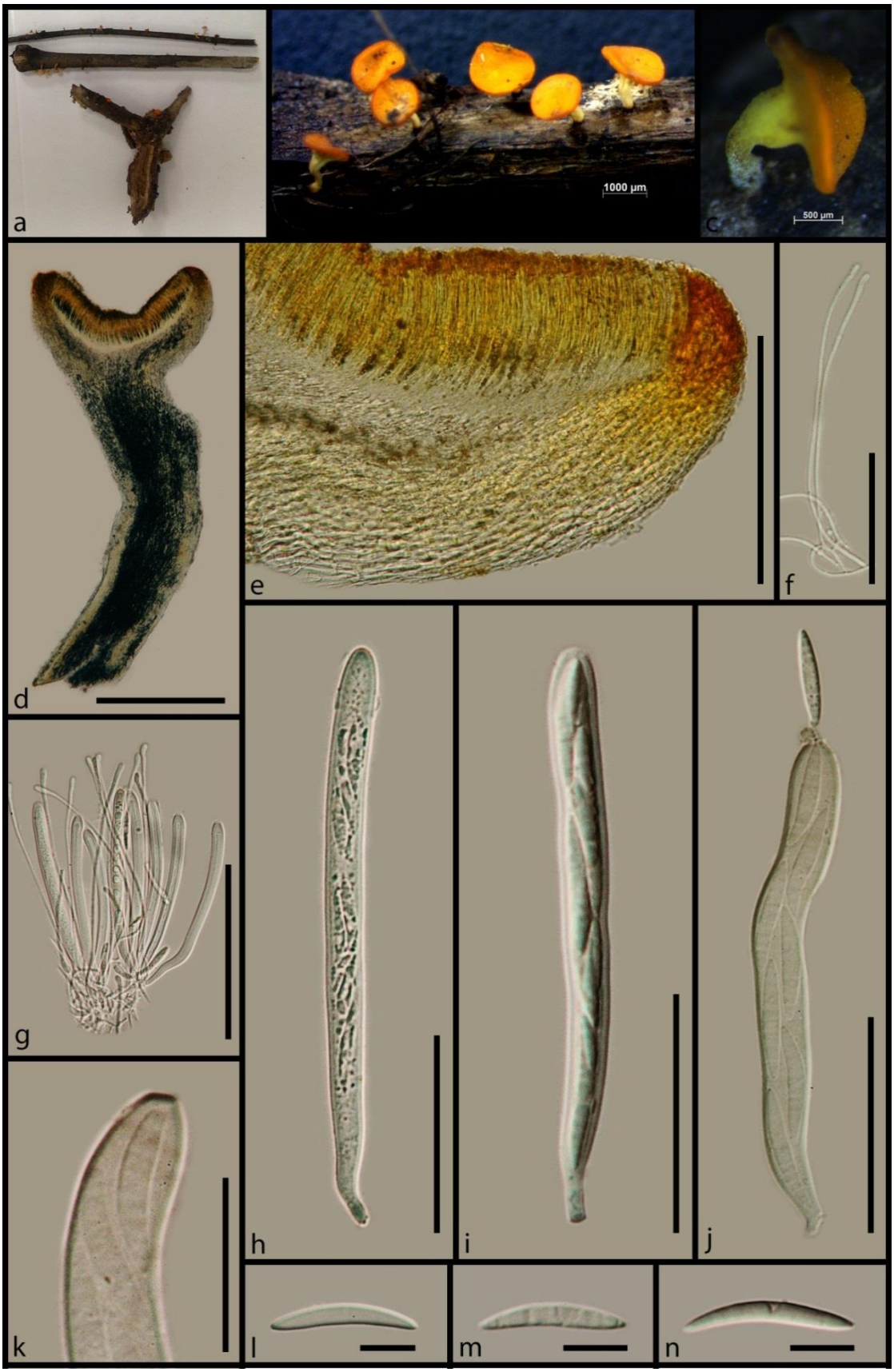

Figure 33 – Morphology of *Dicephalospora aurantiaca* (MFLU 16-0591) a Substrate. b Apothecia on wood. c Apothecium on wood. d Cross section of an apothecium. e Close up of the cross section of apothecium at margins. f Filiform paraphyses. g Bunch of asci and paraphyses. h–j Cylindric-clavate asci. k Apex of the asci. l–n Fusiform ascospores. Scale bars: b = 200 µm, c = 500 µm, d–e = 200 µm, f = 150 µm, g = 100 µm, h–j = 40 µm, k = 20 µm, l–n = 10 µm.

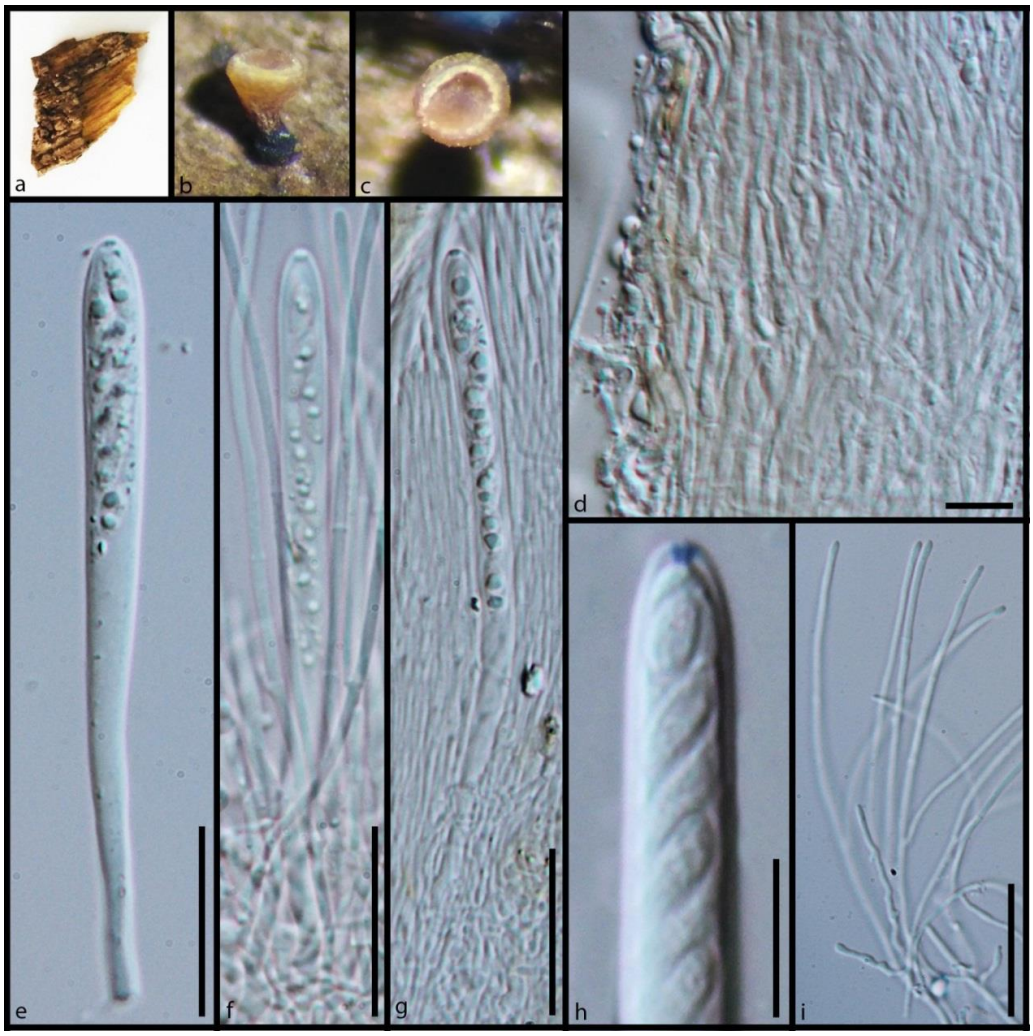

Figure 34 – Morphology of *Hymenoscyphus* cf. *calyculus* (MFLU 16-1865) a Substrate. b, c Apothecia on wood. d Close up of the excipulum at flanks. e–g Cylindrical asci. h Amyloid ascus apex with ascospores. i Filiform paraphyses. Scale bars: d = 10 µm, e = 20 µm, f, g, i = 20 µm, h = 10 µm.

Lachnaceae (Nannf.) Raitv.

Facesoffungi number: FoF 05904

Taxa are mostly saprobic and sometimes plant parasitic. Ascomata are apothecial and characterized by sessile or stipitate, cupulate or discoid receptacle. The margins and flanks are covered with hairs and hairs are cylindrical, septate and sometimes granulate. The ectal excipulum is composed of cells of *textura angularis*, *textura prismatica* or *textura oblita* and medullary excipulum is composed of cells of *textura intricata* or *textura oblita*. Paraphyses are filiform, lanceolate or rarely cylindrical. Asci are 8-spored, cylindric-clavate, amyloid or non-amyloid and sometimes arising from croziers. Ascospores are globose, ellipsoid to filiform or allantoid, septate or aseptate, hyaline and guttulate (Jaklitsch et al. 2016, Guatimosim et al. 2016, Chlebicki 1990, Šandová et al. 2018, Suková 2005, Perić & Baral 2014, Ye et al. 2006, Hosoya et al. 2010, Zhuang & Yu 2001, Han et al. 2014). Asexual morphs are pycnidial and conidia globose and aseptate (Jaklitsch et al. 2016).

Notes – Our phylogeny shows the genera *Lasiobelonium*, *Trichopezizella*, *Solenopezia* and *Trichopeziza*, which were previously classified under *Lachnaceae*, are not genetically related to this family. Similar phylogenetic placement of these genera was shown in the phylogenies of Guatimosim et al. (2016) and Pärtel (2016). Therefore, considering previous literature and results from our phylogeny, we remove these genera from *Lachnaceae*.

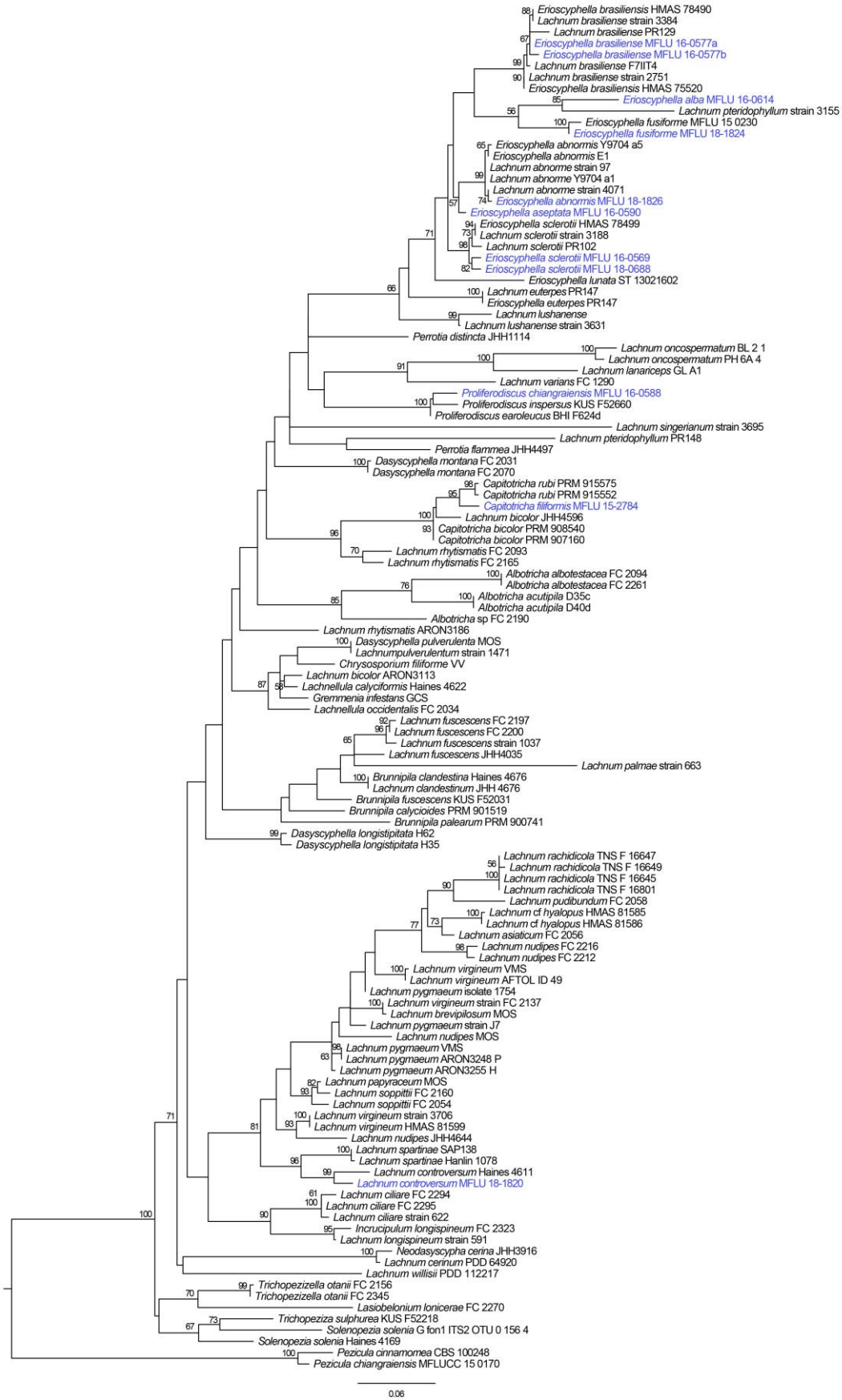

Figure 35 – Phylogram generated from maximum likelihood analysis of sequences of *Lachnaceae* based on ITS sequence data. MLBP values ≥50% are given near the nodes. Strain/culture numbers are given after the taxa. The tree is rooted with *Pezicula chiangraiensis* (MFLUCC 15 0170) and *Pezicula cinnamomea* (CBS 100248).

Capitotricha filiformis Ekanayaka & K.D. Hyde, ***sp. nov.***

Index Fungorum number: IF556290; Facesoffungi number: FoF 05905; Fig. 36.

Etymology – refers to filiform paraphyses

Holotype – MFLU 15-2784

Saprobic on dead stems. **Sexual morph:** *Apothecia* 500–600 × 450–500 µm, arising singly, stipitate. *Receptacle* cupulate. *Disc* concave. *Hairs* 133–200 × 2.5–4.5 µm ($\bar{x}$ = 147.5 × 3 µm, n = 30), cylindric, aseptate, thick-walled, hyaline to whitish, apices partially covered with granules. *Ectal excipulum* 15–20 µm ($\bar{x}$ = 18 µm, n = 10) in upper flanks, composed of thin-walled, hyaline cells of *textura prismatica*. *Medullary excipulum* 20–25 µm ($\bar{x}$ = 28 µm, n = 10) in upper flanks, composed of thin-walled, hyaline cells of *textura prismatica*, cells in ectal excipulum are slightly wider than the cells in medullary excipulum. *Hymenium* hyaline. *Paraphyses* 2–4 µm wide ($\bar{x}$ = 2.7 µm, n = 20), numerous, filiform, obtuse and slightly swollen at the apex, septate, not exceeding the asci in length, smooth, guttulate. *Asci* 50–65 × 7–9 µm ($\bar{x}$ = 58.8 × 7.7 µm, n = 30), 8-spored, unitunicate, cylindric-clavate, rounded and non-amyloid apex, short-stipitate base, croziers absent. *Ascospores* 10–12 × 3–5 µm ($\bar{x}$ = 11.2 × 4.7 µm, n = 40), 1–2-seriate, ellipsoid, aseptate, hyaline. **Asexual morph:** Undetermined.

Material examined – Russia, Arkhangelsk region, Akhangelsk City, Maimaksansky City District, floodplain bushes, saprobic or weak parasitic on dead twigs of *Rubus idaeus* L. (*Rosaceae*), 1 May 2015, Gennady V. Okatov, T617 (MFLU 15-2784).

GenBank accessions – ITS- MK584992, SSU- MK585015

Notes – Our collection from Russia grouped with *Capitotricha rubi* with strong statistical support of 95% (Fig. 35). The ITS data of our collection shows similarity to *C. rubi* collections PRM:915575 (466/475-98% with no gaps) and PRM:915552 (466/475-98% with no gaps).

Capitotricha filiformis is characterized by stipitate, cupulate apothecia with long cylindrical hairs, filiform, cylindrical paraphyses, non-amyloid asci and ellipsoid ascospores. *Capitotricha filiformis* differ from other *Capitotricha* spp. by having filiform paraphyses with slightly swollen apices (Suková 2005).

Erioscyphella fusiforme Ekanayaka & K.D. Hyde

= *Lachnum fusiforme* Ekanayaka & K.D. Hyde

Facesoffungi number: FoF 00970; Fig. 37

Saprobic on dead stems. **Sexual morph:** *Apothecia* 435–440 × 378–382 µm ($\bar{x}$ = 437 × 380 µm, n = 10), arising singly or in small groups, superficial, stipitate, white when fresh, covered with long, white hairs. *Receptacle* cupulate, disc concave, whitish to light yellow, margins white. *Hairs* 70–90 × 3–4 µm (79.4 × 3.5 µm, n = 30), on flanks and stipe, cylindrical or tapered to a blunt hemispherical tip, straight, thin-walled, septate, white, densely covered with colorless granules, occasionally tips are covered with a yellow to white resinous-appearing substance. *Ectal excipulum* 32–37 µm wide ($\bar{x}$ = 35.5 µm, n = 10), composed of hyaline cells of *textura prismatica*. *Medullary excipulum* 48–52 µm wide ($\bar{x}$ = 51.1 µm, n = 10), comprising hyaline cells of *textura intricata*. *Hymenium* hyaline. *Paraphyses* 1.5–2 µm wide ($\bar{x}$ = 1.7 µm, n = 20), numerous, filiform, septate. *Asci* 47–52 × 4–4.5 µm ($\bar{x}$ = 49.4 × 4.2 µm, n = 30), 8-spored, unitunicate, cylindrical, inoperculate, short stipitate base, amyloid, croziers absent. *Ascospores* 18–25 × 1.5–2 µm ($\bar{x}$ = 21.9 × 1.6 µm, n = 40), biseriate, fusiform with sharp tips, hyaline, aseptate, smooth-walled, lacking sheath or appendages, with refractive inclusions. **Asexual morph:** Undetermined.

Material examined – China, Yunnan Province, Xishuangbanna, Jinghong, China, 9 June 2018, Zeng Ming, HC37 (MFLU 18-1824, HKAS102125).

GenBank accessions – LSU- MK591975, ITS- MK584948, RPB2- MK614728

Notes – Our new collection from China grouped with *Erioscyphella fusiforme* from Thailand with strong statistical support of 100% (Fig. 35). The ITS data of our collection shows 99% similarity to the type collection of *E. fusiforme* (MFLU 15-0230) (524/526-99% with 2 gaps).

The first record of *E. fusiforme* is from Thailand. Here we provide a new record of *E. fusiforme* from China. The new strain is morphologically and phylogenetically similar to the type specimen (Hongsanan et al. 2015).

This species previously introduced under the genus *Lachnum* (Hongsanan et al. 2015). However, in our phylogeny this species grouped within *Erioscyphella* clade. Therefore, we synonymize this species under the genus *Erioscyphella*.

Erioscyphella sclerotii (A.L. Sm.) Baral, Šandová & B. Perić

= *Lachnum sclerotii* (A.L. Sm.) J.H. Haines & Dumont

Facesoffungi number: FoF 05907; Fig. 38

Saprobic on dead stems. **Sexual morph:** *Apothecia* 0.6–1 × 1.2–1.5 mm, arising singly or in small groups, superficial, stipitate, yellow when fresh, covered with long, brown hairs. *Receptacle* cupulate, disc concave and bright yellow, margins and flanks brown. *Stipe* hairy, medium to long in length. *Hairs* 35–60 × 3–5 µm (47 × 3.7 µm, n = 30), on flanks and stipe, cylindrical to blunt hemispherical tip, straight, thin-walled, septate, brown, densely covered with colorless granules. *Ectal excipulum* 35–40 µm wide ($\bar{x}$ = 37.3 µm, n = 10) in lower flanks, composed of brownish cells *textura prismatica*. *Medullary excipulum* 78–85 µm wide ($\bar{x}$ = 82 µm, n = 10) in lower flanks, with few cell layers comprising hyaline cells of *textura intricate*, outer cells are tightly packed and inner cells are loosely packed. *Hymenium* hyaline. *Paraphyses* 2–2.5 µm wide ($\bar{x}$ = 2.3 µm, n = 10), numerous, filamentous, septate. *Asci* 70–80 × 6–7 µm ($\bar{x}$ = 78.9 × 6.6 µm, n = 30), 8-spored, unitunicate, cylindrical, inoperculate, amyloid, short-stipitate base, sub-stipitate base. *Ascospore* 23–27 × 2.5–3 µm ($\bar{x}$ = 25.2 × 2.8 µm, n = 40), biseriate, fusiform, hyaline, 3-septate, smooth-walled, no sheath or appendages, sometimes with refractive inclusions. **Asexual morph:** Undetermined.

Material examined – Thailand, Chiang Rai Province, Mae Sai District, Pongpha, Tham Pla Temple M.14 (Bann Tham Pla Temple), on dead stem, 25 November 2014, A. H. Ekanayaka, HD002 (MFLU 16-0569), Thailand, Chiang Rai Province, Kun Korn water fall, 12 January 2018, A. H. Ekanayaka, HD72 (MFLU 18-0688).

GenBank accessions – MFLU 16-0569: LSU- MK591980, ITS- MK584951, SSU- MK585033, RPB2- MK388219; MFLU 18-0688: LSU- MK591995, ITS- MK584969, SSU- MK585042, RPB2- MK614726

Notes – Our two collections from Thailand grouped with *Erioscyphella sclerotii* (Fig. 35) and the clade received strong statistical support of 98%. The ITS data of our collection shows similarity to *Lachnum sclerotii* (strain 3188) (528/534-99% with 2 gaps). The LSU data of our collections is similar to *L. abnorme* collections, TNS:F-16617 (1080/1102-98% with 1 gap) and KUS-F52080 (1077/1103-98% with 3 gaps).

Erioscyphella sclerotii is characterized by having stipitate, cupulate, yellow apothecia, granulate cylindrical hairs, fusiform 3-septate ascospores (Smith 1901). *Erioscyphella abnormis* is similar to *E. sclerotii* but it has 7-septate ascospores (Spooner 1987).

Erioscyphella aseptata Ekanayaka & K.D. Hyde, ***sp. nov.***

Index Fungorum number: IF556291; Facesoffungi number: FoF 05908; Fig. 39.

Etymology – refers to aseptate ascospores

Holotype – MFLU 16-0590

Saprobic on dead stems. **Sexual morph:** *Apothecia* 845–930 × 250–285 µm ($\bar{x}$ = 871.5 × 267.9 µm, n = 10), arising singly or in small groups, sessile or short-stipitate, cupulate, bright yellow when fresh. *Receptacle* flat or slightly concave, disc bright yellow and the margins white when fresh, margins and flanks covered with hairs. *Hairs* 65–80 × 1.8–3.9 µm (73.9 × 2.8 *µm*, n = 30), on flanks and margins, cylindrical, straight, thin-walled, septate, white, densely covered with colorless granules. *Ectal excipulum* 19.6–31.6 µm ($\bar{x}$ = 25.6 µm, n = 10) wide at margins and flanks, composed of large, thin-walled, hyaline cells of *textura prismatica*. *Medullary excipulum* composed of hyaline cells of *textura intricata*. *Hymenium* hyaline. *Paraphyses* 1.6–2.6 µm wide ($\bar{x}$

= 2.1 µm, n = 20), numerous, filiform, obtuse at the apex, septate, slightly branched at the base. *Asci* 70–100 × 6.1–10.5 µm ($\bar{x}$ = 90.8 × 7.7 µm, n = 30), unitunicate, cylindrical, inoperculate, amyloid, short-stipitate, arising from croziers. *Ascospores* 28.5–45.6 × 1.8–3.5 µm ($\bar{x}$ = 37.8 × 2.4 µm, n = 40), multi-seriate, fusiform, hyaline, aseptate, row of guttules present, hyaline, smooth, thin-walled, no sheath or appendages, sometimes with refractive inclusions. **Asexual morph:** Undetermined.

Material examined – Thailand, Chiang Mai Province, Ban Mae Sae Nature Resource Park, 19 July 2015, A. H. Ekanayaka, HD029 (MFLU 16-0590).

GenBank accessions – LSU- MK591986, ITS- MK584957, RPB2- MK388223

Notes – Our strain HD029 formed an independent clade basal to *Erioscyphella abnormis* clade, with statistical support of 57% (Fig. 35). The ITS region of *Erioscyphella aseptata* is similar to that of *Lachnum abnorme* (FC-2172) (791/821-96% with 4 gaps). The LSU data of our strain is similar to *L. abnorme* (KUS-F52080) (793/797-99% with no gaps) and similar to *Erioscyphella lunata* (S.T. 13021602) (781/797-98% with no gaps). *Erioscyphella aseptata* is characterized by short-stipitate, cupulate, bright yellow apothecia covered by granulate, cylindrical hairs, cylindric, short pedicellate, amyloid asci and fusiform, aseptate ascospores. *Erioscyphella aseptata* is phylogenetically close to *E. abnormis*. However, *E. abnormis* and *E. sclerotii* differ from *E. aseptata* by having septate ascospores (Spooner 1987).

Erioscyphella brasiliensis (Mont.) Baral, Šandová & B. Perić

= *Lachnum brasiliense* (Mont.) J.H. Haines & Dumont

Facesoffungi number: FoF 05909; Fig. 40

Saprobic on dead stems. **Sexual morph:** *Apothecia* 0.8–1 × 0.5–0.7 mm, arising singly or in small groups, stipitate. *Disc* yellow, concave and smooth. *Receptacle* cupulate, concolorous, clothed with whitish or pale yellow hairs. *Stipe* cylindric, clothed with hairs. *Hairs* 32.3–40.1 × 2.5–3.2 µm ($\bar{x}$ = 35.4 × 2.8 µm, n = 20), cylindric, septate, walls usually thin, surface finely granulate. *Ectal excipulum* 58–67 µm ($\bar{x}$ = 62.6 µm, n = 10), composed of thin-walled, hyaline cells of *textura prismatica*. *Medullary excipulum* 57–72 µm ($\bar{x}$ = 62 µm, n = 10), composed of narrow, thin-walled, hyaline cells of *textura intricata*. *Hymenium* hyaline. *Paraphyses* 1.5–2.5 µm wide ($\bar{x}$ = 2 µm, n = 20), numerous, filiform, acute at the apex, non-septate. *Asci* 80–100 × 6–9.5 µm ($\bar{x}$ = 89.8 × 7.1 µm, n = 30), 8-spored, cylindric-clavate, unitunicate, tapered, conical at the apex, amyloid, stipitate base, croziers absent. *Ascospores* 20–35 × 2–3 µm ($\bar{x}$ = 29 × 2.8 µm, n = 40), hyaline, narrowly fusoid, aseptate, lying in two or three overlapping series within the ascus. **Asexual morph:** Undetermined.

Material examined – Thailand, Chiang Rai Province, Doi Mae Salon, 12 March 2015, A. H. Ekanayaka, HD015, HD053 (MFLU 16-0577)

GenBank accessions – LSU- MK591993, ITS- MK584967, SSU- MK585040

Notes – Our strains HD015 and HD053 collected from Thailand are clustured with *Erioscyphella brasiliensis* group and the clade received high statistical support of 99% (Fig. 35). Our strain shows close genetic relationship with *E. brasiliensis* collections from Europe (PR129) and China (HMAS 78490) (Fig. 35) and the relationship supported with moderate statistical support of 67% (MLBP).

The ITS data of our collection shows similarity to *Lachnum brasiliense* (strain 3384) (525/527-99% with no gaps) and the LSU region shows similar to *Erioscyphella curvispora* (strain KL381) (790/805-98% with no gaps) and to *Lachnum abnorme* (KUS-F52080) (930/959-97% with 5 gaps).

Erioscyphella brasiliensis is characterized by yellow, cupulate apothecia covered with cylindrical, white hairs with finely granulate walls, filiform paraphyses with acute apices, amyloid asci arising from croziers and fusoid ascospores. Our collection is similar to the descriptions given by Spooner (1987) and Montagne (1856).

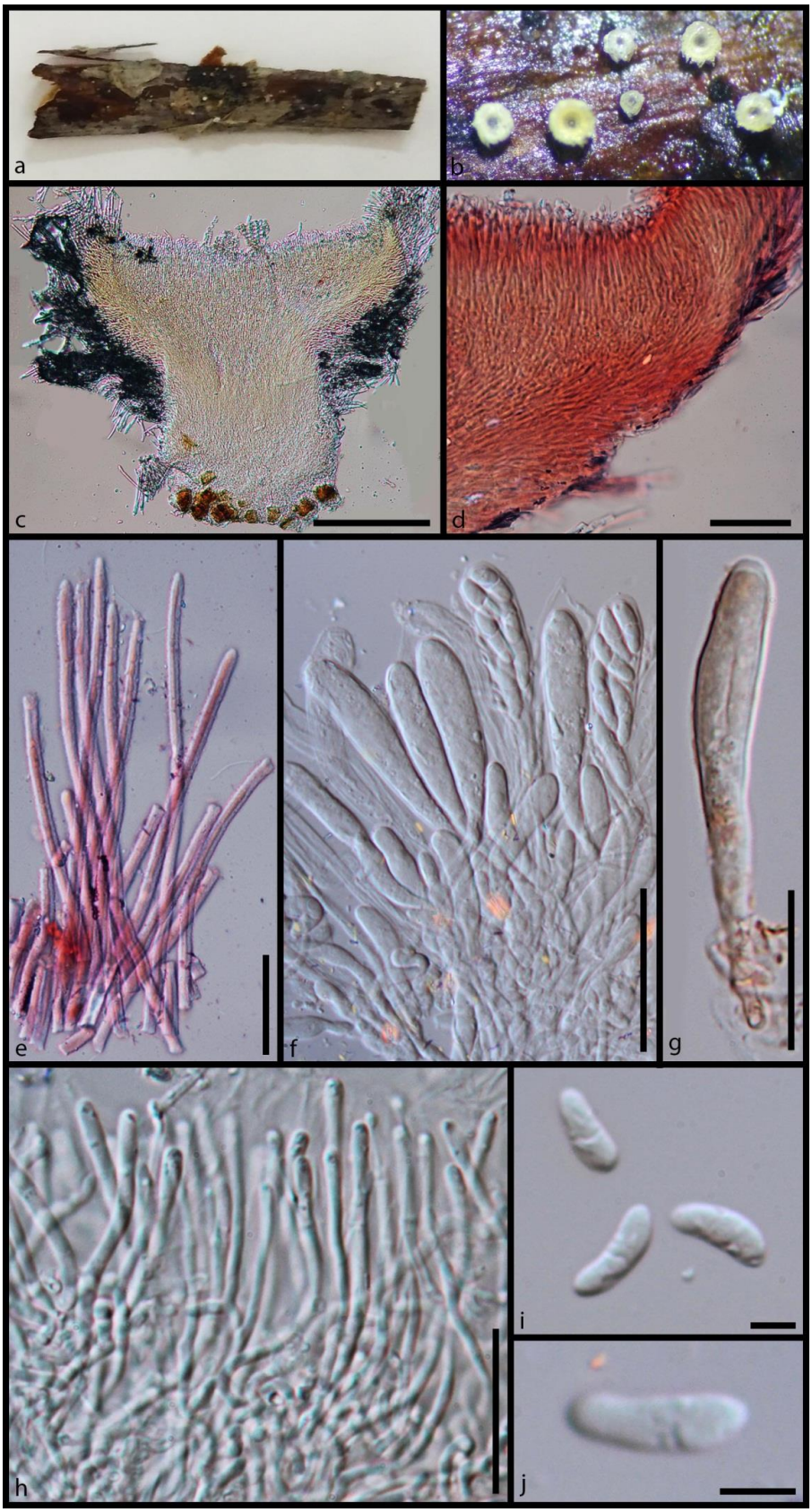

Figure 36 – Morphology of *Capitotricha filiformis* (MFLU 15-2784 holotype) a Substrate. b Apothecia on wood. c Cross section of an apothecium. d Close up of the cross section of apothecium at margins. e Long cylindrical hairs. f–g Cylindric-clavate asci. h Filiform paraphyses. i–j Ellipsoid ascospores. Scale bars: c = 200 µm, d = 30 µm, e = 25 µm, f = 30 µm, g–h = 20 µm, i–j = 5 µm.

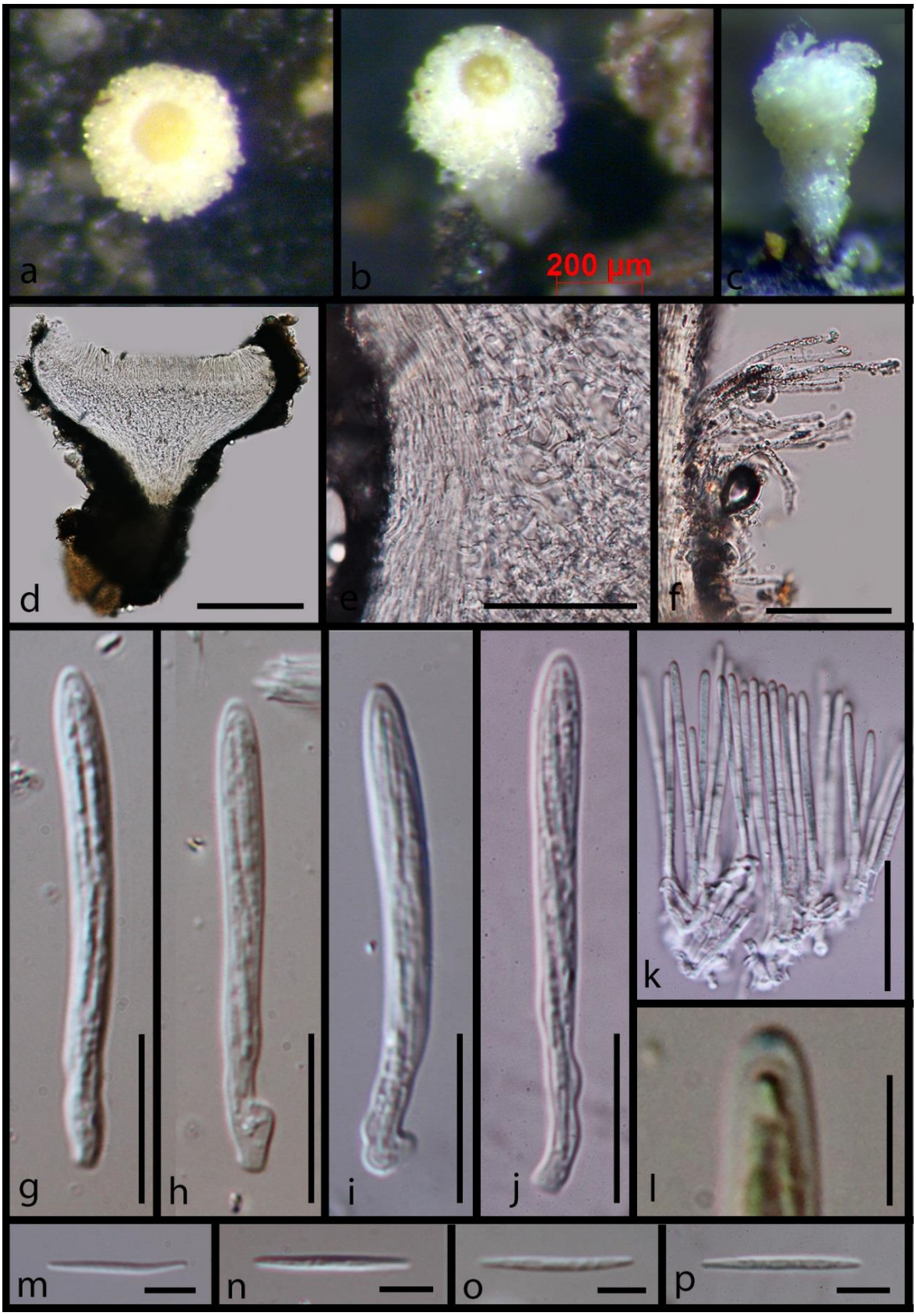

Figure 37 – Morphology of *Erioscyphella fusiforme* (MFLU 18-1824) a Apothecia on wood. b, c Apothecium on wood. d Cross section of an apothecium. e Cylindrical hairs. f Close up of the excipulum. g–j Short pedicellate asci. k Apex of the asci with the plug blueing in Melzer's reagent. l Septate paraphyses. m–p Filiform ascospores. Scale bars: b**,** d = 200 µm, e = 50 µm, f = 30 µm, g–j = 15 µm, k = 30 µm, l–p = 5 µm.

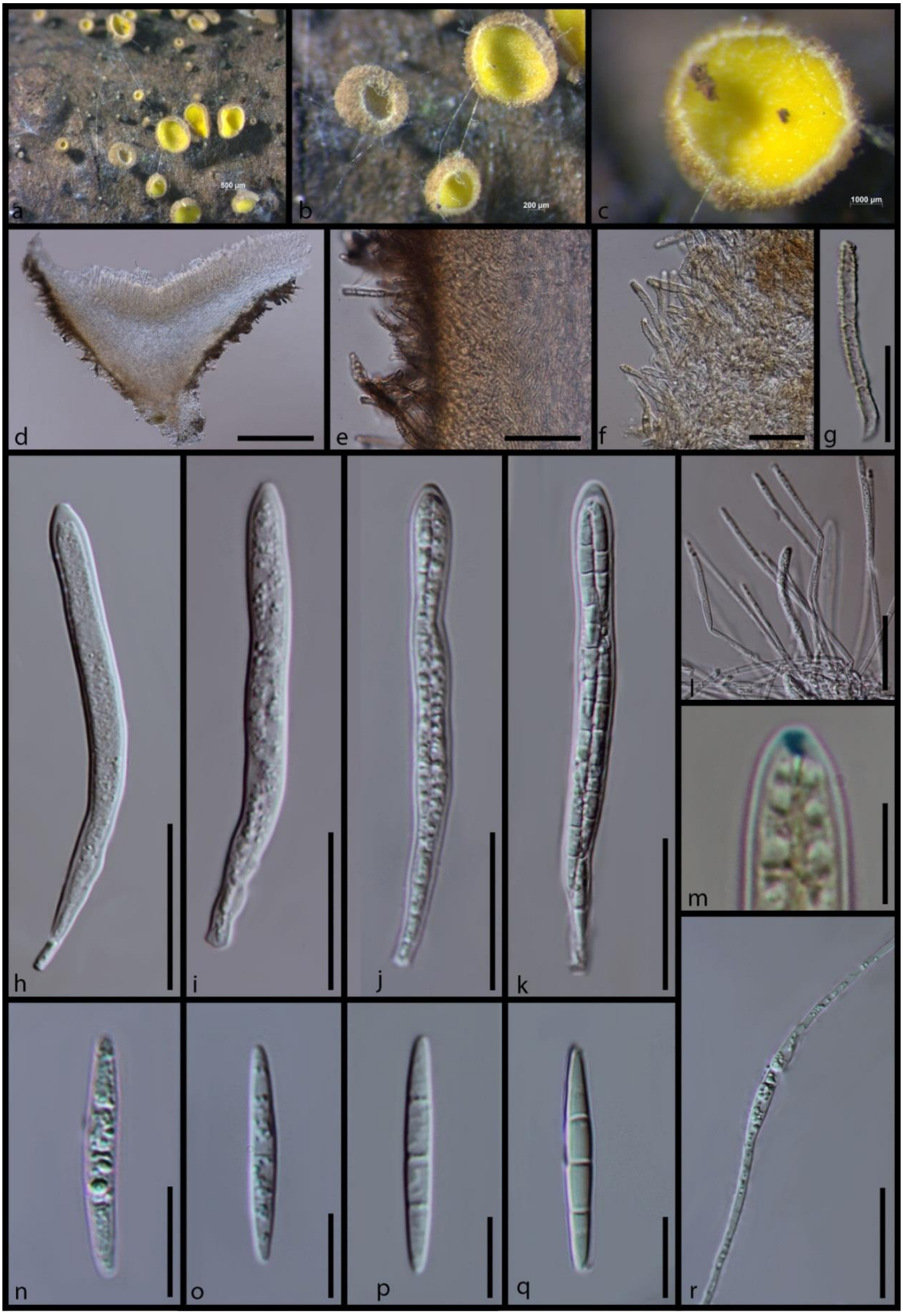

Figure 38 – Morphology of *Erioscyphella sclerotii* (MFLU 16-0569) a, b Apothecia in wood. c Apothecium in wood. d Cross section of a apothecium. e Close up of the peridium. f Setae on apothecium. g Septate seta in water. h–k Asci in water. l Septate paraphyses in water. m Asci in Melzer's reagent with J+ discoid apical apparatus. n–q Fusiform ascospores in water. r Germinated ascospore. Scale bars: a = 500 µm, b = 20 µm, c = 1000 µm, d = 400 µm, e = 50 µm, f–l = 25 µm, m = 5 µm, n–q = 10 µm, r = 25 µm.

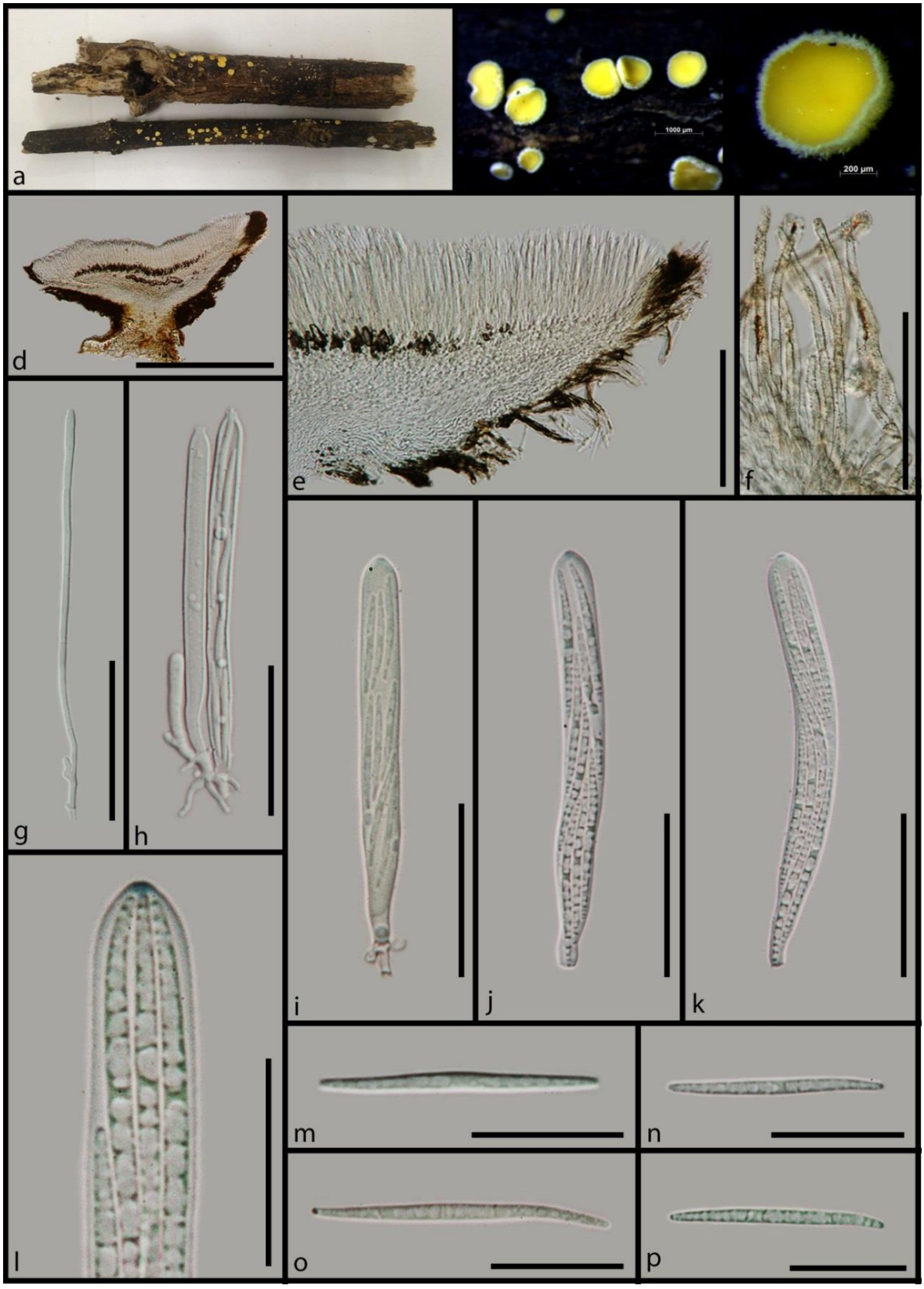

Figure 39 – Morphology of *Erioscyphella aseptata* (MFLU 16-0590 holotype) a Substrate. b Apothecia on wood. c Apothecium on wood. d Cross section of an apothecium. e Vertical section of apothecium at margins. f Cylindric hairs. g Septate, unbranched paraphyses. h–k Short pedicellate asci. l Amyloid ring at apical apex (in Melzer's reagent). m–p Fusiform ascospores. Scale bars: b = 1000 µm, c = 200 µm, d = 500 µm, e = 150 µm, f–g = 50 µm, h–k = 40 µm, l–p = 20 µm.

Figure 40 – Morphology of *Erioscyphella brasiliense* (MFLU 16-0577) a Substrate. b Apothecia on wood. c Close up of apothecium on wood. d Cross section of an apothecium. e Close up of a Vertical section of the apothecium at flanks. f Septate hairs. g Filiform paraphyses. h–j Cylindric asci. k Amyloid ring at the ascus apex. l–o Narrowly fusoid ascospores. Scale bars: a = 1000 µm, b = 500 µm, c = 200 µm, d = 500 µm, e = 100 µm, f = 30 µm, g = 100 µm, h−j = 45 µm, k = 20 µm, l−o = 15 µm.

Erioscyphella alba Ekanayaka & K.D. Hyde, ***sp. nov.***

Index Fungorum number: IF556292; Facesoffungi number: FoF 05910; Fig. 41.

Etymology – refers to white apothecia

Holotype – MFLU 16-0614

Saprobic on dead stems. **Sexual morph:** *Apothecia* 0.8–1 × 0.6–0.9 mm, arising singly or in small groups, stipitate, cupulate, white when fresh. *Receptacle* concave, disc pale yellow and the margins white when fresh, margins and flanks covered with hairs. *Hairs* 41.5–59.4 × 2.9–4.5 µm

(50.6 × 3.5 µm, n = 30), on flanks and margins, cylindrical, straight, thin-walled, septate, white to yellowish, densely covered with colorless granules. *Ectal excipulum* 28–32 µm ($\bar{x}$ = 31.2 µm, n = 10) in lower flanks, composed of large, thin-walled, hyaline cells of *textura prismatica*. *Medullary excipulum* 38–44 µm ($\bar{x}$ = 42 µm, n = 10) in lower flanks, composed of hyaline cells of *textura intricata*. *Hymenium* hyaline. *Paraphyses* 2.3–3.6 µm wide ($\bar{x}$ = 2.8 µm, n = 20), numerous, lanceolate, septate. *Asci* 42.1–48.9 × 4.9–6.3 µm ($\bar{x}$ = 45.7 × 5.6 µm, n = 30), unitunicate, cylindrical, inoperculate, amyloid, short-stipitate base, arising from croziers. *Ascospores* 11.1–13.4 × 1.8–2.4 µm ($\bar{x}$ = 12.3 × 2.1 µm, n = 40), multi-seriate, fusiform, hyaline, aseptate, row of guttules present, hyaline, smooth, thin-walled, no sheath or appendages, sometimes with refractive inclusions. **Asexual morph:** Undetermined.

Material examined – Thailand, Chiang Mai Province, Mushroom Research Center, 19 July 2015, A. H. Ekanayaka, HD034 (MFLU 16-0614).

GenBank accessions – LSU- MK591990, ITS- MK584965

Notes – Our strain HD034 grouped with *Lachnum pteridophyllum* with strong statistical support of 85% (Fig. 35). The ITS data of our collection is similar to that of *Erioscyphella fusiforme* (MFLU 15-0230) (460/495-93% with 2 gaps) and to *Lachnum pteridophyllum* (strain 3155) (445/487-91% with 4 gaps). The LSU data of our collection is similar to *Lachnum abnorme* (KUS-F52080) (791/801-99% with no gaps).

Erioscyphella alba is similar to *Lachnum pteridophyllum*, but differs in having white apothecia covered with white hairs, slightly smaller asci and ascospores (Spooner 1987). *Erioscyphella fusiforme* is similar *E. alba* by having white apothecia covered with white hairs, but differs in having larger ascospores and filiform paraphyses (Hongsanan et al. 2015).

Erioscyphella abnormis (Mont.) Baral, Šandová & B. Perić

= *Lachnum abnorme* (Mont.) J.H. Haines & Dumont

Facesoffungi number: FoF 05911; Fig. 42.

Saprobic on dead stems. **Sexual morph:** *Apothecia* 1–2.5 × 0.5–1.3 mm, arising singly, stipitate. *Receptacle* cupulate, brownish yellow, covered with hairs. *Margin* concolorous to receptacle, covered with hairs. *Disc* concave. *Hairs* 90–120 × 3.5–5 µm ($\bar{x}$ = 103 × 4.7 µm, n = 30), cylindric, septate, walls rough and covered with granules, pigmented, light to dark brown. *Ectal excipulum* 40–55 µm ($\bar{x}$ = 45 µm, n = 10) in lower flanks, composed of thin-walled, slightly pigmented, light brown to hyaline cells of *textura prismatica* to *angularis*. *Medullary excipulum* 65–75 µm ($\bar{x}$ = 70 µm, n = 10) in lower flanks, composed of thin-walled, hyaline cells of *textura porrecta*. *Hymenium* hyaline. *Paraphyses* 2.5–3.5 µm wide ($\bar{x}$ = 2.7 µm, n = 20), numerous, filiform, conical apex, septate, sometimes exceeding the asci in length, smooth. *Asci* 80–95 × 8–11 µm ($\bar{x}$ = 86.3 × 9.4 µm, n = 30), 8-spored, unitunicate, cylindric-clavate, conical apex, amyloid, substipitate base, arising from croziers. Ascospores 40–65 × 1.5–2.5 µm ($\bar{x}$ = 45.5 × 1.8 µm, n = 40), multi-seriate, fusoid, 1–4-septate, hyaline, guttulate, tapered towards the base. **Asexual morph:** Undetermined.

Material examined – China, Yunnan Province, Xishuangbanna, Jinghong, 9 June 2018, Zeng Ming, HC39 (MFLU 18-1826, HKAS102127).

GenBank accessions – LSU- MK591977, ITS- MK584950, SSU- MK585049, RPB2- MK614730

Notes – Our new collection HC39 from China clustered within *Erioscyphella abnormis* clade and the clade has strong statistical support of 99% (Fig. 35). The ITS and LSU data of our collection is 99% similar to *Lachnum abnorme* specimens of KUS-F52080 (ITS: 807/843-96% with 6 gaps, LSU: 1127/1128-99% with 1 gap) and TNS:F-16617 (ITS: 791/801-99% with no gaps).

Morphology of our collection is similar to the description of *E. abnormis* provided by Spooner (1987). However, all the observed ascospores were 1–4-septate and we did not observe 7-septate ascospores as described for *E. abnormis* (Spooner 1987). Asci in our collection are slightly smaller than described for *E. abnormis* (Spooner 1987). Therefore, we assume that our collection is

immature. Our collection is similar to *E. australiense* which is characterised by 1–3-septate ascospores, but *E. australiense* differs in having lanceolate paraphyses (Spooner 1987).

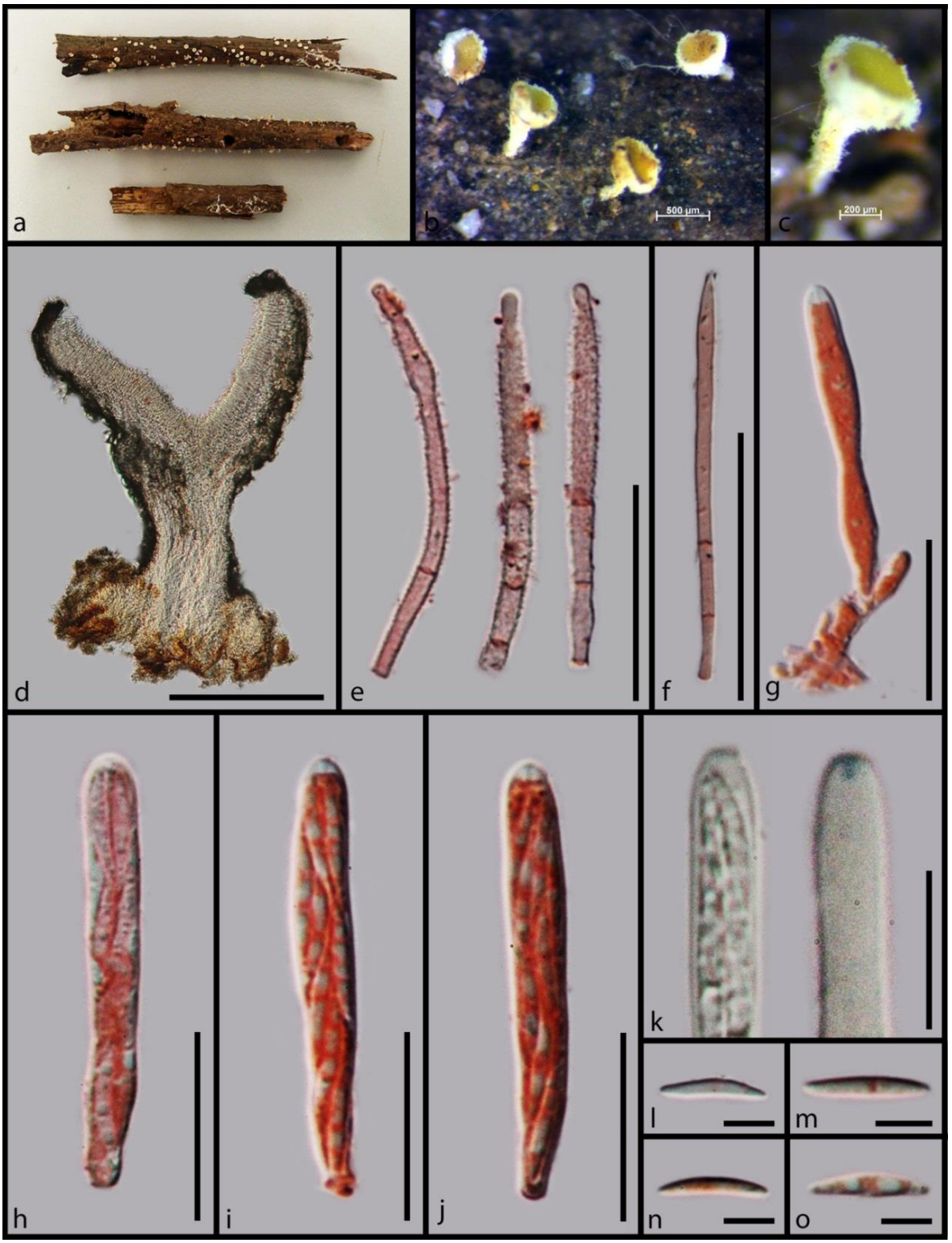

Figure 41 – Morphology of *Erioscyphella alba* (MFLU 16-0614 holotype) a Substrate. b Apothecia on wood. c Apothecium on wood. d Cross section of an apothecium. e Cylindric hairs (in congo red reagent). f Septate, unbranched paraphyses (in Congo red reagent). g–j Short pedicellate asci (in Congo red reagent). k Amyloid ring at apical apex (in Melzer's reagent). l–o Fusiform ascospores (in Congo red reagent). Scale bars: b = 500 µm, c = 200 µm, d = 400 µm, e = 30 µm, f = 40 µm, g–j = 20 µm, k = 10 µm, l–o = 5 µm.

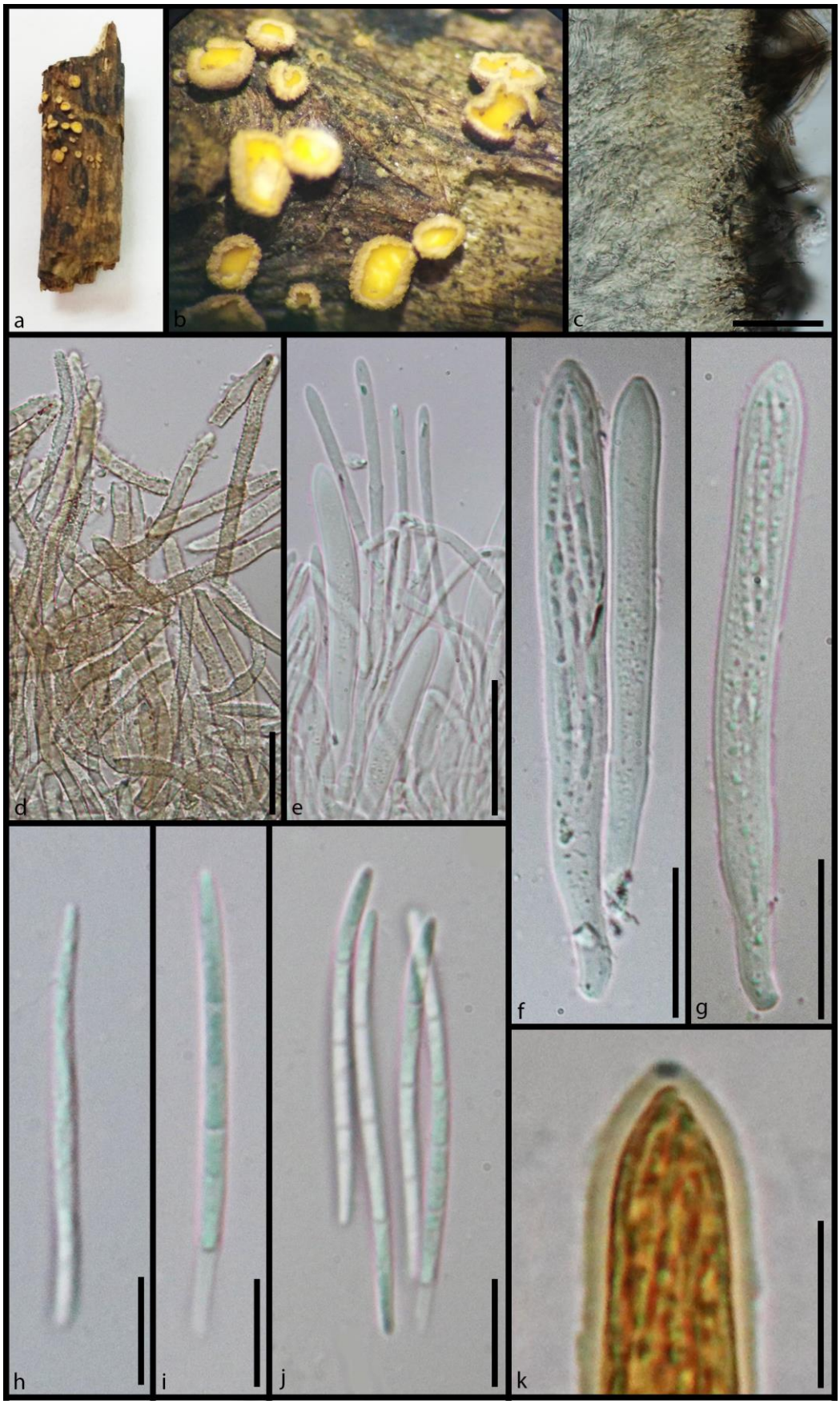

Figure 42 – Morphology of *Erioscyphella abnormis* (MFLU 18-1826) a Substrate. b Apothecia on wood. c Excipulum at margins. d Long cylindrical hairs. e Filiform paraphyses. f, g Cylindric-clavate asci. h–j Fusoid ascospores. k Amyloid ascus apex. Scale bars: c = 50 µm, d, f, g = 20 µm, e = 30 µm, k = 10 µm, h–j = 5 µm.

Proliferodiscus chiangraiensis Ekanayaka & K.D. Hyde, ***sp. nov.***

Index Fungorum number: IF556293; Facesoffungi number: FoF 05912; Fig. 43.

Etymology – refers to the Province where the holotype was collected

Holotype – MFLU 16-0588

Saprobic on dead stems. **Sexual morph:** *Apothecia* 710–780 × 320–350 µm ($\bar{x}$ = 744.3 × 327.6 µm, n = 10). arising in small groups, sessile, white when fresh. *Receptacle* pulvinate, disc convex, orange when fresh. *Hairs* 35.5–40.1 × 3–3.6 µm ($\bar{x}$ = 38.2 × 3.2 µm, n = 30), cylindric, septate, hyaline, eguttulate, walls usually thin, surface finely granulate. *Ectal excipulum* 10–15 µm ($\bar{x}$ = 12.6 µm, n = 10) in upper flanks, composed of thin-walled, hyaline to yellowish cells of *textura prismatica*. *Medullary excipulum* 18–25 µm ($\bar{x}$ = 21.7 µm, n = 10) in upper flanks, composed of thin-walled, yellowish cells of *textura prismatica*. *Hymenium* yellow. *Paraphyses* 1.2–1.5 µm wide ($\bar{x}$ = 1.33 µm, n = 20), numerous, filiform, obtuse at the apex, aseptate, not exceeding the asci in length, smooth, guttulate. *Asci* 27.5–32.3 × 3.1–5.8 µm ($\bar{x}$ = 30.3 × 5.3 µm, n = 30), 8-spored, unitunicate, cylindric-clavate, rounded or medium conical at the apex, amyloid, stipitate base, arising from croziers. *Ascospores* 3.9–5.7 × 1.3–1.8 µm ($\bar{x}$ = 4.7 × 1.5 µm, n = 40), 1–2-seriate, ellipsoid to fusoid, aseptate, hyaline. **Asexual morph:** Undetermined.

Material examined – Thailand, Chiang Rai Province, Doi Mae Salong, on dead stems, 22 June 2015, A.H. Ekanayaka, HD027 (MFLU 16-0588).

GenBank accessions – LSU- MK591985, ITS- MK584956, SSU- MK585037

Notes – Our new collection HD027 from Thailand grouped with *Proliferodiscus earoleucus* (BHI_F624d) and *P. inspersus* (KUS_F52660) and the clade with three *Proliferodiscus* spp. received high statistical support of 100% (Fig. 35). The ITS data of our collection is similar to that of *P. earoleucus* (BHI-F624d) (532/542-98 % with 2 gaps) and to *P. inspersus* (KUS-F52660) (535/549-97% with 4 gaps). The LSU data is similar to *P. inspersus* (KUS-F52660) (810/812-99% with 2 gaps) and to *P. tricolor* (CBS 128288) (850/872-97% with 5 gaps).

Proliferodiscus chiangraiensis is characterized by sessile apothecia with orange disk and margins covered by white granulate hairs, filiform, aseptate paraphyses, cylindric-clavate, amyloid asci and ellipsoid to fusoid ascospores. *Proliferodiscus chiangraiensis* is similar to *P. earoleucus* and *P. inspersus*. However, *P. earoleucus* differs from *P. chiangraiensis* by having non-amyloid asci and stipitate apothecia (Han et al. 2014). *Proliferodiscus inspersus* differs from *P. chiangraiensis* by having stipitate apothecia, paraphyses with slightly swollen apices and larger asci (Haines & Dumont 1983, Han et al. 2014).

Lachnum controversum (Cooke) Rehm

Facesoffungi number: FoF 05913; Fig. 44.

Saprobic on dead stems. **Sexual morph:** *Apothecia* 1–2 × 0.8–1.5 µm, arising singly, stipitate, orange-brown when rehydrated. *Receptacle* cupulate to discoid. *Disc* concave. *Hairs* 80–100 × 2–3.5 µm ($\bar{x}$ = 92.3 × 2.8 µm, n = 30), cylindric, aseptate, walls rough, granulate, brown, sometimes apices slightly swollen and have thin cylindrical outgrowth. *Ectal excipulum* 13–18 µm ($\bar{x}$ = 15 µm, n = 10) in upper flanks, composed of thin-walled, light brown to hyaline cells of *textura prismatica*. *Medullary excipulum* 11–16 µm ($\bar{x}$ = 15 µm, n = 10) in upper flanks, composed of thin-walled, hyaline cells of *textura prismatica*. *Hymenium* hyaline. *Paraphyses* 4–5 µm wide ($\bar{x}$ = 4.6 µm, n = 20), numerous, filiform, lanceolate, conical apex, aseptate, smooth. *Asci* 40–55 × 3–6 µm ($\bar{x}$ = 47.4 × 4.5 µm, n = 30), 8-spored, unitunicate, cylindric-clavate, conical apex, amyloid, stipitate base, arising from croziers. *Ascospores* 6–8.5 × 2–2.5 µm ($\bar{x}$ = 7.4 × 2.3 µm, n = 40), 1–2-seriate, fusoid, aseptate, hyaline, guttulate. **Asexual morph:** Undetermined.

Material examined – UK, Hedge End, on herbaceous stem, 3 March 2016, E.B.G. Jones, GJ239b (MFLU 18-1820).

GenBank accessions – LSU- MK591964, ITS- MK584937, SSU- MK585025, RPB2- MK368613

Notes – Our collection of GJ239b from UK grouped with a Japanese collection of *L. controversum* (Haines 4611) with strong statistical support of 99% (Fig. 35). The ITS data of our

collection is similar to that of *Lachnum controversum* (JHH4611) (521/536-97% with 2 gaps) and to *L. virgineum* (CBS 234.54) (512/553-93% with 2 gaps). The LSU data of our species is similar to *L. pudibundum* (CBS 577.73) (885/896-99% with 8 gaps) and to *L. virgineum* (CBS 234.54) (877/894-98% with 5 gaps).

Morphology of our collection is in agreement with the description by Spooner (1987) and, therefore, we determine it as *L. controversum*.

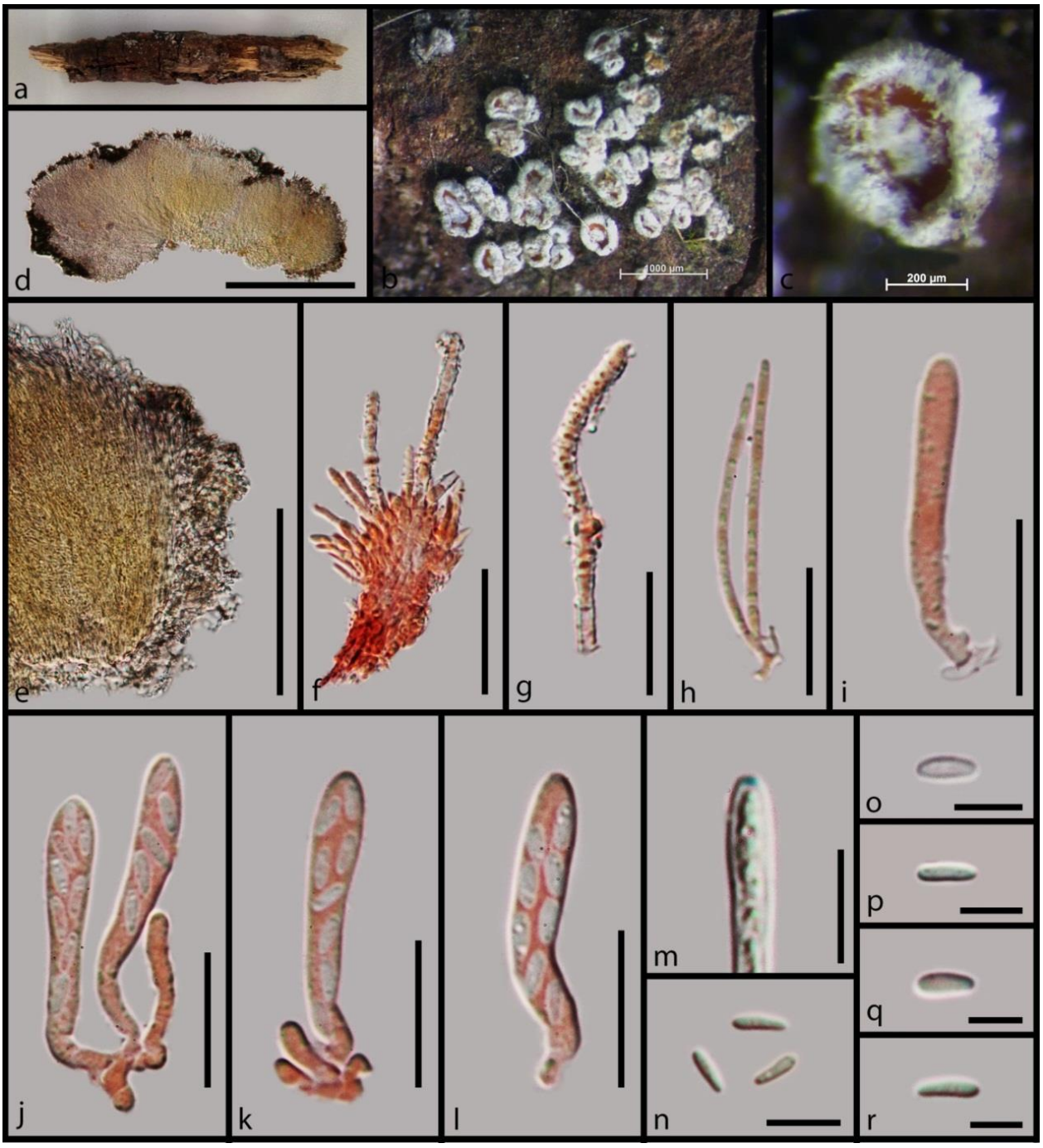

Figure 43 – Morphology of *Proliferodiscus chiangraiensis* (MFLU 16-0588 holotype) a Substrate. b Apothecia on wood. c Apothecium on wood. d Cross section of an apothecium. e Close up of the cross section of apothecium at margins. f, g Long cylindrical hairs (in congo red reagent). h Cylindrical paraphyses (in congo red reagent). i–l Cylindric-clavate asci (in congo red reagent). m Apex of the asci with the plug blueing in Melzer's reagent. n–r Fusoid ascospores (in congo red reagent). Scale bars: b = 1000 µm, c = 200 µm, d = 300 µm, e = 100 µm, f = 20 µm, g–l = 15 µm, m = 10 µm, n–r = 5 µm.

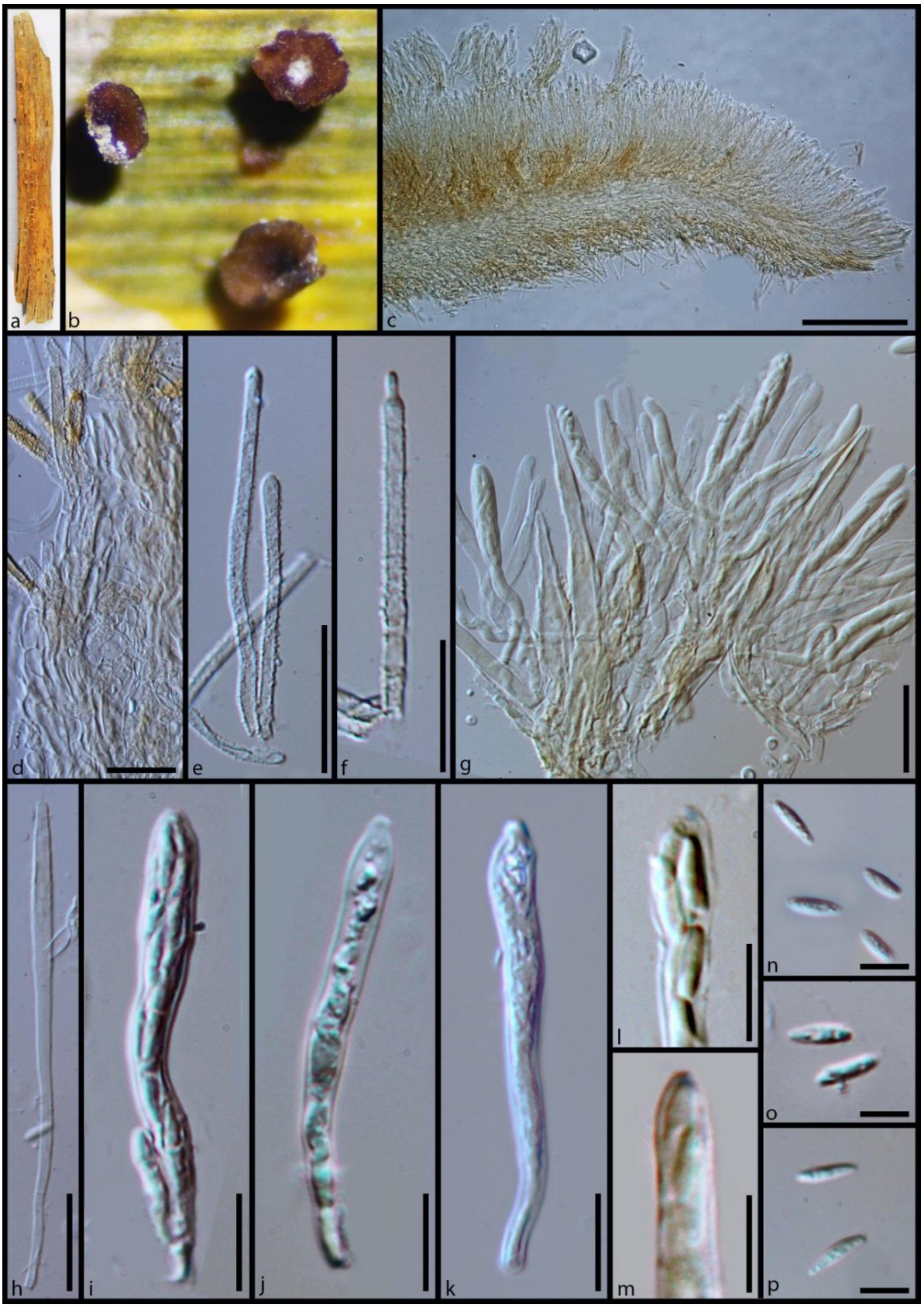

Figure 44 – Morphology of *Lachnum controversum* (MFLU 18-1820) a Substrate. b Rehydrated apothecia on wood. c Close up of the cross section of apothecium at margins. d Hairs and excipular cells at flanks. e Cylindrical hairs. f Cylindrical hairs with apices containing thin cylindrical outgrowth. g Asci and paraphyses. h Lanceolate paraphyses. i–k Cylindric-clavate asci. l, m Amyloid asci apices in Melzer's reagent. n–p Fusoid ascospores. Scale bars: c = 100 µm, d–g = 20 µm, h–m = 10 µm, n–p = 5 µm.

***Bulgariella* clade**

Facesoffungi number: FoF 05914

Taxa are saprobic. Ascomata are apothecial or rarely cleistothecial. Apothecia are cupulate, discoid, turbinate or capitate and sessile or stipitate. The margins and flanks are covered with hairs and hairs are cylindrical, sometimes pigmented which dissolve in KOH and septate. The ectal excipulum is composed of cells of *textura angularis*, *textura prismatica* or *textura oblita*, sometimes granulate and medullary excipulum is composed of cells of *textura intricata* or *textura oblita* and sometimes gelatinized. Paraphyses are filiform, lanceolate or cylindrical and rarely absent. Asci are 8-spored, cylindric-clavate, amyloid or non-amyloid, sometimes arising from croziers and sometimes evanescent. Ascospores are globose, ellipsoid to filiform, septate or aseptate, hyaline or brownish and guttulate (Dennis 1956, Iturriaga et al. 2017, Kohn 1989, Plishka et al. 2008, Gamundi 1977). Asexual morphs are rarely recorded and they are pycnidial and multilocular. Conidiogenous cells are cylindrical and hyaline. Conidia are dark brown with a protruding base and longitudinal striation (Sutton 1980).

Notes –*Bulgariella*, *Chlorovibrissea*, *Connersia*, *Mitrulinia, Pleuroascus* and *Pseudomitrula*, were previously placed within the other helotilian families. In our phylogenetic analysis, we have noticed that they are having a close phylogenetic affiliation to *Lachnaceae* and *Helotiaceae*. Iturriaga et al. (2017) showed the phylogenetic relationship of *Bulgariella* close to *Lachnaceae*, and *Chlorovibrissea* clustered close to *Lachnaceae* taxa within the phylogenetic analysis of Zheng & Zhuang (2017a). Suh & Blackwell (1999) showed that *Pleuroascus* and *Connersia* are genetically closely related. Therefore, considering previous literature and results from our phylogeny, we place these genera under a separate clade. The asexual genus *Endomelanconium* is assigned to the sexual genus *Bulgariella* (Fenwick 1992).

Solenopeziaceae Ekanayaka & K.D. Hyde, ***fam. nov.***

Index Fungorum number: IF556294; Facesoffungi number: FoF 05915

Type genus – *Solenopezia*

Saprobic. **Sexual morphs:** *Ascomata* apothecial cupulate, discoid or pulvinate, sessile or stipitate, sometimes covered with hyaline, whitish, yellow or brown, non-bristle-like hairs. *Ectal excipulum* composed of cells of *textura angularis*, *textura prismatica* or *textura oblita*. *Medullary excipulum* composed of cells of *textura intricata* or *textura oblita*. *Paraphyses* filiform, lanceolate or cylindrical. *Asci* 8-spored, cylindric-clavate, amyloid or non-amyloid, sometimes arising from croziers. *Ascospores* globose, ellipsoid to fusiform, septate or aseptate, guttulate. **Asexual morphs:** *Conidiomata* hyphomycetous. *Conidiophores* simple, sparsely branched or absent. *Conidiogenous* cells cylindrical to subclavate, sometimes apically slightly swollen. *Conidia* hyaline or black, septate, branched, lunate, sometimes formed in a chain and becoming tortuous and appearing as terminal dictyospores, rarely appendaged.

Notes – The genera *Geniculospora Tricladium, Graddonia, Mycofalcella, Halenospora*, *Trichopeziza*, *Lasiobelonium*, *Trichopezizella*, and *Solenopezia*, which were previously assigned to the other helotilian families, formed a monophyletic clade close to *Helotiaceae* and *Lachnaceae*. However, this clade did not receive strong statistical support.

Jaklitsch et al. (2016) suggested that *Trichopeziza*, *Trichopezizella* and *Solenopezia* require a family of their own based on excipular and hair characteristics, and absence of an apothecial stipe, and Guatimosim et al. (2016) and Pärtel (2016) showed that they are genetically closely related to each other and formed a monophyletic clade, but placed away from their former family *Lachnaceae*. Therefore, considering previous literature and our results from phylogenetic analysis we introduce the new family *Solenopeziaceae*.

***Colipila* clade**

Taxa are saprobic on dead plant material (Baral et al. 2012). Ascomata are apothecial and cupulate and covered with long cylindrical hairs. The ectal excipulum is composed of cells of *textura prismatica*. Paraphyses are dimorphic, sub-cylindrical and not exceeding the length of asci,

or broadly lanceolate and exceeding the length of asci. Asci are cylindric-clavate, 8-spored, amyloid and arising from croziers. Ascospores are ellipsoid to fusoid (Baral et al. 2012). Asexual morphs are not recorded (Baral et al. 2012).

Notes – The genus *Colipila* was introduced by Baral et al. (2012) to accommodate two species, *C. masduguana* and *C. pilatensis*. In our phylogenetic analysis this genus forms a separate clade close to *Lachnaceae* and *Helotiaceae* clade.

LAHMIALES

This order was introduced by Eriksson (1986). Raitviir & Spooner (1994) suggested several phylogenetic positions for this order within Dothideomycetes (*Patellariaceae* and *Acrospermaceae*) and Lecanoromycetes (*Odontotremataceae*). Later Jaklitsch et al. (2016) placed it within Leotiomycetes according to its morphology.

Lahmiaceae O.E. Erikss.

Facesoffungi number: FoF 05916

Taxa are saprobic or plant pathogenic (Eriksson 1986). Ascomata are apothecial and characterized by shape, stipitate, black turbinate receptacle which is closed when immature and opening by irregular radial splits at maturity. The ectal excipulum is composed of strongly melanized cells of *textura epidermoidea* and medullary excipulum is composed of strongly gelatinized cells of *textura epidermoidea*. Paraphysoids are densely septate, unbranched and slightly swollen at apices. Asci are 8-spored, cylindric-clavate, non-amyloid, arising from croziers and bitunicate but non-fissitunicate. Ascospores are hyaline, crescent-shaped and 1–4-septate. Asexual morphs are hyphomycetous and phialidic. Conidia are falcate and 1–3-septate (Eriksson 1986).

Notes – This family does not have any available sequence data. Therefore, we are unable to provide a stable phylogenetic position for this family and keep it under Leotiomycetes *incertae sedis* following Jaklitsch et al. (2016).

LAURIOMYCETALES

This order was introduced by Hernandez-Restrepo et al. (2017). This is the most basal clade of Leotiomycetes. Its basal position was also shown in Hernandez-Restrepo et al. (2017).

Lauriomycetaceae Hern.-Restr., R.F. Castañeda & Guarro

Facesoffungi number: FoF 05917

Taxa are saprobic. Sexual morphs are not recorded. Asexual morphs are hyphomycetous synnematous. Conidiophores are macronematous, mononematous, straight or flexuous, thick and smooth-walled, brown to dark brown and paler toward the slightly swollen rounded and thin-walled apex. Conidiogenous cells are blastic, discrete, terminal and hyaline. Conidia are unicellular, hyaline to subhyaline, thin- and smooth-walled, in acropetal chains and ellipsoid to cylindrical or obclavate, in one or several tiers (Somrithipol et al. 2017, 2006, Crous & Wingfield 1994, Hernandez-Restrepo et al. 2017).

Notes – This family includes single genus: *Lauriomyces* and it forms a well-supported clade at the basal position in Leotiomycetes.

LEOTIALES

The order Leotiales was introduced by Korf & Lizon (2001). Formerly this order included the single family *Leotiaceae*.

***Gelatinomyces* clade**

Facesoffungi number: FoF 05918

Taxa are saprobic on soil or dead plant material. Ascomata are apothecial. Apothecia are aggregated (but well separated) in a single stroma, pale grey to dark coloured, soft gelatinous,

translucent, globose or pulvinate when young, discoid to cupulate with maturity and sessile. The exciple is dark and gelatinous. The hymenial surface is covered with a gelatinous layer. Paraphyses are simple and branched. Asci are multi-spored, cylindrical, tapered at the base and non-amyloid. Ascospores are minute, hyaline, globose to ovoid and smooth-walled (Sanoamuang et al. 2013). Asexual morphs are hyphomycetous. Conidiophores are hyaline. Conidiogenous cells are two types, very short conidiogenous cells on hyphal cells, or longer conidiogenous cells at branching points. Conidia are ovoid, minute and powdery with age (Sanoamuang et al. 2013).

Notes – This genus is distinct from other taxa (*Flagellospora*, *Leotiaceae*, *Lichinodiaceae* and *Tympanidaceae*) in the clade except *Myriodiscus* by having gelatinized aggregated apothecia attached to a central stroma. Jaklitsch et al. (2016) considered *Gelatinomyces* as a synonym of *Myriodiscus*. In the outline of Wijayawardene et al. (2018), *Gelatinomyces* was placed in Leotiomycetes genera *incertae sedis*, while *Myriodiscus* was placed in *Tympanidaceae*. However, we are unable to provide the genetic relationship of *Myriodiscus* and *Gelatinomyces* as there is no sequence data available for *Myriodiscus*. Therefore, according to our phylogeny and previous literature regarding morphological characters, we suggest this genus needs to be given a new family name when more information is available.

Leotiaceae Corda

Facesoffungi number: FoF 05986

Taxa are saprobic on soil or dead plant material. Ascomata are apothecial. Apothecia are clavate, turbinate to applanate, sessile to long-stipitate with subglobose to ellipsoid to fusoid fertile part and sometimes gelatinous. The ectal excipulum is composed of cells of *textura intricata* or *textura porrecta*, mostly gelatinized and medullary excipulum is composed of cells of *textura intricata* and mostly non-gelatinized. The hymenium is hyaline to greenish or yellowish. Paraphyses are filiform, sometimes apically slightly swollen and/or branched, straight to slightly curved, aseptate, hyaline and sometimes pigmented with loose exudates. Asci are 8-spored, mostly amyloid and arising from croziers. Ascospores are ellipsoid to fusoid, rarely vermiform, guttulate, aseptate and hyaline (Lizon et al. 1998, Kučera et al. 2014, 2017, Ohenoja et al. 2010). Asexual morphs are not recorded.

Notes – This family formed a monophyletic clade sister to Lichinodiales. *Pezoloma* and *Halenospora* were previously classified within *Leotiaceae*, but according to our phylogenetic analysis they are not genetically related to *Leotiaceae*. Therefore, in here we remove these genera from *Leotiaceae* and transferred to *Discinellaceae* (*Pezoloma*) *and Tricladium- Solenopezia* clade (*Halenospora*).

Microglossum macrosporum Ekanayaka & K.D. Hyde, ***sp. nov.***

Index Fungorum number: IF556295; Facesoffungi number: FoF 05919; Fig. 46.

Etymology – refers to large ascospores

Holotype – MFLU 18-1830

Saprobic on soil. **Sexual morph:** *Apothecia* 10–20 × 1–5 mm, arising singly, stipitate, greenish brown when fresh and brown when dry. *Receptacle* clavate. *Medullary tissue* composed of, thin-walled, hyaline cells of *textura prismatica*. *Hymenium* hyaline. *Paraphyses* 2.5–3.2 µm wide ($\bar{x}$ = 2.8 µm, n = 20), numerous, filiform, obtuse and slightly swollen at the apex, aseptate, smooth, aguttulate. *Asci* 85–105 × 10–12.5 µm ($\bar{x}$ = 91.4 × 11.2 µm, n = 30), arising from croziers, 8-spored, unitunicate, cylindric-clavate, apex rounded and amyloid, short stipitate base. *Ascospores* 50–75 × 4.5–5.5 µm ($\bar{x}$ = 64 × 4.7 µm, n = 40), multi-seriate, fusoid, curved, aseptate, hyaline, guttulate. **Asexual morph:** Undetermined.

Material examined – Thailand, Chiang Rai Province, Chiang Sen, 14 July 2015, A. H. Ekanayaka, HD52 (MFLU 18-1830).

GenBank accessions – LSU- MK591992, RPB2- MK614724

Notes – According to our phylogenetic analysis, *Microglossum* is polyphyletic within Leotiales (Fig. 45). Our strain of *Microglossum* grouped basal to other *Microglossum* species in

clade 1 and is a well-supported clade (100%). The LSU data of our strain is similar to that of *Thuemenidium atropurpureum* (strain 1136126) (775/792-98% with no gaps) and to *Microglossum olivaceum* (KL220) (770/800-96% with 2 gaps) and *Microglossum viride* (strain 1132541) (770/800-96% with 2 gaps). The RPB2 region of our species is similar to that of *Microglossum rufum* (AFTOL-ID 1292) (874/950-92% with 10 gaps).

Microglossum macrosporum is similar to *M. nudipes*, *M. parvisporum*, *M. rufescens* and *M. cyanobasis*, but differs in having larger ascospores (Kucera et al. 2014).

Microglossum viride and *M. griseoviride* formed a basal clade (*Microglossum* II clade, Fig. 45) within Leotiales and they differ from other *Microglossum* spp. by having a squamulose stipe (other *Microglossum* spp. have a naked stipe) (Kucera et al. 2014). Therefore, we suggest that *M. viride* and *M. griseoviride* require a new generic name within Leotiaceae.

Thuemenidium differs from *Microglossum* by having black or dark coloured apothecia (Ohenoja et al. 2010). Our phylogeny shows that *Thuemenidium* is also polyphyletic within Leotiales.

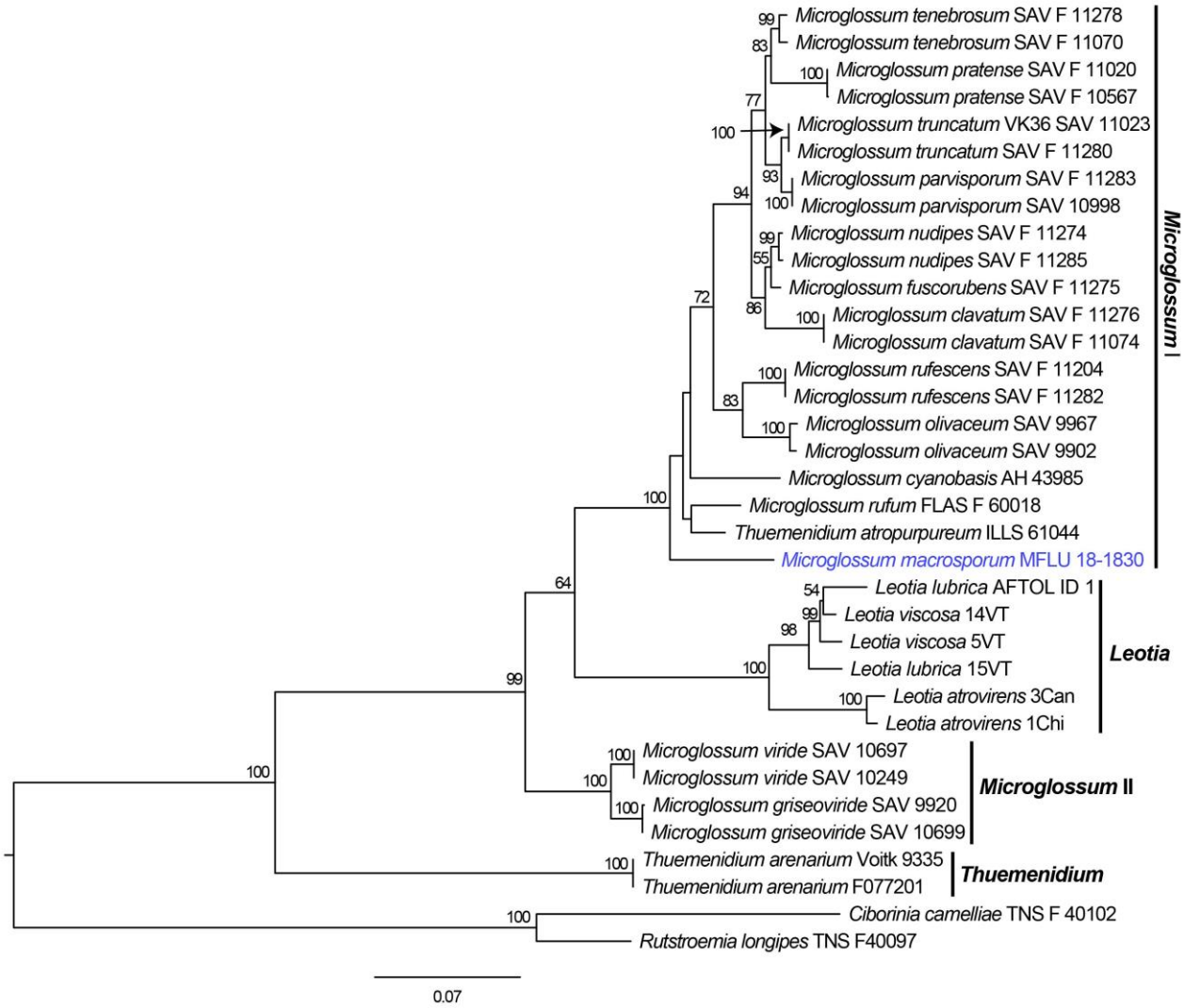

Figure 45 – Phylogram generated from maximum likelihood analysis of sequences of *Leotiaceae* based on ITS, LSU, RPB2 sequence data. MLBP values ≥50% are given near the nodes. Strain/culture numbers are given after the taxa. The tree is rooted with *Ciborinia camelliae* (TNS F 40102) and *Rutstroemia longipes* (TNS F40097).

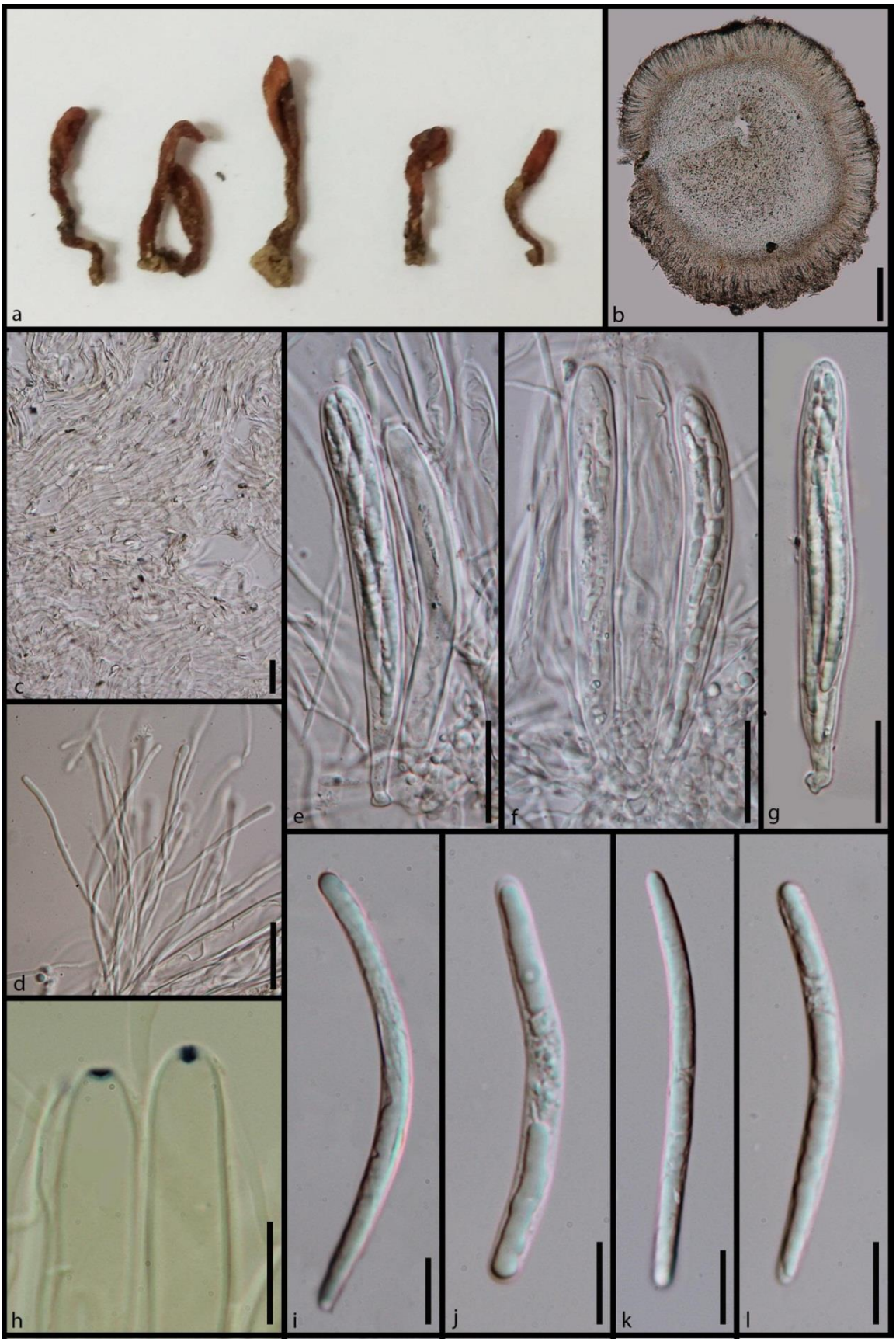

Figure 46 – Morphology of *Microglossum macrosporum* (MFLU 18-1830 holotype) a Apothecia. b Cross section of an apothecium. c Medullary tissue. d Filiform paraphyses. e–g Cylindric-clavate asci. h Amyloid ascus apices. i–l Fusoid ascospores. Scale bars: b = 100 µm, c = 20 µm, d = 20 µm, e–g = 25 µm, h = 25 µm, i–l = 10 µm.

Tympanidaceae Baral & L. Quijada

Facesoffungi number: FoF 05920

Taxa are saprobic on dead plant material (Medardi 2007). Ascomata are apothecial. Apothecia are discoid, turbinate or pulvinate receptacle, rarely aggregated into central stroma, often slightly gelatinous, sessile or stipitate and erumpent or superficial. The ectal excipulum is composed of cells of *textura globulosa* to *textura oblita*, *textura prismatica* or *textura intricata* and medullary excipulum is composed of cells of *textura intricata*. Paraphyses are filiform, cylindrical to capitate, straight, unbranched, densely septate and rarely curved or helicoid. Asci are 4–8-spored or multi-spored, cylindric-clavate, mostly non-amyloid and arising from croziers. Ascospores are globose, ellipsoid, fusiform or sub-cylindrical, sometimes slightly curved, hyaline, 0–21-septate, guttulate, smooth, hyaline and sometimes producing ascoconidia by budding (Medardi 2007, Jaklitsch et al. 2016, Groves 1954, 1952, 1967, Quijada et al. 2018). Asexual morphs are pycnidial or hyphomycetous. Pycnidia are uni- or multilocular and hyphomycetes are synnematal. Conidiogenesis is phialidic and conidia are hyaline, ellipsoid, filiform, cylindric or allantoid, sometimes curved and 0–3-septate (Medardi 2007, Damm et al. 2010, Groves 1954, 1952, Funk 1979, Quijada et al. 2018).

Notes – The genera of this family were previously assigned to *Bulgariaceae*, *Dermateaceae* and *Helotiaceae*. Jaklitsch et al. (2016) suggested they are phylogenetically close to *Phacidiaceae*. However, in our phylogenetic analysis this family formed a monophyletic clade within Leotiales. Pärtel (2016) showed the close genetic relationship of *Tympanidaceae* and *Leotiaceae*. Therefore, considering our results and previous literature, we include this family under Leotiales.

Cochlearomycetaceae Crous

Facesoffungi number: FoF 05921

Taxa are saprobic. Sexual morphs are not recorded. Asexual morphs are ceolomycetous or hyphomycetous. Pycnidia are infundibuliform to nidulariaceous, superficial, separate, dark brown to black, sessile, wall composed of cells of *textura angularis* and *textura prismatica*. Conidiophores are 1–2-septate, hyaline, sparingly branched and arising from conidiomatal basal wall. Hyphomycetous conidiomata are solitary, erect, dark brown or synnemata dark brown and smooth. Conidiogenesis is phialidic. Conidia are solitary, aseptate, hyaline, smooth, cylindrical and straight with obtuse ends (Crous et al. 2017).

Notes – This family was previously placed in Helotiales. However, our phylogeny showed its close relationship within Leotiales.

LEPTODONTIDIACEAE CLADE

This clade includes hyphomycetes, which were previously classified within Helotiales. In our analysis, this clade forms a monophyletic clade close to Rhytismatales.

Leptodontidiaceae Hern.-Restr., Crous & Gené

Facesoffungi number: FoF 05922

Taxa are saprobic. Sexual morphs are not recorded. Asexual morphs are hyphomycetous. Conidiophores are erect, simple or irregularly branched and macronematous. Conidiogenous cells are polyblastic. Conidia are dry, solitary, unicellular, subcylindrical to narrowly obovate, straight or slightly curved and hyaline with truncate base. The synasexual morph is beauveria-like. Conidiophores are in dense clusters and sometimes reduced to conidiogenous cells. Conidiogenous cells are polyblastic, sympodial, lageniform to subcylindrical, curved and hyaline. Conidia are aseptate, globose to subglobose, with apiculate base, guttulate, hyaline and smooth.

Notes – Hernandez-Restrepo et al. (2017) introduced the family *Leptodontidiaceae* to accommodate the asexual genus *Leptodontidium*, with about nine species (Hernandez-Restrepo et al. 2017).

LICHINODIALES

This order was introduced by Prieto et al. (2018). Formerly this order included the single family *Lichinodiaceae*.

Lichinodiaceae M. Prieto, M. Schultz, Olariaga & Wedin

Facesoffungi number: FoF 05923

Taxa are lichenized, saprobic, bryosymbiotic, plant pathogenic or lichenicolous. Ascomata are apothecial and characterized by cupulate, turbinate or pulvinate receptacle. The excipulum is pigmented, composed of tightly arranged hyphae or cells of *textura intricata*, it is not differentiated into ectal excipulum and medullary excipulum or unclear and some taxa lack proper exciple. The hymenium is gelatinous. Paraphyses are cylindrical or filiform, septate, sometimes apically swollen and pigmented. Asci are 8-spored, cylindrical-clavate, sometimes prototunicate, non-amyloid and arising from croziers. Ascospores are simple, hyaline and ellipsoid to pyriform or globose to subglobose (Czarnota & Hernik 2013, Egertová et al. 2016a, Prieto et al. 2018). Asexual morphs are pycnidial and conidiophores are simple with filiform conidia (Prieto et al. 2018).

Notes – This family formerly included the single genus *Lichinodium*. Our phylogeny showed that *Epiglia*, *Mniaecia* and *Mycosymbioces*, the genera previously placed in Helotiales genera *incertae sedis* are genetically related to *Lichinodiaceae*. Therefore, we include these genera in this family.

***Epicladonia-Epithamnolia* clade**

Facesoffungi number: FoF 05987

Taxa are saprobic, plant pathogenic or lichenicolous. Sexual morphs are not recorded. Asexual morphs are coelomycetous, pycnidia subglobose to cupuliform, immersed when immature and superficial at maturity. Walls composed of densely interwoven short-celled hyphal tissue or cells of *textura angularis*, *globulosa* or *textura porrecta*. Conidiogenous cells are lining the pycnidial cavity, elongate to elongate-ampulliform or lageniform to narrowly elliptic, slightly tapering towards the apex, sometimes branched and hyaline. Conidiogenesis is phialidic. Conidia are narrowly ellipsoidal to fusiform or cylindrical, apex rounded and the base slightly truncated, thin-walled, hyaline and aseptate (Ihlen & Wedin 2006, Zhurbenko 2012, Suija et al. 2017, Joshi et al. 2015, 2017).

Notes – *Epicladonia* is a polyphyletic genus. Some species clade in Leotiomycetes and some are genetically related to Lecanoromycetes (Pino-Bodas et al. 2015, 2017). However, the generic type *E. sandstedei* belongs to Leotiomycetes. In our analysis *Epicladonia* and *Epithamnoloia* formed a separate clade. Taxa of this family are frequently occured on *Cladonia* and *Thamnoloia* species (Zhurbenko 2012, Zhurbenko & Pino-Bodas 2017).

MICRASPIS CLADE

Micraspis was introduced by Darker (1963). Previously this genus was placed within *Phacidiaceae* and *Tympanidaceae*. However, in our analysis *Micraspis* formed an independent clade close to Leotiales and Phacidiales.

***Micraspis* clade**

Facesoffungi number: FoF 05924

Taxa are saprobic or plant pathogenic. Ascomata are apothecial, immersed within the substrate, elliptical and opening by a longitudinal slit or irregular split at central area of cover. Ectal excipulum is composed of cells of dark coloured cells of *textura angularis* and medullary excipulum is composed of light coloured cells of *textura angularis*. Paraphyses are filiform and often branched at the tip. Asci are 8-spored, cylindric-clavate and non-amyloid. Ascospores are hyaline, elliptical to obovate, 3-septate and forming ascoconidia by budding (Darker 1963). Asexual morphs are pycnidial, opening by a longitudinal fissure, outer wall composed of dark cells of *textura angularis* and whole cavity of pycnidium lined with short conidiophores arising from

angularis cells of the inner wall. Conidia are filiform, 1–3-septate and slightly curved (Darker 1963).

Notes – *Micraspis* was formerly placed in *Phacidiaceae* based on its morphology (Darker 1963) and later in *Tympanidaceae*, considering its ascoconidia formation by budding and presence of septate macroconidia (DiCosmo et al. 1984).

MEDEOLARIALES

The order Medeolariales was introduced by Eriksson (1982). Previously this order included the single family *Medeolariaceae* and the single genus *Medeolaria*. In our phylogenetic analysis *Medeolariaceae* formed a monophyletic clade with *Ascodichaenaceae*, *Dermateaceae* and *Coleophoma- Parafabraea* clade.

Medeolariaceae Korf

Facesoffungi number: FoF 05925

Taxa are plant pathogenic. Ascomata are apothecial and characterized by irregularly organized, reduced apothecia erumpent in host tissue. The excipulum is reduced or unclear. Paraphyses are filiform, simple, flexuous, septate below and brownish. Asci are 8-spored, cylindric-clavate, non-amyloid, no organized opening and opening by irregularly rupturing. Ascospores are fusiform to naviculate and with a dark outer wall layer with striations (LoBuglio & Pfister 2010). Asexual morphs are not recorded.

Notes – *Medeolariaceae* was a phylogenetically unstable family which included a single plant pathogenic genus. These fungus causes stem lesions and gall-like deformations on stems of herbaceous plants, in autumn (Pfister & LoBuglio 2013).

Ascodichaenaceae D. Hawksw. & Sherwood

Facesoffungi number: FoF 05926

Taxa are plant pathogenic. Ascomata are apothecial and characterized by round to elongate hysterioid apothecia opening by a stellate fissure and carbonaceous. The excipulum is reduced or composed of cells of *textura angularis* to *globulosa* and it is not differentiated into ectal excipulum and to medullary excipulum or it is unclear. Paraphyses are filiform, simple and slightly apically swollen. Asci are 4–8-spored, broad clavate-cylindric, non-amyloid and opening by a fissure. Ascospores are ellipsoid to oblong, 0–1-septate, hyaline and granulate (Butin 1977, Butin & Parameswaran 1980). Asexual morphs are pycnidial, hysteriform. Conidiophores are arising from the innermost layer of pycnidial wall and conidiogenesis is phialidic, microconidia simple or septate, spherical to ovate and hyaline. Conidia are ovate to cylindrical and hyaline (Butin 1977, Butin & Parameswaran 1980).

Notes – *Ascodichaena* was formerly placed in Rhytismatales or Phacidiales (Jaklitsch et al. 2016). Later, this family was transferred to Helotiales (Wijayawardene et al. 2018). Lantz et al. (2011) showed that *Ascodichaena* is genetically related to *Dermateaceae*. In our phylogenetic study *Medeolariaceae* and *Ascodichaenaceae* formed a monophyletic clade.

Ascocorticiaceae J. Schröt.

Facesoffungi number: FoF 05927

Taxa are saprobic or plant pathogenic. Ascomata are apothecial. Apothecia are effuse, irregular in shape, whitish-greyish or ochraceous and pruinose film. The excipulum is strongly reduced. Paraphyses are simple and unbranched. Asci are 4–16-spored, cylindric-clavate, inamyloid and with or without croziers. Ascospores are cylindric-ellipsoid or vermiform, 0–11-septate, hyaline and eguttulate (Jülich & de Vries 1982, Oberwinkler et al. 1967, Jaklitsch et al. 2016). Asexual morphs are hyphomycetous, conidiophores are brown, hyaline and bristle-like, conidiogenesis is sympodial and conidia are subglobose, hyaline and small and arranged in a spike (Jaklitsch et al. 2016).

Notes –*Ascocorticium*, *Ascocorticiellum*, *Ascosorus* were classified under *Ascocorticiaceae* and their phylogenetic position is unresolved, due to lack of sequence data. *Ascocorticiaceae* taxa are similar to *Medeolariaceae* by having erumpent apothecia with strongly reduced excipulum, simple, unbranched paraphyses, cylindric-clavate, non-amyloid asci and cylindric-ellipsoid, septate ascospores. Therefore, we placed this family under Medeolariales.

***Coleophoma- Parafabraea* clade**

Facesoffungi number: FoF 05988

Taxa are saprobic or plant pathogenic. Ascomata are apothecial and characterized by sessile to sub-sessile or short-stalked turbinate apothecia covered by setae-like structures. Setae are rigid, pale brown, septate, cylindrical, straight or slightly curved and slightly enlarged at truncate apex. The excipulum is reduced or composed of cells of *textura angularis* to *globulosa* and not differentiated into ectal excipulum and to medullary excipulum or it is unclear. Paraphyses are cylindrical, slender, and wider at base, septate, apex round and hyaline to pale brown. Asci are 8-spored, clavate to cylindrical-clavate and short-pedicellate. Ascospores are in-equilateral, fusoid to ellipsoid, ends rounded, straight or slightly curved, aseptate, thin-walled, hyaline and guttulate (Chen et al. 2016, Duan et al. 2007). Asexual morphs are pycnidial or hyphomycetous acervular, subcuticular to epidermal, pale brown, opening by rupture of overlying host tissues and sometimes with hyaline paraphyses. Conidiomatal wall composed of cells of *textura angularis*. Conidiogenous cells are arising from inner cells of the wall, phialidic, cylindrical, straight to slightly curved, smooth and hyaline. Conidia are elongate ellipsoidal, mostly straight, broadly obtuse at apex, aseptate, hyaline, thick-walled, minutely guttulate and sometimes producing both micro- and macro-conidia (Duan et al. 2007, Crous et al. 2011, 2012, Chen et al. 2016).

Notes – In our phylogenetic study *Parafabraea* and *Coleophoma* formed a monophyletic clade sister to *Medeolariaceae* and *Ascodichaenaceae* clade.

Dermateaceae Fr.

Facesoffungi number: FoF 05928

Taxa are saprobic or plant pathogenic. Ascomata are apothecial and characterised by sessile or short-stipitate, cupulate to sub-spherical, urceolate or discoid receptacle. The ectal excipulum is sometimes reduced within host tissue or composed of cells of *textura angularis* to *globulosa*, with yellow to brown pigments and medullary excipulum is composed of cells of *textura angularis*. Paraphyses are filiform, apically slightly swollen, septate and branched. Asci are 4–8-spored, cylindric-clavate, amyloid or non-amyloid and arising from croziers. Ascospores are hyaline, ellipsoid-oblong, aseptate, guttulate and sometimes with a delicate sheath (Petrak 1951, Nauta & Spooner 1999a, b, c, d, 2000a, b, Svrček 1977a, Ekanayaka et al. 2016). Asexual morphs are pycnidial or acervular. Microconidia are rod-shaped, eguttulate and hyaline and macroconidia are hyaline, multi-guttulate, ellipsoid-oblong to fusoid, aseptate at immature state and becoming muriform at maturity (Ekanayaka et al. 2016, Verkley et al. 2010, Zhu et al. 2012, Romero et al. 2017).

Notes – *Dermateaceae* is a plant pathogenic family previously classified under Helotiales. However, in our phylogenetic analysis, we observed a close relationship of *Dermateaceae* with the plant pathogenic family *Medeolariaceae*. Therefore, we place this family under Medeolariales. Taxa of this family are plant pathogenic which cause stem and fruit rots on vascular plants (Lin et al. 2018, Cameldi et al. 2017, Michalecka et al. 2016, Pešicová et al. 2017, Yuan et al. 2016, Yuan & Verkley 2015, Chen et al. 2016, Romero et al. 2017).

Neofabraea brunneipila Ekanayaka & K.D. Hyde, ***sp. nov.***

Index Fungorum number: IF556296; Facesoffungi number: FoF 05929; Fig. 48.

Etymology – refers to dark brown disc

Holotype – MFLU 15-0231

Saprobic on dead stems. **Sexual morph:** 115–120 × 283–287 µm ($\bar{x}$ = 117.8 × 285.9 µm, n = 10). *Apothecia* arising singly or in small groups, sessile, erumpent from the substrate, cupulate. *Receptacle* convex, disc and the margins are dark brown when fresh. *Excipulum* 38–42 µm wide ($\bar{x}$ = 40 µm, n = 10), with few cell layers, ectal excipulum comprising light brown, thick-walled cells of *textura angularis*. *Medullary excipulum* comprising with granulate, hyaline, thin walled cells of *textura intricata*, ectal excipulum and medullary excipulum are not clearly distinguishable. *Hymenium* hyaline. *Paraphyses* 2.2–2.6 µm wide ($\bar{x}$ = 2.4 µm, n = 10), numerous, filiform, obtuse. *Asci* 75–80 × 6–7 µm ($\bar{x}$ = 78.9 × 6.6 µm, n = 30), 8-spored, short-pedicellate, unitunicate, cylindric-clavate, rounded at the apex, amyloid ring present at the ascus apex, croziers present at the base of asci. *Ascospores* 12–16 × 3–7 µm ($\bar{x}$ = 14.6 × 5.9 µm, n = 40), partially biseriate, ovoid, apices are slightly pointed, hyaline, non-septate, smooth-walled, guttulate. **Asexual morph:** Undetermined.

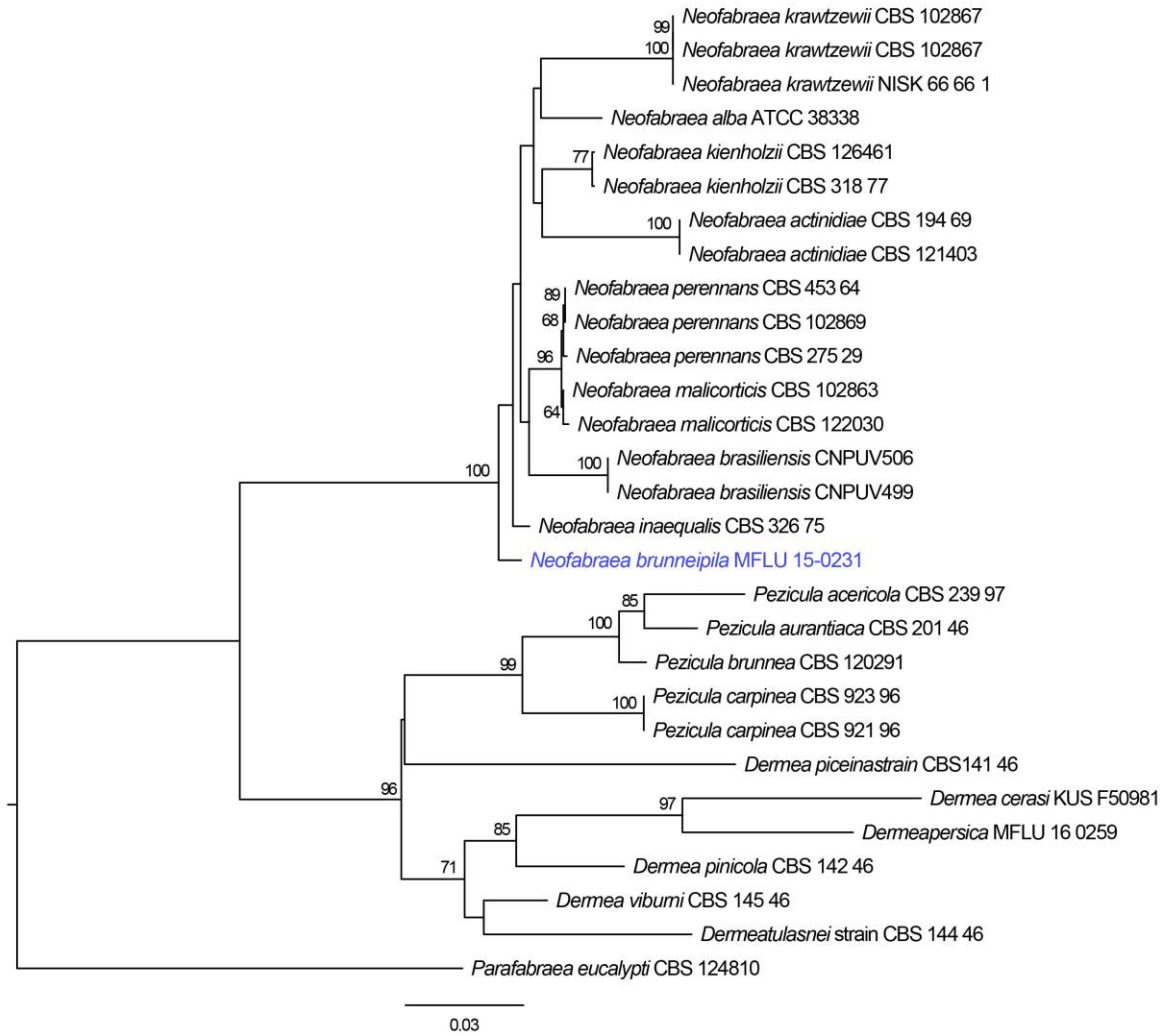

Figure 47 – Phylogram generated from maximum likelihood analysis of sequences of *Dermateaceae* based on ITS, LSU, RPB2 sequence data. MLBP values ≥50% are given near the nodes. Strain/culture numbers are given after the taxa. The tree is rooted with *Parafabraea eucalypti* (CBS 124810).

Material examined – Italy, Forlì-Cesena Province [FC], Strada San Zeno – Galeata, on dead aerial branch of Spartium Junceum, 13 November 2014, Erio Camporesi, IT2238 (MFLU 15-0231).

GenBank accessions – LSU- MK592004, ITS- MK584984, SSU- MK585060

Notes – Our strain IT2238 from Italy grouped in the basal position of *Neofabreae* clade with strong statistical support of 100% (Fig. 47). The ITS data of our collection is similar to that of

Neofabraea inaequalis (CBS 326.75) (546/548-99% with no gaps), *N. perennans* (CBS 453.64) (542/548-99% with no gaps) and *N. kienholzii* (CBS 318.77) (540/545-99% with 1 gap). The LSU data of our species is similar to that of *N. brasiliensis* (CNPUV499) (877/885-99% with 5 gaps), *N. kienholzii* (CBS 126461) (876/885-99% with 5 gaps) and *N. malicorticis* (AFTOL-ID 149) (874/882(99% with 5 gaps).

Neofabraea brunneipila is characterized by cupulate erumpent apothecia, numerous filiform paraphyses, short-pedicellate, unitunicate asci and ovoid ascospores with slightly pointed apices. *Neofabraea brunneipila* is phylogenetically close to *N. inaequalis*. However, we were unable to compare the asexual morph characters of *N. inaequalis* with our strain, as the ascospores of our strain failed in germination. *Neofabraea brunneipila* is distinct from other species of *Neofabraea* by having immersed apothecia, larger, amyloid asci and ascospores with pointed apices (Verkley 1999, Cheewangkoon et al. 2009).

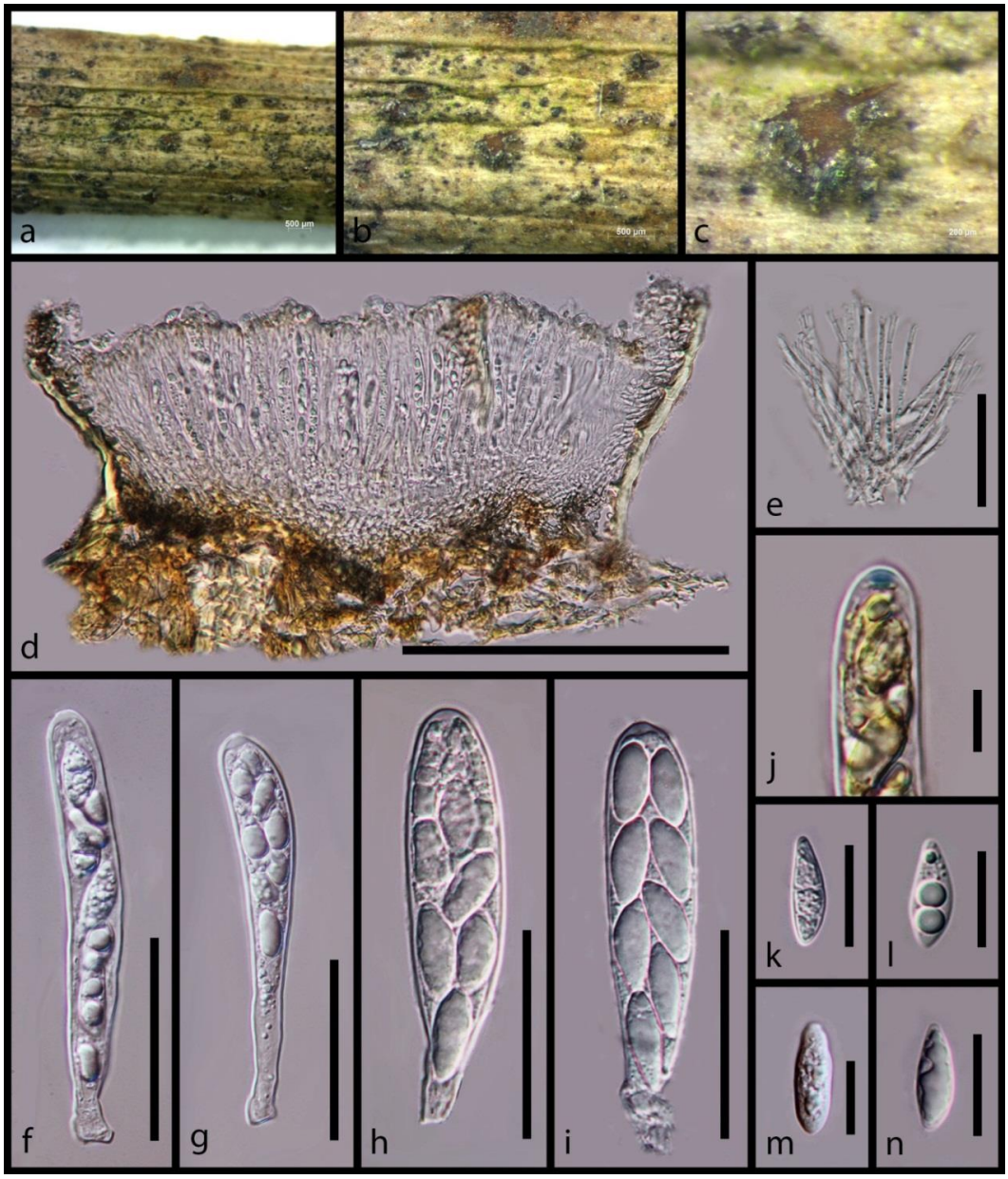

Figure 48 – Morphology of *Neofabraea brunneipila* (MFLU 15-0231 holotype) a Substrate. b Apothecia on wood. c Apothecium on wood. d Cross section of an apothecium. e Septate paraphyses. f–i Cylindric asci. j Amyloid apex of asci in Melzer's reagent. k–n Fusiform ascospores. Scale bars: a = 500 µm, b = 500 µm, c = 200 µm, d = 200 µm, e = 25 µm, f–i = 30 µm, j–n = 10 µm.

NEOCRINULACEAE CLADE

The family *Neocrinulaceae* was introduced by Crous et al. (2017). Formerly this family was placed under Helotiales. In our phylogenetic analysis this family formed an independent clade at order-level, but without a statistical support.

Neocrinulaceae Crous

Facesoffungi number: FoF 05930

Taxa are saprobic. Sexual morphs are not recorded. Asexual morphs are hyphomycetous, sporodochial or synnematous. Conidiophores are hyaline to brown, smooth to verruculose, subcylindrical, branched and septate. Conidiogenesis is phialidic and with periclinal thickening. Conidia are solitary, hyaline, smooth, aseptate and fusoid-ellipsoid (Crous et al. 2017).

Notes – This family includes the single genus *Neocrinula*. In our phylogenetic analysis this family clustered close to *Leptodontidiaceae*.

PHACIDIALES

The order Phacidiales was introduced by Höhnel (1917). Previously this order included three families, *Phacidiacea*e, *Tympanidaceae* and *Helicogoniaceae*. In our phylogenetic analysis, *Phacidiaceae* formed a monophyletic well-supported clade sister to Thelebolales-Leotiales clade. Therefore, considering previous literature (Johnston et al. 2014, Pärtel 2016) and our phylogenetic results we include only *Phacidiaceae* within Phacidiales.

Phacidiaceae Fr.

Facesoffungi number: FoF 05931

Taxa are saprobic or plant pathogenic. Ascomata are apothecial and characterized by discoid to cupulate receptacle. Apothecia are initially immersed and opening usually by splitting of upper layer into teeth or lobes with adhering host tissue. The ectal excipulum is composed of cells of *textura globulosa* to *angularis* and medullary excipulum is unclear or very thin and composed of smooth-walled, hyaline hyphae invested in mucilage. Paraphyses are filiform, cylindrical or lanceolate, sometimes apically curled, rarely branched, anastomosing and invested in mucilage or not. Asci are 4–8-spored, cylindric-clavate, amyloid or non-amyloid and arising from croziers. Ascospores are ellipsoid, fusoid or cylindric-clavate, hyaline, aseptate, guttulate, straight or curved and with or without germ slit (Xiao et al. 2005, Bellemère 1968, Crous et al. 2014, DiCosmo et al. 1984, Egger 1968, Lantz et al. 2011, Verkley 1992). Asexual morphs are pycnidial, uni- or multi-locular, single to aggregated, with one to several ostioles. Walls of conidiomata are composed of *textura angularis* to *textura globulosa*. Conidiogenous cells are arising from inner layer of conidioma. Conidiogenesis is phialidic. Conidia are subcylindrical, ellipsoid-oblong or subreniform, aseptate and sometimes with mucoid apical appendage (Bellemère 1968, Crous et al. 2014, DiCosmo et al. 1984, Egger 1968, Lantz et al. 2011, Verkley 1992, Tanney & Seifert 2018).

Notes – *Bulgariaceae* was previously classified within *Helotiales*. Later, considering its genetic and morphological relationships *Bulgariaceae* was synonymized under *Phacidiaceae* (Crous et al. 2014).

Bacilliformis Ekanayaka & K.D. Hyde, ***gen. nov.***

Index Fungorum number: IF556297; Facesoffungi number: FoF 05932; Fig. 50

Etymology – refers to the baciliform conidia.

Saprobic on dead stem. **Sexual morph:** Undetermined. **Asexual morph:** *Conidiomata* pycnidial, single or in groups, dark brown to black, immersed, multiloculate, opening by a single ostiole. *Wall* composed of dark brown cells of *textura angularis*. *Conidiogenous cells* hyaline, arising from the inner cell wall of peridium, broad base, pointed tips. *Conidia* short cylindrical or baciliform, hyaline.

Type species: ***Bacilliformis hyalinus***

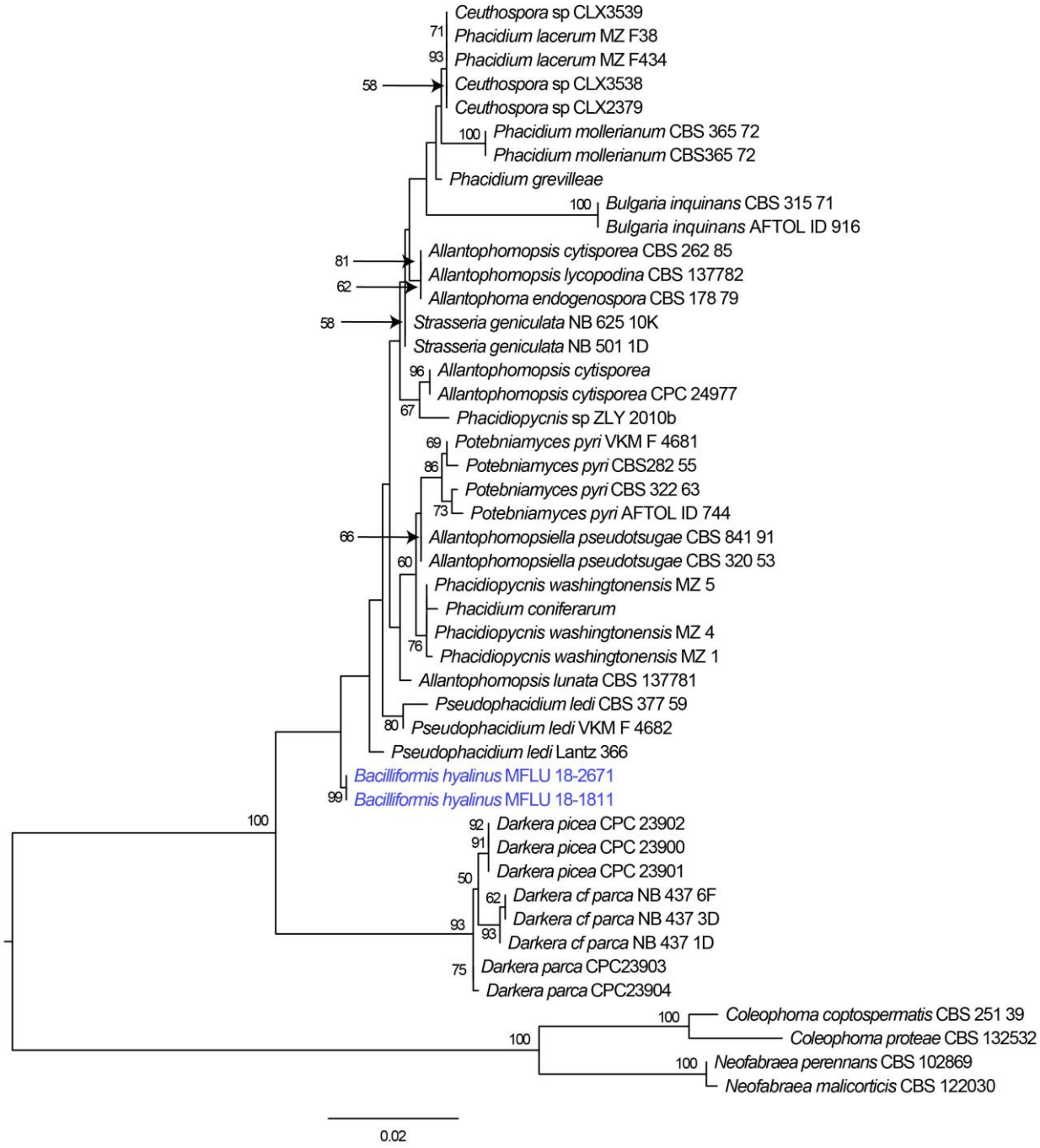

Figure 49 – Phylogram generated from maximum likelihood analysis of sequences of *Phacidiaceae* based on ITS, LSU sequence data. MLBP values ≥50% are given near the nodes. Strain/culture numbers are given after the taxa. The tree is rooted with *Coleophoma proteae* (CBS 132532), *Coleophoma coptospermatis* (CBS 251 39), *Neofabraea perennans* (CBS 102869) and *Neofabraea malicorticis* (CBS 122030).

Bacilliformis hyalinus Ekanayaka & K.D. Hyde, ***sp. nov.***

Index Fungorum number: IF556298; Facesoffungi number: FoF 05933; Fig. 50.

Etymology – refers to the hyaline conidia

Holotype – MFLU 18-2671

Weak pathogenic on dead stem. **Sexual morph:** Undetermined. **Asexual morph:** *Conidiomata* pycnidial 1–2 mm high, 0.8–1.2 mm wide, single or in groups, dark brown to black, immersed, multiloculate, opening by a single ostiole. *Wall* composed of dark brown cells of *textura*

angularis. *Conidiogenous cells* hyaline, arising from the inner cell wall of peridium, flask-shaped, broad base, pointed tips. *Conidia* 3.5–5.5 × 1.5–2.5 µm, short cylindrical or baciliform, hyaline.

Material examined – Russia, Rostov region, Krasnosulinsky District, Gornensky Zakaznik (protected landscape), trees on the riverside of Kundryuchya River, weak parasitic on dying twigs of *Salix alba* L. (*Salicaceae*), 28 June 2015, Timur S. Bulgakov, T847 (MFLU 18-2671); Russia, Arkhangelsk region, Akhangelsk City, Maimaksansky City District, floodplain bushes, saprobic or weak parasitic on dying twigs of *Salix myrsinifolia* Salisb. (*Salicaceae*), 16 May 2016, Gennady V. Okatov, T-553 (MFLU 18-1811).

GenBank accessions – MFLU 18-2671: LSU- MK591952, ITS- MK585001, RPB2- MK341543; MFLU 18-1811: LSU- MK591951, ITS- MK584997, RPB2- MK310263

Notes – Our collections from Russia formed an independent clade within Phacidiales (Fig. 49), with strong statistical support (MLPB- 99%). However, its sister relationship with other Phacidiales taxa is poorly supported (MLPB- 48%, not shown as the value is ≤50%). The ITS data of our collection is similar to that of *Phacidium lacerum* (NW-FVA2688) (473/478-99%), but differ by 5 base pairs with no gaps and to *Allantophomopsiella pseudotsugae* (CBS 321.53) (472/480-98%), but differ by 8 base pairs with 2 gaps. The LSU data of our collection shows similarity to that of *Phacidium lauri* (CBS 308.68) (882/892-99%), but differ by 10 base pairs with 2 gaps, *Allantophomopsiella pseudotsugae* (CBS 437.71) (882/892-99%), but differ by 10 base pairs with 3 gap and *Phacidiopycnis washingtonensis* (MZ-1-Posth) (882/892-99 %), but differ by 10 base pairs with 3 gaps.

Therefore, considering the phylogenetic placement of our collection within Phacidiales and the guidelines to introduce new taxa provided by Jeewon & Hyde (2016), we introduce the new genus *Bacilliformis* here.

Bacilliformis is similar to *Allantophomopsiella*, but is distinct in lacking mucoid apical appendages. Morphology of *Bacilliformis* is also close to *Apostrasseria* and *Allantophomopsis*, but differs in lacking percurrent proliferation and in having short cylindrical or bacilliform conidia (Crous et al. 2014).

RHYTISMATALES

This order was introduced by Hawksworth & Eriksson (1986) to accommodate the single family *Rhytismataceae*. In our analysis *Rhytismataceae* together with *Pezizellaceae* and *Calloriaceae* formed a monophyletic clade close to the *Hyphodiscus-Chalara* clade and therefore, we include them under Rhytismatales.

Calloriaceae Marchand

Facesoffungi number: FoF 05934

Taxa are mostly saprobic in terrestrial and marine habitats and some are endophytes in plant roots (Ashrafi et al. 2018, Baral & Rämä 2015). Ascomata are apothecial. Apothecia are cupulate or rounded to elongated, sessile, erumpent or seemingly superficial, some are closed when immature and opening by slit-like or by lobes. The ectal excipulum is composed of cells of hyaline *textura prismatica* or *textura angularis* to *globulosa* and medullary excipulum is composed of cells of *textura prismatica* to *porrecta*. Paraphyses are filiform or lanceolate, apically slightly swollen, straight or flexuous and sometimes guttulate. Asci are mostly 8-spored, non-amyloid or amyloid and sometimes arising from croziers. Ascospores are ellipsoid to fusoid, aseptate or 1–3-sepatate and guttulate (Svrcek 1977b, 1976, 1982, Nannfeldt 1984, Baral & Räma 2015, Baral & Haelewaters 2015, Haelewaters et al. 2018, Ashrafi et al. (2018). Asexual morphs are hyphomycetous and sporodochial. Conidiogenesis is phialidic. Conidia are aseptate and globose to ellipsoid or fusoid (Jaklitsch et al. 2016).

Notes – In our phylogeny the genera *Stamnaria*, *Belonioscyphella*, *Roseodiscus*, *Tetracladium*, *Cistella*, *Urceolella*, *Mycoarthris*, *Rodwayella*, *Psilachnum* and *Rommelaarsia*, which were previously, classified under the other helotilian families, nested within *Calloriaceae*. Jaklitsch et al. (2016) suggested the genetic similarity of *Tetracladium* with *Calloriaaceae*.

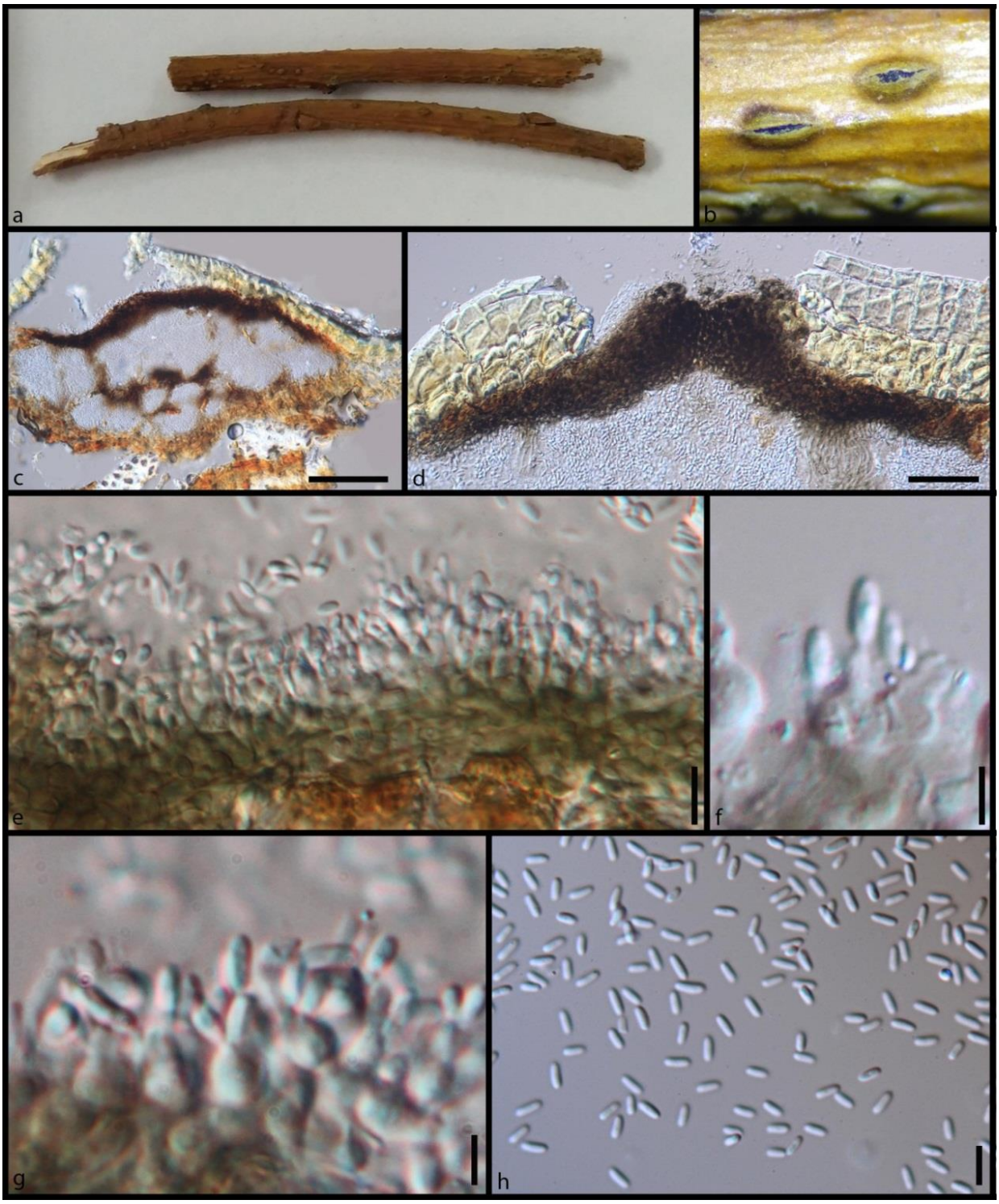

Figure 50 – Morphology of *Bacilliformis hyalinus* (MFLU 18-2671 holotype) a Substrate. b Conidiomata on substrate. c Cross section of conidioma. d Close up of cross section of conidioma at ostiole. e–g Different stages of conidiogenesis. h Conidia of different stages. Scale bars: c = 100 μm, d = 50, e = 15 μm, f, g = 5, h = 10.

Baral & Haelewaters (2015) showed the placement of *Rommelaarsia*, *Psilachnum* and *Cistella* within *Calloriaceae*. Close phylogenetic relationship of *Rodwayella*, *Cistella*, *Urceolella*, *Tetracladium*, *Belonioscyphella*, *Roseodiscus*, *Psilachnum* and *Polyphilus* within *Calloriaceae* was reported by Ashrafi et al. (2018). Bergero et al. (2003) showed close phylogenetic relationship between *Mycoarthris* and *Cistella*. Therefore, considering the results of our phylogenetic study and previous literature, we include these genera in the family *Calloriaceae*.

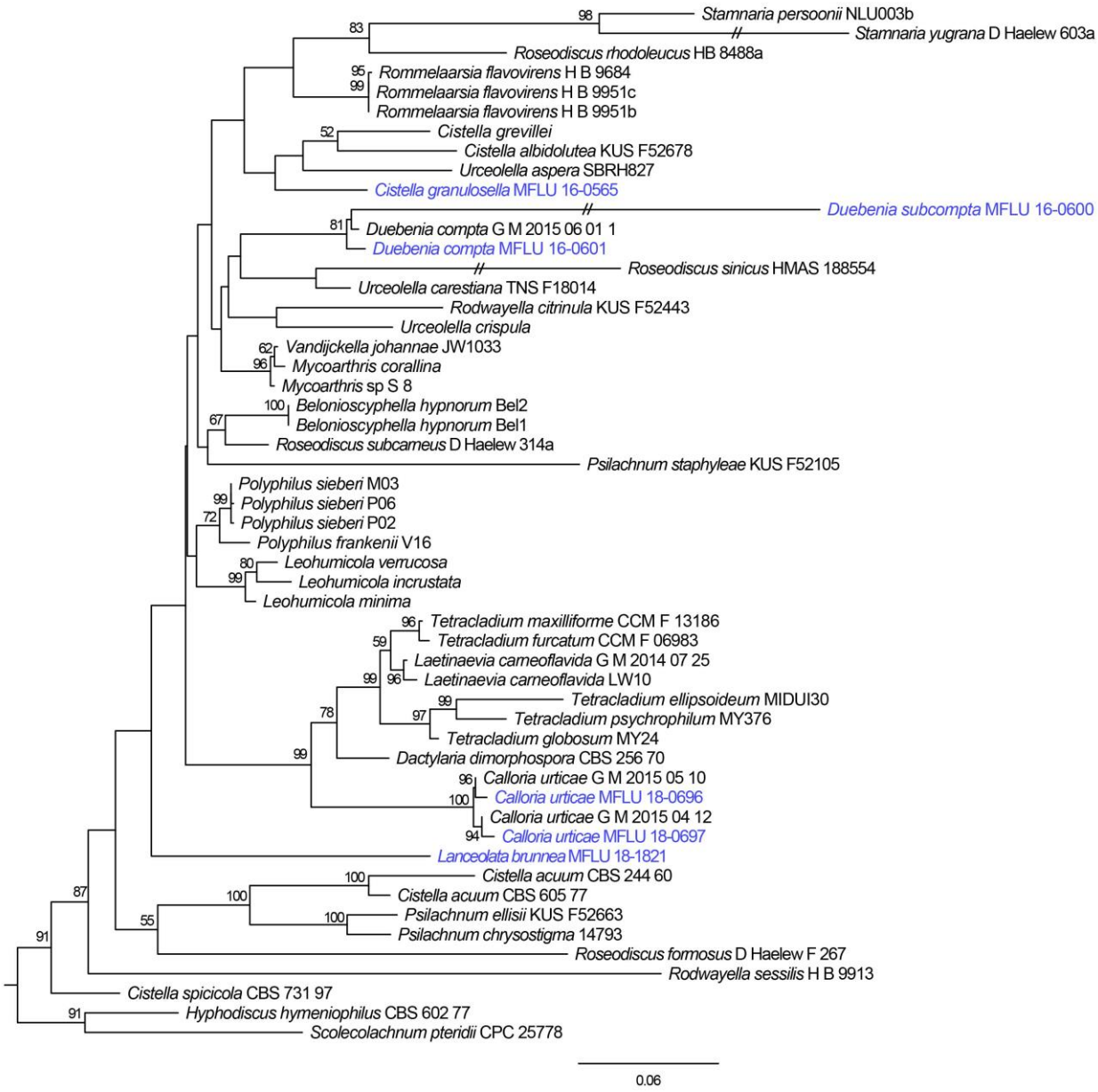

Figure 51 – Phylogram generated from maximum likelihood analysis of sequences of *Calloriaceae* based on ITS and LSU sequence data. MLBP values ≥50% are given near the nodes. Strain/culture numbers are given after the taxa. The tree is rooted with *Hyphodiscus hymeniophilus* (TNS F31801) and *Scolecolachnum pteridii* (CPC 25778).

Calloria urticae (Pers.) J. Schröt. ex Rehm

Facesoffungi number: FoF 05935; Fig. 52

Saprobic on dead stems. **Sexual morph:** *Apothecia* 300–350 × 100–150 µm, arising singly or in groups, sessile, erumpent. *Receptacle* cupulate, reddish orange. *Disc* concave, reddish orange. *Ectal excipulum* 15–20 µm ($\bar{x}$ = 17 µm, n = 10) in upper flanks, composed of thin-walled, light brown to hyaline cells of *textura prismatica* to *angularis*. *Medullary excipulum* 8–12 µm ($\bar{x}$ = 10 µm, n = 10) in upper flanks, composed of thin-walled, hyaline cells of *textura oblita*. *Hymenium* hyaline. *Paraphyses* 2–3.5 µm wide ($\bar{x}$ = 2.8 µm, n = 20), numerous, filiform, obtuse, slightly swollen and curved at the apex, aseptate, smooth. *Asci* 55–75 × 6.5–8.5 µm ($\bar{x}$ = 61 × 7 µm, n = 30), 8-spored, unitunicate, cylindric-clavate, rounded apex, amyloid, stipitate base, croziers absent. *Ascospores* 5.5–7 × 3–4 µm ($\bar{x}$ = 6.6 × 3.6 µm, n = 40), 1–2-seriate, ellipsoid, aseptate, hyaline. **Asexual morph:** Undetermined.

Material examined – UK, West Sussex, Singleton, on unidentified stem, 5 April 2017, E. B. G. Jones, GJ346a (MFLU 18-0696), GJ346b (MFLU 18-0697).

GenBank accessions – MFLU 18-0696: LSU- MK591968, ITS- MK584941, SSU- MK585029, TEF- MK637045, RPB2- MK373057; MFLU 18-0697: LSU- MK591969, ITS- MK584942, SSU- MK585030, TEF- MK637046, RPB2- MK373058

Notes – Our collection of *Calloria urticae* from UK grouped with the European collections of *C. urticae* (G.M. 2015-05-10 and G.M. 2015-04-12) (Fig. 51) with high statistical support. The ITS regions of our collections are identical with *C. urticae* (G.M. 2015-05-10) and 99% similar to that of *C. urticae* (G.M. 2015-04-12) (549/550-99% with no gaps). *Calloria urticae* is characterized by sessile erumpent, reddish orange apothecia, filiform paraphyses with obtuse, slightly swollen and curved apices, cylindric-clavate, amyloid asci and ellipsoid, aseptate ascospores. We identify our collection based on genetic similarities.

Lanceolata Ekanayaka & K.D. Hyde, ***gen. nov.***

Index Fungorum number: IF556300; Facesoffungi number: FoF 05936

Etymology – refers to the lanceolate paraphyses.

Saprobic on dead stems. **Sexual morph:** *Apothecia* arising singly, sessile, superficial. *Receptacle* cupulate, brown or orange with glassy appearance. *Disc* concave, brown. *Ectal excipulum* composed of thin-walled, light brown to hyaline cells of *textura angularis*. *Medullary excipulum* composed of thin-walled, hyaline cells of *textura prismatica*. *Hymenium* hyaline. *Paraphyses* numerous, filiform, lanceolate, conical at the apex, aseptate, smooth. *Asci* arising from croziers, 8-spored, unitunicate, cylindric-clavate, conical to rounded apex, amyloid, sub-stipitate base, absent at the base of asci. *Ascospores* fusoid, aseptate, hyaline, guttulate. **Asexual morph:** Undetermined.

Type species: *Lanceolata brunnea*

Lanceolata brunnea Ekanayaka & K.D. Hyde, ***sp. nov.***

Index Fungorum number: IF556299; Facesoffungi number: FoF 05937; Fig. 53.

Etymology – refers to the brownish apothecia

Holotype – MFLU 18-1821

Saprobic on dead stems. **Sexual morph:** *Apothecia* 400–500 × 100–150 µm, arising singly, sessile, superficial. *Receptacle* cupulate, brown or orange with glassy appearance. *Disc* concave, brown. *Ectal excipulum* 15–18 µm ($\bar{x}$ = 17 µm, n = 10) in lower flanks, composed of thin-walled, light brown to hyaline cells of *textura angularis*. *Medullary excipulum* 9–15 µm ($\bar{x}$ = 13 µm, n = 10) in lower flanks, composed of, thin-walled, hyaline cells of *textura prismatica*. *Hymenium* hyaline. *Paraphyses* 2.5–3.5 µm wide ($\bar{x}$ = 3.3 µm, n = 20), numerous, filiform, lanceolate, conical at the apex, aseptate, smooth. *Asci* 35–50 × 6–9 µm ($\bar{x}$ = 43 × 8.4 µm, n = 30), arising from croziers, 8-spored, unitunicate, cylindric-clavate, conical to rounded apex, amyloid, sub-stipitate base, arising from croziers. *Ascospores* 12–20 × 3–4 µm ($\bar{x}$ = 17 × 3.6 µm, n = 40), 1–2-seriate, fusoid, aseptate, hyaline, guttulate. **Asexual morph:** Undetermined.

Material examined – UK, Hampshire, New Forest, Exbury Gardens, 19 April 2016, E.B.G Jones, GJ270 (MFLU 18-1821).

GenBank accessions – LSU- MK591967, ITS- MK584940, SSU- MK585028, TEF- MK637044, RPB2- MK373056

Notes – Our collection formed an independent clade within *Calloriaceae* close to *Calloria urticae* clade (Fig. 51). However, the statistical support for this clade is low.

The LSU region of our collection is similar to that of *Polyphilus sieberi* (P02) (861/888-97% with 4 gaps) and *Polyphilus frankenii* (REF050) (849/875-97% with 2 gaps). The ITS region shows 90% similarity to that of *Hyphodiscus brachyconius* (CBS 700.73) (376/423-89%), but differ by 47 base pairs with 7 gaps and *Hyphodiscus brevicollaris* (CBS 126.74) (366/410-89%), but differ by 44 base pairs with 11 gaps. The single gene analyses of LSU and ITS from *Calloriaceae* and some

selected helotilian taxa shows its placement within *Calloriaceae* (data not shown). Therefore, we introduce this collection as a new genus in *Calloriaceae.*

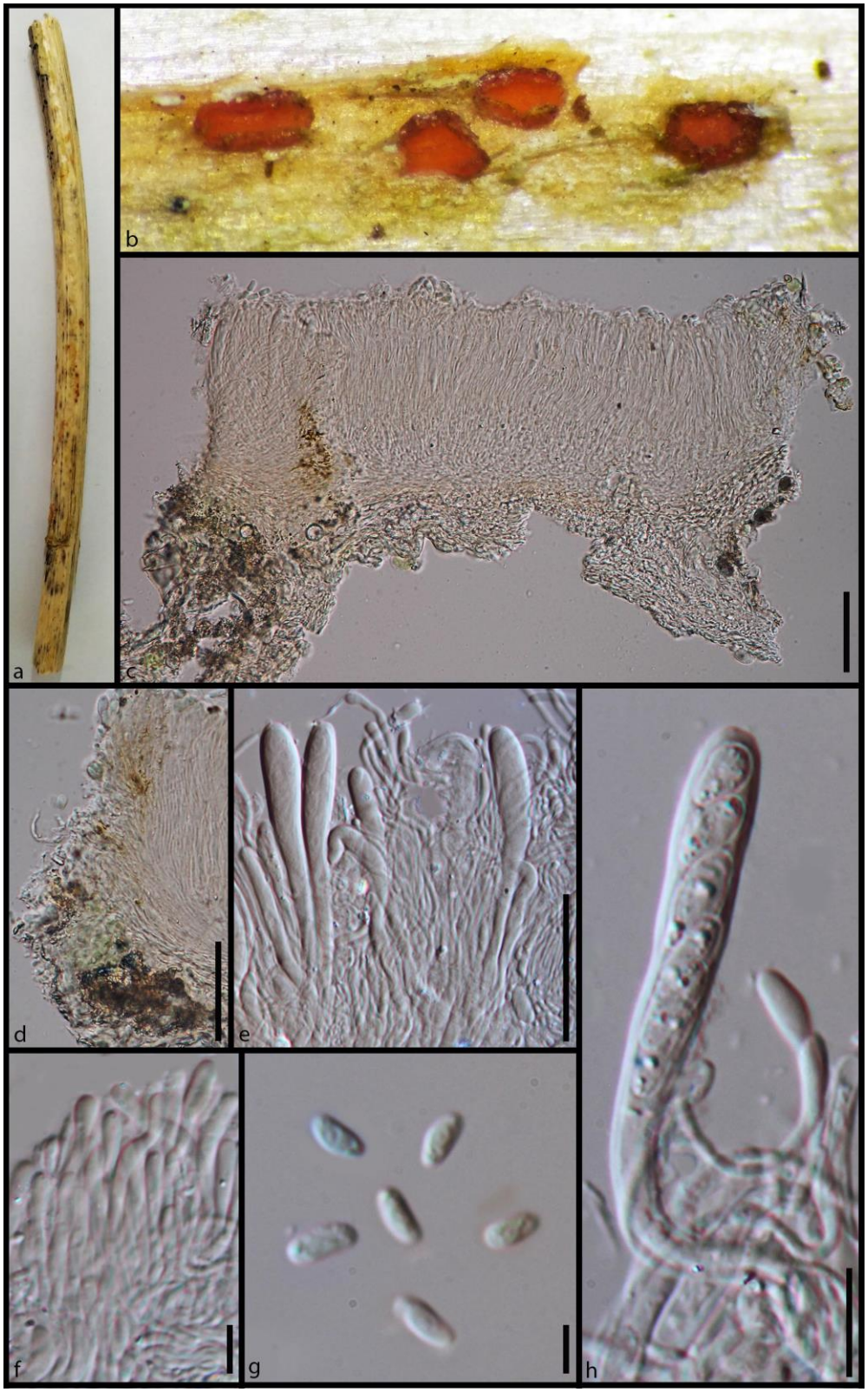

Figure 52 – Morphology of *Calloria urticae* (MFLU 18-0696) a Substrate. b Apothecia on stem. c Cross section of an apothecium. d Close up of the cross section of apothecium at margins. e Asci and paraphyses. f Filiform paraphyses. g Ellipsoid ascospores. h Cylindric-clavate ascus. Scale bars: c, d = 40 µm, e = 35 µm, f, g = 5 µm, h = 10 µm.

Lanceolata is similar to other taxa within the family *Calloriaceae* by having brown to orange cupulate apothecia, amyloid asci arising from croziers, ellipsoid to fusoid ascospores. However, it differs from *Calloria*, *Stamnaria*, *Roseodiscus* and *Belonioscyphella* by having lanceolate paraphyses and from *Psilachnum*, *Cistella*, *Rommelaarsia* and *Urceolella* by not having hairs on the apothecia (Svrcek 1977b, 1976, 1982, Nannfeldt 1984, Zheng & Zhuang 2013, Baral & Rama 2015, Baral & Haelewaters 2015, Egertová et al. 2016b, Quijada et al. 2017).

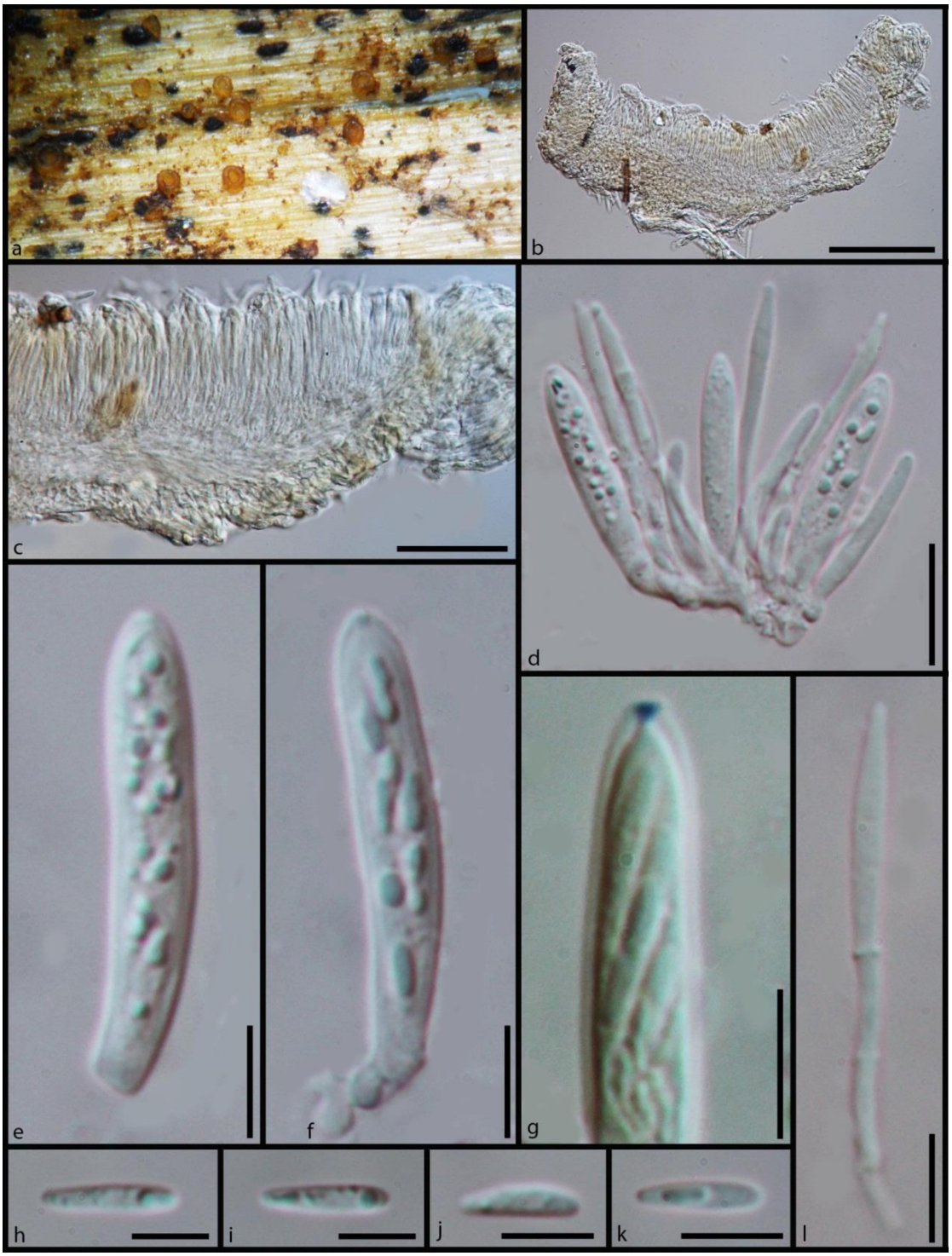

Figure 53 – Morphology of *Lanceolata brunnea* (MFLU 18-1821 holotype) a Apothecia on wood. b Cross section of an apothecium. c Close up of the cross section of apothecium at margins. d Asci and paraphyses. e–f Cylindric-clavate asci. g Amyloid ascus apex in Melzer's reagent. h–k Fusoid ascospores. l Lanceolate paraphyses. Scale bars: b = 100 µm, c = 30 µm, d = 20 µm, e–l = 10 µm.

Cistella granulosella (P. Karst.) Nannf.

Facesoffungi number: FoF 05938; Fig. 54

Saprobic on dead stems. **Sexual morph:** *Apothecia* 130–180 µm wide, arising singly or in small groups, sessile, erumpent from the substrate, brownish white when fresh. *Receptacle* cupulate to urceolate. Disc concave, disc and the margins are brownish white when fresh. *Hairs* 25–32 × 3.5–5 µm ($\bar{x}$ = 30.3 × 4 µm, n = 30), cylindric, clavate, 1–2-septate, hyaline, walls usually thin, apices slightly swollen and finely granulate. *Ectal excipulum* 18–25 µm ($\bar{x}$ = 21.8 µm, n = 10) in margins and upper flanks, 3–4 cells deep, cell walls are thick, brown cells of *textura globulosa* to *angularis*. *Medullary excipulum* 12–22 µm ($\bar{x}$ = 16.3 µm, n = 10) in upper flanks, composed of narrow, long, thin-walled, hyaline cells of *textura epidomoidea*. *Hymenium* hyaline. *Paraphyses* 1.2–1.8 µm wide ($\bar{x}$ = 1.4 µm, n = 20), numerous, filiform, branched, septate, hyaline, acute at the apex, not exceeding asci in length. *Asci* 30–40 × 5–7 µm ($\bar{x}$ = 33.4 × 5.7 µm, n = 30), 8-spored, unitunicate, cylindric-clavate, rounded or medium conical and amyloid apex, short stipitate base, arising from croziers. *Ascospores* 6–7.5 × 1.5–1.8 µm ($\bar{x}$ = 7 × 1.7 µm, n = 40), multi-seriate, ellipsoid-clavate, aseptate, hyaline, one side rounded and other side slightly pointed. **Asexual morph:** Undetermined.

Material examined – UK, Isle of Wight, Calbourne stream, on *Apiaceae* stem, 11 May 2015, E. B. G. Jones, GJ154a (MFLU 16-0565).

GenBank accessions – LSU- MK591962, ITS- MK584936, SSU- MK585023

Notes – Our new collection from UK grouped with *Cistella albidolutea* (KUS F52678) and *C. grevillei*, but with low statistical support (Fig. 51). The ITS data of our collection is similar to *Polyphilus sieberi* (strain 17A) (517/551-94% with 8 gaps), *Urceolella carestiana* (TNS-F18014) (491/526-93% with 6 gaps), *Cistella albidolutea* (KUS-F52678) (480/526-91% with 11 gaps) and to *Leohumicola minima* (CBS 209.74) (492/535-92 % with 9 gaps). The LSU region is similar to that of *Polyphilus frankenii* (strain V16) (839/862-97% with 1 gap), *Polyphilus sieberi* (strain M03) (840/862-97% with 1 gap) and to *Tetracladium maxilliforme* (CCM F-13186) (1080/1176-92% with 15 gaps).

Cistella granulosella is similar to *Psilachnum* and *Cistella*, but differs from *Psilachnum* by having hairs with granulate walls.

However, its morphology fits with the description of *Cistella granulosella* provided by Raitviir (2004). *Cistella granulosella* is similar to *C. dentata* but differs in lacking dentate margins and slightly smaller asci (Quijada et al. 2015).

Duebenia subcompta Ekanayaka & K.D. Hyde, ***sp. nov.***

Index Fungorum number: IF556301; Facesoffungi number: FoF 05939; Fig. 55.

Etymology – refers to the similarity the species *Duebenia compta*

Holotype – MFLU 16-0600

Saprobic on dead stems. **Sexual morph:** 625–635 × 225–235 µm ($\bar{x}$ = 630 × 231 µm, n = 10), arising singly or in small groups, sessile, slightly erumpent from the substrate, turbinate, yellow, orange when fresh, brownish yellow when drying. *Receptacle* concave, disc and the margins are yellow to light brown when fresh. *Ectal excipulum* 33–38 µm at flanks ($\bar{x}$ = 34.6 µm, n = 10), composed of pigmented, thick- and granulate-walled, yellow cells of *textura prismatica*. *Medullary excipulum* 22–26 µm at flanks ($\bar{x}$ = 23.4 µm, n = 10), composed of narrow, long, thin-walled, yellow cells of *textura epidomoidea*. *Hymenium* hyaline. *Paraphyses* 3–4 µm wide at the tip ($\bar{x}$ = 3.5 µm, n = 20), numerous, filiform, obtuse, enlarged at the apex, septate, arising from croziers. *Asci* 35–45 × 3.5–5 µm ($\bar{x}$ = 39.8 × 4.5 µm, n = 30), 4–8-spored, short-pedicellate, unitunicate, cylindric-clavate, conical at the apex, non-amyloid, arising from croziers. *Ascospores* 6–10 × 2.3–3.2 µm ($\bar{x}$ = 8.4 × 2.8 µm, n = 40), uniseriate, hyaline, smooth-walled, clavate, fusoid, sometimes allantoid, non-septate, usually with two small polar guttules. **Asexual morph:** Undetermined.

Material examined – Italy, Arezzo Province [AR], near Poppi, on dead aerial stems of *Lathyrus* sp., 14 May 2014, Erio Camporesi, IT1873 (MFLU 16-0600).

GenBank accessions – LSU- MK592002, ITS- MK584982, SSU- MK585058, TEF- MK714033

Notes – Our collection from Italy grouped with *Duebenia compta* from Luxembourg (Fig. 51). The ITS data of our collection is similar to *D. compta* (G.M. 2015-06-01-1) (298/350-85% with 6 gaps) and the LSU region is similar to that of *Duebenia compta* (G.M. 2015-06-01-1) (809/905-89% with 10 gaps). *Duebenia subcompta* is characterized by erumpent, orange to brownish apothecia with thick and granulate-walled excipular cells, filiform paraphyses with slightly swollen apices, and aseptate, hyaline ascospores. *Duebenia subcompta* is similar to *D. compta*. However, *D. compta* has 1-septate ascospores and apically curved paraphyses (Hein 1976).

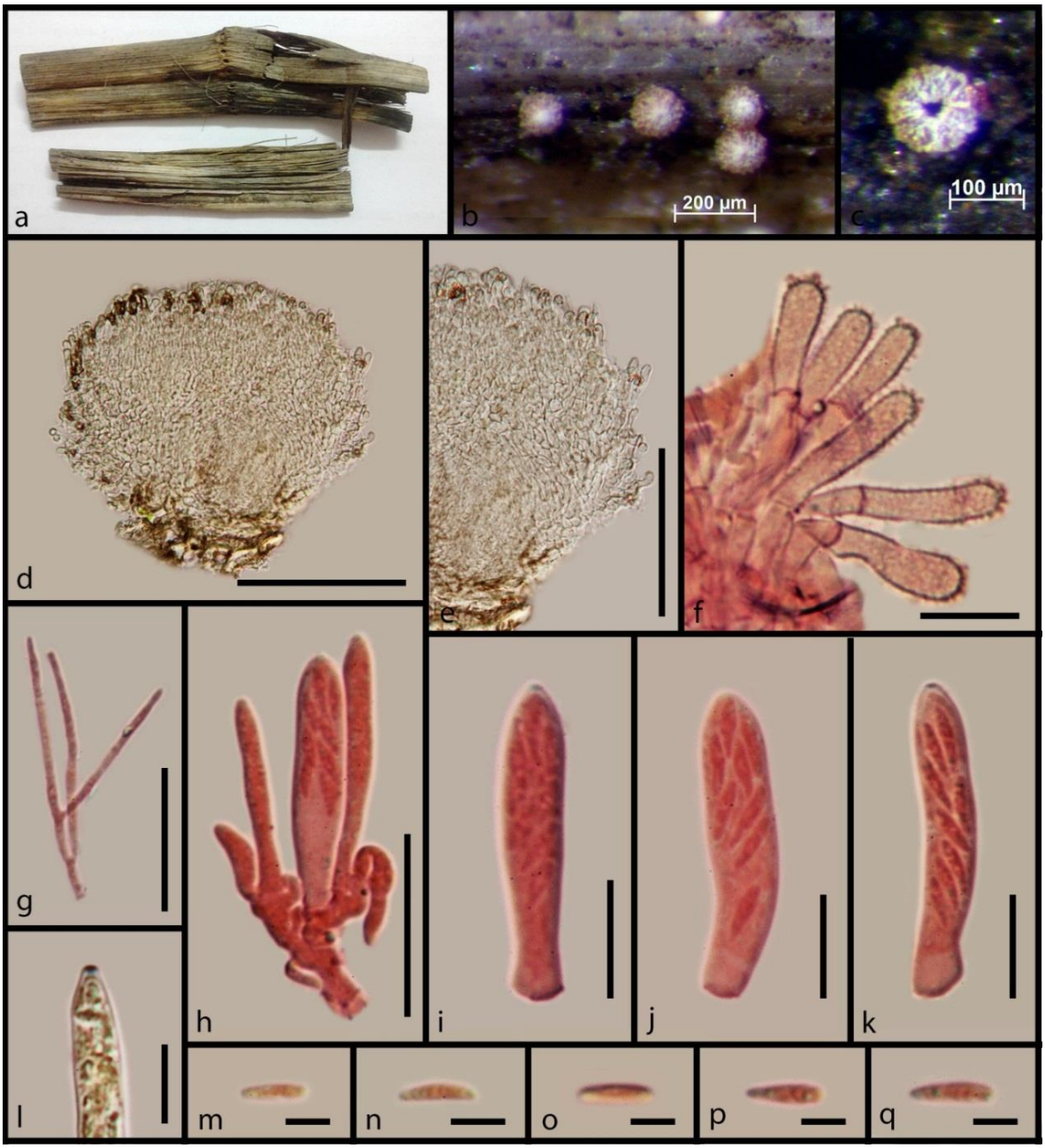

Figure 54 – Morphology of *Cistella granulosella* (MFLU 16-0565) a Substrate. b Apothecia on wood. c Apothecium on wood. d Cross section of an apothecium. e Vertical section of the apothecium at margin. f Clavate hairs (in Congo red reagent). g Aseptate, branched paraphyses (in Congo red reagent). h–k Cylindrical asci (in Congo red reagent). l Amyloid ring at apical apex. m–q Clavate ascospores (in Congo red reagent). Scale bars: b = 200 µm, c = 100 µm, d = 200 µm, e = 100 µm, f–h = 20 µm, i–l = 10 µm, m–q = 5 µm.

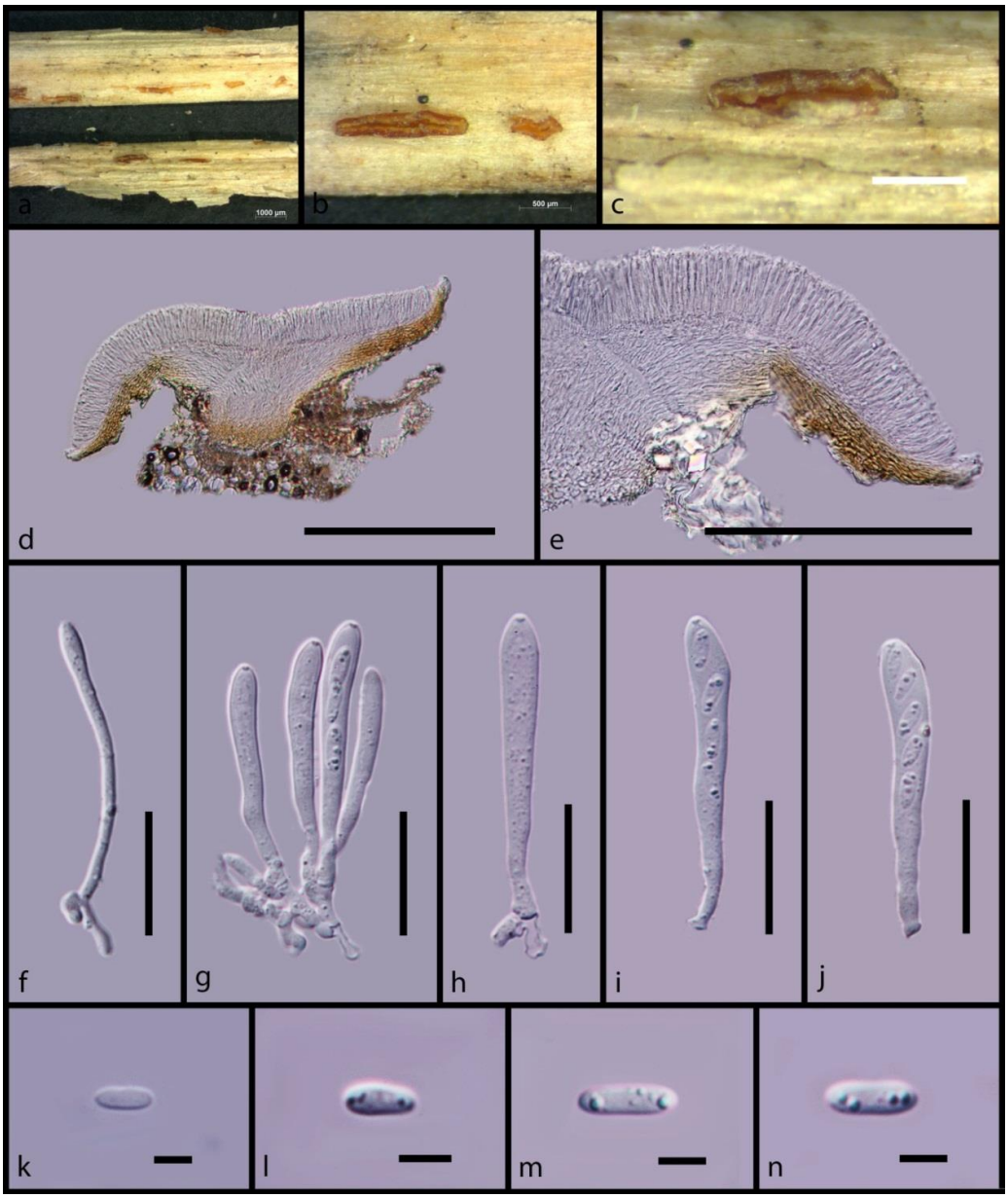

Figure 55 – Morphology of *Duebenia subcompta* (MFLU 16-0600 holotype) a Substrate, b Apothecia on wood, c Apothecium on wood, d Cross section of an apothecium, e Close up of a vertical section of the apothecium at margin, f Septate paraphyses, g–j Short pedicellate asci with croziers at the base, k–n Fusoid ascospores. Scale bars: a = 1000 µm, b, c = 500 µm, d = 80 µm, e = 200 µm, f–j = 20 µm, k−n = 5 µm.

Duebenia compta (Sacc.) Nannf. ex B. Hein

Facesoffungi number: FoF 05940; Fig. 56.

Saprobic on dead stems. **Sexual morph:** 450–500 × 300–400 µm ($\bar{x}$ = 468.4 × 353.3 µm, n = 10). *Apothecia* scattered, sessile, erumpent from the substrate. *Disc* brown, concave and smooth. *Receptacle* cupulate, brown at margins. *Ectal excipulum* 24.1–33.5 µm ($\bar{x}$ = 28.1 µm, n = 10), composed of thin-walled, hyaline cells of *textura prismatica*. *Medullary excipulum* 20–40 µm ($\bar{x}$ = 32.7 µm, n = 10), composed of narrow, thin-walled, hyaline cells of *textura epidomoidea*. *Hymenium* hyaline. *Paraphyses* 1.5–2 µm wide ($\bar{x}$ = 1.9 µm, n = 20), numerous, filiform, lanceolate at the apex, septate, exceeding asci in length, apices of the paraphyses stuck together and develop a pseudoepithecium on the hymenium layer. *Asci* 55.3–62.2 × 6.2–6.6 µm ($\bar{x}$ = 58.5 × 6.4 µm, n = 30), 8-spored, cylindric-clavate, unitunicate, rounded at the apex, faintly amyloid, tapered

and stipitate base, arising from croziers. *Ascospores* 6–8 × 2.5–3 µm ($\bar{x}$ = 7.4 × 2.8 µm, n = 40), hyaline, partially biseriate, smooth-walled, clavate, fusoid, 0–1-septate.

Material examined – Italy, Forlì-Cesena Province [FC], Passo della Braccina – Premilcuore, dead aerial stem of Ononis spinosa, 1 June 2014, Erio Camporesi, IT1906 (MFLU 16-0601).

GenBank accessions – LSU- MK592003, ITS- MK584983, SSU- MK585059

Notes – Our new *Duebenia* collection from Italy grouped with *Duebenia subcompta* from Italy and *D. compta* from Luxembourg. The ITS and LSU data of our collection is 99% similar to that of *D. compta* (G.M. 2015-06-01-1) (ITS: 545/551-99% with 3 gaps, LSU: 875/882-99% with 2 gaps). Morphological characteristics of our collection are similar to the description of *D. compta* by Hein (1976).

Duebenia compta is characterized by erumpent, dark brown to light brown apothecia with thick and granulate-walled excipular cells, filiform paraphyses with slightly swollen apices, and 0–1-septate, hyaline ascospores.

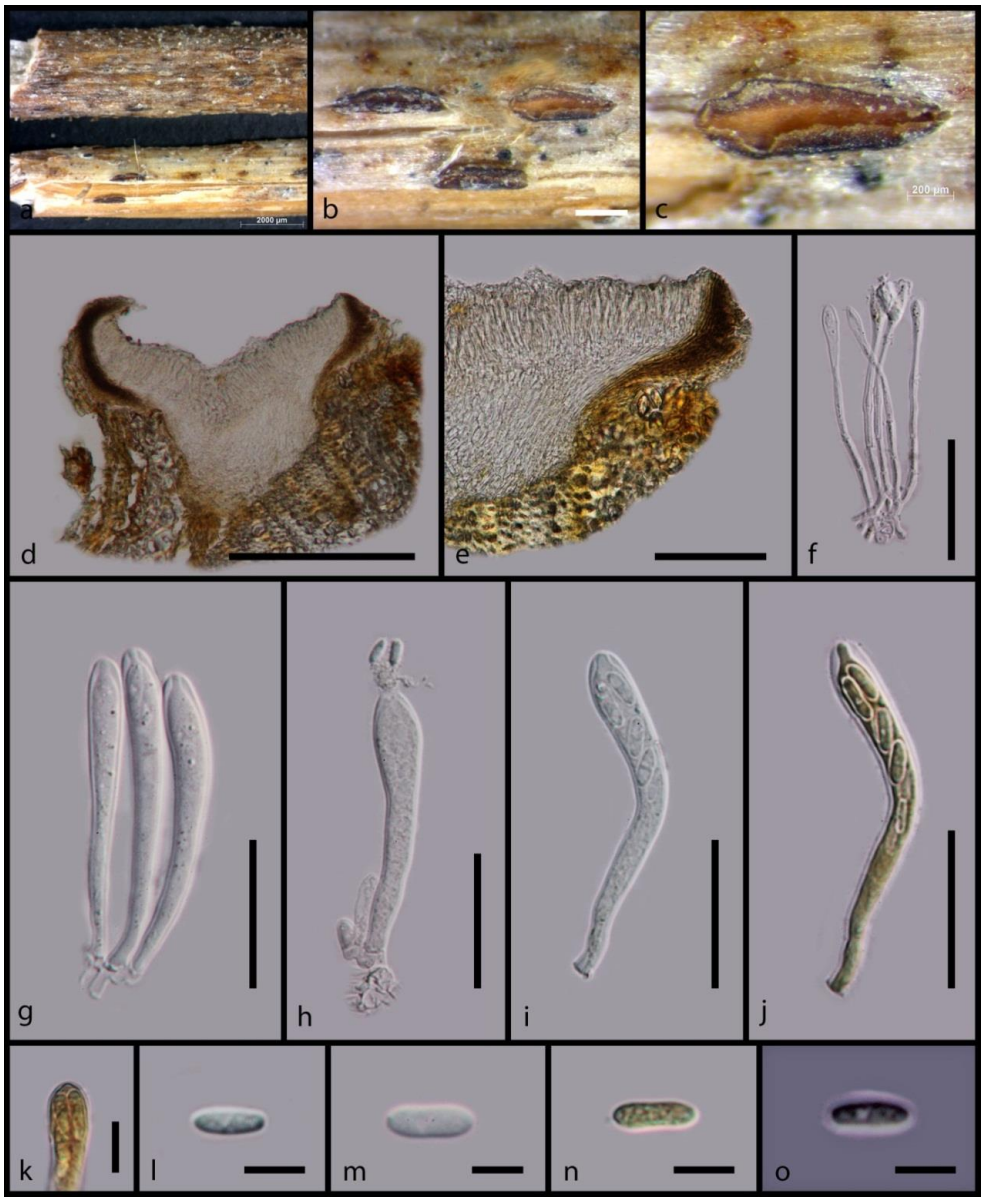

Figure 56 – Morphology of *Duebenia compta* (MFLU 16-0601) a Substrate. b Apothecia on wood. c Apothecium on wood. d Cross section of an apothecium. e Close up of a vertical section of the apothecium at margin and flanks. f Septate paraphyses. g–j Short pedicellate asci. k Amyloid ring at the ascus apex. l–o Fusoid ascospores. Scale bars: a = 2000 µm, b = 500 µm, c = 200 µm, d = 300 µm, e = 100 µm, f = 30 µm, g–j = 25 µm, k = 10 µm, l–o = 5 µm.

Pezizellaceae Velen.

= *Bloxamiaceae* Locq. ex Hern.-Restr., Gené, R.F. Castañeda, J. Mena, Crous & Guarro

Facesoffungi number: FoF 05941

Taxa are saprobic on dead plant material. Ascomata are apothecial. Apothecia are discoid to cupulate, sessile or stipitate. The margins are smooth or covered by hairs. Hairs are hyaline, cylindrical and septate or aseptate. The ectal excipulum is composed of cells of *textura angularis*, *prismatica* or *oblita* and medullary excipulum is composed of cells of *textura intricata*. Paraphyses are filiform or lanceolate and septate or aseptate. Asci are 4–8-spored, amyloid or non-amyloid, cylindric-clavate, sometimes arising from croziers. Ascospores are ellipsoid, allantoid to fusoid, 0–3-septate and guttulate (Baral & Rämä 2015, Carpenter & Dumont 1978, Seifert and Carpenter 1987, Jaklitsch et al. 2016). Asexual morphs are hyphomycetous, sporodochial and phialidic. Conidia are fusoid to cylindrical and 0–1-septate (Kowalski & Bartnik 2010, Koukol 2011, Jaklitsch et al. 2016, Crous et al. 2016, Guatimosim et al. 2016, Hernandez-Restrepo et al. 2017, Hosoya & Zhao 2016, Spooren 2014).

Notes –In our phylogenetic study, the family *Bloxamiaceae* clustered within *Pezizellaceae*. Therefore, we synonymize the later family *Bloxamiaceae* under the older name *Pezizellaceae*.

Bisporella shangrilana W.Y. Zhuang & H.D. Zheng

Facesoffungi number: FoF 05942; Fig. 58

Saprobic on dead stems. **Sexual morph:** *Apothecia* 2–4 × 1–2 mm, arising in clusters, stipitate. *Receptacle* cupulate. *Disc* concave. *Ectal excipulum* 20–25 µm ($\bar{x}$ = 20.3 µm, n = 10) in lower flanks, composed of thin-walled, light brown to hyaline, gelatinized cells of *textura angularis* to *intricata*. *Medullary excipulum* 90–110 µm ($\bar{x}$ = 102 µm, n = 10) in lower flanks, composed of thin-walled, hyaline, gelatinized cells of *textura intricata*. *Hymenium* hyaline. *Paraphyses* 1–2 µm wide ($\bar{x}$ = 1.6 µm, n = 20), numerous, filiform, obtuse and slightly swollen at the apex, aseptate, smooth, aguttulate. *Asci* 85–100 × 8–10 µm ($\bar{x}$ = 98 × 9 µm, n = 30), 8-spored, unitunicate, cylindric, apex rounded and amyloid, base stipitate, croziers absent. *Ascospores* 6.5–10.5 × 3–5.2 µm ($\bar{x}$ = 8.3 × 4.6 µm, n = 40), 1–2-seriate, ellipsoid, aseptate, rarely 1-septate, hyaline. **Asexual morph:** Undetermined.

Material examined – China, Yunnan Province, Shangri-La, Da-cuo National Park, opposite of Bi-Ta Lake, alt. 3551m, 22 September 2015, Bo Li, HK01 (HKAS 90655a), HK03 (HKAS 90655b).

GenBank accessions – HKAS 90655a: LSU- MK591998, ITS- MK584972, SSU- MK585053, TEF- MK637050; HKAS 90655b: LSU- MK591997, ITS- MK584971, SSU- MK585052, TEF- MK637049

Notes – Our collection from China grouped with the type species of *Bisporella shangrilana* (HMAS 275569) (Fig. 57). The ITS data of our collections is 99% similar to that of *B. shangrilana* (HMAS 275569) (498/499-99% with 1 gap) and its morphology is similar to the type description of *B. shangrilana* (Zhuang et al. 2017). *Bisporella shangrilana* is characterized by its gelatinized excipulum (Zhuang et al. 2017).

Bisporella discedens (P. Karst.) S.E. Carp.

Facesoffungi number: FoF 05943; Fig. 59

Saprobic on dead stems. **Sexual morph:** *Apothecia* 0.7–1 × 0.2–0.3 µm, scattered singly, sessile, slightly erumpent from the substrate, cupulate, yellow when fresh. *Receptacle* concave, disc and the margins are yellow to white when fresh. *Hymenium* hyaline. *Hairs* 10–15 × 1.5–2 µm ($\bar{x}$ = 13.4 × 1.8 µm), cylindric, thick-walled, pigmented, 3-septate. *Ectal excipulum* 17–23 µm ($\bar{x}$ = 19.9 µm, n = 10), composed of thin-walled, hyaline cells of *textura prismatica*. *Medullary excipulum* 60–70 µm ($\bar{x}$ = 64.3 µm, n = 10), composed of narrow, thin-walled, hyaline cells of *textura epidomoidea*. *Paraphyses* 0.9–1.3 µm wide ($\bar{x}$ = 1.1 µm, n = 20), numerous, filiform, obtuse at the apex, septate, septate. *Asci* 65–75 × 4.7–5.5 µm ($\bar{x}$ = 73.1 × 5.2 µm, n = 30), cylindric-clavate, unitunicate, rounded apex, non-amyloid, tapered and stipitate base, arising from croziers.

Ascospores 7.2–9.1 × 2.5–3 µm ($\bar{x}$ = 8.7 × 2.7 µm, n = 40), fusiform, hyaline, 1-septate, smooth-walled. **Asexual morph:** hyphomycetous, sporodochial, on the surface of the receptacle of the apothecia. *Conidiogenous cells* phialidic, dark brown. *Conidia* 2–3 × 1 µm, ellipsoid to ovoid, aseptate, hyaline, with two guttules.

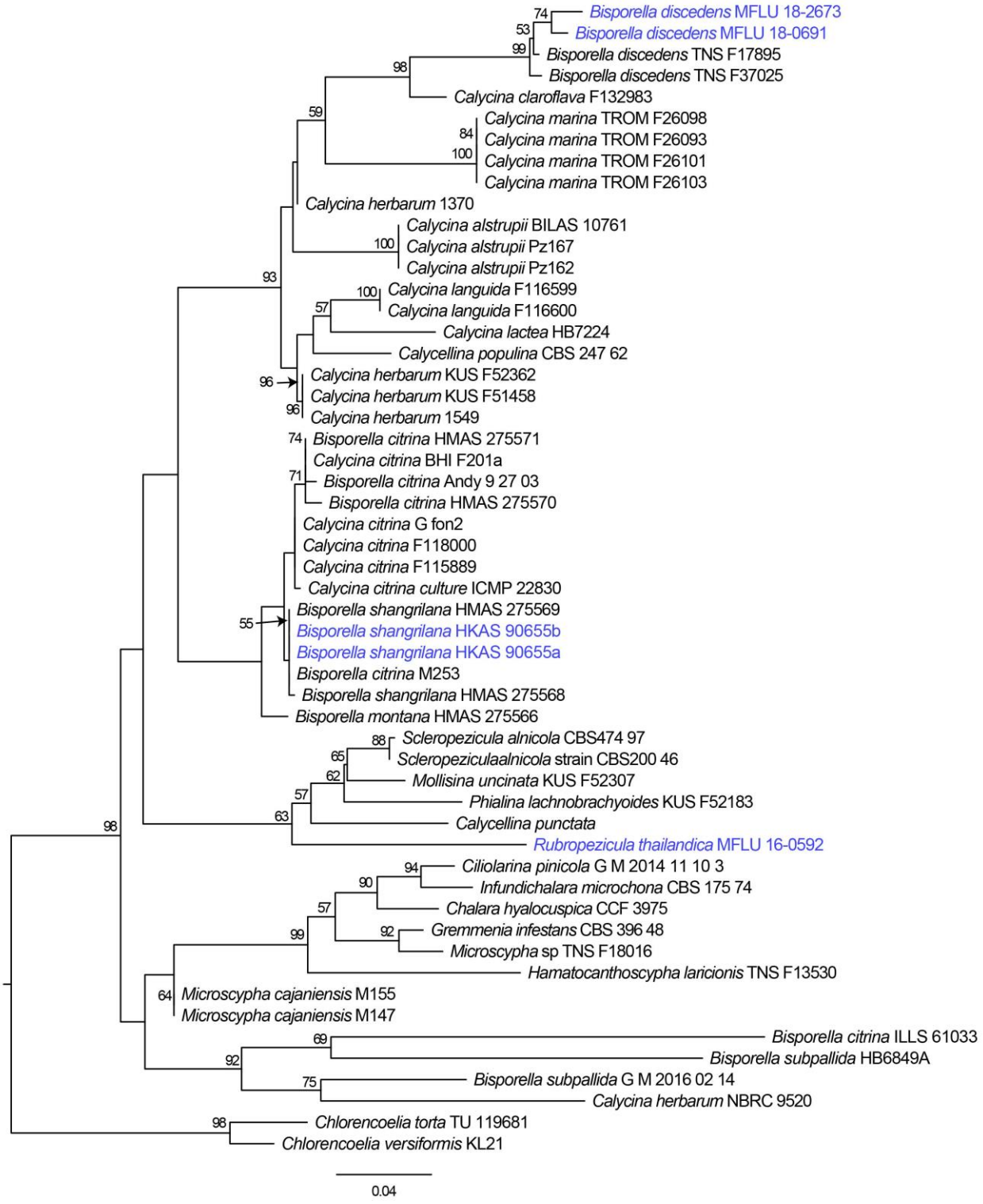

Figure 57 – Phylogram generated from maximum likelihood analysis of sequences of *Pezizellaceae* based on ITS sequence data. MLBP values ≥50% are given near the nodes. Strain/culture numbers are given after the taxon names. The tree is rooted with *Chlorencoelia versiformis* (KL21) and *Chlorencoelia torta* (TU 119681).

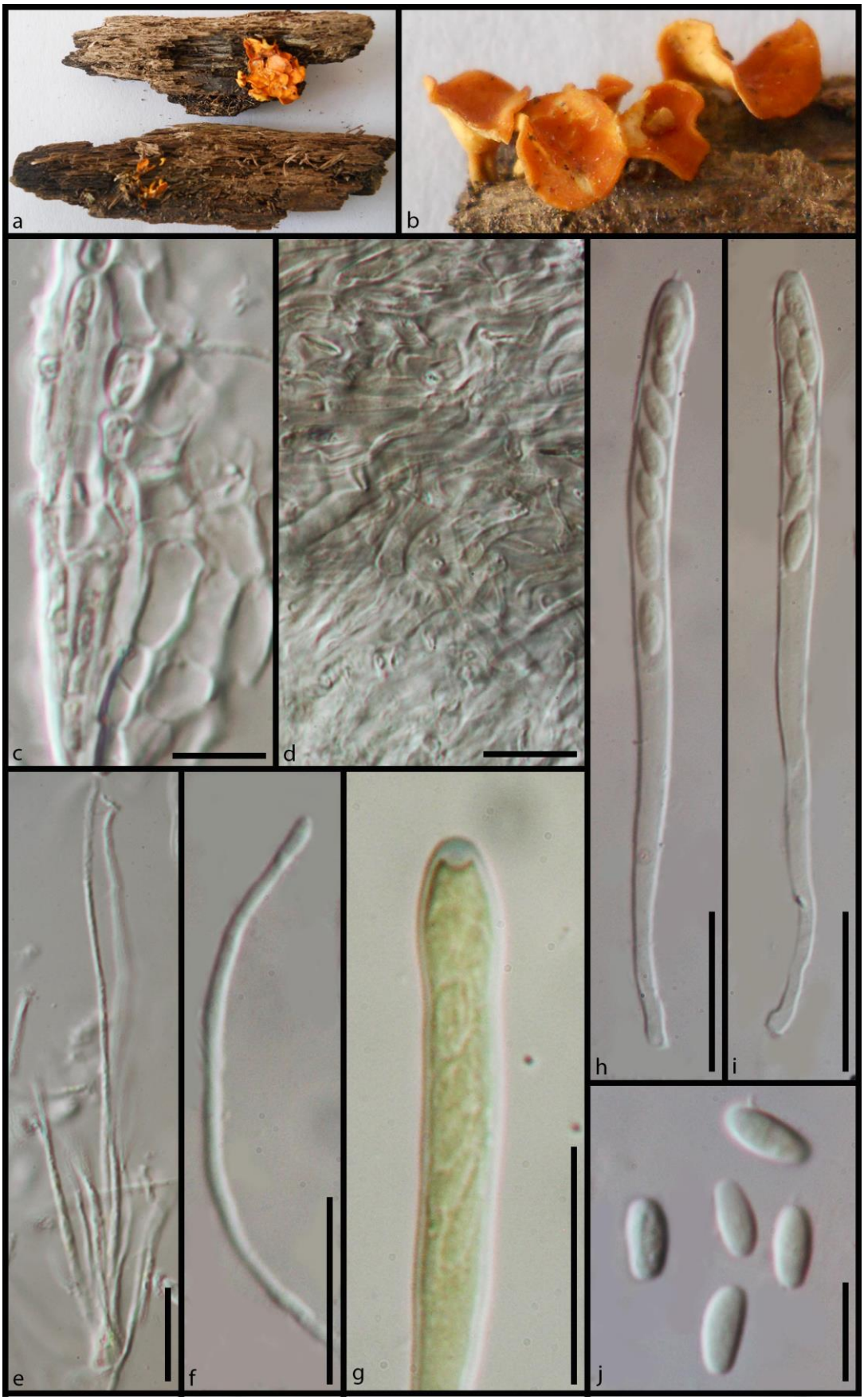

Figure 58 – Morphology of *Bisporella shangrilana* (HKAS 90655) a, b Apothecia on wood. c Ectal excipular cells. d Medullary excipular cells. e, f Filiform paraphyses. g Amyloid ascus apex. h–i Cylindrical asci. j Ellipsoid ascospores. Scale bars: c–i = 20 µm, j = 10 µm.

Material examined – Thailand, Chiang Mai Province, Mushroom Research Center, 1 March 2015, A. H. Ekanayaka HD014 (MFLU 18-2673), Thailand, Mushroom Research Center, Chiang Mai Province, 18 July 2017, A. H. Ekanayaka, HD077 (MFLU 18-0691).

GenBank accessions – MFLU 18-2673: LSU- MK591982, ITS- MK584952, SSU- MK585035; MFLU 18-0691: LSU- MK591996, ITS- MK584970, SSU- MK585043, TEF- MK714026

Notes – Our collections from Thailand grouped with *Bisporella discedens* (TNS F17895) from Japan (Fig. 57) and the whole clade received strong statistical support of 99%. The ITS data of our collection is 98% similar to that of *B. discedens* strains TNS:F37025 (517/528-98% with 4 gaps) and TNS:F17895 (514/525-98% with 5 gaps). *Bisporella discedens* is characterized by whitish to yellowish apothecia with a thick layer of medullary excipulum of *textura epidomoidea*, cylindric-clavate asci and 1-septate, ellipsoid ascospores (Carpenter & Dumont 1978) and our collection agrees with these features. In our collection we observed a bloxamia-like asexual morph to *Bisporella discedens*.

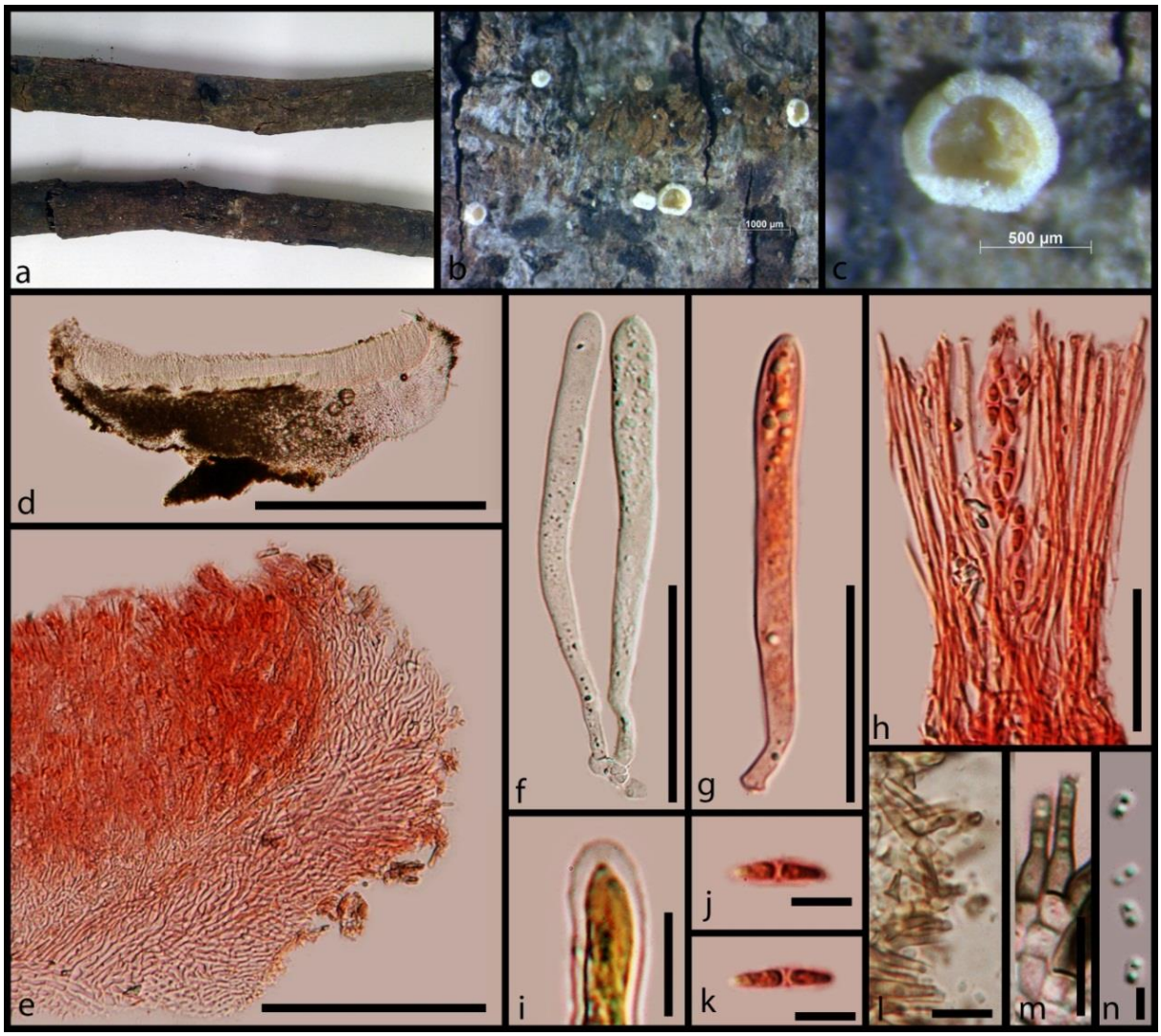

Figure 59 – Morphology of *Bisporella discedens* (MFLU 18-2673) a Substrate. b Apothecia on wood. c Apothecium on wood. d Cross section of an apothecium. e Close up of a vertical section of the apothecium at margin (in Congo red reagent). f, g Stipitate asci (f mounted in water and g in Congo red reagent). h Septate paraphyses with ascus (in Congo red reagent). i Close up of ascus apex. j, k Hyaline, single septate ascospores (in Congo red reagent). l, m Conidiogenous cells. n Conidia. Scale bars: b = 1000 µm, c = 500 µm, d = 500 µm, e = 100 µm, f, g = 30 µm, h = 30, i = 10 µm, j, k = 5 µm, l, m = 10 µm, n = 2 µm.

Rubropezicula Ekanayaka & K.D. Hyde, ***gen. nov.***

Index Fungorum number: IF556302; Facesoffungi number: FoF 05944

Etymology – refers to the similarity with the genus *Pezicula* and presence of red pigments in excipular hairs.

Saprobic on dead stems. **Sexual morph:** *Apothecia* arising in small groups, sessile to sub-stipitate, erumpent. *Receptacle* cupulate, disc flat and whitish, margins are covered with hairs. *Hairs* cylindric, septate, composed of red pigments that readily dissolve in KOH and slightly dissolve in water. *Ectal excipulum* composed of cells of *textura angularis. Medullary excipulum* composed of cells of *textura prismatica*. *Hymenium* hyaline to reddish. *Paraphyses* numerous, filiform, obtuse and slightly swollen at the apex, septate, not exceeding the asci in length, smooth, aguttulate. *Asci* 8-spored, unitunicate, cylindric-clavate, rounded or medium conical at the apex, amyloid, stipitate base, croziers absent. *Ascospores* ovoid, septate, hyaline.

Type species: *Rubropezicula thailandica*

Rubropezicula thailandica Ekanayaka & K.D. Hyde, ***sp. nov.***

Index Fungorum number: IF556303; Facesoffungi number: FoF 05945; Fig. 60.

Etymology – refers to the country where Holotype collected

Holotype – MFLU 16-0592

Saprobic on dead stems. **Sexual morph:** 408–434 × 170–200 µm ($\bar{x}$ = 425.7 × 198.3 µm, n = 10), arising in small groups, sessile to sub-stipitate, erumpent. *Receptacle* cupulate, disc flat and white, margins are red when fresh. *Hairs* 100–150 × 1–2.7 µm ($\bar{x}$ = 130 × 1.7 µm, n = 30), cylindric, septate, walls usually thin, composed of red pigments that readily dissolve in KOH and slightly dissolve in water. *Ectal excipulum* 38–42 µm ($\bar{x}$ = 40.8 µm, n = 10) in lower flanks, composed of thin-walled, dark brown cells of *textura angularis. Medullary excipulum* 10–15 µm ($\bar{x}$ = 12 µm, n = 10) in lower flanks, composed of thin-walled, brown to hyaline cells of *textura prismatica*. *Hymenium* hyaline. *Paraphyses* 1.4–2.4 µm wide ($\bar{x}$ = 1.8 µm, n = 20), numerous, filiform, obtuse and slightly swollen at the apex, septate, not exceeding the asci in length, smooth, aguttulate. *Asci* 80–120 × 10–20 µm ($\bar{x}$ = 102.2 × 14.8 µm, n = 30), 8-spored, unitunicate, cylindric-clavate, rounded or medium conical at the apex, amyloid, stipitate base, croziers absent. *Ascospores* 19.3–23.9 × 6.3–8.3 µm ($\bar{x}$ = 22.2 × 7.6 µm, n = 40), 1–2-seriate, ovoid, septate, hyaline. **Asexual morph:** Undetermined.

Material examined – Thailand, Chiang Mai Province, Mushroom Research Center, on dead stems, 19th July 2015, A.H. Ekanayaka, HD031 (MFLU 16-0592).

GenBank accessions – ITS- MK584963

Notes – In our phylogenetic analysis of *Pezizellaceae* (Fig. 57), our collection formed an independent clade basal to *Scleropezicula-Phialina* clade with strong statistical support of 63%. The ITS data of our collection is 90% similar to that of *Scleropezicula alnicola* (CBS200.46) (503/557-90%) but differ by 54 base pairs with 10 gaps, 85% to *Bisporella citrina* (420526MF0079) (466/546-85%), but differ by 80 base pairs with 16 gaps. Therefore here we considered the phylogenetic position of our collection within *Pezizellaceae* and the guidelines for introducing new taxa provided by Jeewon & Hyde (2016), and introduce the new genus *Rubropezicula* here.

The genus *Rubropezicula* is close to *Scleropezicula* and *Phialina* by having sub-stipitate, cupulate apothecia, filiform paraphyses with swollen apices, and septate, ovoid ascospores (Verkley 1999). However, *Rubopezicula* differs from *Scleropezicula* and *Phialina* by having red pigmented excipular hairs.

Rhytismataceae Chevall.

= *Cudoniaceae* P.F. Cannon

Facesoffungi number: FoF 05946

Taxa are saprobic on dead plant material or parasitic (Wang et al. 2006a). Ascomata are apothecial. Apothecia are long-stipitate, clavate, capitate or spathulate or sessile, erumpent, circular, navicular or hysteriform, clypeate and opening by longitudinal split or radial fissures. The ectal excipulum is composed of cells of *textura angularis* or *textura porrecta* and medullary excipulum is reduced or

Figure 60 – Morphology of *Rubropezicula thailandica* (MFLU 16-0592 holotype) a Substrate. b Apothecia on wood. c Apothecium on wood. d Cross section of an apothecium. e Close up of the cross section of apothecium at margins. f Long cylindrical hairs. g Cylindrical paraphyses. h–k Cylindric-clavate asci. l Apex of amyloid asci in Melzer's reagent. m–p Obovoid ascospores. Scale bars: c = 200 µm, d = 200 µm, e = 70 µm, f = 100 µm, g = 50 µm, h–l = 40 µm, m–p = 15 µm. (Note: all the figures appeared reddish, as it is impossible to get rid of pigments produced by hairs)

composed of cells of *textura intricata* to *prismatica*. Paraphyses are rarely absent, filiform, mostly aseptate, branched or unbranched, sometimes apically slightly swollen and strongly curved and hyaline. Asci are 4–8-spored, mostly non-amyloid, cylindric-clavate and arising from croziers. Ascospores are ovoid, ellipsoid, clavate, sub-cylindrical, fusoid or filiform, hyaline, usually aseptate, apex slightly curved, base strongly tapered and sometimes apex partly covered by a gel cap (Wang et al. 2006a, Ge et al. 2014, Geesteranus 1972, Wang et al. 2002, 2006b, Cannon & Minter 1986, Johnston 2001a, b, Minter 1981, Sherwood 1980, Hou & Piepenbring 2006, 2009, Tanney & Seifert 2017). Asexual morphs are pycnidial. Conidiogenesis is holoblastic, with sympodial proliferation. Conidia are ellipsoid to fusoid, rod-shape, hyaline and aseptate (Hou & Piepenbring 2006, Wang et al. 2006a, Ge et al. 2014).

Notes – In our phylogenetic analysis taxa assigned to *Cudoniaceae* nested within *Rhytismataceae*, instead of forming a monophyletic clade. Taxa in *Cudoniaceae* were formerly classified within *Geoglossaceae* considering their morphological similarities (clavate apothecia, filiform ascospores etc.). Later the family was placed under Rhytismatales considering their genetic similarities. However, we synonymize the family under *Rhytismataceae* according to its phylogenetic placement. The same phylogenetic placement of *Cudoniaceae* taxa was observed by Lantz et al. (2011). The taxa of *Cudoniaceae* and *Rhytismataceae* are very similar in their ascus morphology, filiform ascospores with a sheath and apically curled paraphyses (Lantz et al. 2011, Ge et al. 2014, Song et al. 2012, Yang et al. 2011).

Lophodermium microsporum Ekanayaka & K.D. Hyde, ***sp. nov.***

Index Fungorum number: IF556304; Facesoffungi number: FoF 05947; Fig. 62

Etymology – refers to small ascospores

Holotype – MFLU 15-3100

Weak pathogenic on dying leaves and leafstalks. **Sexual morph:** *Apothecia* 0.3–0.5 × 0.5–0.8 mm, arising singly, sessile, erumpent, opening by a longitudinal split. *Receptacle* palisade layer of asci and paraphyses. *Disc* flat. *Excipulum* 15–24 µm ($\bar{x}$ = 20.3 µm, n = 10) thick at lower side walls, composed of thin-walled cells of *textura angularis*, cells in outer layer are dark brown to black and inner cells are light brown to hyaline. *Hymenium* hyaline. *Paraphyses* 1.5–2 µm wide ($\bar{x}$ = 1.7 µm, n = 20), numerous, filiform, obtuse and slightly curved at the apex, rarely septate, exceeding the asci in length, smooth, guttulate. *Asci* 63–68 × 6–9 µm ($\bar{x}$ = 66.2 × 7 µm, n = 30), 8-spored, unitunicate, cylindric, conical and non-amyloid apex, short-stipitate base, arising from croziers. *Ascospores* 34–38 × 1.8–2.2 µm ($\bar{x}$ = 34.5 × 1.9 µm, n = 40), multi-seriate, fusoid, acute tips, aseptate, hyaline, guttulate. **Asexual morph:** Undetermined.

Material examined – Russia, Rostov region, Shakhty City District, flowerbed, weak parasitic on living, dying, and dead leaves and leafstalks of *Paeonia lactiflora* Pall. (Paeoniaceae), 20 September 2015, Timur S. Bulgakov, T-959 (MFLU 15-3100).

GenBank accessions – ITS- MK584994, SSU- MK585019

Notes – The phylogenetic analysis of ITS and LSU data indicates that our collection belongs to *Lophodermium* (Fig. 61). The ITS region of *Lophodermium microsporum* is similar to that of *L. agathidis* (strain T11) (415/460-90% with 4 gaps) and to *L. minor* (strain H12) (415/461-90% with 6 gaps) from China. *Lophodermium microsporum* is positioned in a moderately supported independent clade and nested close to *L. pini-taiwanensis*. *Lophodermium microsporum* differs from *L. pini-taiwanensis*, *L. minor* and *L. agathidis* in possessing shorter asci and ascospores (Johnston 1989, Minter & Hetiige 1983, Li et al. 2016). *Lophodermium paeoniae* was the only member of the Rhytismatales known on the plant genus *Paeonia*. Our new species also recorded from *Paeonia lactiflora*. However our new species differ from *L. paeoniae* by having smaller asci and ascospores. Asci and ascospore measurement of *L. paeoniae* are 65–80 × 8 µm and 55–65 × 1.5 µm (Rehm 1897).

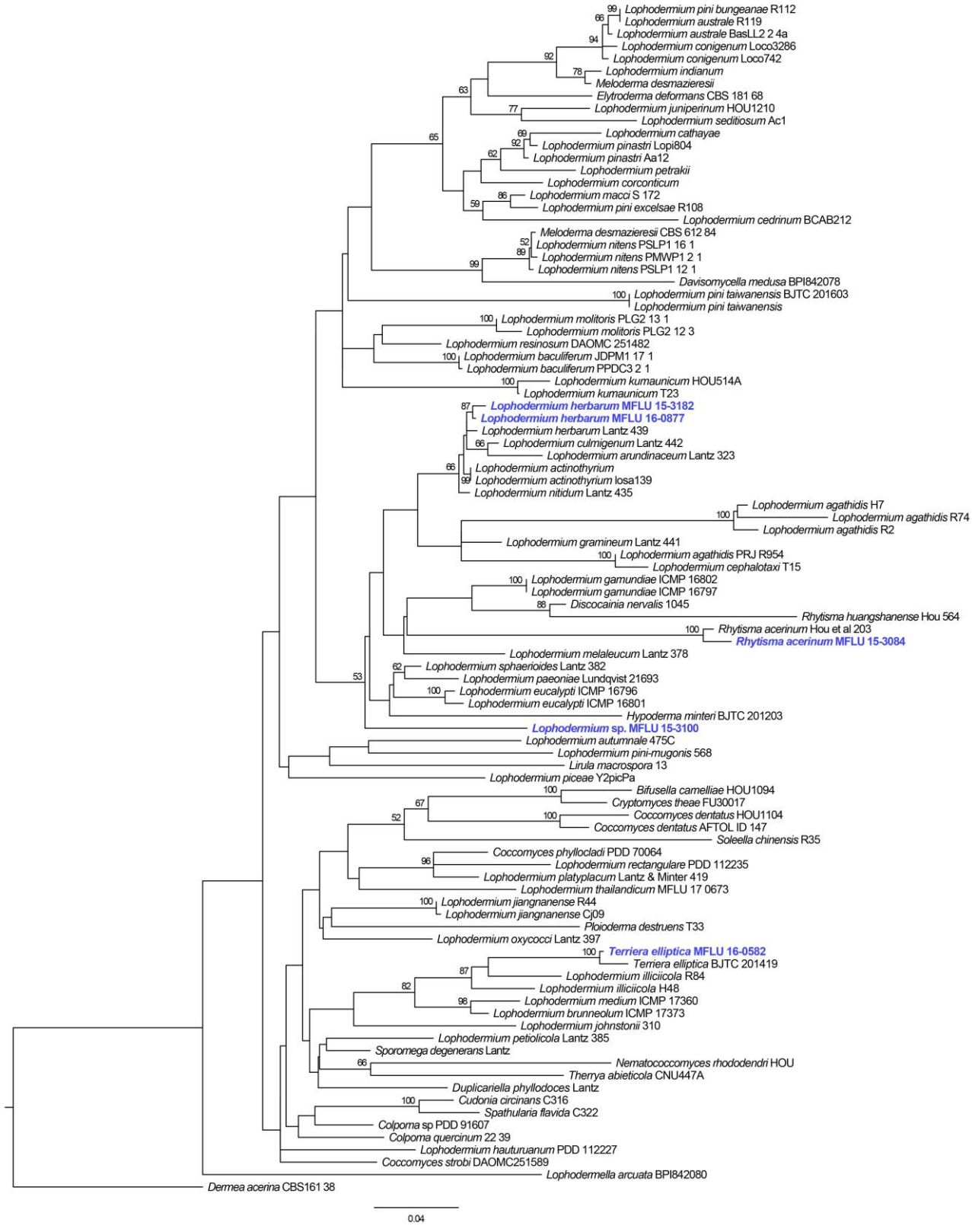

Figure 61 – Phylogram generated from maximum likelihood analysis of sequences of *Rhytismataceae* based on ITS, LSU sequence data. MLBP values ≥50% are given near the nodes. Strain/culture numbers are given after the taxon names. The tree is rooted with *Dermea acerina* (CBS161 38).

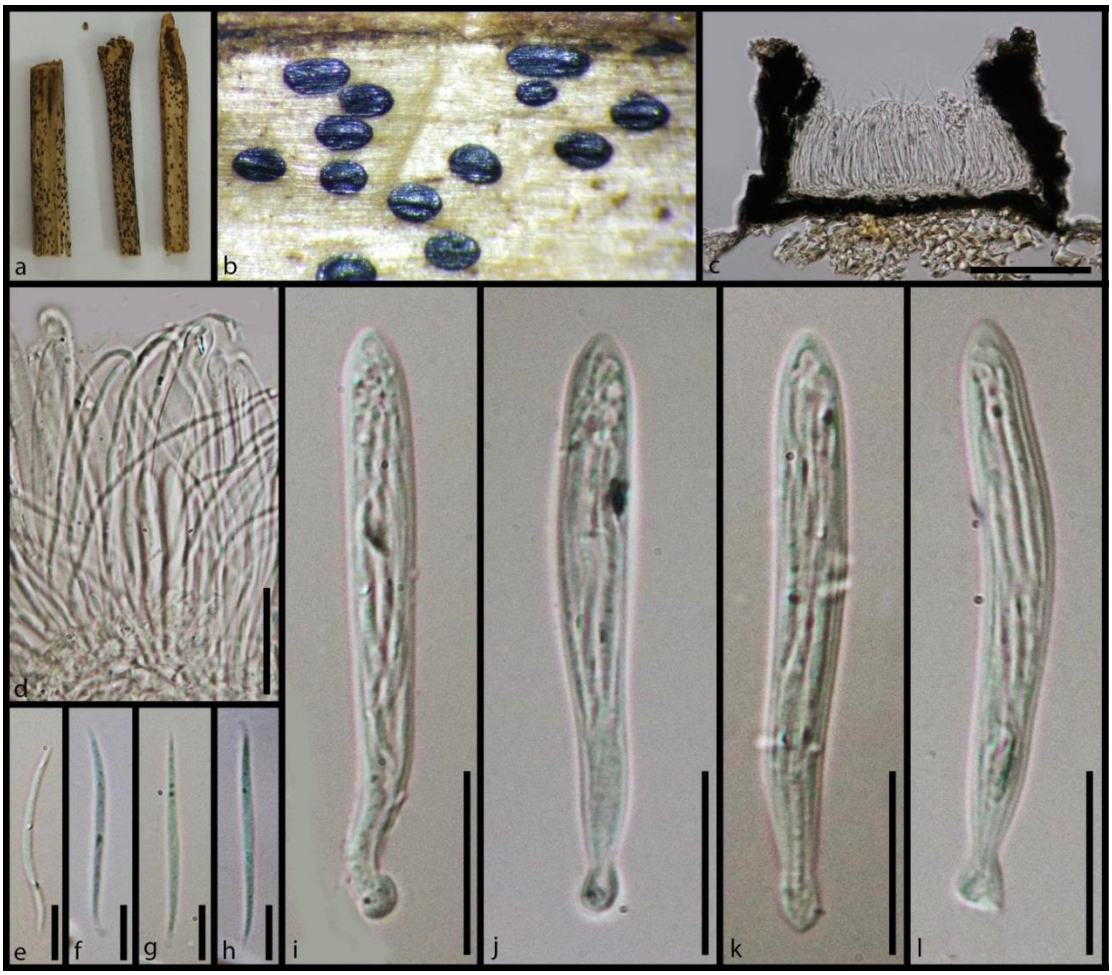

Figure 62 – Morphology of *Lophodermium microsporum* (MFLU 15-3100 holotype) a Substrate. b Apothecia on wood. c Cross section of an apothecium. d Part of the hymenium layer showing asci and paraphyses. e–h Fusoid ascospores. i–l Cylindrical asci. Scale bars: c = 100 µm, d = 25 µm, e–h = 10 µm, i–l = 20 µm.

Lophodermium herbarum (Fr.) Fuckel

Facesoffungi number: FoF 05948; Fig. 63

Saprobic on dead stems and leaves. **Sexual morph:** *Apothecia* 0.5–1 × 0.3–0.6 mm, arising singly, sessile, ellipsoid, slightly erumpent. *Receptacle* palisade layer of asci and paraphyses. *Disc* flat to slightly concave. *Excipulum* 30–35 µm ($\bar{x}$ = 33 µm, n = 10) in lower side walls, composed of thin-walled cells of *textura angularis*, cells in outer layer are dark brown to black and inner cells are light brown to hyaline. *Hymenium* hyaline. *Paraphyses* 1–2.5 µm wide ($\bar{x}$ = 2.2 µm, n = 20), numerous, filiform, apices obtuse, slightly curved and attached together with gelatinized material, septate, smooth, guttulate. *Asci* 80–110 × 8–10 µm ($\bar{x}$ = 85.3 × 9.3 µm, n = 30), 8-spored, unitunicate, cylindric-clavate, conical and non-amyloid apices, short-stipitate base, arising from croziers. *Ascospores* 40–50 × 1–2 µm ($\bar{x}$ = 44.5 × 1.5 µm, n = 40), multi-seriate, fusoid, aseptate, hyaline, guttulate, acute tips. **Asexual morph:** Undetermined.

Material examined – Russia, Arkhangelsk region, Akhangelsk City, Maimaksansky City District, saprobic or weak parasitic on dead stems of *Calamagrostis epigeios* (L.) Roth (Poaceae), 2 August 2015, Gennady V. Okatov, AR-042 (MFLU 15-3182). Italy, Ravenna Province [RA], Lido di Dante, dead aerial stem of *Ammophila arenaria* (L.) Link (Poaceae), 9 February 2016, Erio Camporesi IT2829 (MFLU 16-0877).

GenBank accessions – MFLU 15-3182: LSU- MK591954, SSU- MK585011; MFLU 16-0877: LSU- MK592005, ITS- MK584985, SSU- MK585061

Notes – Our strains of *Lophodermium* from Russia and Italy grouped with *L. herbarum- L. actinothyrium* clade (Fig. 61). The ITS region of our collections is similar to that of *L. actinothyrium* (isolate losa139) (437/442-99% with no gaps) from Argentina, while the LSU region is similar to that of *L. herbarum* (voucher Lantz 439) (733/736 -99% with no gaps), *L. nitidum* (Lantz 435) (771/778-99% with 2 gaps) and *L. culmigenum* (Lantz 442) (768/778-99% with 2 gaps). LSU data of *L. actinothyrium* and ITS data of *L. herbarum, L. culmigenum* and *L. nitidum* are not available in GenBank to compare with our data.

The morphological characters of our collection are in agreement with the description for *L. herbarum* provided by Tehon et al. (1935). Therefore, we name our collection as *Lophodermium herbarum*.

Terriera elliptica T.T. Zhang & C.L. Hou

Facesoffungi number: FoF 05949; Fig. 64

Saprobic on dead stems. **Sexual morph:** *Apothecia* 0.8–1.5 × 0.2–0.8 mm arising singly or in small groups, erumpent, black, ellipsoid. *Receptacle* hysteriform. Disc flat to concave. *Excipulum* 8–12 *µm* at lower side walls, composed of thin-walled, black cells of *textura angularis*, cells in outer layer are dark brown to black and inner cells are light brown to hyaline. *Hymenium* hyaline. *Paraphyses* 0.8–1.5 µm wide, filiform, branched, septate, exceeding the asci in length and form an epithecium, smooth, eguttulate. *Asci* 95–130 × 8–15 µm, arising from croziers, 8-spored, unitunicate, cylindric, rounded and non-amyloid apex, long-stipitate base, croziers absent. *Ascospores* 50–70 × 2–3 µm, multi-seriate, filiform with acute apices, aseptate, hyaline, guttulate with thin gelatinous sheath. **Asexual morph:** Undetermined.

Material examined – Thailand, Chiang Rai Province, Hyde's farm, 22 April 2015, A. H. Ekanayaka, HD020 (MFLU 16-0582).

GenBank accessions – ITS- MK584954

Notes – Our collection from Thailand grouped with *Terriera elliptica* from China (Fig. 61). The ITS region of our collection is similar to the ITS data of the type material of *T. elliptica* (BJTC 201419) (736/746-99% with 2 gaps). *Terriera elliptica* is characterized by elliptic hysteriform apothecia erumpent to the substrate, filiform branched paraphyses form an epithecium, cylindric asci, arising from croziers and filiform ascospores with acute apices. Morphology of our collection is similar to the description from Zhang et al. (2015).

***Meloderma* sp1**

Fig. 65

Saprobic on dead stems. **Sexual morph:** *Apothecia* 1–1.5 × 0.5–0.8 mm, arising singly or in small groups, erumpent, black. *Receptacle* palisade layer of asci and paraphyses, disc flat. *Excipulum* 15–20 µm composed of thin-walled, black cells of *textura angularis*, cells in outer layer are dark brown to black and inner cells are hyaline. *Hymenium* hyaline. *Paraphyses* 1.5–2.3 µm wide, subcylindrical, filiform and circinate or curved at the apex, aseptate, exceeding the asci in length, smooth, eguttulate. *Asci* 90–100 × 10–15 µm, 8-spored, unitunicate, cylindric-clavate, conical and non-amyloid apex, gradually tapering, long-stipitate base, croziers absent. *Ascospores* 15–20 × 2–3 µm, multi-seriate, narrowly obovoid, 1-septate, hyaline, guttulate, tapering towards the base.

Material examined – Italy, Forlì-Cesena [FC] Province, Tontola di Predappio, dead land branch of Robinia pseudacacia, 5 September 2014, Erio Camporesi, IT2085 (MFLU 16-0603).

Notes – This strain was collected from Italy, but ascospores failed to germinate and the DNA extraction directly from fruiting bodies did not succeed. Our strain is similar to the genus *Meloderma* by having ellipsoid apothecia, with wider upper wall near ascocarp opening (clearly seen in vertical section of apothecium), filiform paraphyses, often circinate at their tips, clavate asci tapering gradually to base, and narrowly obovoid ascospores tapering towards the base (Johnston 1988). Therefore, we refer this collection to *Meloderma* sp1 untill we have more data to identify this collection to species level.

Figure 63 – Morphology of *Lophodermium herbarum* (MFLU 15-3182) a Substrate. b Apothecia on wood. c Cross section of an apothecium. d, e Filiform paraphyses. f, g Fusoid ascospores. h–j Cylindric-clavate asci. Scale bars: c = 25 µm, d, e = 20 µm, f–g = 10 µm, h–j = 20 µm.

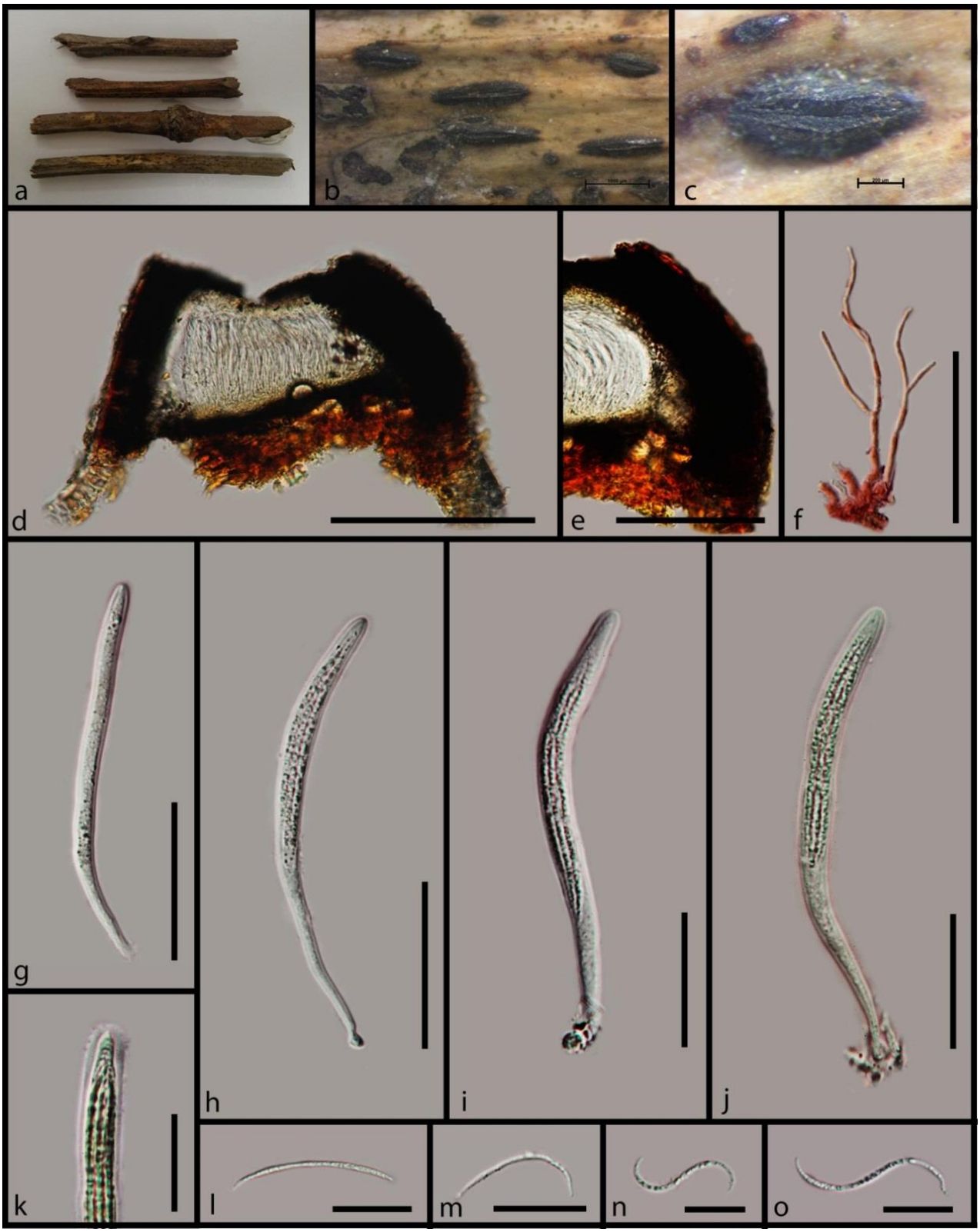

Figure 64 – Morphology of *Terriera elliptica* (MFLU 16-0582) a Substrate. b, c Apothecia on wood. d Cross section of an apothecium. e Close up of the excipulum. f Filiform paraphyses in congo red. g–j Long pedicellate asci. k Ascus tip. l–o Fusoid ascospores. Scale bars: d = 200 µm, e = 100 µm, f = 50 µm, g–j = 35 µm, k = 15 µm, l–o = 25 µm.

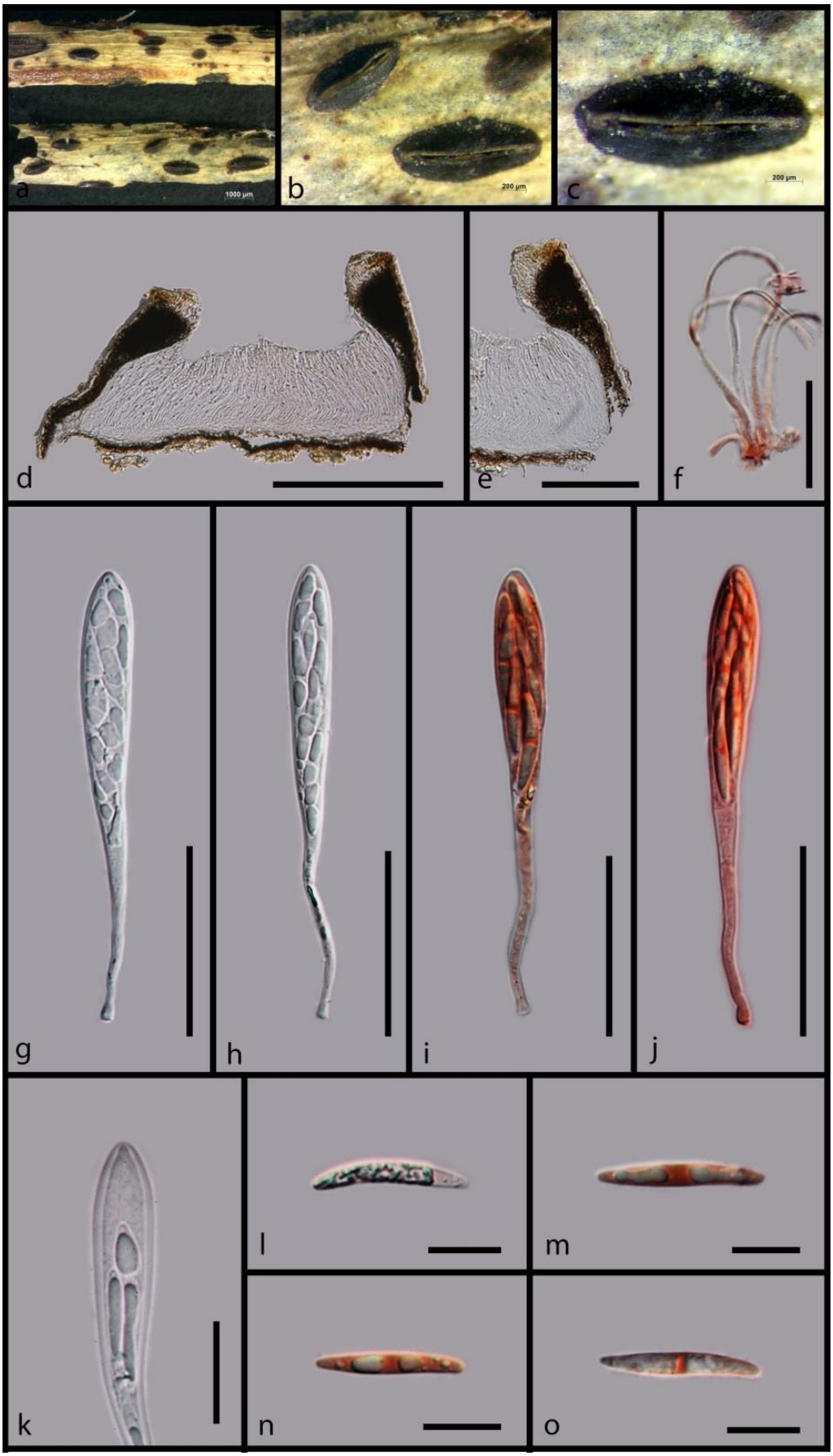

Figure 65 – Morphology of *Meloderma* sp1 (MFLU 16-0603) a Substrate, b, c Apothecia on wood, d Cross section of an apothecium, e Close up of the peridium, f Filiform paraphyses in congo red, g–j Long pedicellate asci in water and congo red, k Ascus tip, l–o Fusoid ascospores in congo red. Scale bars: d = 200 µm, e = 100 µm, f = 30 µm, g–j = 40 µm, k = 15 µm, l–o = 10 µm.

Rhytisma acerinum (Pers.) Fr.

Facesoffungi number: FoF 05951; Fig. 66

Parasitic on living leaves. **Sexual morph:** Undetermined. **Asexual morph:** Pycnidia 0.5–1 mm wide, single or in groups, dark brown to black, immersed. *Wall* composed of dark brown cells of *textura angularis*. *Conidiogenous cells* 10–14 × 1–2 µm ($\bar{x}$ = 12 × 1.5 µm, n = 20), thin, cylindrical, tapering to the apex, hyaline, arising from the inner cell wall of peridium. *Conidia* 5–8 × 1–1.5 µm ($\bar{x}$ = 6 × 1.3 µm, n = 20), bacilliform, one side rounded and other side pointed, aseptate, hyaline, produced sympodially from the conidiogenous cell apex.

Material examined – Russia, Rostov region, Shakhty City District, former Shakhtisnskoye forestry, parasitic on living leaves of *Acer platanoides* L. (Sapindaceae), 1 September 2015, Timur S. Bulgakov, T-943 (MFLU 15-3084).

GenBank accessions – LSU- MK591958, ITS- MK585002, SSU- MK585018

Notes – Our collection is genetically similar to *Rhytisma acerinum* (Fig. 61) and blast result of ITS sequence of our collection shows 99% similarity (526/530-99% with no gaps) with that of *R. acerinum* (isolate- Hou et al. 203) (Hou et al. 2010). The morphology of our collection is also similar to the characteristics provided by Jones (1925) and Minter (2018). However, the conidia are slightly smaller in our collection than the drawing (8–10 µm) provided by Minter (2018). We did not observe the sexual morph of *R. acerinum*.

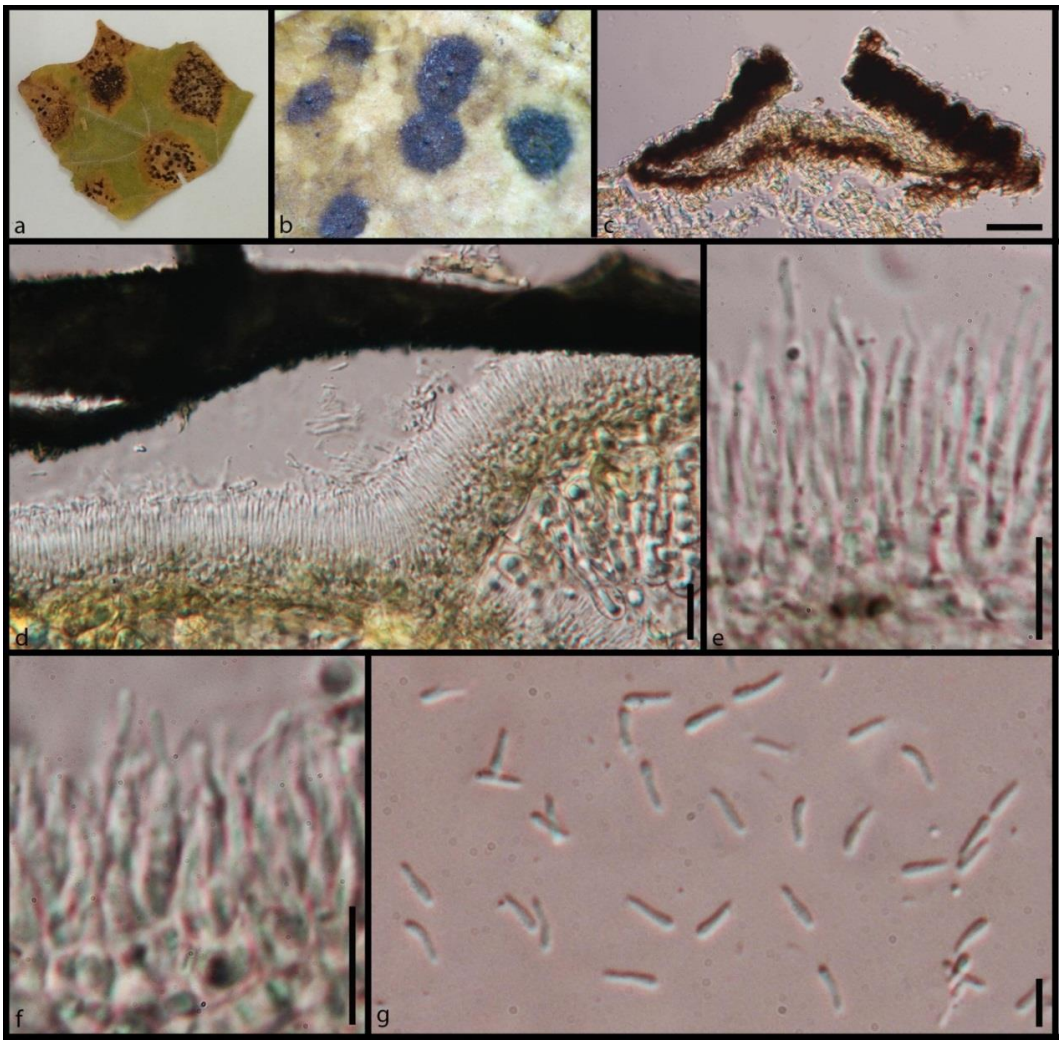

Figure 66 – Morphology of *Rhytisma acerinum* (MFLU 15-3084) a Substrate. b Conidiomata on substrate. c Cross section of conidioma. d Close up of cross section of conidioma at the margin. e, f Different stages of conidiogenesis. g Conidia. Scale bars: c = 30 µm, d = 15, e, f = 10 µm, g = 5 µm.

"SCLEROTINIALES"

The families included in this clade (*Sclerotiniaceae*, *Hemiphacidiaceae*, *Cenangiaceae Rutstroemiaceae* and *Chlorociboriaceae*) were previously classified under Helotiales. Pärtel (2016) also suggested this as a monophyletic group separate from other Helotiales.

Hemiphacidiaceae Korf

Facesoffungi number: FoF 05952

Taxa are saprobic, plant parasitic or rarely endoparasitic on nematodes (Jansson et al. 1984, Korf 1962, Pärtel et al. 2017). Ascomata are apothecial. Apothecia are discoid to cupulate, sessile or stipitate, sometimes immersed in host tissue and opening by a lid or transversal cracks of the overlying host tissue. The margin and exterior surface are smooth or sometimes tomentose to pustulate by hyaline to brown hair-like elements. The ectal excipulum is reduced or composed of cells of hyaline to brown *textura globulosa-angularis* or *textura prismatica* and medullary excipulum is composed of cells of *textura angularis* or *textura intricata*. Paraphyses are cylindrical or lanceolate and sometimes slightly swollen at the apices. Asci are 2–8-spored, amyloid or non-amyloid and sometimes arising from croziers. Ascospores are ellipsoid, fusoid, clavate or allantoid, 0–1-septate, hyaline or brown, sometimes with sheath and sometimes form microconidia by budding (Korf 1962, Corner 1930, Gernandt et al. 2001, Hein 1983, Stone & Gernandt 2005, Tedersoo et al. 2009, Verkley 1995, Wang et al. 2006a, Zhuang et al. 2010, Jaklitsch et al. 2016, Stoykov & Assyov 2009, Chalkley 2018, Ren & Zhuang 2014a, Baral & Peric 2014, Perić et al. 2015). Asexual morphs are hyphomycetous, acervular or sporodochial. Conidiogenesis is holoblastic or phialidic. Conidia are aseptate or staurosporous and micro- and macroconidial (Jaklitsch et al. 2016).

Notes – This family was previously synonymized with *Cenangiaceae*, but we observed a separate clade for this family. The same phylogenetic position was also shown by Pärtel et al. (2017). Therefore, we reintroduce the family within "Sclerotiniales".

Sclerotiniaceae Whetzel ex Whetzel

Facesoffungi number: FoF 05953

Taxa are saprobic or plant parasitic. Ascomata are apothecial. Apothecia are cupulate to plane or pileate, stipitate and usually emerge from sclerotia. The ectal excipulum is composed of cells of *textura globulosa* or *textura prismatica* and medullary excipulum is composed of cells of *textura prismatica*, *textura intricata* or loosely arranged hyphae. Paraphyses are filiform, cylindrical and hyaline. Asci are 2–8-spored, amyloid, rarely non-amyloid and sometimes arising from croziers. Ascospores are ellipsoid, rarely fusoid or allantoid, smooth, hyaline, rarely warted, guttulate, often with sheath, 1–3-septate and form microconidia by budding (Saito & Kaji 2006, Fuhrer & May 1993, Beaton & Weste 1984, Hosoya et al. 2014, Salgado-Salazar et al. 2018, Andrew et al. 2012, Batra 1991, Holst-Jensen et al. 1997, Hustad & Miller 2011, Kohn & Nagasawa 1984, Schumacher & Holst-Jensen 1997, Schumacher & Kohn 1985, Spooner 1987, Verkley 1993, Livsey & Minter 1994). Asexual morphs are hyphomycetous, acervular or pycnidial. Conidiogenesis is holoblastic and phialidic. Conidia are aseptate hyaline, rod-shape and smooth (Jaklitsch et al. 2016, Livsey & Minter 1994).

Notes – This family includes plant parasites and phylogenetically formed a monophyletic clade sister to *Rutstroemiaceae*. Some taxa are pathogens on various mono and dicots stems, leaves, flowers, fruits, seeds and wood, which cause stem cankers, flower blight and fruit and leaf spots (Navaud et al. 2018). This family also includes mould pathogens such as the grey mould pathogen *Botrytis cinerea*, which consider as one of the ten most devastating plant pathogens (Dean et al. 2012).

Rutstroemiaceae Holst-Jensen, L.M. Kohn & T. Schumach.

Facesoffungi number: FoF 05954

Taxa are saprobic or fungicolous. Ascomata are apothecial, rarely cleistothecial. Apothecia are cupulate to discoid, stipitate. The margin and exterior surface are smooth or sometimes with hairs. Hairs are cylindrical, septate and mostly hyaline. The ectal excipulum is composed of cells of *textura prismatica* or *textura globulosa* and medullary excipulum is composed of cells of *textura intricata*. Paraphyses are cylindrical. Asci are 8-spored, cylindric-clavate, amyloid, rarely non-amyloid and sometimes arising from croziers. Ascospores are ellipsoid to allantoid, hyaline, 0–4-septate and form microconidia by budding (Zhao et al. 2013, 2016, Zhuang 1988, Nannfeldt 1936, Jaklitsch et al. 2016, Spooner 1987). Cleistothecia are characterized by sub-globose shape and peridium composed of cells of *textura angularis* and evanescent asci (Galán et al. 2015). Asexual morphs are hyphomycetous and phialidic (Jaklitsch et al. 2016).

Notes – This family includes apothecial ascomata except for the genus *Bicornispora* (Galán et al. 2015). The family forms a monophyletic clade between *Cenangiaceae* and *Sclerotiniaceae*.

Cenangiaceae Rehm

Facesoffungi number: FoF 05955

Taxa are saprobic. Ascomata are apothecial and characterized by sessile or short-stipitate, cupulate to discoid receptacle. The ectal excipulum is composed of cells of *textura angularis* to *globulosa* and medullary excipulum is composed of cells of *textura intricata*. Paraphyses are filiform, septate and slightly swollen at the apex. Asci are 8-spored, cylindric-clavate, amyloid and sometimes arising from croziers. Ascospores are globose, ellipsoid to fusoid, 0–2-septate, and hyaline (Singhr & Tewari 1977, Johnston 2002, Kunca & Leontovyč 2013). Asexual morphs are pycnidia, conidiogenesis is phialidic and conidia are aseptate, hyaline, and staminate (Kunca & Leontovyč 2013).

Notes – The family *Hemiphacidiaceae* formed a monophyletic clade within "Sclerotiniales" clade.

Neolauriomycetaceae Crous

Facesoffungi number: FoF 05956

Taxa are saprobic. Sexual morphs are not recorded. Asexual morphs are hyphomycetous. Conidiophores are solitary, subcylindrical, straight or slightly flexuous, unbranched, brownish, smooth, septate and branched. Conidiogenesis is phialidic and conidia are fusiform to drop-shaped or ampulliform, hyaline to brownish, smooth and including the apical collarette (Réblová et al. 2011, Crous et al. 2018).

Notes – In our phylogenetic analysis this family formed a monophyletic clade sister to *Chlorociboriaceae*. The family includes saprobic, hyphomycete genera.

Chlorociboriaceae Baral & P.R.Johnst.

Facesoffungi number: FoF 05957

Taxa are saprobic on dead stems. Ascomata are apothecial. Apothecia are stipitate, cupulate to discoid, arising from a basal stromatic mass, erumpent or superficial and blue green. The exterior surface is glabrous or with short septate hairs. The ectal excipulum is composed of cells of *textura prismatica or textura intricata* and covered by dark green exudate and medullary excipulum is composed of cells of *textura intricata*. Paraphyses are filiform. Asci are 8-spored, arising from croziers and cylindric-clavate with amyloid ring. Ascospores are ellipsoid to fusoid, straight to slightly curved, hyaline and 0–3-septate (Johnston & Park 2005, Donner et al. 2012, Robinson 2012, Robinson et al. 2012, 2014, Ren & Zhuang 2014b, Zheng & Zhuang 2017b). Asexual morphs are stromatic and multilocular and conidia are rod-shaped (Jaklitsch et al. 2016).

Notes – *Chlorociboria* species are economically important as they produce green stain, named xylindein (Edwards & Kale 1965, Saikawa et al. 2000, Donner et al. 2012).

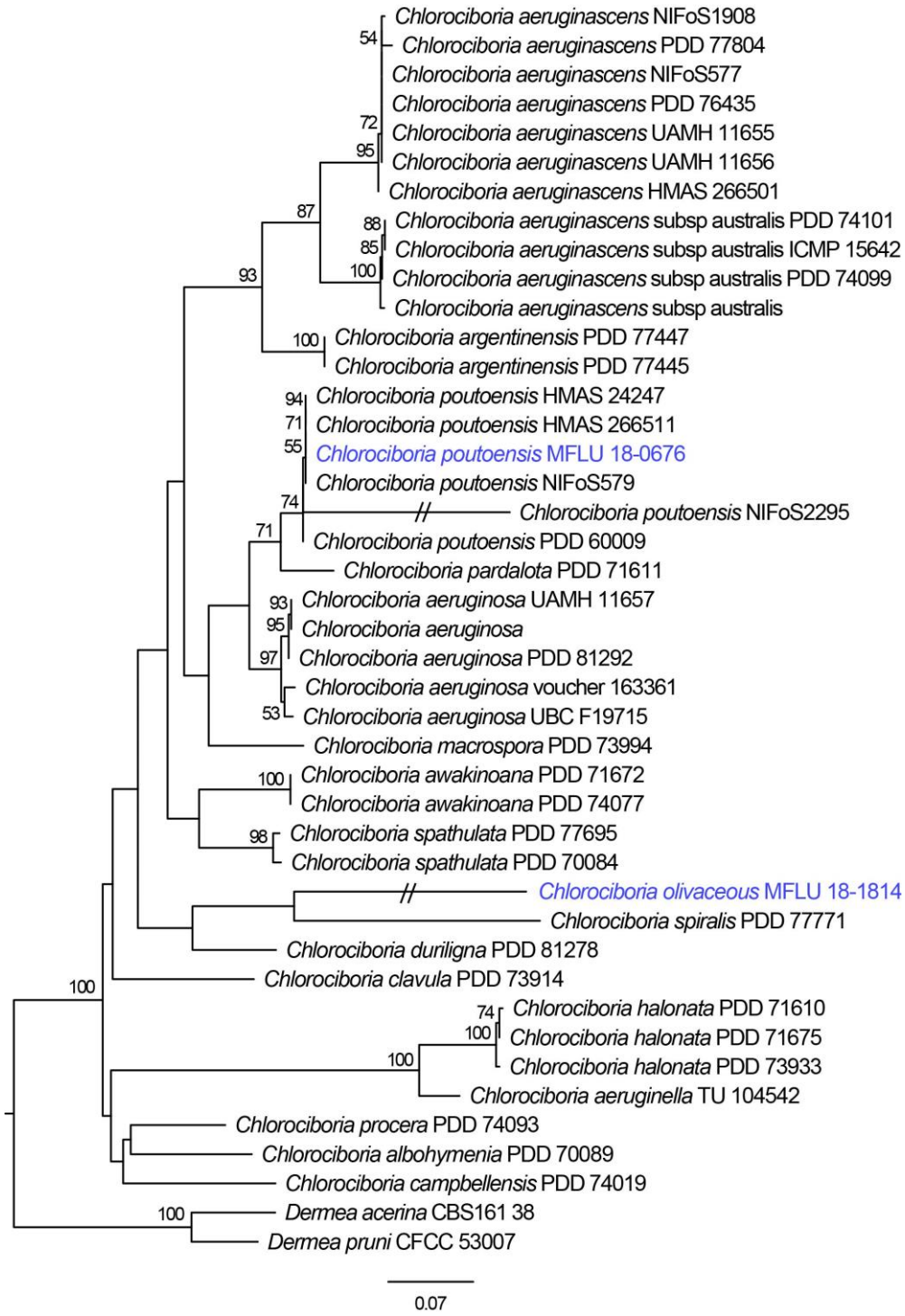

Figure 67 – Phylogram generated from maximum likelihood analysis of sequences of *Chlorociboria* based on ITS sequence data. MLBP values ≥50% are given near the nodes. Strain/culture numbers are given after the taxon names. The tree is rooted with *Dermea acerina* (CBS161 38) and *Dermea pruni* (CFCC 53007).

Chlorociboria olivaceous Ekanayaka & K.D. Hyde, ***sp. nov.***

Index Fungorum number: IF556305; Facesoffungi number: FoF 05958; Fig. 68

Etymology – refers to the colour of apothecial disc

Holotype – MFLU 18-1814

Saprobic on dead stems. **Sexual morph:** *Apothecia* 2–3 × 1–2 mm, arising in clusters, stipitate. *Receptacle* cupulate, bluish green to yellowish or olive green. Margins concolorous to receptacle, inrolled towards the disc. *Disc* concave, yellowish green. *Ectal excipulum* 25–35 µm ($\bar{x}$

= 27 µm, n = 10) in lower flanks, composed of thin-walled cells of *textura angularis* to *globulosa*, two layers, cells in outer layer are green and inner layer is hyaline. *Medullary excipulum* 80–120 µm ($\bar{x}$ = 95 µm, n = 10) in lower flanks, composed of, thin-walled, hyaline cells of *textura intricata*. *Hymenium* hyaline. *Paraphyses* 1.6–2.3 µm wide ($\bar{x}$ = 1.8 µm, n = 20), numerous, filiform, obtuse at the apex, aseptate, exceeding the asci in length, smooth, apices covered with greenish gelatinous material. *Asci* 50–75 × 4–5.5 µm ($\bar{x}$ = 63 × 4.5 µm, n = 30), 8-spored, unitunicate, cylindrical, rounded at the apex, faintly amyloid apex, stipitate base. *Ascospores* 4.5–5 × 2.5–3 µm ($\bar{x}$ = 4.8 × 2.7 µm, n = 40), 1-seriate, ellipsoid to ovoid, aseptate, hyaline, guttulate. **Asexual morph:** Undetermined.

Material examined – China, Yunnan Province, Kunming, December 2015, Samantha Karunarathna, NB93 (MFLU 18-1814).

GenBank accessions – LSU- MK592009, ITS- MK584990, TEF- MK714034

Notes – Our collection of NB 93 from China grouped with *Chlorociboria spiralis* (PDD 77771) with moderate support (Fig. 4). ITS data of our collection is similar to *C. spiralis* (PDD 77771) (203/228-89% with 4 gaps) and to *C. aeruginosa* (voucher 163361) (203/231-88% with 6 gaps), while the LSU data is similar to *C. awakinoana* (D1549) (768/898-86% with 17 gaps), *C. aeruginascens* (DSM 107184) (777/921-84 % with 20 gaps) and *C. glauca* (KL238) (688/803-86% with 16 gaps).

Chlorociboria olivaceous is characterized by bluish green to yellowish, cupulate, stipitate apothecia, pigmented ectal excipulum of *textura angularis* cells, filiform paraphyses covered with greenish gelatinous material, long cylindrical asci and ellipsoid to ovoid ascospores. *Chlorociboria olivaceous* is phylogenetically close to *C. spiralis.* However, *C. spiralis* differs in having filiform and coiled ascospores (Johnston & Park 2005).

Chlorociboria poutoensis P.R. Johnst.

Facesoffungi number: FoF 05959; Fig. 69

Saprobic on dead stems. **Sexual morph:** *Apothecia* 2–4 × 1–3 mm, arising singly, stipitate. *Receptacle* cupulate, greenish blue. Margins concolorous to receptacle. *Disc* concave, whitish green. *Ectal excipulum* 35–45 µm ($\bar{x}$ = 40 µm, n = 10) in lower flanks, composed of thin-walled, greenish blue cells of *textura angularis* to *prismatica*. *Medullary excipulum* 240–260 µm ($\bar{x}$ = 247 µm, n = 10) in lower flanks, composed of thin-walled, hyaline to bluish cells of *textura intricata*. *Hymenium* hyaline. *Paraphyses* 1.2–1.8 µm wide ($\bar{x}$ = 1.5 µm, n = 20), numerous, filiform, obtuse, aseptate, exceeding the asci in length, smooth, guttulate. *Asci* 90–100 × 6.8–7.2 µm ($\bar{x}$ = 93 × 6.9 µm, n = 30), 8-spored, unitunicate, cylindrical, apex rounded and amyloid, base stipitate. *Ascospores* 10–15 × 3.5–4 µm ($\bar{x}$ = 12.5 × 3.7 µm, n = 40), 1–2-seriate, ellipsoid to fusoid, aseptate, hyaline, guttulate and with slightly tapered ends. **Asexual morph:** Undetermined.

Material examined – Thailand, Chiang Mai Province, Mushroom Research Center, August 2017, A.H. Ekanayaka, HD59 (MFLU 18-0676).

GenBank accessions – LSU- MK591994, ITS- MK584968, SSU- MK585041, TEF- MK714025, RPB2- MK614725

Notes – Our collection HD59 from Thailand grouped within *Chlorociboria poutoensis* clade and the clade received 74%statistical support (Fig. 67). The ITS data of our collection is similar to *C. poutoensis* strains HMAS 24247 (505/507-99% with 2 gaps) and HMAS 266511 (505/508-99% with 3 gaps), while the LSU data is similar to *C. poutoensis* (HMAS 266511) (589/593-99% with 1 gap) and to *C.* cf. *aeruginosa* (OSC 100056) (582/594-98% with 2 gaps).

Chlorociboria poutoensis is characterized by blue green, cupulate, stipitate apothecia, pigmented ectal excipulum of *textura angularis* to *textura prismatica* cells, filiform paraphyses, long cylindrical asci and ellipsoid to fusoid ascospores. Morphology of our collection agrees with the description of *C. poutoensis* by Johnston & Park (2005).

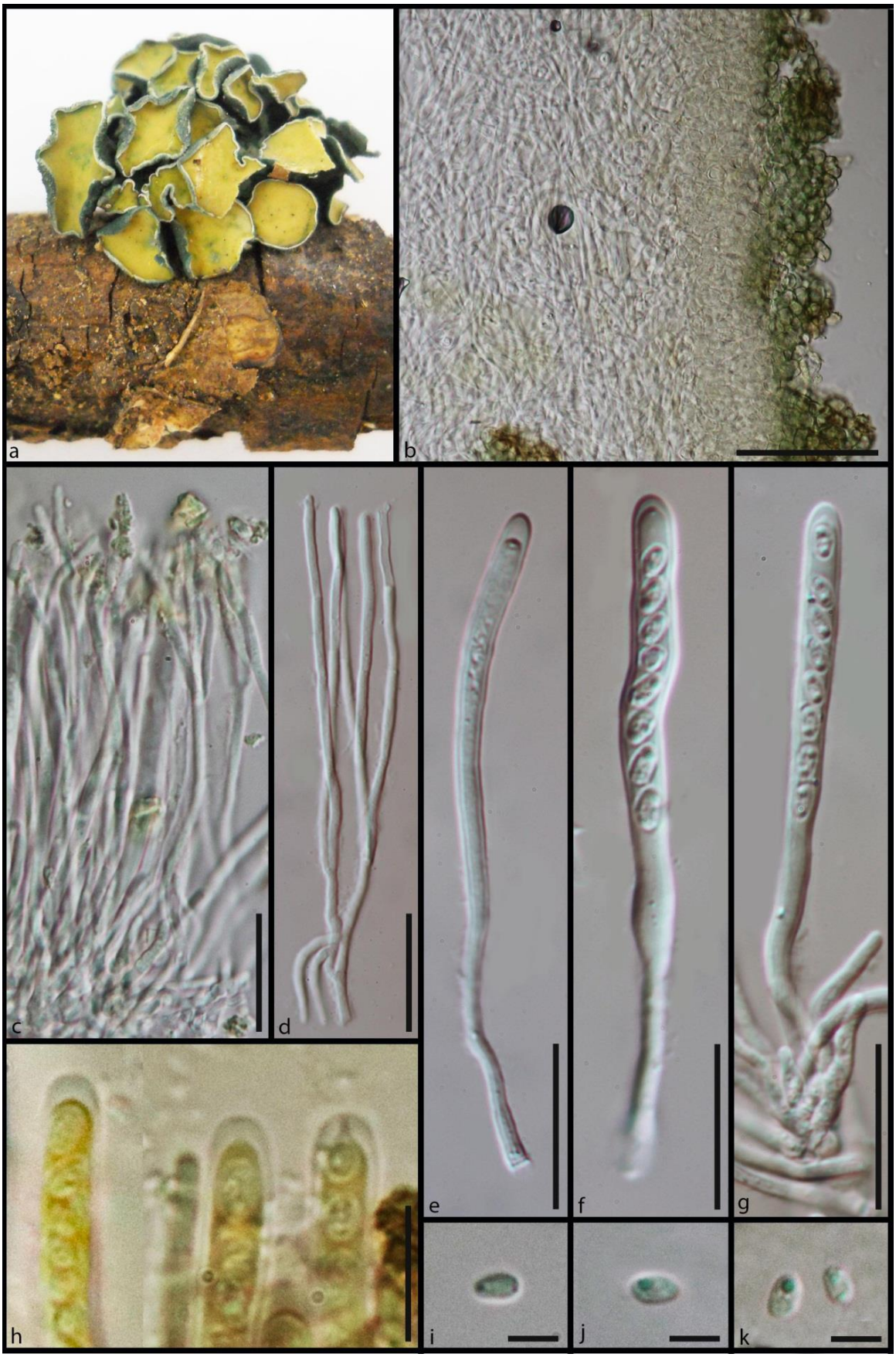

Figure 68 – Morphology of *Chlorociboria olivaceous* (MFLU 18-1814 holotype) a Apothecia on wood. b Close up of excipulum at flanks. c, d Filiform paraphyses. e–g Cylindrical asci. h Apices of amyloid asci in Melzer's reagent. i–k Ellipsoid ascospores. Scale bars: b = 30 µm, c, d = 25 µm, e–g = 20 µm, h = 10 µm, i–k = 5 µm.

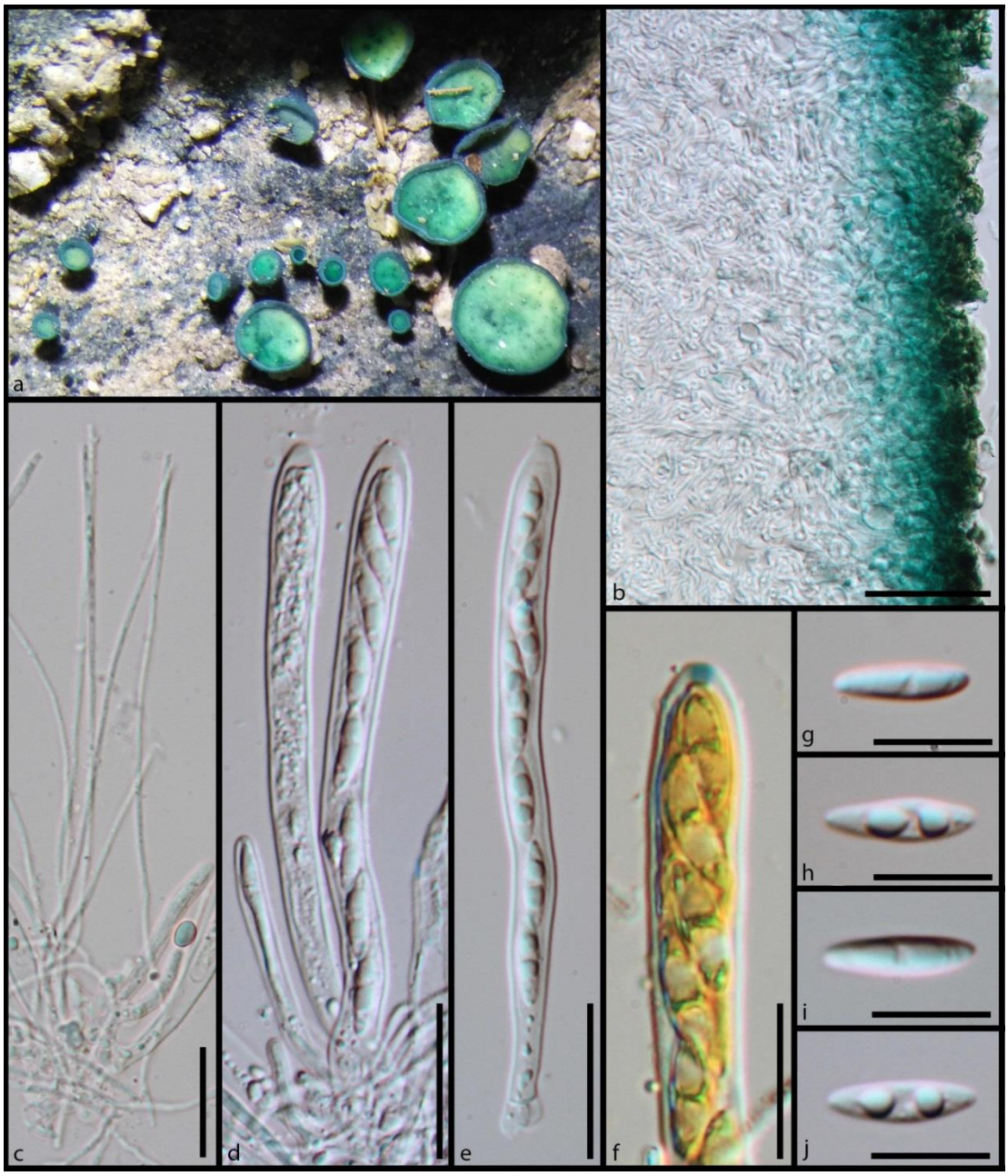

Figure 69 – Morphology of *Chlorociboria poutoensis* (MFLU 18-0676) a Substrate. b Close up of the excipulum at flanks. c Filiform paraphyses. d, e Cylindrical asci. f Amyloid ascus apex. g–j Fusoid ascospores. Scale bars: b = 40 µm, c = 15 µm, d, e = 20 µm, f = 15 µm, g–j = 10 µm.

THELEBOLALES

This order was introduced by Haeckel (1894). Taxa include small translucent apothecia, mostly coprophilous. In our analysis it forms a monophyletic clade sister to Lichinodiales.

Thelebolaceae Engl.

= *Pseudeurotiaceae* Malloch & Cain

Facesoffungi number: FoF 05960

Taxa are saprobic on dead plant material or herbivore dung, rarely plant parasitic. Asomata are absent, apothecial or cleistothecial. When ascomata absent, asci formed directly on fertile hyphae without an exciple, paraphyses are absent, asci are 8-spored, sessile, subglobose to ellipsoidal and arising from croziers and ascospores are ellipsoid to fusiform and hyaline (Stchigel et al. 2001, de Menezes et al. 2017, Brummelen 1985). Apothecia are turbinate, cylindrical,

obconical, pulvinate, or cupulate, sessile and glabrous or with thin-walled, tapering hairs. The ectal excipulum is composed of cells of *textura globulosa-angularis*, *textura prismatica* or *textura porrecta* and medullary excipulum is composed of cells of *textura porrecta*. Paraphyses are filiform, sometimes apically swollen, straight to slightly curved and septate. Asci are 4–1000-spored, clavate to subglobose or broadly cylindrical, non-amyloid, opening by rupturing or operculum and sometimes arising from croziers. Ascospores are ellipsoid, fusoid to filiform, hyaline, aseptate, rarely septate, sometimes guttulate and smooth-walled or ornamented (Doveri 2007, Brummelen & Kristiansen 1998, Cain & Kimbrough 1969, Brummelen 1977, Hoog et al. 2005, Korf & Abawi 1971, Spegazzini 1887). Cleistothecia are subglobose and covered with appendages. The peridium composed of cells of *textura globulosa-angularis*. The interscal tissue sometimes absent, when present they are filiform paraphyses. Asci are globose, thin-walled, and evanescent or opening by splitting and some ascomata contain only a few asci or sometimes only a single polysporous ascus. Ascospores are globose to ellipsoid or lunate, aseptate, hyaline, brown and smooth-walled or with longitudinal striations (Malloch & Cain 1971, Doveri et al. 2013, Rice & Currah 2006, Sigler et al. 2000, Malloch et al. 2016). Asexual morphs are hyphomycetous, synnematal. Conidiogenesis is phialidic. Conidia are aseptate, hyaline, subglobose to irregularly cylindrical or filiform and smooth (Doveri et al. 2013, Hoog et al. 2005, Korf & Abawi 1971, Crous et al. 2017, Rice & Currah 2006, Malloch et al. 2016, Adhikari et al. 2016).

Notes – In our phylogenetic analysis, *Pseudeurotiaceae* nested within *Thelebolaceae*. Jaklitsch et al. (2016) also suggested the genetic similarity between these families. Therefore, considering the results of our phylogeny and previous literature, we synonymize *Pseudeurotiaceae* under *Thelebolaceae*.

***Alatospora- Miniancora* clade**

Facesoffungi number: FoF 05989

Taxa are saprobic. Sexual morphs are not recorded. Asexual morphs are hyphomycetous, producing long conidiophores, conidiogenesis is phialidic and conidia are tetraradiate, T-shaped or flail-shaped, main axis filiform and septate with 0–4 branches (Fiuza et al. 2017, Fiuza & Gusmão 2013, Baschien et al. 2013).

Notes – This clade includes the genera previously classified under *Leotiaceae* and Leotiomycetes genera *incertae sedis*. They are mostly found in aquatic habitats (Baschien et al. 2013).

TRIBLIDIALES

This order was introduced by Eriksson (1992) and was previously placed in Ostropales (Lecanoromycetes) (Magnes 1997). Jaklitsch et al. (2016) placed it within Leotiomycetes considering its morphological characters.

Triblidiaceae Rehm

Facesoffungi number: FoF 05961

Taxa are saprobic on dead plant material (Magnes 1997). Ascomata are apothecial. Apothecia are discoid or hysterioid, sessile or sub-stipitate, closed when immature and opening by a split or radial fissures at maturity. The ectal excipulum is composed of cells of heavily melanized *textura angularis*. Paraphyses are apically slightly swollen, branched, hyaline and guttulate. Asci are 4–8-spored, cylindric-clavate, non-amyloid and arising from croziers. Ascospores are ellipsoid to fusiform, dictyo- to phragmosporous or muriform, thick-walled, smooth or warted and multiguttulate (Magnes 1997, Jaklitsch et al. 2016). Asexual morphs are not recorded.

Notes – This family does not have any available sequence data. Therefore, we are unable to provide a stable phylogenetic position for this family and keep it under Leotiomycetes *incertae sedis* following Jaklitsch et al. (2016).

***TRIZODIA-CALLORIOPSIS* CLADE**

This clade includes two subclades *Trizodia* clade and *Corticifraga-Calloriopsis* clade.

***Trizodia* clade**

Facesoffungi number: FoF 05962

Taxa are saprobic. Ascomata are apothecial and characterised by sessile to short-stipitate, subglobose or turbinate receptacle. The ectal excipulum is composed of cells of *textura porrecta* and medullary excipulum is not clear. Paraphyses are filiform and septate. Asci are 8-spored, clavate, often with a long and narrow base, arising from croziers and amyloid. Ascospores are ellipsoid to ovate to pyriform, smooth, one-celled and with one large or several small oil droplets (Stenroos et al. 2010). Asexual morphs are not recorded.

Notes – This genus formed a basal clade sister to Chaetomellales as also reported by Stenroos et al. (2010).

***Corticifraga-Calloriopsis* clade**

Facesoffungi number: FoF 05990

Taxa are mainly lichenicolous and sometimes saprobic. Ascomata are apothecial and characterised by sessile or sub-stipitate, cupulate, globose or pulvinate receptacle, sometimes gelatinous and sometimes developed within host and opening by splitting into irregular lobes. The ectal excipulum is reduced or composed of cells of *textura prismatic-angular* or *globulosa* and medullary excipulum is composed of *textura prismatica* or loosely arranged hyphae. The hymenium is gelatinized or not. Paraphyses are filiform, apically slightly swollen, septate and unbranched or very rarely branched. Asci are 4–8-spored, clavate or globose, sometimes bitunicate, non-amyloid and sometimes with small ocular chamber. Ascospores are hyaline, ellipsoid to fusoid or bacilliform, septate and sometimes form ascoconidia by budding (Spribille et al. 2010, Zhurbenko 2007, Baral & Marson 2001, Pfister 1976). Asexual morphs are hyphomycetous. Conidiophores are semimacronematous, mononematous, septate and unbranched. Conidiogenous cells are integrated and holoblastic. Conidia are distinctly irregularly globose and formed by branched and loosely spirally interwoven filaments (Voglmayr 2004).

Notes – *Calloriopsis* was previously classified under *Helicogoniaceae* and *Corticifraga* and *Spirosphaera* under Helotiales, genera *incertae sedis*. Sexual morphs are recorded only for *Corticifraga* and *Calloriopsis* and asexual morphs are only known for *Spirosphaera*. We observed a close phylogenetic relationship between these three genera that formed a monophyletic clade sister to *Trizodia* clade.

Discussion

Class Leotiomycetes comprises the inoperculate discomycetes, although it also includes some operculate and non-apothecial taxa (Brummelen & Kristiansen 1998, Cain & Kimbrough 1969, Brummelen 1977). This paper outlines the families of Leotiomycetes based on known information from the literature and morphological and molecular data from fresh collections. Hence our study provides a natural classification for Leotiomycetes to the family-level which may be modified by the addition of new data in the future.

Even though Leotiomycetes taxa have a wide geographical distribution, most are recorded from the Northern Hemisphere and temperate regions. For example, many taxa in *Stamnaria*, *Medeolariaceae*, *Ascocorticiaceae*, and *Sclerotiniaceae* are plant pathogens and *Mitrulaceae* includes saprobes, and these fungi might have evolved primarily in the Northern Hemisphere (LoBuglio & Pfister 2010, Jaklitsch et al. 2016, Wang et al. 2006a, b). However, *Cyttaria* spp. and *Chlorovibrissea* spp. are only found in the Southern Hemisphere (Peterson & Pfister 2010, Peterson et al. 2010, Kohn 1989, Sandoval-Leiva et al. 2014). The genera such as *Chlorociboria* have a higher diversity in Asian/Australasian locations (Johnston & Park 2005).

Many Leotiomycetes taxa are only known from either their sexual or asexual stages (Ekanayaka et al. 2017), and confirmation of links between sexual and asexual morphs in

Leotiomycetes is little known (Sati & Pathak 2016, Sutton & Hennebert 1995, Ekanayaka et al. 2017). Many studies have shown that fungi from various environmental samples including soil, root and leaf endophytes belong to Leotiomycetes (Arnold et al. 2007, Arnold & Lutzoni 2007, Herrera et al. 2010, Higgins et al. 2011, Napoli et al. 2010, Seephueak et al. 2010, Soca-Chafre et al. 2011, U'Ren et al. 2010). However, there are often no clear sexual-asexual morph connections. Most aquatic asexual taxa are phylogenetically related to Leotiomycetes (Campbell et al. 2009, Pascoal et al. 2005, Marvanova et al. 1997, Sri-indrasutdhi et al. 2015, Baschien et al. 2013). Many Leotiomycetes cannot be cultured easily under laboratory conditions (McLaughlin & Spatafora 2015), thus proving difficult to undertake studies within this class.

The greatest challenge to provide a natural classification for the Leotiomycetes is the lack of sequence data for many taxa. Although ITS and LSU sequence data are available in GenBank for many of the genera, SSU, TEF and RPB2 gene regions are comparatively poorly represented. We provide more than 250 new sequences for 51 Leotiomycetes species that helps to resolve the identification of many taxa and is leading to a more natural classification.

The current study identified nine new families (*Hamatocanthoscyphaceae*, *Hyphodiscaceae*, *Deltopyxidaceae*, *Amicodiscaceae*, *Chlorospleniaceae*, *Discinellaceae*, *Bryoglossaceae*, *Hydrocinaceae* and *Solenopeziaceae*) and 14 new family-level clades (*Trizodia* clade, *Corticifraga-Calloriopsis* clade, *Micraspis* clade, *Flagellospora* clade, *Gelatinomyces* clade, *Epicladonia-Epithamnolia* clade, *Alatospora- Miniancora* clade, *Coleophoma-Parafabraea* clade, *Aquapoterium-Unguicularia* clade, *Patellariopsis* clade, *Phialocephala urceolata* clade, *Peltigeromyces* clade, *Bulgariella* clade and *Colipila* clade) within Leotiomycetes.

We also introduced six new genera and 22 new species belonging to the families *Cordieritidaceae*, *Chlorociboriaceae*, *Helotiaceae*, *Lachnaceae*, *Calloriaceae*, *Loramycetaceae*, *Ploettnerulaceae*, *Vibrisseaceae*, *Godroniaceae*, *Dermateaceae*, *Leptodontidiaceae*, *Phacidiaceae*, *Rhytismataceae* and *Pezizellaceae*.

We have not included some genera, such as *Sclerotia*, *Coma*, *Phacidiella*, *Leohumicola*, *Trullula*, and *Mycosymbioces*, previously assigned to the Leotiomycetes, as our preliminary phylogenetic study (data not shown) showed they did not group in the class and are phylogenetically related to non-Leotiomycetes taxa.

According to our phylogenetic analysis there are 19 clades within Leotiomycetes, but the statistical support for those clades are relatively low. More sequence data from various Leotiomycetes taxa are required to stabilize these clades and sub-clades, and also other gene regions need to be selected to develop a more robust classification. Many genera were shown to be highly polyphyletic (e.g. *Lachnum*, *Hyalopeziza*, *Mollisia*, *Pyrenopeziza*, *Lophodermium* and *Coccomyces*) as also indicated by other studies (Li et al. 2016, Hosoya et al. 2010). Many Leotiomycetes genera lack type specimens in good condition and often have poor morphological descriptions. Therefore, these taxa are need to be recollected to establish a better resolved natural classification for the Leotiomycetes. Detailed monographs of genera are required to identify generic delineations. Furthermore, ranking of Leotiomycetes with evidence from molecular clock analyses (as in Hyde et al. 2017) is required.

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Supplementary Table 1 GenBank accession number and other information of strains used in phylogenetic analysis of Back-bone tree for Leotiomycetes of this study (Newly generated sequences are in bold).

Species	**Isolate**	**LSU**	**ITS**	**SSU**	**TEF**	**RPB2**
Arachnopeziza aurata	KUS_F52038	JN086696	JN033393	–	–	JN086847
Arachnopeziza obtusipila	TNS_F12769	JN086747	JN033446	–	–	JN086891
Eriopezia caesia	SBRH 843	KX501130	KX501126	–	–	–
Parachnopeziza guangxiensis		–	–	AY120864	–	–
Calloria urticae	G.M. 2015_05_10	–	KT185668	–	–	–
Duebenia compta	G.M. 2015_06_01_1	–	KY462820	–	–	–
Laetinaevia carneoflavida	G.M. 2014_07_25	–	KT185666	–	–	–
Naevala minutissima	CBS 115920	–	AY853229	–	–	–
Ameghiniella australis	KL391	KX090841	–	KX090893	KX090690	–
Cordierites frondosa	HKAS41508	AY789354	AY789355	AY789353	–	–
Diplocarpa bloxamii	KL317	KX090834	–	KX090885	KX090688	KX090745
Diplolaeviopsis ranula	NBM FL_14388	KP984785	KP984782	–	–	–
Ionomidotis fulvotingens	KL239	KX138407	–	KX138403	–	KX138401
Ionomidotis fulvotingens	G.M. 2015_03_31	–	KY462808	–	–	–
Llimoniella terricola	LL95	KX090842	–	KX090895	KX090693	KX090741
Llimoniella gregorellae	Vondrak 8374	KJ559569	KJ559547	KJ559589	–	–
Rhymbocarpus fuscoatrae	Ertz 16200	KJ559571	KJ559549	KJ559593	–	–
Skyttea lecanorae	NY1595972	KJ559561	KJ559539	–	–	–
Thamnogalla crombiei	Diederich 17315	KJ559578	KJ559550	KJ559594	–	–
Unguiculariopsis lettaui	Ertz 16346	KJ559579	KJ559548	KJ559592	–	–
Chlorociboria cf. aeruginosa	AFTOL_ID 151	AY544669	DQ491501	AY544713	DQ471053	DQ470886
Chlorociboria awakinoana	D1549	JN939922	–	–	–	–
Angelina rufescens	JK 12040101	JX624162	–	–	–	–
Dermea acerina	AFTOL_ID 941	DQ247801	–	DQ247809	DQ471091	DQ247791
Dermea acerina	CBS161.38	DQ247801	AF141164	DQ247809	–	–

Supplementary Table 1 Continued.

Species	Isolate	LSU	ITS	SSU	TEF	RPB2
Neofabraea malicorticis	CBS 102863	KR858876	KR859085	–	KX982708	KR859325
Pezicula cinnamomea	CBS 240.96	KR858916	KF376105	–	KF376265	KF376163
Blumeriella kerriae	JS20160615	–	KY929501	–	–	–
Diplocarpon rosae	DR_19	–	KP052773	–	–	–
Marssonina coronariae	NL1	–	KY672995	–	–	–
Pseudopeziza medicaginis	Ap1	–	EU729125	–	–	–
Thedgonia ligustrina	CBS:132025	GU253856	GU269839	–	GU384552	–
Ascocalyx abietina	ATCC 28379	–	AF260815	–	–	–
Godronia cassandrae	DAOM 233255	–	EF672239	–	–	–
Gremmeniella laricina	81_857	–	KC352997	–	–	KC533140
Ascocoryne cylichnium	KUS_F52351	JN086709	JN033406	–	–	–
Ascotremella faginea	GM_2015_10_28	–	KY462798	–	–	–
Chloroscypha cf. enterochroma	AFTOL_ID 67	AY544656	–	AY544700	–	–
Chlorociboria awakinoana	D1549	JN939922	U92312	JN939869	–	JN985503
Neobulgaria lilacina	M258	EU940141	EU940217	EU940066	–	EU940352
Ombrophila violacea	WZ0024	AY789365	AY789366	AY789364	–	–
Xerombrophila crystallifera	CBS 128289	–	JX454953	–	–	–
Neocudoniella radicella	UAMH 5794	–	NR_121301	–	–	–
Bisporella citrina	M253	EU940087	EU940164	EU940014	–	EU940303
Bisporella shangrilana	HMAS 275568	–	NR_153628	–	–	–
Bryoscyphus dicrani	M141	EU940107	EU940183	EU940034	–	EU940323
Cudoniella clavus	AFTOL_ID 166	DQ470944	DQ491502	DQ470992	DQ471056	DQ470888
Cyathicula microspora	M267	EU940088	EU940165	EU940015	–	EU940304
Dicephalospora rufocornea	KUS_F52274	JN086704	JN033401	–	–	JN086855
Graddonia coracina	ILLS60491	JN012009	JQ256423	–	–	–
Hymenoscyphus pseudoalbidus	Hokk_14	–	KJ511191	–	–	–

Supplementary Table 1 Continued.

Species	Isolate	LSU	ITS	SSU	TEF	RPB2
Hymenoscyphus occultus	KUS_F52847	–	KP068064	–	–	–
Hymenotorrendiella madsenii	ICMP 15648	KJ606676	AY755336	KJ606666	–	–
Hymenoscyphus ericae	UAMH6735	–	AJ319078	–	–	–
Phaeohelotium geogenum	KL219	KX090816	–	KX090867	KX090668	KX090717
Phaeohelotium epiphyllum	TNS:F_40042	AB926130	AB926061	–	–	AB926219
Tricladium obesum	CCM F_14598	KC834035	KC834068	–	–	–
Tricladium splendens	CCM F_16599	GQ477333	–	–	–	–
Cenangiopsis quercicola	KL174	KX090811	LT158425	KX090862	KX090663	KX090713
Cenangium acuum	KL276	KX090828	LT158445	KX090879	KX090680	KX090727
Chlorencoelia versiformis	KL21	KX090795	LT158427	KX090846	–	–
Crumenulopsis sororia	KL254	KX090826	LT158442	–	–	KX090725
Didymascella thujina	Dd5_3a_800.SCF	–	KT875767	–	–	–
Encoelia furfuracea	KL107	KX090798	LT158416	KX090850	KX090653	KX090701
Fabrella tsugae		AF356694	U92304	AF106015	–	–
Heyderia abietis	HMAS71954	AY789296	AY789297	AY789295	–	–
Pseudomitrula cf.	MES_2129	–	KY462665	–	–	–
Rhabdocline parkeri	ATCC 201660	–	AF260813	–	–	–
Sarcotrochila longispora	CBS 273.74	KJ663877	KJ663836	–	–	KJ663918
Trochila laurocerasi	KL336	KX090835	LT158460	KX090887	KX090689	KX090734
Velutarina alpestris	KL378	KX090839	LT158470	KX090891	–	KX090738
Heterosphaeria patella	G.M. 2014_08_04_1	–	MF196187	–	–	–
Amicodisca sp.	KUS_F51377	JN086692	JN033389	–	–	JN086843
Asperopilum juncicola	PRJ D456	–	KP161274	–	–	–
Cistella albidolutea	KUS_F52678	JN086732	JN033429	–	–	JN086872
Dematioscypha dematiicola	TNS_F_17834	JN086739	JN033438	–	–	JN086883
Endoscypha perforans	PDD:102231	–	KF727424	–	–	–

Supplementary Table 1 Continued.

Species	Isolate	LSU	ITS	SSU	TEF	RPB2
Fuscolachnum misellum	SBRH 799b	KX501129	KX501124	–	–	–
Hyalopeziza pygmaea	TNS_F17940	JN086748	JN033448	–	–	JN086894
Hyaloscypha monodictys	TNS_F5013	JN086756	JN033456	–	–	JN086906
Hyaloscypha hepaticola	M339	EU940150	EU940226	EU940074	–	EU940359
Hyaloscypha albohyalina	M259	EU940151	EU940227	EU940075	–	EU940360
Hyphodiscus hymeniophilus	TNS_F31801	AB546946	AB546948	–	–	JN086901
Olla millepunctata	KACC45226	JN086683	JN033380	–	–	JN086835
Unguicularia unguiculata	NK322	–	HG326612	HG326613	–	–
Urceolella carestiana	TNS_F18014	JN086744	JN033443	–	–	JN086888
Venturiocistella japonica	TNS_F18030	AB546954	JN033447	–	–	JN086893
Albotricha sp.	FC_2190	AB481310	AB481237	–	–	AB481347
Brunnipila fuscescens	KUS_F52031	JN086695	JN033392	–	–	JN086846
Dasyscyphella montana	FC_2070	AB481299	AB481242	–	–	AB481336
Erioscyphella lunata	S.T. 13021602	KX501133	KX501132	–	–	–
Incrucipulum longispineum	FC_2323	AB481325	AB481256	–	–	AB481362
Lachnellula occidentalis	FC_2034	AB481296	AB481244	–	–	AB481333
Lachnum fuscescens	FC_2200	AB481311	AB481255	–	–	AB481348
Lasiobelonium lonicerae	FC_2270	AB481319	AB481284	–	–	AB481356
Neodasyscypha cerina		–	U57812	–	–	–
Perrotia populina	KL120	KX090802	–	KX090854	KX090656	KX090705
Proliferodiscus sp.	KUS_F52660	JN086730	JN033427	–	–	JN086871
Solenopezia solenia	G_fon1	–	KY592188	–	–	–
Trichopeziza sulphurea	KUS_F52218	JN086701	JN033398	–	–	JN086852
Trichopezizella otanii	FC_2156	AB481307	AB481287	–	–	AB481345
Loramyces macrosporus	AFTOL_ID 913	DQ470957	JN033383	DQ471005	DQ471076	DQ470907
Mitrula brevispora	ZW02_012	AY789293	AY789294	AY789292	–	–

Supplementary Table 1 Continued.

Species	Isolate	LSU	ITS	SSU	TEF	RPB2
Mollisia cinerea	AFTOL_ID 76	DQ470942	DQ491498	DQ470990	DQ471051	DQ470883
Mollisia ventosa	KUS_F52181	JN086700	JN033397	–	–	JN086851
Acephala applanata	CBS 109321	KF951051	NR_119482	KT259197	–	–
Phialocephala urceolata	UAMH 10827	–	NR_111285	EU155146	–	–
Phialocephala scopiformis	CBS 468.94	–	NR_119460	–	–	–
Tapesia fusca	ARON3154.H	–	AJ430229	–	–	–
Calycellina populina	CBS:247.62	JN086685	JN033382	–	–	JN086837
Calycina marina	TROM:F26101	KT185671	KT185674	–	–	–
Ciliolarina pinicola	G.M. 2014_11_10.3	–	KY800411	–	–	–
Hamatocanthoscypha laricionis	TNS_F13530	JN086742	JN033441	–	–	JN086886
Microscypha sp.	TNS_F18016	JN086745	JN033444	–	–	JN086889
Mollisina uncinata	KUS_F52307	JN086707	JN033404	–	–	JN086858
Psilachnum staphyleae	KUS_F52105	JN086699	JN033396	–	–	JN086850
Rodwayella citrinula	KUS_F52443	JN086717	JN033414	–	–	JN086862
Scleropezicula alnicola	CBS474.97	–	AF141169	–	–	–
Oculimacula yallundae	TN 401	–	KF977547	–	–	–
Pirottaea palmicola	PDD:60282	–	KM677208	–	–	–
Pyrenopeziza sp.	KUS_F52417	JN086716	JN033413	–	–	–
Pyrenopeziza velebitica	CNF 2_10097	NG_060837	MF593628	–	–	–
Cadophora viticola	Cme_3	–	HQ661098	–	HQ661083	–
Cadophora antarctica	FMR16056	MG385663	MG385664	–	–	–
Ypsilina graminea	UMB_111.01	–	GQ411306	–	–	–
Roesleria subterranea	CBS 339.96	EF608074	EF060308	–	–	–
Bicornispora seditiosa	AH 44702	KF499362	KF499362	–	–	–
Lambertella palmeri	AH 7576	KF499364	KF499364	–	–	–
Lanzia berggrenii	ICMP:19614	KC164640	KC164645	KC164670	–	–

Supplementary Table 1 Continued.

Species	Isolate	LSU	ITS	SSU	TEF	RPB2
Rutstroemia longipes	TNS:F_40097	AB926142	AB926073	–	–	AB926187
Torrendiella eucalypti	CPC 11050	DQ195800	DQ195788	DQ195811	–	–
Botrytis sinoallii	LeekBC_18	–	FJ169673	–	–	FJ169679
Ciboria shiraiana	KUS_F52447	JN086733	JN033430	–	–	JN086873
Ciborinia camelliae	TNS:F_40102	AB926159	AB926074	–	–	AB926207
Coprotinia minutula	1916.P	Z81405	Z81428	–	–	–
Cristulariella depraedans	KUS_F25920	KX098505	KT462571	–	–	–
Dumontinia tuberosa	TNS:F_40114	AB926161	AB926077	–	–	AB926215
Elliottinia kerneri	KL402	–	LT158475	–	–	–
Grovesinia moricola	KUS_F26901	KX098504	KC460209	–	–	–
Haradamyces foliicola	MAFF 411026	–	NR_137642	AB329717	–	–
Kohninia linnaeicola	ARON_3887	–	AY236424	–	–	–
Moellerodiscus pinicola	TNS:F_40115	AB926162	AB926078	–	–	AB926192
Monilinia laxa	SK278	–	LN714571	–	–	LN714676
Mycopappus alni	KUS:F29393	KY696724	KY696717	–	–	–
Myriosclerotinia caricis	SCL14704	KX670973	KX574456	–	–	–
Piceomphale bulgarioides	LMK 102	–	U21814	–	–	–
Pycnopeziza sejournei	KL267	KX090827	LT158443	KX090878	KX090679	KX090726
Scleromitrula shiraiana	Hirayama062001	AY789407	AY789408	AY789406	–	–
Sclerotinia nivalis	PSnS_R	KM265190	KM265189	–	–	–
Septotinia populiperda	S2_4	KF590142	–	–	–	–
Stromatinia cryptomeriae	TNS:F_40103	AB926160	AB926075	–	–	AB926191
Valdensinia heterodoxa	485.2	Z81423	Z81447	Z81399	–	–
Chlorovibrissea sp.	PDD70070	DQ257352	DQ257353	DQ257351	–	–
Vibrissea truncorum	AFTOL_ID 1322	FJ176874	–	FJ176818	FJ238405	FJ238356
Vibrissea flavovirens	MBH39316	AY789426	AY789427	AY789425	–	–

Supplementary Table 1 Continued.

Species	Isolate	LSU	ITS	SSU	TEF	RPB2
Ascodichaena rugosa	Lantz 313	HM140500	–	–	–	–
Chaetomella oblonga	BPI 843552	AY487080	AY487079	AY487081	–	–
Pilidium acerinum	BPI 843555	AY487092	AY487091	AY487093	–	–
Sphaerographium nyssicola	CBS 128284	–	NR_119916	–	–	–
Synchaetomella acerina	DAOM 242271	NG_042747	NR_111811	JX989832	–	–
Amylocarpus encephaloides	017cN	KM272361	KM272369	–	–	–
Banksiamyces sp.	PDD 105253	–	KM880187	–	–	–
Belonioscyphella hypnorum	Bel2	KU900906	KU900903	–	KU900910	–
Bulgariella pulla	DHP_06_607	KJ704849	KJ704848	KJ704850	–	–
Calycellinopsis xishuangbanna		KR094163	–	GU936124	–	–
Cashiella sticheri	PDD:103198	KF033117	KF033116	KF033118	–	–
Chlorosplenium chlora	BHI_F737a	–	MG553994	–	–	–
Chlorosplenium chlora isolate	BHI_F736a	MG553993	MG553993	–	–	–
Colipila masduguana	CBS 128287	HQ694501	–	–	–	–
Corticifraga peltigerae	G.M. 2015_05_02_1	KY462801	KY462801	–	–	–
Crocicreas cacaliae	F_148, 706	FJ005126	FJ005107	–	–	–
Leptodontidium trabinellum	CBS_329.53	KY853509	KY853449	–	–	–
Leptodontidium irregulare	CBS_851.73	KY853508	KY853448	AY129281	–	–
Mitrulinia ushuaiae	PDD:105643	KX273439	KX273438	–	–	–
Orbiliopsis callistea	PDD:97932	HQ533050	HQ533049	–	–	–
Patellariopsis atrovinosa	G.M. 2016_05_04.1	KY970066	KY970066	KY970066	–	–
Patellariopsis atrovinosa voucher	G.M. 2014_06_15_1	KY462814	KY462814	KY462814	–	–
Patinella hyalophaea	H.B. 9739	–	KT876978	–	–	–
Peltigeromyces sp.	KL153	KX090803	–	KX090855	–	KX090707
Polydesmia pruinosa	TNS_F12764	JN086753	JN033453	–	–	JN086899
Roseodiscus subcarneus	D. Haelew. 314a	KT972715	KT972714	KT972713	–	–

Supplementary Table 1 Continued.

Species	Isolate	LSU	ITS	SSU	TEF	RPB2
Tetracladium ellipsoideum	MIDUI30	KF768467	–	–	KF768430	–
Tetracladium marchalianum	F_312	–	FJ000360	–	–	–
Halenospora varia	G_ela3	–	MF329638	–	–	–
Leotia lubrica	AFTOL_ID 1	AY544644	–	AY544687	DQ471041	DQ470876
Leotia lubrica	KKM 337	KF836627	KF836617	–	–	–
Microglossum aff. nudipes	SAV F_11285	KX382869	KX382859	–	–	KX382887
Thuemenidium atropurpureum	ILLS 61044	JQ256441	JQ256427	–	–	–
Pezoloma sp.	NBRC 103659	AB506026	AB506027	–	–	–
Medeolaria farlowii		GQ406807	GQ406809	GQ406808	–	–
Calloriopsis sp.	G.M. 2014_12_07.1	–	MF322774	–	–	–
Eleutheromyces pseudosubulatus	CBS:458.88	EU754162	KJ710467	EU754063	–	–
Gelatinipulvinella astraoeca	TRL 11234	–	U72611	–	–	–
Gelatinopsis hysteropatellae	G.M. 2015_10_27.2	MF322772	MF322772	–	–	–
Geltingia associata	Perez_Ortega 1039	KJ559562	KJ559540	KJ559584	–	–
Allantophomopsiella pseudotsugae	CBS 841.91	KJ663868	KJ663829	–	–	KJ663909
Allantophomopsis lycopodina	CBS 137782	KR873264	KR873230	–	KR873305	–
Bulgaria inquinans	AFTOL_ID 916	DQ470960	–	DQ471008	DQ471079	DQ470910
Darkera picea	CPC 23897	KM108397	NR_132906	KM108446	KM108423	–
Gremmenia infestans	CBS 396.48	KJ663876	KM216393	–	–	KJ663917
Lophophacidium dooksii	DAOM183323	–	KF889652	–	–	–
Phacidium lacerum	CBS 400.81	KJ663884	KJ663843	–	–	KJ663925
Phacidiopycnis sp.	ZLY_2010b	HM595597	HM595538	–	–	–
Pseudophacidium ledi	CBS 377.59	KJ663901	KJ663860	–	–	KJ663941
Claussenomyces sp.	PDD:106298	MG807388	MG807392	MG807389	–	–
Collophora hispanica	CBS 128568	MH878014	NR_111680	–	–	–
Grovesiella abieticola	SaFap2016ID_17	–	KX358852	–	–	–

Supplementary Table 1 Continued.

Species	Isolate	LSU	ITS	SSU	TEF	RPB2
Holwaya mucida	B 70 0009352	DQ257356	DQ257357	DQ257355	–	–
Mniaecia jungermanniae	M145	EU940109	EU940185	EU940036	–	EU940324
Mniaecia nivea	M167	EU940115	EU940188	EU940042	–	–
Trizodia acrobia	M157	EU940113	EU940190	EU940040	–	EU940326
Trizodia acrobia	M160	EU940114	EU940191	EU940041	–	EU940327
Cudonia circinans	C316	KC833182	KC833156	–	KC833349	KC833275
Spathularia flavida	isolate C322	KC833227	KC833070	–	KC833394	–
Cyclaneusma minus	NY199	–	KJ406925	–	–	–
Mellitiosporium versicolor	Lantz 357	HM140560	–	–	–	–
Naemacyclus fimbriatus	AFTOL_ID 1295	FJ176867	–	FJ176811	FJ238399	–
Propolis farinosa	PRJ R1018	KJ606675	KJ606681	KJ606668	–	–
Bifusella camelliae	HOU1094	KF797447	KF797435	–	–	–
Coccomyces strobi	AFTOL_ID 1250	DQ470975	–	DQ471027	DQ471099	DQ470929
Colpoma quercinum	Lantz 368	HM140513	–	–	–	–
Colpoma quercinum	22_39	–	KX815492	–	–	–
Cryptomyces theae	FU30017	KF797444	KF797432	–	–	–
Davisomycella medusa	BPI842078	–	AY465525	–	–	–
Discocainia nervalis	1045	KJ513473	KJ507206	–	–	–
Duplicariella phyllodoces	Lantz 389	HM140516	–	–	–	–
Elytroderma deformans	CBS 181.68	–	AF203469	AF203455	–	–
Hypoderma minteri	BJTC 201203	JX232418	NR_120173	–	–	–
Lirula macrospora	isolate 13	HQ902152	HQ902159	–	–	–
Lophodermella arcuata	BPI842080	–	AY465518	–	–	–
Lophodermium gamundiae	ICMP 16802	–	NR_119628	–	–	–
Marthamyces desmoschoeni	PRJ R908	KJ606673	KJ606679	KJ606670	–	–
Meloderma desmazieresii	CBS 612.84	–	AF203470	AF203454	–	–

Supplementary Table 1 Continued.

Species	Isolate	LSU	ITS	SSU	TEF	RPB2
Nematococcomyces rhododendri	HOU 879A	KC312685	–	–	–	–
Ploioderma destruens	T33	–	GU138756	–	–	–
Rhytisma acerinum	Hou et al. 203	FJ495190	GQ253100	–	–	–
Rhytisma huangshanense	Hou 564	FJ495192	GQ253101	FJ495193	–	–
Soleella chinensis	R35	–	GU138755	–	–	–
Sporomega degenerans	Lantz 367	HM140567	–	–	–	–
Terriera elliptica	HOU327	KP878550	KP878549	–	–	–
Therrya abieticola	CNU447A	KP322579	KP322573	–	–	–
Tryblidiopsis pinastri	AFTOL_ID 1319	DQ470983	–	DQ471035	DQ471106	DQ470935
Tryblidiopsis pinastri	BPI665552	–	KF545364	–	–	–
Antarctomyces pellizariae	UFMGCB 12416	–	KX576510	–	–	KY100007
Ascozonus woolhopensis		–	–	AF010590	–	–
Caccobius minusculus	ARO 2536	–	–	AF010587	–	–
Cleistothelebolus nipigonensis		KC492061	KC492060	–	–	–
Thelebolus ellipsoideus	AFTOL_ID 5005	FJ176895	AY957550	FJ176840	–	FJ238378
Thelebolus globosus	AFTOL_ID 5016	FJ176905	–	FJ176851	FJ238418	FJ238385
Thelebolus sp.	I12F_02287	JX852407	JX852357	–	–	–
Arthrocladiella mougeotii	CF2012024	KP975400	KR048053	–	–	–
Blumeria graminis	MUMH1725	–	AB273558	–	–	–
Brasiliomyces trina		AB022350	AB022351	AB022349	–	–
Caespitotheca forestalis	MUMH1461	AB193467	AB193466	AB193465	–	–
Cystotheca lanestris	CF2012052	KR048117	KR048055	–	–	–
Erysiphe javanica	MUMH5153	JQ220159	JQ220162	–	–	–
Erysiphe platani	KR29265	JQ365939	JQ365943	–	–	–
Golovinomyces ambrosiae	MUMH731	AB077680	AB077679	–	–	–
Leveillula sp.	MUMH805	AB080478	AB045156	–	–	–

Supplementary Table 1 Continued.

Species	Isolate	LSU	ITS	SSU	TEF	RPB2
Microidium phyllanthi	MUMH1778	AB120754	AB719951	AB120753	–	–
Neoerysiphe geranii	CF2013083	KR048161	KR048092	–	–	–
Parauncinula septata	MUMH585	AB183532	AB183533	AB183530	–	–
Phyllactinia alnicola	MUMH916	AB080452	AB080554	–	–	–
Pleochaeta shiraiana	MUMH36	–	D84381	AB120750	–	–
Podosphaera photiniae	MUMH 248	–	NR_147412	–	–	–
Sawadaea tulasnei	MUMHS112	AB193400	AB193388	–	–	–
Leveillula taurica	GZP	–	KX709873	–	–	–
Oidium heveae	HO_473	KY302627	KY302626	–	–	–
Ovulariopsis cf. insolita	CCCUPc07	–	KC122682	–	–	–
Pseudoidium neolycopersici	MUMH 561	AB921990	AB921989	–	–	–
Deltopyxis triangulispora	H.B. 9625b	–	JQ688406	–	–	–
Deltopyxis triangulispora	G.M. 2016_12_06	–	MF594688	–	–	–
Stamnaria americana	NBRC 108774	AB773854	–	AB773855	AB773858	AB773857
Discinella schimperi	M192	EU940127	–	EU940054	–	EU940340
Hydrocina chaetocladia	HME4375	AY789412	AY789413	AY789411	–	–
Durella macrospora	G.M. 2015_04_05	–	KY462813	–	–	–
Strossmayeria basitricha	ILLS60498	JN012016	–	–	–	–
Bryoclaviculus campylopi	PDD:101074	JX393085	JX393084	JX393087	–	–
Bryoglossum gracile	MBH52481	AY789420	AY789421	AY789419	–	–
Cyttaria darwinii Berk. 1842	isolate 14	EU107208	EU107253	EU107181	–	–
Cyttaria johowii	isolate 73	EU107229	EU107257	EU107198	–	–
Cyttaria hariotii	isolate 55	EU107218	–	EU107195	EU107252	–
Cyttaria hookeri	isolate 60	EU107227	EU107256	–	–	–
Amorphotheca resinae	ATCC 200942	AY352592	NR_119450	–	–	–
Byssoascus striatosporus	CBS 642.66	AB040688	–	AJ315170	–	–

Supplementary Table 1 Continued.

Species	Isolate	LSU	ITS	SSU	TEF	RPB2
Byssoascus striatosporus	UAMH 3572	–	NR_111040	–	–	–
Gymnostellatospora alpina	C11	–	FJ590609	FJ590656	–	–
Myxotrichum deflexum	CBS 228.61	AB040689	LN833542	AB015777	–	LN833563
Oidiodendron chlamydosporicum	UAMH 6520	–	NR_111032	–	–	–
Oidiodendron sp.	TTC455	KX640791	KX640717	–	–	–
Pseudogymnoascus roseus	CS20	–	AY608924	–	–	–
Connersia rilstonii	CBS 537.74	AF096189	KJ755499	AF096174	–	KJ755473
Leuconeurospora pulcherrima	CBS 343.76	AF096193	KJ755518	AF096178	–	KJ755491
Pleuroascus nicholsonii	CBS 345.73	AF096196	KJ755519	AF096182	–	–
Pseudeurotium ovale	FMR 13600	KP686193	KP686192	–	–	–
Rhynchosporium agropyri	ZT Myc2337	–	NR_121480	–	–	–
Varicosporium delicatum	CCM F_19494	KC834036	JQ412864	–	–	–
Filosporella fistucella	CCM_13091	KC834021	NR_153981	–	–	–
Meliniomyces variabilis	UAMH 10029	–	AY838793	AY838792	–	–
Chalara hyalocuspica	CCF 3975	FR667867	NR_137568	–	–	–
Rhyzoscyphus ericae	strain 111	AM887699	–	–	–	–
Gyoerffyella tricapillata	CBS 451.64	KC834030	NR_155114	–	–	–
Articulospora tetracladia	CCM F_11805	–	EU998928	–	–	–
Lemonniera centrosphaera	CCM F_149	KC834032	NR_155313	–	–	–
Glarea sp.	C2B	–	KX610435	–	–	–
Mycofalcella calcarata	CCMF 10289	KC834033	NR_154165	–	–	–
Infundichalara microchona	CBS 175.74	HQ609479	KR859078	HQ609486	–	KR859318
Phialina lachnobrachyoides	KUS_F52183	JN086715	JN033412	–	–	JN086861
Poculum pseudosydowianum	TNS:F_40071	AB926136	AB904505	–	–	AB926182
Clarireedia bennettii	CBS 309.37	–	MF964321	–	–	–
Meria laricis	AFTOL_ID 244	–	KT225534	–	–	–

Supplementary Table 1 Continued.

Species	Isolate	LSU	ITS	SSU	TEF	RPB2
Scytalidium lignicola	UAMH 1502	–	NR_121314	NG_061078	–	–
Cryptosporiopsis sp.	CBS 433.75	GU973599	GU973506	–	–	–
Rhizodermea veluwensis	CBS 110605	KR859076	NR_137757	–	–	KR859353
Pseudofabraea citricarpa	CBS 130533	KR859075	KR859281	–	–	KR859352
Phlyctema vagabunda	CBS 304.62	KR859070	KR859276	–	KX982722	KR859347
Parafabraea eucalypti	CBS:124810	KR858882	KR859091	–	KX982731	KR859331
Crinula caliciiformis	AFTOL_ID 272	AY544680	KT225524	AY544729	–	KT225542
Alatospora acuminata	ccm_F 37194	–	AY204590	AY204585	–	–
Flagellospora curvula	CB_M13	KC834024	KC834045	–	–	–
Xeropilidium dennisii	KL159	KX090807	LT158422	KX090859	KX090660	KX090710
Coleophoma proteae	CBS 132532	NG_042679	NR_111760	–	–	–
Diplococcium spicatum	CBS 852.73	EF204496	–	EF204513	–	EF204483
Cheirospora botryospora	CPC 24607	KR611894	KR611872	–	–	–
Acidomelania panicicola	61R8	KF874622	KF874619	–	–	–
Ceuthospora sp	CLX3538	KF493763	KF493753	KF493743	–	–
Sclerencoelia fascicularis	G.M. 2016-03-09.1	MH194576	MH194576	MH194576	–	–
Cryptosporella hypodermia	AFTOL-ID 2124	DQ862028	–	DQ862049	DQ862034	DQ862018
Ophiocordyceps irangiensis	OSC 128578	DQ518770	JN049833	DQ522556	DQ522345	DQ522445
Ophiocordyceps gracilis	OSC 151906	KJ878890	–	KJ878923	KJ878969	–
Ophiocordyceps variabilis	OSC 111003	EF468839	–	EF468985	EF468779	EF468933
Ophiocordyceps sinensis	YN09-64	JX968033	JQ325141	JX968028	–	JX968013
Rommelaarsia flavovirens	HB9951c	KT958771	KT958774	–	–	–
Polyphilus sieberi	TT3B	MG719708	MG719690	MG719729	–	MG719750
Scolecolachnum pteridii	CPC 24666	KU597764	KU597797	–	–	–
Zymochalara cyatheae	CPC:24736	KU597770	KU597803	KU597785	–	–
Soosiella minima	MH_2012_1230	JX124327	JX124327	JX124327	–	–

Supplementary Table 1 Continued.

Species	Isolate	LSU	ITS	SSU	TEF	RPB2
Cylindrosporium olivae	CBS 218.54	MH873826	MH857298	–	–	–
Rhexocercosporidium carotae	CBS 418.65	MH870289	NR_111086	NG_061015	–	–
Cylindrosporium concentricum	CBS 157.35	MH867125	MH855615	–	–	–
Gelatinomyces siamensis	KKUK1	JX219381	JX219379	JX219377	–	–
Lachnopsis catarinensis	CPC 24723	KU597760	KU597793	KU597778	–	–
Bloxamia cyatheicola	VIC 42563	KU597757	KU597790	KU597775	–	–
Lauriomyces cylindricus	SFC01649	KX649966	KX649977	KX649955	–	–
Lauriomyces basitruncatus	CC00049	KX649970	KX649981	KX649959	–	–
Satchmopsis brasiliensis	CBS 420.93	MH874078	DQ195784	DQ195807	–	–
Fuscosclera lignicola	CBS 142287	KY853504	KY853444	–	–	–
Triposporium deviatum	CBS 137300	KY853537	KY853474	–	–	–
Acidea extrema	CCF3830	FJ430779	FJ430779	FJ430779	–	–
Macroskyttea parmotrematis	UGDA	KP984788	KP984784	KP984790	–	–
Amphobotrys ricini	RWB 1595	–	JX961614	–	–	–
Valdensinia heterodoxa	VSP4A1	–	KU306730	–	–	–
Geomyces auratus	CBS 108.14	NG_042776	NR_111872	–	–	–
Miniancora allisoniensis	CCMF 30487	–	NR_154164	–	–	–
Cornicullariella sp.	URM 6964	–	KF700366	–	–	–
Typhulochaeta japonica		–	–	AB120752	–	–
Cystodendron sp.	ER20F	–	KU986824	–	–	–
Arbusculina fragmentans	CCMF 13486	NG_057024	NR_153520	–	–	–
Cladochasiella divergens	CCM F-13489	–	NR_153874	–	–	–
Clathrosphaerina zalewskii	CBS 162.49	–	NR_159766	–	–	–
Crucellisporiopsis marquesiae	CBS 138895	MH878639	NR_137925	–	–	–
Curviclavula anemophila	CBS 138123	MH877653	KM503089	–	–	–
Haplographium delicatum	CBS 196.73	MH872362	MH860659	–	–	–

Supplementary Table 1 Continued.

Species	Isolate	LSU	ITS	SSU	TEF	RPB2
Mycoarthris corallina		–	AH009124	AH009124	–	–
Dimorphospora foliicola	CBS 221.59	MH869385	NR_153969	–	–	–
Fontanospora sp.	59_DS.ST28.FK	–	KY977554	–	–	–
Geniculospora grandis		MH873440	MH861735	–	–	–
Gloeotinia granigena	CBS 417.50	MH868212	–	–	–	–
Helicodendron websteri		MH874234	MH862609	–	–	–
Cochlearomyces eucalypti	CBS:142622	MG386081	MG386025	–	–	–
Epicladonia sandstedei	RP106	KY661650	KY661614	KY661693	–	–
Exochalara longissima	CBS 980.73	HQ609476	–	HQ609484	–	–
Gorgomyces honrubiae	CCMF 12003	KC834028	NR_154062	–	–	–
Epithamnolia xanthoriae	Boom 52584	KY814515	KY814535	KY828441	–	–
Leohumicola lenta	DAOM 231149	–	NR_111180	–	–	–
Tetrachaetum elegans	THEL 180-1653	–	KX858625	–	–	–
Xenopolyscytalum pinea	CBS 126493	MH875581	NR_156543	–	–	–
Spirosphaera minuta	CBS 475.66	MH870502	MH858870	–	–	–
Sabahriopsis eucalypti	CBS 139906	MH878669	NR_137991	–	–	–
Aquapoterium pinicola	ATCC MYA-4213	NG_056957	NR_111345	–	–	–
Rhizocladosporium argillaceum	CBS 241.67	MH870652	NR_145279	–	–	–
Phaeopyxis punctum	isolate RP95	KY661670	KY661643	–	–	–
Lareunionomyces syzygii	strain CPC 26531	KX228338	KX228287	–	–	–
Mastigosporium kitzebergense	CBS 270.69	MH871040	MH859306	–	–	–
Neolauriomyces eucalypti	culture CPC:32613	MH327842	MH327806	–	–	–
Hyalodendriella betulae	CBS 261.82	MH873240	MH861496	–	–	–
Humicolopsis cephalosporioides	CBS 645.76	MH872792	MH861021	–	–	–
Fulvoflamma eucalypti	CPC 11243	DQ195791	DQ195779	DQ195802	–	–
Encoeliopsis rhododendri	CBS 905.69	MH871259	MH859479	–	–	–

Supplementary Table 1 Continued.

Species	**Isolate**	**LSU**	**ITS**	**SSU**	**TEF**	**RPB2**
Dactylaria dimorphospora	CBS 256.70	MH871358	MH859594	–	–	–
Crucellisporium umtamvunae	CBS 125742	MH875124	MH863659	–	–	–
Collembolispora aristata	CPC 21145	KC005811	NR_111830	–	–	–
Brefeldochium pruinosum	CBS 111544	MH874458	MH862876	–	–	–
Brachyalara straminea	CBS 622.82	HQ609475	–	HQ609482	–	–
Scytalidium vaccinii	CBS 652.89	MH873881	MH862193	–	–	–
Neocrinula xanthorrhoeae	CPC 29474	NG_059743	KY173412	–	–	–
Clathrosporium intricatum	ICMP:14611	–	EF029191	–	–	–
Strasseria geniculata	CBS 132.65	MH870153	MH858519	–	–	–
Collophorina euphorbiae	IBRC-M 30208	MG592738	MG592740	MG592742	–	–
Xenochalara juniperi	cmw1901	–	AF184889	–	–	–
Porodiplodia livistonae	culture CPC:32154	MH327845	MH327809	–	–	–
Davidhawksworthia ilicicola	CBS 734.94	KU728556	NR_154008	–	KU728592	–
Vandijckella johannae	JW1033	LT904726	LT904725	–	–	LT904707
Epiglia gloeocapsae	CBS 126302	MH875424	MH863969	–	–	–
Epiglia gloeocapsae	CBS 126301	MH875423	MH863968	–	–	–
Pseudohelotium pineti	CBS 251.60	MH869527	–	–	–	–
Lichinodium ahlneri	SL129	MK228847	–	MK225515	–	–
Lichinodium sirosiphoideum	SL91	MK228845	–	MK225517	–	MK244604
Lichinodium sirosiphoideum	SL92	MK228846	–	MK225516	–	MK244603
Potebniamyces pyri	CBS 322.63	KJ663900	KJ663859	–	–	KJ663940
Mycosymbioces mycenaphila	OSC 148294	–	NR_137807	–	–	–
Claussenomyces olivaceus	NB_479	KY633629	KY633590	–	–	–
Micraspis acicola	NB-366-3A	KY633626	KY633586	–	–	–
Micraspis acicola	NB-505-2I	KY633624	KY633584	–	–	–
Cistella granulosella	MFLU 16-0565	**MK591962**	**MK584936**	**MK585023**		**–**

Supplementary Table 1 Continued.

Species	Isolate	LSU	ITS	SSU	TEF	RPB2
Lachnum controversum	MFLU 18-1820	**MK591964**	**MK584937**	**MK585025**		**MK368613**
Pulvinata tomentosa	MFLU 18-1819	**MK591965**	**MK584938**	**MK585026**		**MK373054**
Cadophora microspora	MFLU 18-2672	**MK591966**	**MK584939**	**MK585027**		**MK373055**
Lanceolata brunnea	MFLU 18-1821	**MK591967**	**MK584940**	**MK585028**	**MK637044**	**MK373056**
Calloria urticae	MFLU 18-0696	**MK591968**	**MK584941**	**MK585029**	**MK637045**	**MK373057**
Calloria urticae	MFLU 18-0697	**MK591969**	**MK584942**	**MK585030**	**MK637046**	**MK373058**
Cyathicula cyathoidea	MFLU 18-0698	**MK591970**	**MK584943**	**MK585031**	**MK637047**	**MK388217**
Crocicreas sp	MFLU 18-1822	**MK591963**	**MK584944**	**MK585024**		–
Rhexocercosporidium sp	MFLU 16-0559	**MK591961**	**MK584945**	**MK585022**	**MK637048**	**MK368612**
Unguiculella globosa	MFLU 18-1816	**MK591972**	**MK584946**	**MK585044**	**MK714027**	**MK614727**
Dicephalospora sessilis	MFLU 18-1823	**MK591974**	**MK584947**	**MK585047**	**MK714028**	**MK577779**
Erioscyphella fusiforme	MFLU 18-1824	**MK591975**	**MK584948**	–		**MK614728**
Dicephalospora rufocornea	MFLU 18-1825	**MK591976**	**MK584949**	**MK585048**	**MK714030**	**MK614729**
Erioscyphella abnormis	MFLU 18-1826	**MK591977**	**MK584950**	**MK585049**		**MK614730**
Erioscyphella sclerotii	MFLU 16-0569	**MK591980**	**MK584951**	**MK585033**		**MK388219**
Bisporella discedens	MFLU 18-2673	**MK591982**	**MK584952**	**MK585035**		–
Erioscyphella brasiliensis	MFLU 16-0577a	**MK591983**	**MK584953**	**MK585036**		**MK388221**
Terriera elliptica	MFLU 16-0582	–	**MK584954**	–		–
Dicephalospora rufocornea	MFLU 16-0585	**MK591984**	**MK584955**	–	**MK714021**	**MK388222**
Proliferodiscus chiangraiensis	MFLU 16-0588	**MK591985**	**MK584956**	**MK585037**		–
Erioscyphella aseptata	MFLU 16-0590	**MK591986**	**MK584957**	–		**MK388223**
Dicephalospora aurantiaca	MFLU 16-0591b	–	**MK584958**	**MK585038**	**MK714024**	**MK614722**
Dicephalospora rufocornea	MFLU 18-0674a	–	**MK584959**	–	**MK714023**	–
Dicephalospora rufocornea	MFLU 18-0674b	**MK591989**	**MK584960**	**MK585039**	**MK689342**	–
Dicephalospora rufocornea	MFLU 18-0675	**MK591987**	**MK584961**	–	**MK714022**	**MK614723**
Dicephalospora aurantiaca	MFLU 16-0591a	**MK591988**	**MK584962**	–		–

Supplementary Table 1 Continued.

Species	Isolate	LSU	ITS	SSU	TEF	RPB2
Rubropezicula thailandica	MFLU 16-0592	–	**MK584963**	–		–
Strossmayeria bakeriana	MFLU 16-1862	**MK591971**	**MK584964**	**MK585032**		**MK614732**
Erioscyphella alba	MFLU 16-0614	**MK591990**	**MK584965**	–		–
Hymenoscyphus cf calyculus	MFLU 16-1865	**MK591991**	**MK584966**	–		–
Erioscyphella brasiliensis	MFLU 16-0577b	**MK591993**	**MK584967**	**MK585040**		–
Chlorociboria poutoensis	MFLU 18-0676	**MK591994**	**MK584968**	**MK585041**	**MK714025**	**MK614725**
Erioscyphella sclerotii	MFLU 18-0688	**MK591995**	**MK584969**	**MK585042**		**MK614726**
Bisporella discedens	MFLU 18-0691	**MK591996**	**MK584970**	**MK585043**	**MK714026**	–
Bisporella shangrilana	HKAS 90655b	**MK591997**	**MK584971**	**MK585052**	**MK637049**	–
Bisporella shangrilana	HKAS 90655a	**MK591998**	**MK584972**	**MK585053**	**MK637050**	–
Ascocoryne sarcoides	HKAS 90651	**MK591999**	**MK584973**	**MK585054**	**MK637051**	**MK614731**
Banksiamyces sp	HKAS 90000	**MK592000**	**MK584974**	**MK585055**		**MK388218**
Scolecolachnum nigricans	MFLU 18-1817	**MK591973**	**MK584975**	**MK585045**		–
Helicogoniaceae sp	HC06-b	–	**MK584976**	**MK585046**		–
Dicephalospora rufocornea	MFLU 18-1832	–	**MK584977**	–	**MK714029**	**MK577780**
Dicephalospora rufocornea	MFLU 18-1827	**MK591978**	**MK584978**	**MK585050**	**MK714031**	**MK577781**
Dicephalospora huangshanica	MFLU 18-1828	**MK591979**	**MK584979**	**MK585051**	**MK714032**	**MK577782**
Vibrissea brevistipitata	MFLU 16-0597	–	**MK584980**	–		–
Neopyrenopeziza nigripigmentata	MFLU 16-0599	**MK592001**	**MK584981**	**MK585057**		–
Duebenia subcompta	MFLU 16-0600	**MK592002**	**MK584982**	**MK585058**	**MK714033**	–
Duebenia compta	MFLU 16-0601	**MK592003**	**MK584983**	**MK585059**		–
Neofabraea brunneipila	MFLU 15-0231	**MK592004**	**MK584984**	**MK585060**		–
Lophodermium herbarum	MFLU 16-0877	**MK592005**	**MK584985**	**MK585061**		–
Chalara sp	MFLU 18-1812	**MK592006**	**MK584986**	**MK585017**		–
Chalara sp	MFLU 18-1813	**MK592007**	**MK584987**	**MK585056**		–
Crocicreas cf tomentosum	MFLU 17-0082	**MK592008**	**MK584988**	**MK585062**		–

Supplementary Table 1 Continued.

Species	Isolate	LSU	ITS	SSU	TEF	RPB2
Dicephalospora rufocornea	MFLU 16-1860	**MK592011**	**MK584989**	**MK585064**		–
Chlorociboria olivaceous	MFLU 18-1814	**MK592009**	**MK584990**	–	**MK714034**	–
Dicephalospora rufocornea	MFLU 16-1858	**MK592010**	**MK584991**	**MK585063**		–
Capitotricha filiformis	MFLU 15-2784	–	**MK584992**	**MK585015**		–
Trimmatostroma betulinum	MFLU 15-2991	**MK591956**	**MK584993**	**MK585016**		–
Lophodermium microsporum	MFLU 15-3100	–	**MK584994**	**MK585019**		–
Chalara sp	MFLU 15-3167	**MK591953**	**MK584995**	**MK585010**	**MK348529**	**MK310262**
Trimmatostroma salicis	MFLU 18-0702	–	**MK584996**	–		–
Bacilliformis hyalinus	MFLU 18-1811	**MK591951**	**MK584997**	–		**MK310263**
Cyathicula cyathoidea	MFLU 16-0613	**MK591957**	**MK584998**	**MK585012**	**MK637041**	–
Rhexocercosporidium sp	MFLU 15-2755	–	**MK584999**	**MK585013**		–
Heterosphaeria linariae	MFLU 15-2764	**MK591955**	**MK585000**	**MK585014**	**MK637042**	**MK343131**
Bacilliformis hyalinus	MFLU 18-2671	**MK591952**	**MK585001**	–		**MK341543**
Rhytisma acerinum	MFLU 15-3084	**MK591958**	**MK585002**	**MK585018**		–
Cadophora lacrimiformis	MFLU 16-1486	**MK591959**	**MK585003**	**MK585020**		–
Neomollisia gelatinosa	MFLU 18-0701	**MK591960**	**MK585004**	**MK585021**	**MK637043**	**MK358463**
Lophodermium herbarum	MFLU 15-3182	**MK591954**	–	**MK585011**		–
Erioscyphella fusiforme	MFLU 15-0230	**MK591981**	**NR_154122**	**MK585034**		**MK388220**
Microglossum macrosporum	MFLU 18-1830	**MK591992**	–	–	–	**MK614724**