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Article

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Global diversity, molecular phylogeny and divergence times of the brown-rot fungi within the Polyporales

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Abstract

Brown-rot fungi are an important group of wood-decaying fungi, aside from the ecological significance as decomposer and plant pathogens in forest ecosystems, some species are edible and medicinal fungi, which have important economic value. Recent taxonomic and phylogenetic studies shown that Polyporales contains the majority of brown-rot fungi and forms 14 family-level lineages. However, its species composition and divergence time are not fully understood. In this study, we inferred phylogeny and divergence times of the brown-rot fungi within the Polyporales. The phylogenetic relationships of the brown-rot fungi within the Polyporales are reconstructed based on DNA sequences of multiple loci including the internal transcribed spacer regions (ITS), the large subunit of nuclear ribosomal RNA gene (nLSU), the small subunit of mitochondrial rRNA gene (mtSSU), the small subunit of nuclear ribosomal RNA gene (nuSSU), the largest subunit of RNA polymerase II gene (RPB1), the second largest subunit of RNA polymerase II gene (RPB2) and the translation elongation factor 1-α gene (TEF1). Molecular clock analysis for the divergence time of the brown-rot fungi within the Polyporales is performed using BEAST based on the seven DNA fragments (ITS, nLSU, mtSSU, nuSSU, RPB1, RPB2, TEF1). Phylogenetic and molecular clock analyses showed that Polyporales appeared in the early Cretaceous (about 141.55 Mya); species of brown-rot fungi within Polyporales gathered and formed 14 family-level lineages, and the differentiation with white-rot fungi occurred in the early Cretaceous (about 119.25 Mya); the brown-rot families of Polyporales were centralized differentiation in the middle Cretaceous (about 81.48–99.54 Mya). Through years of extensive field trip investigations, combined with relevant literature and databases, we concluded that there are 383 brown-rot fungi species within the Polyporales worldwide. Based on the evidence of morphological characters and molecular phylogenetic analyses, 383 brown-rot fungi species within Polyporales belonging to 14 families and 69 genera are recognized, including two new genera, viz., *Eucalyptoporia* and *Resupinopostia*; nine new species, viz., *Daedalea submodesta*, *D. vinacea*, *Eucalyptoporia tasmanica*, *Fuscopostia avellaneus*, *F. persicinus*, *F. tomentosa*, *Niveoporofomes orientalis*, *Rhodoantrodia subtropica* and *Resupinopostia sublateritia*; and five new combinations, viz., *Cystidiopostia simanii*, *Osteina subundosa*, *Resupinopostia lateritia*, *Spongiporus japonica* and *S. persicinus*. Additionally, an

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annotated checklist of the species composition, geographical distribution, host trees and some morphological characteristics of brown-rot fungi within Polyporales is given, based on the field trip investigations and published papers.

Keywords – 16 new taxa – brown-rot fungi – macro-fungi – molecular clock – multi-gene phylogeny

Introduction

Wood-decaying fungi can decompose wood plants and produce enzymes to break down the celluloses, hemicelluloses and lignins of wood. Generally, wood-decaying fungi can be divided into two types: brown-rot fungi and white-rot fungi. Among them, brown-rot fungi mainly decompose celluloses and hemicelluloses, which is of great significance to maintain the stability of forest ecosystem (Wei & Dai 2004, Li et al. 2018). Some brown-rot fungi are forest pathogens, which can infect different parts of wood, such as branch, heartwood, trunk and base (Dai 2012, Yuan et al. 2023); and some are edible fungi or medicinal fungi (Dai et al. 2009a, Wu et al. 2019).

Although the brown-rot fungi are dispersed in different orders of Basidiomycota (He et al. 2019), Polyporales Gäum. still contains the majority of brown-rot fungi, which divided into two clades, viz., the antrodia clade and the leptoporus clade (Ortiz-Santana et al. 2013, Liu et al. 2023a, b). In recent years, many mycologists have focused on the brown-rot fungi within Polyporales and concluded most of the brown-rot fungi gathered in the antrodia clade, including many new taxa (Binder et al. 2013, Ortiz-Santana et al. 2013, Han et al. 2016, Chen et al. 2017, Justo et al. 2017, Shen et al. 2019, Liu et al. 2023a). The leptoporus clade is embedded in Irpicaceae Spirin & Zmitr. and only includes *Leptoporus mollis* (Pers.) Quél. and *L. submollis* B.K. Cui & Shun Liu (Chen et al. 2021, Liu et al. 2023b). Liu et al. (2023a) performed a comprehensive systematic classification and phylogenetic study on the brown-rot fungi within the Polyporales, and revised the classification system of the brown-rot fungi within the Polyporales.

Some studies shown that there is a relatively constant relationship between the differences in the amino acid sequences and divergence time of species (Zuckerkandl & Pauling 1962, Doolittle & Blombäck 1964). Recently, divergence time was used as important criteria for the classification and estimation of evolutionary time in Basidiomycota (Chen et al. 2015a, Song et al. 2016, Zhao et al. 2016, 2017, Song & Cui 2017, He et al. 2019, Zhu et al. 2019, Wang et al. 2021a, Ji et al. 2022, Liu et al. 2022c, 2023c). Nevertheless, there is no comprehensive study focused on the divergence times of brown-rot fungi within the Polyporales.

In recent years, during our investigations of the diversity of wood-decay fungi, some specimens with poroid hymenophores can produce brown rot were obtained. Preliminary morphological observations showed that these specimens may belong to Fomitopsidaceae Jülich or Postiaceae B.K. Cui, Shun Liu & Y.C. Dai. To determine the exact phylogenetic positions of these specimens, we performed phylogenetic analyses of the brown-rot fungi within the Polyporales based on the combined sequences datasets of ITS+nLSU+mtSSU+nuSSU+RPB1+RPB2+TEF1 following Liu et al. (2023a). In order to better understand the phylogeny and evolution of brown-rot fungi within the Polyporales, we used molecular data to analyze the divergence times of this group. Furthermore, previous reports of brown-rot fungi within the Polyporales were dispersed in various books and journals. To facilitate mycologists to search for and compare the species information of brown-rot fungi within the Polyporales, we collect species information of this group from surveys and scattered publications.

Materials & Methods

Voucher deposition

Most specimens tested in this study are deposited at the herbarium of the Institute of Microbiology, Beijing Forestry University, China (BJFC), some specimens loaned from the herbaria of the Institute of Applied Ecology, Chinese Academy of Sciences, China (IFP).

Morphological examination

Macro-morphological descriptions were based on the field notes and measurements of herbarium specimens. Special color terms followed Petersen (1996). Micro-morphological data were obtained from the dried specimens and observed under a light microscope following Sun et al. (2022) and Liu et al. (2023a). Sections were studied at a magnification up to × 1000 using a Nikon Eclipse 80i microscope and phase contrast illumination (Nikon, Tokyo, Japan). Drawings were made with the aid of a drawing tube. Microscopic features, measurements and drawings were made from slide preparations stained with Cotton Blue and Melzer's reagent. Spores were measured from sections cut from the tubes. To present variation in the size of basidiospores, 5% of measurements were excluded from each end of the range and extreme values are given in parentheses. In the text the following abbreviations were used: IKI = Melzer's reagent, IKI– = neither amyloid nor dextrinoid, KOH = 5% potassium hydroxide, CB = Cotton Blue, CB– = acyanophilous, L = mean spore length (arithmetic average of all spores), W = mean spore width (arithmetic average of all spores), Q = variation in the L/W ratios between the specimens studied, n (a/b) = number of spores (a) measured from given number (b) of specimens.

DNA extraction, amplification and sequencing

A cetyl trimethylammonium bromide (CTAB) rapid plant genome extraction kit-DN14 (Aidlab Biotechnologies Co., Ltd, Beijing, China) was used to extract total genomic DNA from dried specimens and perform the polymerase chain reaction (PCR) according to the manufacturer's instructions with some modifications following Cui et al. (2019) and Ji et al. (2022). The ITS regions were amplified with primer pairs ITS5 and ITS4 (White et al. 1990). The nLSU regions were amplified with primer pairs LR0R and LR7 (http://www.biology.duke.edu/fungi/mycolab/primers.htm). The mtSSU regions were amplified with primer pairs MS1 and MS2 (White et al. 1990). The nuSSU regions were amplified with primer pairs PNS1 and NS41 (White et al. 1990). RPB1 was amplified with primer pairs RPB1-Af and RPB1-Cr (Matheny et al. 2002). RPB2 was amplified with primer pairs bRPB2-5F and bRPB2-7CR (Matheny 2005). Part of TEF1 was amplified with primer pairs EF1-983F and EF1-1567R (Rehner & Buckley 2005). The PCR cycling schedule for ITS, mtSSU and TEF1 included an initial denaturation at 95 ℃ for 3 min, followed by 35 cycles at 94 ℃ for 40 s, 54–55 ℃ (ITS) and 53–56 ℃ (mtSSU, TEF1) for 45 s, 72 ℃ for 1 min, and a final extension at 72 ℃ for 10 min. The PCR cycling schedule for nLSU and nuSSU included an initial denaturation at 94 ℃ for 1 min, followed by 35 cycles at 94 ℃ for 30 s, 50 ℃ (nLSU) and 51 ℃ (nuSSU) for 1 min, 72 ℃ for 1.5 min, and a final extension at 72 ℃ for 10 min. The PCR cycling schedule for RPB1 and RPB2 included an initial denaturation at 94 ℃ for 2 min, followed by 10 cycles at 94 ℃ for 40 s, 60 ℃ for 40 s and 72 ℃ for 2 min, then followed by 37 cycles at 94 ℃ for 45 s, 54–57 ℃ for 1.5 min and 72 ℃ for 2 min, and a final extension of 72 ℃ for 10 min. The PCR products were purified and sequenced at the Beijing Genomics Institute (BGI), China, with the same primers. All newly generated sequences were deposited at GenBank (Table 1).

Phylogenetic analyses

Additional sequences were downloaded from GenBank (Table 1). All sequences of ITS, nLSU, mtSSU, nuSSU, RPB1, RPB2 and TEF1 were aligned in MAFFT 7 (Katoh & Standley 2013; http://mafft.cbrc.jp/alignment/server/) and manually adjusted in BioEdit (Hall 1999). Alignments were spliced in Mesquite (Maddison & Maddison 2017). The missing sequences and ambiguous nucleotides were both coded as "N".

The phylogenetic analyses used in this study followed the approach of Shen et al. (2019) and Sun et al. (2020). The Maximum Likelihood (ML), Maximum Parsimony (MP) and Bayesian Inference (BI) methods were used to analyze the combined datasets of sequences. The congruences of the seven gene sequences were evaluated with the incongruence length difference (ILD) test (Farris et al. 1994) implemented in PAUP* 4.0b10 (Swofford 2002), under heuristic search and 1000 homogeneity replicates.

Table 1 A list of species, specimens, and GenBank accession number of sequences used in this study. Newly generated sequences are shown in black bold.

Species name	Sample no.	Locality	GenBank accessions							References
			ITS	nLSU	mtSSU	nSSU	RPB1	RPB2	TEF1	
Abortiporus biennis	Cui 17845	China	ON417149	ON417197	ON417064	ON417009	ON424663	ON424750	ON424821	Liu et al. (2023a)
Abortiporus biennis	Cui 16986	China	ON417150	ON417198	ON417065	ON417010	ON424664	ON424751	ON424822	Liu et al. (2023a)
Adustoporia sinuosa	Cui 16484	China	MW377252	MW377333	MW382047	MW377411	MW337154	ON424753	MW337083	Liu et al. (2023a)
Adustoporia sinuosa	Cui 16252	China	OM039269	OM039169	OM039204	OM039235	OM037741	OM037767	OM037791	Liu et al. (2023a)
Adustoporia sinuosa	Dai 18998	China	**OQ518678**	**OQ518681**	**OQ534091**	**OQ518682**	**OQ550487**	**OQ550488**	**OQ550489**	Present study
Agaricus campestris	LAPAG370	Unknown	KM657927	KR006607	–	–	–	KT951556	KR006636	Zhou et al. (2016b)
Amaropostia hainanensis	Cui 5367	China	KX900910	KX900980	KX901052	KX901124	KX901172	KX901224	–	Shen et al. (2019)
Amaropostia hainanensis	Cui 13739	China	KX900909	KX900979	KX901051	KX901123	KX901171	KX901223	–	Shen et al. (2019)
Amaropostia stiptica	Cui 17037	China	OK045504	OK045510	OK045498	OK045492	OK076902	OK076930	OK076958	Liu et al. (2023a)
Amaropostia stiptica	Cui 18013	China	OM039270	OM039170	OM039205	OM039236	OM037742	OM037768	OM037792	Liu et al. (2023a)
Amylocorticium cebennense	HHB 2808	USA	GU187505	GU187561	–	GU187612	GU187439	GU187770	GU187675	Binder et al. (2010)
Amylocystis lapponica	HHB 13400	USA	KC585237	KC585059	AF518667	AF518570	–	–	–	Ortiz-Santana et al. (2013)
Amylocystis lapponica	FP 105131	USA	KY948805	KY948879	–	–	KY948973	–	–	Ortiz-Santana et al. (2013)
Amyloporia alpina	RLG 6107	USA	KC585267	KC585090	–	–	–	–	–	Ortiz-Santana et al. (2013)
Amyloporia alpina	FP 105523	USA	KC585266	KC585089	–	–	–	–	–	Ortiz-Santana et al. (2013)
Amyloporia nivea	Cui 16479	Vietnam	MW377254	MW377335	MW382049	MW377413	MW337155	MW337022	MW337085	Liu et al. (2023a)
Amyloporia nivea	Cui 16480	Vietnam	MW377255	MW377336	MW382050	MW377414	MW337156	MW337023	MW337086	Liu et al. (2023a)
Amyloporia nothofaginea	CIEFAPcc 196	Argentina	JF713078	–	–	–	–	–	–	Rajchenberg et al. (2011)
Amyloporia nothofaginea	CIEFAPcc 304	Argentina	JF713079	–	–	–	–	–	–	Rajchenberg et al. (2011)
Amyloporia subxantha	Cui 16487	China	OM039271	OM039171	OM039206	OM039237	OM037743	OM037769	OM037793	Liu et al. (2023a)
Amyloporia subxantha	Cui 17175	China	OM039272	OM039172	OM039207	OM039238	OM037744	OM037770	OM037794	Liu et al. (2023a)
Amyloporia xantha	Cui 11544	China	KR605817	KR605756	KR606018	KR605918	ON424665	KR610836	KR610746	Han et al. (2016)
Amyloporia xantha	Dai 19011	China	OM039273	OM039173	OM039208	OM039239	OM037745	OM037771	OM037795	Liu et al. (2023a)
Anthoporia albobrunnea	FP 100514	Unknown	EU232215	EU232299	–	EU232257	–	–	–	Unpublished
Anthoporia albobrunnea	S 4665	Russia	KY948808	KY948880	–	–	KY949020	–	–	Justo et al. (2017)
Antrodia aridula	Dai 24525	China	OP854667	OP856750	OP856741	OP856745	–	OP851381	OP851386	Zhou et al. (2023)
Antrodia bambusicola	Cui 11280	China	MG787579	MG787620	MG787667	MG787726	–	MG787792	MG787845	Chen (2018)
Antrodia bambusicola	Dai 11901	China	MG787580	MG787621	MG787668	MG787727	–	MG787793	MG787846	Chen (2018)

Table 1 Continued.

Species name	Sample no.	Locality	GenBank accessions							References
			ITS	nLSU	mtSSU	nSSU	RPB1	RPB2	TEF1	
Antrodia favescens	JV 0309/103	USA	KC543127	MG787622	MG787669	MG787729	KY949009	MG787794	KC543178	Chen (2018)
Antrodia favescens	JV 0412/4-J	USA	KC543129	KC543129	MG787670	MG787730	–	MG787795	KC543179	Chen (2018)
Antrodia griseoflavescens	Spirin 11175	Russia	MK119762	MK119762	–	–	MK134850	–	–	Runnel et al. (2019)
Antrodia heteromorpha	Dai 12755	USA	KP715306	KP715322	KR606009	KR605908	–	KR610828	KP715336	Chen & Cui (2016)
Antrodia heteromorpha	Dai 12742	USA	KP715319	ON417199	MG787671	MG787728	–	KT895887	MG787847	Chen & Cui (2016)
Antrodia latebrosa	Ryvarden 10031	Tanzania	MK119769	MK119769	–	–	–	–	–	Runnel et al. (2019)
Antrodia macra	Eriksson 1967	Unknown	KR605810	KR605749	–	KR605909	–	MG787796	KR610739	Han et al. (2016)
Antrodia mappa	RP 11756	Finland	KC543113	KC543113	–	–	–	–	–	Spirin et al. (2013a)
Antrodia multiformis	JV 1209/76	USA	KT381618	KT381618	–	–	MK134845	–	–	Runnel et al. (2019)
Antrodia neotropica	Cui 11141	China	MG787581	MG787623	MG787673	–	–	MG787797	MG787848	Chen (2018)
Antrodia parvula	OM 18226	Indonesia	MK119764	MK119764	–	–	–	–	–	Runnel et al. (2019)
Antrodia peregrina	Dai 3026	China	MK119767	MK119767	–	–	–	–	–	Runnel et al. (2019)
Antrodia serpens	Dai 7465	Luxemburg	KR605813	KR605752	KR606013	KR605913	ON424666	KR610832	KR610742	Han et al. (2016)
Antrodia serpens	Dai 14850	Poland	MG787582	MG787624	MG787674	MG787731	ON424667	MG787798	MG787849	Chen (2018)
Antrodia subheteromorpha	Cui 9623	China	MG787584	MG787626	MG787676	MG787736	–	MG787800	MG787851	Chen (2018)
Antrodia subheteromorpha	Cui 18416	China	MW377257	MW377338	MW382052	MW377416	–	MW337025	MW337088	Liu et al. (2023a)
Antrodia subserpens	Cui 16210	China	ON417151	ON417200	ON417066	ON417011	ON424668	ON424754	ON424823	Liu et al. (2023a)
Antrodia subserpens	Cui 16285	China	ON417152	ON417201	ON417067	ON417012	ON424669	ON424755	ON424824	Liu et al. (2023a)
Antrodia tanakae	Cui 16170	China	**OQ476245**	**OQ476304**	**OQ476419**	**OQ476364**	**OQ506064**	**OQ511161**	**OQ511209**	Present study
Antrodia tanakae	Dai 11770	China	KR605815	KR605754	KR606015	KR605915	–	KR610834	KR610744	Han et al. (2016)
Antrodia tenerifensis	Kout 13129	Spain	KY446066	KY446066	–	–	MK134848	–	–	Runnel et al. (2019)
Antrodia variispora	Dai 23995	China	OP854671	OP856749	–	OP856744	–	OP851385	–	Zhou et al. (2023)
Athelia arachnoidea	CBS 418.72	Unknown	GU187504	GU187557	–	–	GU187436	GU187769	GU187672	Binder et al. (2010)
Athelia epiphylla	FP 100564	USA	GU187501	GU187558	–	GU187613	GU187440	GU187771	GU187676	Binder et al. (2010)
Aurantipostia macrospora	Cui 16604	Australia	MW377258	MW377339	–	MW377417	MW337157	MW337026	MW337089	Liu et al. (2023a)
Aurantipostia macrospora	Cui 16634	Australia	MW377259	MW377340	–	MW377418	MW337158	MW337027	MW337090	Liu et al. (2023a)
Aurantipostia macrospora	Cui 16671	Australia	MW377260	MW377341	–	MW377419	MW337159	MW337028	MW337091	Liu et al. (2023a)
Auriporia aurea	Cui 10665	China	KX966182	KX966183	–	–	–	–	KX966184	Shen et al. (2019)
Auriporia aurea	FP 98524	USA	KC585316	KC585141	–	–	KY948984	–	–	Justo et al. (2017)
Auriporia aurulenta	Dai 6922	China	MW377261	MW377342	MW382053	–	–	–	–	Liu et al. (2023a)
Auriporia aurulenta	Cui 2545	China	MW377262	–	MW382054	MW377420	–	–	–	Liu et al. (2023a)
Auriporia aurulenta	HHB 8864	USA	KC585317	KC585142	–	–	–	–	–	Ortiz-Santana et al. (2013)
Austroporia stratosa	Cui 16612	Australia	MW377263	MW377343	–	MW377421	MW337160	MW337029	MW337092	Liu et al. (2023a)

Table 1 Continued.

Species name	Sample no.	Locality	GenBank accessions							References
			ITS	nLSU	mtSSU	nSSU	RPB1	RPB2	TEF1	
Austroporia stratosa	Cui 16613	Australia	MW377264	MW377344	–	MW377422	MW337161	MW337030	MW337093	Liu et al. (2023a)
Austroporia stratosa	Cui 16618	Australia	MW377265	MW377345	–	MW377423	MW337162	MW337031	MW337094	Liu et al. (2023a)
Austropostia brunnea	NLB 1135	Australia	MT536995	MT524530	–	–	–	–	–	Unpublished
Austropostia brunnea	Dai 18591A	Australia	MW377272	MW377352	–	MW377430	MW337169	MW337038	MW337101	Liu et al. (2023a)
Austropostia hirsuta	Cui 16660	Australia	MW377267	MW377347	MW382055	MW377425	MW337164	MW337033	MW337096	Liu et al. (2023a)
Austropostia hirsuta	Cui 16626	Australia	**OQ476291**	**OQ476350**	**OQ476457**	**OQ476406**	**OQ506098**	**OQ511197**	**OQ511251**	Present study
Austropostia pelliculosa	MR 10592	Argentina	JX090102	JX090124	–	–	–	–	–	Pildain & Rajchenberg (2013)
Austropostia pelliculosa	MR 10671	Argentina	JX090101	JX090123	–	–	–	–	–	Pildain & Rajchenberg (2013)
Austropostia plumbea	Cui 16550	Australia	MW377270	MW377350	MW382058	MW377428	MW337167	MW337036	MW337099	Liu et al. (2023a)
Austropostia plumbea	Cui 16639	Australia	MW377271	MW377351	MW382059	MW377429	MW337168	MW337037	MW337100	Liu et al. (2023a)
Austropostia punctata	MR 12398	Chile	JX090111	JX090127	–	–	–	–	–	Pildain & Rajchenberg (2013)
Austropostia subpunctata	Cui 16685	Australia	MW377274	MW377354	MW382061	MW377432	MW337171	MW337040	MW337103	Liu et al. (2023a)
Austropostia subpunctata	Cui 16528	Australia	**OQ476294**	**OQ476353**	**OQ476460**	**OQ476409**	**OQ506101**	**OQ511200**	**OQ511254**	Present study
Boletus edulis	HMJAU4637	Unknown	JN563894	KF112455	–	–	KF112586	KF112704	KF112202	Feng et al. (2012)
Bondarzewia montana	AFTOL 452	Unknown	DQ200923	DQ234539	–	–	DQ256049	AY218474	DQ059044	Matheny et al. (2007b)
Bondarzewia sp.	Yu 56	China	KT693203	KT693205	–	–	KX066158	KX066165	KX066148	Song et al. (2016)
Brunneoporus cyclopis	Miettinen 91661	Indonesia	KU866249	MG787627	MG787679	MG787737	–	MG787802	KU866242	Chen (2018)
Brunneoporus kuzyana	JV 0909/37	Czech Republic	KU866267	MG787628	MG787680	MG787738	–	MG787803	KU866221	Chen (2018)
Brunneoporus kuzyana	Spirin 6771	Russia	KU866265	MG787629	MG787681	MG787739	–	MG787804	KU866218	Chen (2018)
Brunneoporus malicola	Cui 7258	China	MG787586	MG787631	MG787683	MG787741	ON424670	MG787806	MG787853	Chen (2018)
Brunneoporus malicola	Cui 16272	China	OK045505	OK045511	OK045499	OK045493	OK076903	OK076931	OK076959	Liu et al. (2023a)
Brunneoporus minuta	JV 0211/1A	Czech Republic	KU866257	MG787632	MG787684	MG787742	–	MG787807	KU866233	Chen (2018)
Brunneoporus minuta	Spirin 3477	Russia	KU866250	MG787633	MG787685	MG787743	ON424671	MG787808	KU866243	Chen (2018)
Brunneoporus tuvensis	Kotiranta 267351	Russia	KU866258	–	–	–	–	–	KU866236	Spirin et al. (2016)
Buglossoporus americanus	JV 1707 9 J	Costa Rica	MN318452	–	–	–	–	–	–	Unpublished
Buglossoporus eucalypticola	Dai 13660	China	KR605808	KR605747	KR606007	KR605906	–	KR610825	KR610736	Han et al. (2016)
Buglossoporus eucalypticola	Dai 13660A	China	KR605809	KR605748	KR606008	KR605907	–	KR610826	KR610737	Han et al. (2016)
Buglossoporus pulvinus	CBS 85872	Germany	DQ491419	MH872316	DQ491446	–	–	DQ491392	–	Kim et al. (2007)

Table 1 Continued.

Species name	Sample no.	Locality	GenBank accessions							References
			ITS	nLSU	mtSSU	nSSU	RPB1	RPB2	TEF1	
Buglossoporus quercinus	JV 1406/1	Czech Republic	KR605801	KR605740	KR606002	KR605899	–	KR610820	KR610730	Han et al. (2016)
Buglossoporus quercinus	LY BR 2030	France	KR605799	KR605738	KR606000	KR605897	–	KR610818	KR610728	Han et al. (2016)
Cabalodontia delicata	MCW 564/17	Brazil	MT849295	MT849295	–	–	MT833947	–	MT833934	Westphalen et al. (2021)
Calcipostia guttulata	Cui 16274	China	OM039274	OM039174	OM039209	OM039240	OM037746	OM037772	OM037796	Liu et al. (2023a)
Calcipostia guttulata	Cui 16281	China	OM039275	OM039175	OM039210	OM039241	OM037747	OM037773	OM037797	Liu et al. (2023a)
Calcipostia guttulata	Cui 17150	China	**OQ476268**	**OQ476327**	**OQ476434**	**OQ476383**	**OQ506077**	**OQ511174**	**OQ511228**	Present study
Cartilosoma ramentacea	Cui 16256	China	OK045506	OK045512	OK045500	OK045494	OK076904	OK076932	OK076960	Liu et al. (2023a)
Cartilosoma ramentacea	Dai 19005	China	OK045507	OK045513	OK045501	OK045495	OK076905	OK076933	OK076961	Liu et al. (2023a)
Cartilosoma rene-hentic	Kout 1709/7	Czech Republic	MK558726	–	–	–	–	–	–	Rivoire et al. (2015)
Cartilosoma rene-hentic	HR B000001	Czech Republic	MK558724	–	–	–	–	–	–	Rivoire et al. (2015)
Cerrena unicolor	He 6082	China	OM100740	OM083972	ON417068	–	ON424672	ON424756	ON424825	Liu et al. (2023a)
Cerrena zonata	Cui 16578	Australia	ON417153	ON417203	ON417069	ON417013	ON424673	ON424757	ON424826	Liu et al. (2023a)
Cerrena zonata	Cui 18502	China	ON417154	ON417204	ON417070	ON417014	ON424674	ON424758	ON424827	Liu et al. (2023a)
Climacocystis borealis	Dai 4014	China	KJ566627	KJ566637	–	–	ON688463	–	KJ566644	Song et al. (2014a)
Climacocystis borealis	FD 31	USA	KP135308	KP135210	–	–	KP134882	KP134895	–	Floudas & Hibbett (2015)
Climacocystis montana	Cui 9607	China	KJ566629	KJ566639	–	–	ON688464	ON688484	KJ566646	Song et al. (2014a)
Climacocystis montana	Cui 17122	China	ON682359	ON680811	–	**OQ519784**	ON688466	ON688485	ON688505	Liu et al. (2023c); Present study
Climacocystis montana	Cui 17123	China	ON682360	ON680812	–	**OQ519785**	ON688467	ON688486	ON688506	Liu et al. (2023c); Present study
Crustoderma dryinum	FP 105487	USA	KC585320	KC585145	–	–	–	–	–	Ortiz-Santana et al. (2013)
Crustoderma dryinum	HHB 7517	USA	KC585322	KC585147	–	–	–	–	–	Ortiz-Santana et al. (2013)
Crustoderma flavescens	HHB 9359	USA	KC585325	KC585150	–	–	–	–	–	Ortiz-Santana et al. (2013)
Crustoderma flavescens	L 10857	USA	KC585326	KC585151	–	–	–	–	–	Ortiz-Santana et al. (2013)
Crustoderma opuntiae	RLG 1229	USA	KC585329	KC585154	–	–	–	–	–	Ortiz-Santana et al. (2013)
Crustoderma resinosum	L 10631	USA	KC585330	KC585155	–	–	–	–	–	Ortiz-Santana et al. (2013)

Table 1 Continued.

Species name	Sample no.	Locality	GenBank accessions							References
			ITS	nLSU	mtSSU	nSSU	RPB1	RPB2	TEF1	
Cyanosporus alni	Cui 7185	China	KX900879	KX900949	KX901017	KX901092	KX901254	KX901202	KX901155	Shen et al. (2019)
Cyanosporus alni	Dai 14845	Poland	KX900880	KX900950	KX901018	KX901093	KX901255	KX901203	KX901156	Shen et al. (2019)
Cyanosporus arbuti	Spirin 8327	USA	MG137039	–	–	–	–	–	MG137132	Miettinen et al. (2018)
Cyanosporus auricoma	Cui 13518	China	KX900887	KX900957	KX901025	KX901100	–	KX901209	–	Shen et al. (2019)
Cyanosporus bifarius	Cui 16277	China	OL423599	OL423609	OL437196	OL423621	OL444986	OL447000	OL444995	Liu et al. (2023a)
Cyanosporus bubalinus	Cui 16976	China	MW182172	MW182225	MW182208	MW182189	MW191547	MW191563	MW191530	Liu et al. (2021b)
Cyanosporus bubalinus	Cui 16985	China	MW182173	MW182226	MW182209	MW182190	MW191548	MW191564	MW191531	Liu et al. (2021b)
Cyanosporus caesiosimulans	Miettinen 16976	USA	MG137054	–	–	–	–	–	MG137137	Miettinen et al. (2018)
Cyanosporus caesius	Miettinen 141562	Finland	MG137048	MG137048	–	–	–	–	MG137134	Miettinen et al. (2018)
Cyanosporus caesius	Cui 18630	France	OL423600	OL423610	OL437197	OL423622	–	–	OL444996	Liu et al. (2022b)
Cyanosporus coeruleivirens	Dai 19220	China	MW182174	MW182227	MW182210	MW182191	MW191549	–	MW191532	Liu et al. (2021b)
Cyanosporus comatus	Cui 18388	China	MW182175	MW182228	ON417071	MW182192	MW191550	–	MW191533	Liu et al. (2021b)
Cyanosporus cyanescens	Miettinen 15919	Spain	MG137071	–	–	–	–	–	MG137144	Miettinen et al. (2018)
Cyanosporus flavus	Cui 18547	China	MW448564	MW448561	ON417072	MW448557	MW452596	MW452599	MW452601	Liu et al. (2022b)
Cyanosporus flavus	Cui 18562	China	MW448565	MW448562	ON417073	MW448558	MW452597	MW452600	MW452602	Liu et al. (2022b)
Cyanosporus fusiformis	Dai 15036	China	KX900867	KX900937	KX901005	KX901080	–	KX901190	KX901244	Shen et al. (2019)
Cyanosporus glaucus	Spirin 5317	Russia	MG137078	–	–	–	–	–	–	Miettinen et al. (2018)
Cyanosporus gossypinus	LY BR 6658	France	–	–	–	–	–	–	MG137146	Miettinen et al. (2018)
Cyanosporus hirsutus	Cui 17083	China	MW182179	MW182233	MW182214	MW182197	MW191554	MW191568	MW191538	Liu et al. (2021b)
Cyanosporus hirsutus	Cui 17343	China	OL423601	OL423611	OL437198	OL423623	OL444987	OL447001	OL444997	Liu et al. (2021b)
Cyanosporus livens	Miettinen 17177	USA	MG137082	–	–	–	–	–	MG137147	Miettinen et al. (2018)
Cyanosporus luteocaesia	LY BR 2605	France	MG137091	–	–	–	–	–	–	Miettinen et al. (2018)
Cyanosporus magnus	Cui 16983	China	MW182180	MW182234	MW182215	MW182198	MW191555	MW191569	MW191539	Liu et al. (2021b)
Cyanosporus magnus	Dai 21105	China	OL423603	OL423613	OL437200	OL423625	OL444989	OL447003	OL444999	Liu et al. (2022b)
Cyanosporus mediterraneocaesius	LY BR 4274	France	KX900886	–	KX901024	KX901099	–	–	–	Shen et al. (2019)
Cyanosporus microporus	Cui 11014	China	KX900878	KX900948	KX901016	KX901091	–	KX901201	–	Shen et al. (2019)
Cyanosporus nothofagicola	Cui 16697	Australia	MW182181	MW182235	MW182216	MW182199	MW191556	MW191570	MW191540	Liu et al. (2021b)
Cyanosporus nothofagicola	Dai 18765	Australia	MW182182	MW182236	MW182217	MW182200	MW191557	ON424759	MW191541	Liu et al. (2021b)
Cyanosporus piceicola	Cui 12158	China	KX900866	KX900936	KX901004	KX901079	KX901153	KX901189	KX901243	Shen et al. (2019)

Table 1 Continued.

Species name	Sample no.	Locality	GenBank accessions							References
			ITS	nLSU	mtSSU	nSSU	RPB1	RPB2	TEF1	
Cyanosporus populi	Dai 18934	China	OL423604	OL423614	OL437201	OL423626	OL444990	OL447004	OL445000	Liu et al. (2022b)
Cyanosporus rigidus	Cui 17032	China	OL423606	OL423617	OL437204	OL423629	OL444993	–	OL445003	Liu et al. (2022b)
Cyanosporus simulans	Miettinen 20422	Finland	MG137110	–	–	–	–	–	MG137160	Miettinen et al. (2018)
Cyanosporus subcaesius	JV 0110/24	Czech Republic	MG137117	–	–	–	–	–	MG137164	Miettinen et al. (2018)
Cyanosporus subhirsutus	Dai 14892	China	KX900871	KX900941	KX901009	KX901084	–	KX901194	KX901248	Shen et al. (2019)
Cyanosporus submicroporus	Cui 16306	China	MW182184	MW182239	MW182220	MW182203	MW191560	MW191573	MW191544	Liu et al. (2021b)
Cyanosporus subungulatus	Cui 18046	China	MW448566	MW448563	MW448560	MW448559	MW452598	–	MW452603	Liu et al. (2022b)
Cyanosporus subviridis	Spirin 8774a	USA	MG137120	–	–	–	–	–	MG137166	Miettinen et al. (2018)
Cyanosporus tenuicontextus	Zhao 813	China	MG231802	OL423619	OL437206	OL423631	–	–	OL445005	Liu et al. (2022b)
Cyanosporus tenuis	Dai 12974	China	KX900884	KX900954	KX901022	KX901097	KX901160	KX901207	KX901258	Shen et al. (2019)
Cyanosporus tenuis	Cui 10788	China	KX900885	KX900955	KX901023	KX901098	KX901161	KX901208	ON424830	Shen et al. (2019)
Cyanosporus tricolor	Cui 10780	China	KX900874	KX900944	KX901012	KX901087	–	KX901197	KX901251	Shen et al. (2019)
Cyanosporus ungulatus	Dai 12897	China	KX900869	KX900939	KX901007	KX901082	KX901154	KX901192	KX901246	Shen et al. (2019)
Cyanosporus yanae	HK 27606	Russia	MG137122	–	–	–	–	–	MG137168	Miettinen et al. (2018)
Cymatoderma elegans	Dai 17511	China	ON417155	ON417205	–	–	–	–	–	Liu et al. (2023a)
Cymatoderma sp.	OMC 1427	USA	KY948826	KY948872	–	–	KY948971	–	–	Justo et al. (2017)
Cystidiopostia hibernica	Cui 2658	China	KX900905	KX900975	KX901045	KX901118	–	KX901218	–	Shen et al. (2019)
Cystidiopostia hibernica	Cui 8248	China	KF699126	KJ684980	–	KX901117	–	KX901217	–	Shen et al. (2019)
Cystidiopostia inocybe	LY BR 3703	France	KX900903	KX900973	KX901044	KX901116	–	–	KX901267	Shen et al. (2019)
Cystidiopostia pileata	Cui 5721	China	KF699127	KX900960	KX901049	KX901121	KX901169	KX901221	KX901268	Shen et al. (2019)
Cystidiopostia pileata	Cui 10034	China	KX900908	KX900956	KX901050	KX901122	KX901170	KX901222	KX901269	Shen et al. (2019)
Cystidiopostia subhibernica	Cui 17095	China	MW377278	MW377358	MW382065	MW377436	MW337174	MW337042	MW337106	Liu et al. (2023a)
Cystidiopostia subhibernica	Dai 17621	China	OM039276	OM039176	OM039211	OM039242	OM037749	OM037774	OM037798	Liu et al. (2023a)
Dacryobolus angiospermarum	He 4455	China	MH048964	MH048977	–	–	–	–	–	Xu et al. (2018)
Dacryobolus angiospermarum	Dai 10531	China	MH048966	MH048979	–	–	–	–	–	Xu et al. (2018)
Dacryobolus angiospermarum	Wu 0302-2	China	MH048967	MH048980	–	–	–	–	–	Xu et al. (2018)
Dacryobolus gracilis	Dai 14943	China	MH048972	MH048985	ON417074	ON417015	–	–	–	Xu et al. (2018)
Dacryobolus gracilis	He 5995	China	ON417156	ON417206	ON417075	ON417016	–	ON424760	ON424831	Liu et al. (2023a)
Dacryobolus karstenii	He 4283	China	MH048970	MH048983	–	–	–	–	–	Xu et al. 2018

Table 1 Continued.

Species name	Sample no.	Locality	GenBank accessions							References
			ITS	nLSU	mtSSU	nSSU	RPB1	RPB2	TEF1	
Dacryobolus karstenii	Dai 15047	China	MH048971	MH048984	–	–	–	–	–	Xu et al. (2018)
Dacryobolus montanus	Yuan 5758	China	KC344412	KC344413	–	–	–	–	–	Yuan et al. (2016)
Dacryobolus montanus	He 6314	China	ON417157	ON417207	ON417076	ON417017	–	ON424761	ON424832	Liu et al. (2023a)
Dacryobolus sudans	FP 150381	USA	KC585333	KC585158	–	–	–	–	–	Ortiz-Santana et al. (2013)
Dacryobolus sudans	HHB 8966	USA	KC585334	KC585159	–	–	–	–	–	Ortiz-Santana et al. (2013)
Daedalea africana	O 15372	Kenya	KP171196	KP171216	KR605974	KR605871	–	KR610795	KR610704	Han et al. (2016)
Daedalea allantoidea	Dai 13612A	China	KR605795	KR605734	KR605995	KR605892	–	KR610813	KR610723	Han et al. (2016)
Daedalea americana	JV 0909/19	USA	KP171198	KP171218	KR605976	KR605873	–	KR610797	KR610706	Han et al. (2016)
Daedalea americana	JV 0909/20	USA	KP171199	KP171219	KR605977	KR605874	–	KR610798	KR610707	Han et al. (2016)
Daedalea circularis	Cui 10125	China	JQ780411	KP171220	KR605978	KR605875	–	KR610799	KR610708	Han et al. (2016)
Daedalea circularis	Cui 10134	China	JQ314352	KP171221	KR605979	KR605876	–	KR610800	KR610709	Han et al. (2016)
Daedalea dickinsii	Yuan 2685	China	KP171201	KP171223	KR605982	KR605879	–	KR610803	KR610712	Han et al. (2016)
Daedalea dickinsii	Yuan 1090	China	KR605790	KR605729	KR605981	KR605878	–	KR610802	KR610711	Han et al. (2016)
Daedalea dochmia	CBS 42684	Thailand	DQ491401	AY515326	DQ491428	–	–	DQ491374	–	Han et al. (2016)
Daedalea hydnoides	O 14083	Costa Rica	KP171203	KP171225	KR605984	KR605881	–	–	–	Han et al. (2016)
Daedalea modesta	Cui 10151	China	KP171205	KP171227	KR605986	KR605883	–	KR610806	KR610716	Han et al. (2016)
Daedalea modesta	Cui 10124	China	KR605791	KR605730	KR605985	KR605882	–	KR610805	KR610715	Han et al. (2016)
Daedalea neotropica	DLC04 100	Belize	FJ403218	–	–	–	–	–	–	Lindner et al. (2011)
Daedalea pseudodochmia	10533	China	FJ403210	–	–	–	–	–	–	Lindner et al. (2011)
Daedalea quercina	Dai 12152	Czech Republic	KP171207	KP171229	KR605989	KR605886	ON424675	KR610809	KR610717	Han et al. (2016)
Daedalea quercina	Dai 12659	Finland	KP171208	KP171230	KR605990	KR605887	ON424676	KR610810	KR610719	Han et al. (2016)
Daedalea radiata	Cui 8575	China	KP171210	KP171233	KR605991	KR605888	–	KR610811	KR610720	Han et al. (2016)
Daedalea sprucei	O 10546	China	KR605794	KR605733	KR605993	KR605890	–	KR610812	KR610722	Han et al. (2016)
Daedalea stereoides	10551	Ethiopia	FJ403215	–	–	–	–	–	–	Lindner et al. (2011)
Daedalea stevensonii	O 10543	Borneo	KP171212	KP171235	KR605994	KR605891	–	–	–	Han et al. (2016)
Daedalea submodesta	Cui 16748	Australia	**MW377280**	**MW377360**	**MW382067**	**MW377438**	**MW337176**	**MW337043**	**MW337108**	Present study
Daedalea submodesta	Cui 16773	Australia	**MW377281**	**MW377361**	**MW382068**	**MW377439**	**MW337177**	**MW337044**	**MW337109**	Present study
Daedalea vinacea	Dai 18562	Malaysia	**MW377284**	**MW377364**	**MW382071**	**MW377442**	**MW337179**	**MW337047**	**MW337111**	Present study
Daedalea vinacea	Dai 17823	Singapore	**MW377285**	–	**MW382072**	**MW377443**	**MW337180**	**MW337048**	**MW337112**	Present study
Daedalella micropora	Dai 18509	Malaysia	MW377286	MW377365	MW382073	MW377444	–	MW337049	MW337113	Liu et al. (2023a)
Daedalella micropora	E 7389	Indonesia	AJ542527	–	–	–	–	–	–	Unpublished
Dentiporus albidoides	X 1794	Kenya	KC543175	–	–	–	–	–	–	Spirin et al. (2013a)
Dentiporus albidoides	X 1433	Italy	KC543147	KC543147	–	–	–	–	–	Spirin et al. (2013a)
Dentiporus albidoides	X 1510	France	KC543168	–	–	–	–	–	–	Spirin et al. (2013a)

Table 1 Continued.

Species name	Sample no.	Locality	GenBank accessions							References
			ITS	nLSU	mtSSU	nSSU	RPB1	RPB2	TEF1	
Diplomitoporus crustulinus	Cui 17394	China	MW377287	MW377366	MW382074	MW377445	MW337181	MW337050	MW337114	Liu et al. (2023c)
Diplomitoporus crustulinus	Cui 17475	China	MW377288	MW377367	MW382075	MW377446	MW337182	–	MW337115	Liu et al. (2023c)
Diplomitoporus crustulinus	Cui 17690	China	MW377289	MW377368	MW382076	MW377447	MW337183	–	MW337116	Liu et al. (2023c)
Diplomitoporus flavescens	Cui 17457	China	MW377291	MW377370	MW382078	MW377449	MW337184	MW337052	MW337118	Liu et al. (2023c)
Diplomitoporus flavescens	Cui 17419	China	MW377290	MW377369	MW382077	MW377448	ON688468	MW337051	MW337117	Liu et al. (2023c)
Diplomitoporus flavescens	Dai 23640	China	ON682363	ON680815	**OQ534088**	**OQ519786**	ON688470	ON688489	ON688511	Liu et al. (2023c); Present study
Echinodontium tinctorium	AFTOL 455	USA	AY854088	AF393056	–	–	AY864882	AY218482	AY885157	Unpublished
Eucalyptoporia tasmanica	Cui 16677	Australia	**OQ476250**	**OQ476309**	**OQ476423**	**OQ476369**	–	**OQ511165**	**OQ511214**	Present study
Eucalyptoporia tasmanica	AJMH 2010	Australia	HM583823	–	–	–	–	–	–	Hopkins et al. (2011)
Fibroporia albicans	Cui 16486	Vietnam	OM039277	OM039177	OM039212	OM039243	OM037750	OM037775	OM037799	Liu et al. (2023a)
Fibroporia albicans	Dai 10595	China	KC456249	KR605759	KR606020	KR605921	–	KR610839	KR610749	Chen et al. (2017)
Fibroporia bambusa	Dai 16211	China	KU550480	KU550487	KU550507	KU550527	–	KU550545	KU550560	Chen et al. (2017)
Fibroporia bambusa	Dai 16212	China	KU550481	KU550488	KU550508	KU550528	–	KU550546	KU550561	Chen et al. (2017)
Fibroporia bohemica	PRM 859138	Czech Republic	KT895883	KU550489	KU550509	KU550529	–	KT895900	KU550562	Chen et al. (2017)
Fibroporia bohemica	Vampola 2187992	Czech Republic	KF112876	KF112876	–	–	–	–	–	Chen et al. (2017)
Fibroporia ceracea	Cui 16299	China	MW377293	MW377372	MW382079	MW377451	MW337186	MW337054	MW337120	Liu et al. (2023a)
Fibroporia ceracea	Cui 16300	China	MW377294	MW377373	MW382080	MW377452	MW337187	MW337055	MW337121	Liu et al. (2023a)
Fibroporia citrina	LY BR 4205	Luxemburg	KT895884	KU550493	KU550513	–	–	KT895901	KU550566	Chen et al. (2017)
Fibroporia citrina	Cui 10497	China	KT895886	KT988993	–	KU550532	–	KT895903	KU550565	Chen et al. (2017)
Fibroporia gossypium	LY BR 3994	Argentina	KT895885	KU550496	KU550516	KU550535	–	KT895902	KU550570	Chen et al. (2017)
Fibroporia gossypium	Cui 9472	China	KU550474	KU550494	KU550514	KU550534	ON424677	KU550550	KU550567	Chen et al. (2017)
Fibroporia norrlandica	4122	Finland	KC595908	KC595908	–	–	–	–	–	Ortiz-Santana et al. (2013)
Fibroporia norrlandica	4151	Finland	KC595909	KC595909	–	–	–	–	–	Ortiz-Santana et al. (2013)
Fibroporia pseudorennyi	LY BR 3914	France	KU550475	KU550495	KU550515	–	ON424678	KU550552	KU550569	Chen et al. (2017)
Fibroporia pseudorennyi	X 1377	France	KC595927	KC595927	–	–	–	–	–	Chen et al. (2017)
Fibroporia radiculosa	Cui 16485	Vietnam	OM039278	OM039178	OM039213	OM039244	OM037751	OM037776	OM037800	Liu et al. (2023a)
Fibroporia radiculosa	Cui 11404	China	KP145011	KR605760	KR606022	KR605922	ON424679	KR610840	KR610751	Chen et al. (2017)
Fibroporia vaillantii	FP 90877	USA	KC585345	KC585170	–	–	KY949035	–	–	Ortiz-Santana et al. (2013)
Fibroporia vaillantii	Dai 23467	China	ON417158	ON417208	ON417077	ON417018	ON424680	ON424763	ON424833	Liu et al. (2023a)
Flavidoporia mellita	VS 3315	Russia	KC543140	KC543140	–	–	KY948994	–	–	Spirin et al. (2013a)
Flavidoporia pulverulenta	LY BR 3450	France	JQ700280	JQ700280	–	–	–	–	–	Spirin et al. (2013b)

Table 1 Continued.

Species name	Sample no.	Locality	GenBank accessions							References
			ITS	nLSU	mtSSU	nSSU	RPB1	RPB2	TEF1	
Flavidoporia pulverulenta	Dai 15877	China	MG787588	–	MG787687	MG787745	–	MG787810	MG787855	Chen (2018)
Flavidoporia pulvinascens	Cui 10441	China	MG787590	MG787636	MG787688	ON417019	–	MG787811	MG787857	Chen (2018)
Flavidoporia pulvinascens	Cui 9542	China	MG787589	MG787635	ON417078	MG787746	–	ON424764	MG787856	Chen (2018)
Fomitiporia hartigii	MUCL 53551	Belgium	JX093789	JX093833	–	–	–	JX093877	JX093746	Amalfi & Decock (2013)
Fomitiporia mediterranea	AFTOL 688	USA	AY854080	AY684157	–	AY662664	AY864870	AY803748	AY885149	Unpublished
Fomitopsis abieticola	Cui 10532	China	MN148230	OL621246	OL621757	KR605858	–	MN158174	MN161745	Liu et al. (2021a)
Fomitopsis bambusae	Dai 22110	China	MW937874	MW937881	MW937888	MW937867	ON424681	MZ082974	MZ082980	Zhou et al. (2021)
Fomitopsis bambusae	Dai 22116	China	MW937876	MW937883	MW937890	MW937869	ON424682	ON424766	ON424834	Zhou et al. (2021)
Fomitopsis betulina	Cui 17121	China	OL621853	OL621242	OL621753	OL621779	ON424683	OL588969	OL588982	Liu et al. (2022a)
Fomitopsis betulina	Dai 11449	China	KR605798	KR605737	KR605998	KR605895	ON424684	KR610816	KR610726	Han et al. (2016)
Fomitopsis bondartsevae	X 1207	China	JQ700277	JQ700277	–	–	–	–	–	Spirin et al. (2013b)
Fomitopsis cana	Cui 6239	China	JX435777	JX435775	KR605934	KR605826	–	KR610761	KR610661	Han et al. (2016)
Fomitopsis caribensis	Cui 16871	Puerto Rico	MK852559	MK860108	MK860116	MK860124	–	MK900474	MK900482	Liu et al. (2019)
Fomitopsis durescens	Overholts 4215	USA	KF937293	KF937295	KR605941	KR605835	–	–	–	Han et al. (2016)
Fomitopsis durescens	O 10796	Venezuela	KF937292	KF937294	KR605940	KR605834	–	KR610766	KR610669	Han et al. (2016)
Fomitopsis eucalypticola	Cui 16594	Australia	MK852560	MK860110	MK860118	MK860126	ON424685	MK900476	MK900483	Liu et al. (2019)
Fomitopsis eucalypticola	Cui 16598	Australia	MK852562	MK860113	MK860121	MK860129	ON424686	MK900479	MK900484	Liu et al. (2019)
Fomitopsis ginkgonis	Cui 17170	China	MK852563	MK860114	MK860122	MK860130	–	MK900480	MK900485	Liu et al. (2019)
Fomitopsis hemitephra	O 10808	Australia	KR605770	KR605709	KR605947	KR605841	–	–	KR610675	Han et al. (2016)
Fomitopsis hengduanensis	Cui 16259	China	MN148232	OL621247	OL621758	OL621782	–	MN158175	MN161747	Liu et al. (2021a)
Fomitopsis iberica	Dai 6614	China	MG787591	MG787637	MG787689	MG787747	–	MG787812	MG787858	Chen (2018)
Fomitopsis kesiyae	Cui 16437	Vietnam	MN148234	OL621249	OL621760	OL621784	ON424687	MN158177	MN161749	Liu et al. (2021a)
Fomitopsis kesiyae	Cui 16466	Vietnam	MN148235	OL621250	OL621761	OL621785	ON424688	MN158178	MN161750	Liu et al. (2021a)
Fomitopsis massoniana	Cui 11288	China	MN148238	OL621252	OL621763	–	–	MN158179	MN161753	Liu et al. (2021a)
Fomitopsis meliae	Roberts GA863	United Kingdom	KR605775	KR605714	KR605953	KR605848	–	–	KR610682	Han et al. (2016)
Fomitopsis meliae	Ryvarden 16893	Unknown	KR605776	KR605715	KR605954	KR605849	–	KR610775	KR610681	Han et al. (2016)
Fomitopsis mounceae	DR 366	USA	KF169624	–	–	–	–	KF169693	KF178349	Haight et al. (2019)
Fomitopsis nivosa	JV 0509/52-X	China	KR605779	KR605718	KR605957	KR605853	–	KR610777	KR610686	Han et al. (2016)
Fomitopsis ochracea	ss 5	Canada	KF169609	–	–	–	–	KF169678	KF178334	Haight et al. (2019)
Fomitopsis ostreiformis	Cui 18217	Malaysia	OL621855	OL621244	OL621755	OL621781	ON424689	OL588970	OL588984	Liu et al. (2023a)
Fomitopsis palustris	Cui 7597	China	KP171213	KP171236	KR605958	KR605854	–	KR610778	KR610687	Han et al. (2016)
Fomitopsis pinicola	LT 319	Estonia	KF169652	–	–	–	–	KF169721	KF178377	Haight et al. (2019)
Fomitopsis pinicola	AT Fp 1	Sweden	MK208852	–	–	–	–	MK236362	MK236359	Haight et al. (2019)

Table 1 Continued.

Species name	Sample no.	Locality	GenBank accessions							References
			ITS	nLSU	mtSSU	nSSU	RPB1	RPB2	TEF1	
Fomitopsis resupinata	Cui 6697	China	OL621842	OL621231	OL621745	OL621768	–	OL588960	OL588971	Liu et al. (2022a)
Fomitopsis resupinata	Dai 10819	China	OL621843	OL621232	OL621746	OL621769	–	OL588961	OL588972	Liu et al. (2022a)
Fomitopsis roseoalba	AS 1496	Brazil	KT189139	KT189141	–	–	–	–	–	Soares et al. (2017)
Fomitopsis schrenkii	JEH-144	USA	KF169621	–	–	–	–	MK208857	MK236355	Haight et al. (2019)
Fomitopsis srilankensis	Dai 19528	Sri Lanka	OL621844	OL621233	OL621747	OL621770	**OQ540801**	OL588962	OL588973	Liu et al. (2022a); Present study
Fomitopsis submeliae	Dai 18559	Malaysia	OL621848	OL621237	OL621751	OL621774	–	OL588964	OL588977	Liu et al. (2022a)
Fomitopsis subpinicola	Cui 9836	China	MN148249	OL621253	OL621764	–	–	MN158181	MN161764	Liu et al. (2021a0
Fomitopsis subtropica	Cui 10578	China	KR605787	KR605726	KR605971	KR605867	ON424690	KR610791	KR610698	Han et al. (2016)
Fomitopsis subtropica	Dai 18566	China	OL621854	OL621243	OL621754	OL621780	ON424691	ON424768	OL588983	Liu et al. (2022a)
Fomitopsis tianshanensis	Cui 16821	China	MN148258	OL621255	OL621766	OL621786	–	ON424769	MN161773	Liu et al. (2021a)
Fomitopsis yimengensis	Cui 5027	China	OL621850	OL621239	OL621839	OL621776	–	OL588966	OL588979	Liu et al. (2022a)
Fragifomes niveomarginatus	Cui 10108	China	KR605778	KR605717	KR605955	KR605851	–	KR610776	KR610684	Han et al. (2016)
Fragifomes niveomarginatus	Wei 5583	China	HQ693994	KC507175	KR605956	KR605852	–	ON424771	KR610685	Han et al. (2016)
Fragiliporia fragilis	Dai 13080	China	KJ734260	KJ734264	KJ734268	–	–	KJ790248	KJ790245	Zhao et al. (2014)
Fragiliporia fragilis	Dai 13559	China	KJ734261	KJ734265	KJ734269	–	–	KJ790249	KJ790246	Zhao et al. (2014)
Fragiliporia fragilis	Dai 13561	China	KJ734262	KJ734266	KJ734270	–	–	KJ790250	KJ790247	Zhao et al. (2014)
Fragiliporia fragilis	Yuan 5516	China	KJ734263	KJ734267	KJ734271	–	–	–	–	Zhao et al. (2014)
Fuscopostia avellana	Cui 16266	China	**OQ476273**	**OQ476332**	**OQ476439**	**OQ476388**	**OQ506080**	**OQ511179**	**OQ511233**	Present study
Fuscopostia avellana	Cui 18064	China	**OQ476274**	**OQ476333**	**OQ476440**	**OQ476389**	**OQ506081**	**OQ511180**	**OQ511234**	Present study
Fuscopostia duplicata	Dai 23429	China	**OQ476269**	**OQ476328**	**OQ476435**	**OQ476384**	**OQ506078**	**OQ511175**	**OQ511229**	Present study
Fuscopostia duplicata	Cui 10366	China	KF699124	KJ684975	KR606026	KR605927	KX901173	KR610844	KR610755	Han et al. (2016)
Fuscopostia fragilis	Dai 21040	Belarus	**OQ476271**	**OQ476330**	**OQ476437**	**OQ476386**	–	**OQ511177**	**OQ511231**	Present study
Fuscopostia fragilis	Dai 20956	Belarus	**OQ476272**	**OQ476331**	**OQ476438**	**OQ476387**	–	**OQ511178**	**OQ511232**	Present study
Fuscopostia leucomallella	Cui 9599	China	KF699123	KJ684983	KX901056	KX901129	KX901176	KX901228	KX901272	Shen et al. (2019)
Fuscopostia leucomallella	Cui 9577	China	KF699122	KJ684982	KX901055	KX901128	KX901175	KX901227	KX901271	Shen et al. (2019)
Fuscopostia persicina	Cui 17086	China	**OQ476283**	**OQ476342**	**OQ476449**	**OQ476398**	**OQ506090**	**OQ511189**	**OQ511243**	Present study
Fuscopostia persicina	Dai 23341	China	**OQ476284**	**OQ476343**	**OQ476450**	**OQ476399**	**OQ506091**	**OQ511190**	**OQ511244**	Present study
Fuscopostia subfragilis	Cui 16282	China	MW377296	MW377375	MW382082	MW377454	MW337189	MW337057	MW337123	Liu et al. (2023a)
Fuscopostia subfragilis	Cui 16302	China	MW377297	MW377376	MW382083	MW377455	MW337190	MW337058	MW337124	Liu et al. (2023a)
Fuscopostia tomentosa	Cui 17114	China	**OQ476285**	**OQ476344**	**OQ476451**	**OQ476400**	**OQ506092**	**OQ511191**	**OQ511245**	Present study
Fuscopostia tomentosa	Cui 17865	China	**OQ476288**	**OQ476347**	**OQ476454**	**OQ476403**	**OQ506095**	**OQ511194**	**OQ511248**	Present study
Geastrum recolligens	OSC41996	Unknown	–	DQ218486	–	–	–	DQ219052	DQ219230	Hosaka et al. (2008)
Gelatoporia subvermispora	Cui 17120	China	ON417159	ON417209	–	ON417020	ON424694	ON424772	ON424835	Liu et al. (2023a)
Gelatoporia subvermispora	Dai 22847	China	ON417160	ON417210	–	ON417021	ON424695	ON424773	ON424836	Liu et al. (2023a)
Gilbertsonia angulopora	FP 133019	USA	KC585354	KC585182	–	–	–	–	–	Ortiz-Santana et al. (2013)

Table 1 Continued.

Species name	Sample no.	Locality	GenBank accessions							References
			ITS	nLSU	mtSSU	nSSU	RPB1	RPB2	TEF1	
Gloeophyllum sepiarium	Wilcox-3BB	USA	HM536091	HM536061	–	HM536062	–	HM536109	HM536110	Garcia-Sandoval et al. (2011)
Gloeophyllum striatum	ARIZAN 027866	Unknown	HM536092	HM536063	–	HM536064	–	HM640259	HM536111	Garcia-Sandoval et al. (2011)
Gloeoporellus merulinus	Dai 18734	Australia	MW377298	MW377377	MW382084	MW377456	MW337191	MW337059	MW337125	Liu et al. (2023c)
Gloeoporellus merulinus	Dai 18735	Australia	MW377299	MW377378	MW382085	MW377457	MW337192	ON688490	MW337126	Liu et al. (2023c)
Gloeoporellus merulinus	Cui 16629	Australia	ON682364	ON680816	**OQ534089**	**OQ519787**	ON688471	ON688492	ON688512	Liu et al. (2023c); Present study
Gloeoporellus merulinus	Cui 16650	Australia	ON682365	ON680817	**OQ534090**	**OQ519788**	ON688472	ON688493	ON688513	Liu et al. (2023c); Present study
Grifola frondosa	AFTOL 701	Unknown	AY854084	AY629318	–	AY705960	AY864876	–	AY885153	Lutzoni et al. (2004)
Grifola frondosa	Dai 19172	Canada	ON417161	ON417211	–	ON417022	ON424696	ON424774	ON424837	Liu et al. (2023a)
Grifola frondosa	Dai 19175	Canada	ON417162	ON417212	–	ON417023	ON424697	ON424775	ON424838	Liu et al. (2023a)
Gymnopilus picreus	ZRL2015011	Unknown	LT716066	KY418882	–	KY418948	KY418980	KY419027	KY419077	Zhao et al. (2017)
Heterobasidion annosum	Dai 20962	Belarus	ON417163	ON417213	ON417079	ON417024	ON424698	ON424776	ON529284	Liu et al. (2023a)
Hymenochaete rubiginosa	He 1049	Unknown	JQ716407	JQ279667	–	–	–	–	–	He & Li (2013)
Hyphoderma litschaueri	FP 101740	USA	KP135295	KP135219	–	–	KP134868	KP134965	–	Floudas & Hibbett (2015)
Hyphoderma medioburiense	FD-335	USA	KP135298	KP135220	–	–	KP134869	KP134966	–	Floudas & Hibbett (2015)
Hyphoderma mutatum	HHB 15479	USA	KP135296	KP135221	–	–	KP134870	KP134967	–	Floudas & Hibbett (2015)
Hyphoderma setigerum	FD 312	USA	KP135297	KP135222	–	–	KP134871	–	–	Floudas & Hibbett (2015)
Irpex flavus	Wu 0705-1	China	MZ636988	MZ637149	–	–	MZ748432	OK136087	MZ913683	Chen et al. (2021)
Ischnoderma benzoinum	Cui 17058	China	ON417164	ON417214	ON417080	ON417025	ON424699	ON424777	ON424839	Liu et al. (2023a)
Ischnoderma benzoinum	Cui 17700	China	ON417165	ON417215	ON417081	ON417026	ON424700	ON424778	ON424840	Liu et al. (2023a)
Ischnoderma resinosum	FD 328	USA	KP135303	KP135225	–	–	KP134884	KP134972	–	Floudas & Hibbett (2015)
Jaapia argillacea	CBS 252.74	Netherlands	GU187524	GU187581	–	–	GU187463	GU187788	GU187711	Binder et al. (2010)
Jahnoporus brachiatus	X 3232	Russia	KU165781	–	–	–	–	–	–	Spirin et al. (2015b)
Jahnoporus hirtus	AFTOL ID 1687	USA	DQ911605	DQ911606	–	DQ911607	–	DQ911608	–	Lutzoni et al. (2004)
Jahnoporus hirtus	Spinosa 10X2014	USA	KU165784	–	–	–	KY949044	–	–	Spirin et al. (2015b)
Jahnoporus oreinus	X 3241	Russia	KU165785	–	–	–	–	–	–	Spirin et al. (2015b)
Jahnoporus oreinus	X 3243	Russia	KU165786	–	–	–	–	–	–	Spirin et al. (2015b)

Table 1 Continued.

Species name	Sample no.	Locality	GenBank accessions							References
			ITS	nLSU	mtSSU	nSSU	RPB1	RPB2	TEF1	
Kusaghiporia usambarensis	JMH 01	Tanzania	–	MH010044	–	MH010046	–	MH048870	MH048871	Hussein et al. (2018)
Kusaghiporia usambarensis	JMH 02	Tanzania	–	MH010045	–	–	–	–	MH048869	Hussein et al. (2018)
Lactarius deceptivus	AFTOL-ID 682	USA	AY854089	AY631899	–	AY707093	AY864883	AY803749	AY885158	Unpublished
Laetiporus ailaoshanensis	Cui 12387	China	KX354469	KX354497	KX354576	KX354534	–	KX354664	KX354622	Song et al. (2018)
Laetiporus ailaoshanensis	Dai 13567	China	KX354470	KX354498	KX354577	KX354535	–	KX354665	KX354623	Song et al. (2018)
Laetiporus caribensis	GDL 1	Guadeloupe	EU402547	EU402525	EU402483	–	–	–	–	Banik et al. (2012)
Laetiporus caribensis	PR 914	Puerto Rico	JN684762	EU402526	EU402482	–	–	–	–	Banik et al. (2012)
Laetiporus cincinnatus	JV 0709/168J	USA	KF951290	KF951305	KX354559	KX354517	–	KX354651	KX354606	Song et al. (2018)
Laetiporus cincinnatus	Dai 12811	USA	KF951291	KF951304	KX354558	KX354516	–	KT894788	KX354605	Song et al. (2018)
Laetiporus conifericola	JV 0709/81J	USA	KF951292	KF951327	KX354573	KX354531	–	KX354683	–	Lindner & Banik (2008)
Laetiporus conifericola	CA 8	USA	EU402575	EU402523	EU402487	–	–	–	AB472663	Lindner & Banik (2008)
Laetiporus cremeiporus	Dai 10107	China	KF951281	KF951301	KX354557	KX354515	–	KX354650	KX354604	Song et al. (2018)
Laetiporus cremeiporus	Cui 10586	China	KF951277	KF951297	KX354555	KX354513	–	KX354648	KX354602	Song et al. (2018)
Laetiporus gilbertsonii	JV 1109/31	USA	KF951293	KF951306	KX354584	KX354542	–	KX354671	KX354630	Song et al. (2018)
Laetiporus gilbertsonii	CA 13	USA	EU402549	EU402527	EU402496	–	–	–	AB472666	Lindner & Banik (2008)
Laetiporus huroniensis	HMC 3	USA	EU402571	EU402540	–	–	–	–	–	Lindner & Banik (2008)
Laetiporus huroniensis	MI 14	USA	EU402573	EU402539	EU402489	–	–	–	AB472672	Lindner & Banik (2008)
Laetiporus lobatus	JV1704 52 1	Costa Rica	MK098490	–	–	–	–	–	–	Kout et al. (2019)
Laetiporus lobatus	JV1704 52 2	Costa Rica	MK098491	–	–	–	–	–	–	Kout et al. (2019)
Laetiporus medogensis	Cui 12219	China	KX354472	KX354500	KX354580	KX354538	–	KX354667	KX354626	Song et al. (2018)
Laetiporus medogensis	Cui 12240	China	KX354473	KX354501	KX354581	KX354539	–	KX354668	KX354627	Song et al. (2018)
Laetiporus montanus	Cui 10015	China	KF951273	KF951311	KX354571	KX354529	ON424701	KT894791	KX354618	Song et al. (2018)
Laetiporus montanus	Cui 10011	China	KF951274	KF951315	KX354570	KX354528	MG867670	KT894790	KX354617	Song et al. (2018)
Laetiporus persicinus	HHB 9564	USA	EU402579	EU402513	–	–	KY949027	–	–	Lindner & Banik (2008)
Laetiporus persicinus	RLG 14725	USA	EU402581	EU402512	EU402502	–	–	–	–	Lindner & Banik (2008)
Laetiporus sulphureus	Cui 12388	China	KR187105	KX354486	KX354560	KX354518	MG867671	KX354652	KX354607	Song et al. (2018)
Laetiporus sulphureus	Cui 12389	China	KR187106	KX354487	KX354561	KX354519	ON424702	KX354653	KX354608	Song et al. (2018)
Laetiporus versisporus	Dai 13160	China	KF951266	KF951320	KX354597	ON417028	–	KT894785	KX354643	Song et al. (2018)
Laetiporus versisporus	Cui 7882	China	KF951269	KF951323	KX354596	ON417029	–	KT894783	KX354642	Song et al. (2018)

Table 1 Continued.

Species name	Sample no.	Locality	GenBank accessions							References
			ITS	nLSU	mtSSU	nSSU	RPB1	RPB2	TEF1	
Laetiporus xinjiangensis	Dai 15953	China	KX354460	KX354488	KX354564	KX354522	–	KX354656	KX354611	Song et al. (2018)
Laetiporus xinjiangensis	Dai 15828	China	KX354461	KX354489	KX354565	KX354523	–	KX354657	KX354612	Song et al. (2018)
Laetiporus zonatus	Dai 13633	China	KX354481	KX354508	KX354589	KX354547	–	KX354676	KX354635	Song et al. (2018)
Laetiporus zonatus	Cui 10404	China	KF951283	KF951308	KX354593	KX354551	–	KT894797	KX354639	Song et al. (2018)
Laricifomes officinalis	JV 0309/49-J	USA	KR605821	KR605764	–	KR605929	–	KR610846	KR610757	Han et al. (2016)
Laricifomes officinalis	JV 9010/14	Slovak Republic	KR605822	KR605765	–	KR605930	–	KR610847	KR610758	Han et al. (2016)
Lentoporia carbonica	Zabel-40GLN	USA	KC585243	KC585065	–	–	KY949013	–	–	Ortiz-Santana et al. (2013)
Lentoporia carbonica	DAOM F 8281	Canada	KC585239	KC585061	–	–	–	–	–	Ortiz-Santana et al. (2013)
Lentoporia subcarbonica	Cui 12212	China	MG787593	MG787639	MG787691	MG787749	–	–	MG787859	Chen (2018)
Lentoporia subcarbonica	Dai 20175	China	OM039283	OM039183	OM039218	OM039250	–	–	OM037806	Liu et al. (2023a)
Lepiota cristata	ZRL20151133	Unknown	LT716026	KY418841	–	KY418910	KY418963	KY418992	KY419048	Zhao et al. (2017)
Leptoporus mollis	RLG 7163	USA	KY948794	MZ637155	–	–	KY948956	OK136101	MZ913693	Chen et al. (2021)
Leptosporomyces raunkiaeri	HHB 7628	USA	GU187528	GU187588	–	GU187640	GU187471	GU187791	GU187719	Binder et al. (2010)
Luteoporia albomarginata	GC 1702-1	China	LC379003	LC379155	–	–	LC379160	LC387358	LC387377	Chen et al. (2021)
Luteoporia lutea	GC 1409-1	China	MZ636998	MZ637158	–	–	MZ748467	OK136050	MZ913656	Chen et al. (2021)
Macrohyporia dictyopora	NLB 1383	Australia	MT537069	MT537069	–	–	–	–	–	Unpublished
Macrohyporia dictyopora	Dai 18878	Australia	OK036736	OK036735	OK044507	OK036737	–	–	OK076964	Liu et al. (2023a)
Melanoporella carbonacea	JV 1704/16	Costa Rica	MN392908	MN392908	–	–	–	–	–	Unpublished
Melanoporella carbonacea	JV 1704/2	Costa Rica	MN392909	MN392909	–	–	–	–	–	Unpublished
Melanoporia castanea	X 1284	China	KC595926	KC595926	–	–	–	–	–	Ortiz-Santana et al. (2013)
Melanoporia condensa	JV 1312/E15-J	Costa Rica	KT156690	–	–	–	–	–	–	Unpublished
Melanoporia nigra	FP 90888	USA	KC585357	KC585186	–	–	–	–	–	Ortiz-Santana et al. (2013)
Melanoporia nigra	CBS 34163	USA	DQ491420	–	DQ491447	–	–	DQ491393	–	Kim et al. (2007)
Melanoporia tropica	Cui 16444	Vietnam	MW377306	MW377384	MW382087	MW377463	–	MW337065	ON424841	Liu et al. (2023a)
Melanoporia tropica	Cui 16455	Vietnam	MW377307	MW377385	MW382088	MW377464	–	MW337066	MW337132	Liu et al. (2023a)
Meripilus giganteus	FP 135344	United Kingdom	KP135307	KP135228	–	–	KP134873	–	–	Floudas & Hibbett (2015)
Metuloidea reniforme	MCW 542/17	Brazil	MT849303	MT849303	–	–	MT833950	–	MT833940	Westphalen et al. (2021)
Neoantrodia alaskan	JV 0309/13	USA	KT995122	KT995145	–	MG787753	–	–	KU052719	Chen (2018)
Neoantrodia alaskan	VS 8791	USA	KT995123	KT995146	–	MG787754	–	MG787816	KU052720	Chen (2018)
Neoantrodia angusta	Cui 17068	China	ON417166	ON417216	ON417082	ON417030	ON424703	ON424780	ON424842	Liu et al. (2023a)

Table 1 Continued.

Species name	Sample no.	Locality	GenBank accessions							References
			ITS	nLSU	mtSSU	nSSU	RPB1	RPB2	TEF1	
Neoantrodia angusta	Cui 17072	China	ON417167	ON417217	ON417083	ON417031	ON424704	ON424781	ON424843	Liu et al. (2023a)
Neoantrodia calcitrosa	VS 8610	USA	KT995125	KT995147	MG787697	MG787757	–	MG787819	KU052723	Chen (2018)
Neoantrodia flavimontis	JV 1307/17-J-1	USA	KU052739	MG787643	MG787698	MG787758	–	–	KU052738	Chen (2018)
Neoantrodia infirma	TN 7426	Finland	JQ700294	JQ700294	–	–	–	–	–	Spirin et al. (2013b)
Neoantrodia kmetii	JV 9610/13	Slovak Republic	KC886708	MG787644	–	MG787759	–	–	KU052733	Chen (2018)
Neoantrodia kmetii	PRM 837474	Croatia	KC886710	KT995153	–	–	–	–	KU052734	Vlasák et al. (2013)
Neoantrodia leucaena	Dai 2910	China	JQ700281	JQ700281	–	–	–	–	–	Spirin et al. (2013b)
Neoantrodia morganii	TN 4119	USA	KT995130	–	–	–	–	–	KU052721	Chen (2018)
Neoantrodia primaeva	Dai 11156	China	MG787598	MG787645	MG787699	MG787761	–	MG787820	–	Chen (2018)
Neoantrodia serialiformis	JV 0809/132-1	USA	MG787599	MG787646	–	MG787762	–	–	MG787864	Chen (2018)
Neoantrodia serialiformis	Dai 19181	Canada	ON417169	ON417219	–	ON417033	ON424706	ON424783	ON424845	Liu et al. (2023a)
Neoantrodia serialis	JV 1509/5	Czech Republic	KT995120	KT995143	–	–	–	–	KU052726	Spirin et al. (2017)
Neoantrodia serialis	TP 243	Finland	KT995121	KT995144	–	–	–	–	KU052725	Spirin et al. (2017)
Neoantrodia serrata	JV 0809/72	USA	KT995118	KT995141	–	MG787763	–	–	KU052730	Chen (2018)
Neoantrodia serrata	Dai 7626	China	KR605812	KR605751	KR606012	KR605912	–	KR610831	KR610740	Han et al. (2016)
Neoantrodia variiformis	JV 0809/96	USA	KT995131	KT995154	MG787701	MG787766	–	MG787821	KU052736	Chen (2018)
Neoantrodia variiformis	Dai 18995	China	**OQ476252**	**OQ476311**	–	**OQ476371**	**OQ506069**	–	**OQ511216**	Present study
Neolentiporus maculatissimus	CIEFAP 92	Argentina	JX090121	–	–	–	–	–	–	Pildain & Rajchenberg (2013)
Neolentiporus maculatissimus	Rajchenberg 158	Argentina	–	AF518632	AF334884	AF334921	–	AY218497	–	Wang et al. (2004)
Neolentiporus tropicus	Cui 13915	China	MW377308	MW377386	MW382089	MW377465	ON424707	ON424784	ON424846	Liu et al. (2023a)
Neolentiporus tropicus	Cui 13923	China	MW377309	MW377387	MW382090	MW377466	ON424708	ON424785	ON424847	Liu et al. (2023a)
Niveoporofomes globosporus	Aime 3413	Belize	KC017760	KC017762	–	–	–	–	–	Ryvarden et al. (2009)
Niveoporofomes globosporus	S-20	Mexico	KR135353	–	–	–	–	–	–	Unpublished
Niveoporofomes oboensis	MUCL 53518	Sao Tome	OM366266	OM366267	–	–	–	OM329950	OM329949	Decock et al. (2022)
Niveoporofomes orientalis	Dai 16982	China	**OQ476254**	**OQ476313**	–	**OQ476372**	–	–	–	Present study
Niveoporofomes orientalis	Dai 19905	China	**OQ476256**	**OQ476315**	–	**OQ476373**	**OQ506070**	–	**OQ511218**	Present study
Niveoporofomes spraguei	Cui 8969	China	KR605785	KR605724	KR605967	KR605863	ON424709	KR610787	KR610695	Han et al. (2016)
Niveoporofomes spraguei	JV 0509/62	USA	KR605786	KR605725	KR605968	KR605864	ON424710	KR610788	KR610697	Han et al. (2016)
Niveoporofomes spraguei	Dai 19169	Canada	**OQ476257**	**OQ476316**	–	**OQ476374**	–	**OQ511167**	**OQ511219**	Present study
Niveoporofomes spraguei	Dai 19177	Canada	**OQ476258**	**OQ476317**	–	**OQ476375**	–	**OQ511168**	**OQ511220**	Present study

Table 1 Continued.

Species name	Sample no.	Locality	GenBank accessions							References
			ITS	nLSU	mtSSU	nSSU	RPB1	RPB2	TEF1	
Nothofagiporus venatus	Cui 16616	Australia	MW377310	MW377388	MW382091	MW377467	MW337196	MW337067	MW337133	Liu et al. (2023a)
Nothofagiporus venatus	Cui 16617	Australia	MW377311	MW377389	MW382092	MW377468	MW337197	MW337068	MW337134	Liu et al. (2023a)
Nothofagiporus venatus	Cui 16552	Australia	**OQ476297**	**OQ476356**	**OQ476463**	**OQ476412**	**OQ506104**	**OQ511203**	**OQ511257**	Present study
Obba rivulosa	Cui 16483	Vietnam	ON417171	ON417221	–	ON417035	ON424711	ON424787	ON424849	Liu et al. (2023a)
Obba rivulosa	Cui 16482	Vietnam	ON417172	ON417222	–	ON417036	ON424712	ON424788	ON424850	Liu et al. (2023a)
Oligoporus podocarpi	Dai 22042	China	MW937877	MW937884	MW937891	MW937870	MZ005579	MZ082976	MZ082982	Zhou et al. (2021)
Oligoporus podocarpi	Dai 22043	China	MW937878	MW937885	MW937892	MW937871	MZ005580	MZ082977	MZ082983	Zhou et al. (2021)
Oligoporus rennyi	Cui 17054	China	OK045508	OK045514	OK045502	OK045496	OK076906	OK076934	OK076962	Liu et al. (2023a)
Oligoporus rennyi	Dai 21016	Belarus	ON417173	ON417223	ON417085	ON417037	ON424713	ON424789	ON424851	Liu et al. (2023a)
Oligoporus romellii	Dai 21034	Belarus	MW377312	MW377390	MW382093	MW377469	MW337198	ON424790	MW337135	Liu et al. (2023a)
Oligoporus romellii	Dai 23576	China	ON417174	ON417224	ON417086	ON417038	ON424714	ON424791	ON424852	Liu et al. (2023a)
Oligoporus sericeomollis	Cui 9560	China	KX900919	KX900989	KX901067	KX901140	KX901183	ON424792	ON424853	Liu et al. (2023a)
Oligoporus sericeomollis	Dai 23473	China	ON417175	ON417225	ON417087	ON417039	ON424715	ON424793	ON424854	Liu et al. (2023a)
Osteina obducta	Cui 10074	China	KX900924	KX900994	KX901071	KX901144	–	KX901240	–	Shen et al. (2019)
Osteina obducta	Cui 9959	China	KX900923	KX900993	KX901070	KX901143	–	KX901239	–	Shen et al. (2019)
Osteina undosa	Dai 7105	China	KX900921	KX900991	KX901069	KX901142	–	KX901238	–	Shen et al. (2019)
Osteina undosa	Cui 16651	Australia	MW377313	MW377391	MW382094	MW377470	MW337199	MW337069	MW337136	Liu et al. (2023a)
Panus conchatus	Dai 23421	China	ON417176	ON417226	ON417088	ON417040	ON424716	ON424794	ON424855	Liu et al. (2023a)
Panus fragilis	HHB 11042	USA	KP135328	KP135233	–	–	KP134877	–	–	Floudas & Hibbett (2015)
Phaeolus asiae-orientalis	Dai 8025	China	KX354457	KX354511	–	KX354553	–	DQ408119	KX354686	Song & Cui (2017)
Phaeolus asiae-orientalis	Dai 20867	China	ON310980	ON310967	–	–	–	–	–	Yuan et al. (2022)
Phaeolus asiae-orientalis	Dai 21783	China	ON310982	ON310968	–	–	–	–	–	Yuan et al. (2022)
Phaeolus fragilis	Cui 16579	Australia	MW377314	MW377392	MW382095	MW377471	–	MW337070	MW337137	Liu et al. (2023a)
Phaeolus schweinitzii	AFTOL-ID 702	USA	–	AY629319	JN710740	AY705961	–	DQ408119	DQ028602	Unpublished
Phaeolus sharmae	KMA 19-014	India	MT762941	MT764209	–	–	–	–	–	Buyck et al. (2022)
Phaeolus sharmae	KMA 19-026	India	MT762940	MT764236	–	–	–	–	–	Buyck et al. (2022)
Phaeolus tabulaeformis	Dollinger 873	USA	ON310989	–	–	–	–	–	–	Yuan et al. (2022)
Phaeolus tabulaeformis	PhSch	USA	MW795374	–	–	–	–	–	–	Yuan et al. (2022)
Phaeolus yunnanensis	Dai 20426	China	ON310995	ON310977	–	–	–	–	–	Yuan et al. (2022)
Phaeolus yunnanensis	Dai 22527	China	ON310996	ON310978	–	–	–	–	–	Yuan et al. (2022)
Phaeophlebiopsis himalayensis	Chen 3143	China	MZ637013	MZ637174	–	–	MZ748359	OK135992	MZ913633	Chen et al. (2021)
Phanerochaete sordida	Wu 1109-55	China	MZ422829	MZ637213	–	–	MZ748389	OK136017	MZ913638	Chen et al. (2021)
Phanerochaetella angustocystidiata	Wu 9606-39	China	MZ637020	GQ470638	–	–	MZ748422	OK136082	MZ913687	Chen et al. (2021)

Table 1 Continued.

Species name	Sample no.	Locality	GenBank accessions							References
			ITS	nLSU	mtSSU	nSSU	RPB1	RPB2	TEF1	
Phanerochaetella leptoderma	Chen 1362	China	MZ637025	GQ470646	–	–	MZ748423	OK136083	MZ913689	Chen et al. (2021)
Phlebia tomentopileata	GC 1602-67	China	MZ637040	MZ637244	–	–	MZ748457	OK136064	MZ913702	Chen et al. (2021)
Phlebiopsis gigantea	FCUG 1417	Norway	MZ637051	AF141634	–	–	MZ748370	OK135996	MZ913623	Chen et al. (2021)
Physisporinus longicystidius	Cui 16630	Australia	ON417177	ON417227	–	ON417041	ON424717	ON424795	ON424856	Liu et al. (2023a)
Physisporinus longicystidius	Cui 16725	Australia	ON417178	ON417228	–	ON417042	ON424718	ON424796	ON424857	Liu et al. (2023a)
Piptoporellus baudonii	JMH 02/19	Tanzania	MT447067	MT447070	–	MT447064	–	–	MT452550	Tibuhwa et al. (2020)
Piptoporellus baudonii	JMH 03/19	Zimbabwe	MT447068	MT447071	–	MT447065	–	–	MT452551	Tibuhwa et al. (2020)
Piptoporellus hainanensis	Dai 13714	China	KR605806	KR605745	KR606005	KR605904	–	KR610824	KR610735	Han et al. (2016)
Piptoporellus soloniensis	Cui 16932	China	OM039285	OM039185	OM039220	OM039252	OM037752	OM037781	OM037808	Liu et al. (2023a)
Piptoporellus soloniensis	Cui 11390	China	KR605803	KR605742	KR606003	KR605901	ON424721	KR610822	KR610733	Han et al. (2016)
Piptoporellus triqueter	Dai 13121	China	KR605807	KR605746	KR606006	KR605905	–	KR610827	KR610738	Han et al. (2016)
Podoscypha venustula	Cui 16923	Puerto Rico	ON417181	ON417231	ON417089	ON417045	ON424722	ON424799	ON424860	Liu et al. (2023a)
Podoserpula ailaoshanensis	ZJL2015015	China	KU324484	KU324487	–	KU324491	–	–	KU324494	Zhou et al. (2016a)
Polyporus squamosus	Cui 10595	China	KU189778	KU189809	KU189960	KU189840	KU189892	KU189988	KU189925	Zhou et al. (2016c)
Polyporus varius	Cui 12249	China	KU507581	KU507583	KU507585	KU189838	KU507589	KU507592	KU507591	Zhou et al. (2016c)
Porodaedalea chinensis	Cui 10252	China	KX673606	MH152358	–	–	–	MH101479	MG585301	Dai et al. (2017)
Postia amurensis	Cui 1044	China	KX900902	KX900972	KX901043	–	–	–	–	Shen et al. (2019)
Postia amurensis	Dai 903	China	KX900901	KX900971	KX901042	–	–	–	–	Shen et al. (2019)
Postia carbophila	MR 10758	Argentina	JX090114	JX090132	–	–	–	–	–	Pildain & Rajchenberg (2013)
Postia carbophila	MR 12281	Argentina	JX090115	–	–	–	–	–	–	Pildain & Rajchenberg (2013)
Postia crassicontexta	Cui 16637	Australia	MW377315	MW377393	MW382096	MW377472	MW337200	MW337071	MW337138	Liu et al. (2023a)
Postia cylindrica	Dai 23087	China	ON417182	ON417232	ON417090	ON417046	–	–	ON424861	Liu et al. (2023a)
Postia cylindrica	Dai 17941	China	ON417183	ON417233	ON417091	ON417047	–	–	ON424862	Liu et al. (2023a)
Postia folliculocystidiata	JV 0907-7	Czech Republic	JF950565	–	–	–	–	–	–	Niemelä et al. (2001)
Postia folliculocystidiata	MJ 27-06	Czech Republic	JF950564	–	–	–	–	–	–	Niemelä et al. (2001)
Postia hirsuta	Cui 11237	China	KJ684970	KJ684984	KX901038	KX901113	–	–	KX901266	Shen et al. (2019)
Postia hirsuta	Cui 18347	China	OM039286	OM039186	OM039221	OM039253	–	ON424800	OM037809	Liu et al. (2023a)
Postia lactea	Cui 17334	China	OM039287	OM039187	OM039222	OM039254	OM037753	OM037782	OM037810	Liu et al. (2023a)
Postia lactea	Cui 17790	China	OM039288	OM039188	OM039223	OM039255	OM037754	OM037783	OM037811	Liu et al. (2023a)
Postia lactea	Cui 12141	China	KX900892	KX900962	KX901029	KX901104	KX901163	KX901211	KX901260	Shen et al. (2019)
Postia lowei	Cui 9585	China	KX900898	KX900968	KX901035	KX901110	–	–	–	Shen et al. (2019)
Postia lowei	Cui 18366	China	OM039289	OM039189	OM039224	OM039256	–	ON424801	ON424863	Liu et al. (2023a)

Table 1 Continued.

Species name	Sample no.	Locality	GenBank accessions							References
			ITS	nLSU	mtSSU	nSSU	RPB1	RPB2	TEF1	
Postia ochraceoalba	Cui 17047	China	OM039291	OM039191	OM039226	OM039258	OM037756	OM037785	OM037813	Liu et al. (2023a)
Postia ochraceoalba	Cui 17076	China	**OQ476290**	**OQ476349**	**OQ476456**	**OQ476405**	**OQ506097**	**OQ511196**	**OQ511250**	Present study
Postia sublowei	Cui 9352	China	KX900899	KX900969	KX901036	KX901111	ON424723	–	KX901264	Shen et al. (2019)
Postia sublowei	Cui 17460	China	OM039294	OM039194	OM039229	OM039261	OM037759	ON424802	ON424864	Liu et al. (2023a)
Postia sublowei	Dai 21038	Belarus	**OQ476300**	**OQ476359**	**OQ476466**	**OQ476415**	**OQ506107**	–	**OQ511260**	Present study
Postia tephroleuca	Cui 17560	China	OM039295	OM039195	OM039230	OM039262	OM037760	OM037788	OM037816	Liu et al. (2023a)
Postia tephroleuca	Dai 12610	Finland	KX900897	KX900967	KX901034	KX901109	KX901166	KX901214	KX901263	Shen et al. 2019
Pseudoantrodia monomitica	Dai 13381	China	MG787602	ON417234	–	MG787768	–	MG787822	MG787866	Liu et al. (2023a)
Pseudoantrodia monomitica	Dai 10828	China	MG787601	MG787648	–	MG787767	–	ON424803	MG787865	Liu et al. (2023a)
Pseudofibroporia citrinella	He 20120721	China	KU550477	KU550500	KU550520	KU550539	–	KU550555	KU550574	Chen et al. (2017)
Pseudofibroporia citrinella	Yuan 6181	China	KU550478	KU550501	KU550521	KU550540	–	KU550556	KU550575	Chen et al. (2017)
Pseudofomitopsis microcarpa	Cui 16404	Vietnam	MW377316	MW377394	MW382097	MW377473	–	–	MW337139	Liu et al. (2023a)
Pseudofomitopsis microcarpa	Cui 16406	Vietnam	MW377317	MW377395	MW382098	MW377474	–	–	ON424865	Liu et al. (2023a)
Ptychogaster albus	Dai 23618	China	OM039292	OM039192	OM039227	OM039259	OM037757	OM037786	OM037814	Liu et al. (2023a)
Ptychogaster albus	Dai 21035	Belarus	OM039293	OM039193	OM039228	OM039260	OM037758	OM037787	OM037815	Liu et al. (2023a)
Ptychogaster albus	Dai 23535	China	ON417184	ON417235	ON417092	ON417048	ON424724	ON424804	ON424866	Liu et al. (2023a)
Pycnoporellus alboluteus	CBS 41848	Canada	MH856417	MH867965	–	–	–	–	–	Vu et al. (2019)
Pycnoporellus alboluteus	HHB 17598	USA	KC585383	KC585216	–	–	–	–	–	Ortiz-Santana et al. (2013)
Pycnoporellus alboluteus	FP 105074	USA	KC585381	KC585214	–	–	–	–	–	Ortiz-Santana et al. (2013)
Pycnoporellus fulgens	FP 133367	USA	KC585386	KC585219	–	–	–	–	–	Ortiz-Santana et al. (2013)
Pycnoporellus fulgens	Cui 10033	China	KX354458	KX354512	–	KX354554	ON424726	KX354684	KX354687	Song & Cui (2017)
Pycnoporellus fulgens	Cui 16463	Vietnam	MW377318	MW377396	–	MW377475	ON424725	ON424805	ON424867	Liu et al. (2023a)
Pyrenogaster pityophilus	OSC 59743	Unknown	–	DQ218519	–	–	–	DQ219057	DQ219232	Hosaka et al. (2008)
Radulodon casearius	Cui 17979	China	ON417185	ON417236	ON417093	ON417049	ON424727	–	ON424868	Liu et al. (2023a)
Resinoporia cincta	JV 1009/12	USA	MG787604	KT711029	–	MG787770	–	–	KT711072	Chen (2018)
Resinoporia cincta	Dai 12739	USA	MG787603	MG787651	MG787703	MG787769	–	–	MG787870	Chen (2018)
Resinoporia crassa	Kinnunen 3476	Finland	KJ028073	KT711031	–	–	–	–	KT711070	Runnel et al. (2014)
Resinoporia crassa	Dai 20860	China	OM039296	OM039196	–	–	–	–	–	Liu et al. (2023a)
Resinoporia cretacea	JV 1207/1	Czech Republic	KT711010	–	–	MG787771	–	–	–	Chen (2018)

Table 1 Continued.

Species name	Sample no.	Locality	GenBank accessions							References
			ITS	nLSU	mtSSU	nSSU	RPB1	RPB2	TEF1	
Resinoporia cretacea	Lohmus 971	Estonia	KJ028064	KT711032	–	–	–	–	KT711067	Chen (2018)
Resinoporia ferox	JV 1209/75	USA	KT711011	KT711035	MG787704	MG787772	–	MG787827	KT711074	Chen (2018)
Resinoporia ignobilis	JV 1209/36	USA	KT711013	KT711038	MG787705	MG787773	–	–	KT711061	Chen (2018)
Resinoporia ignobilis	Gilbertson 8128	USA	KT711012	KT711036	–	–	–	–	–	Chen (2018)
Resinoporia ladiana	JV 1008/65	USA	KT711015	KT711040	MG787706	MG787774	–	MG787828	KT711073	Chen (2018)
Resinoporia ladiana	Ryvarden 21853	USA	KT711014	KT711039	–	–	–	–	KT711077	Chen (2018)
Resinoporia luteola	Cui 16472	Vietnam	MW377319	MW377397	MW382099	MW377476	ON424728	MW337072	MW337140	Liu et al. (2023a)
Resinoporia luteola	Cui 16473	Vietnam	MW377320	MW377398	MW382100	MW377477	ON424729	MW337073	ON424869	Liu et al. (2023a)
Resinoporia piceata	JV 1110/14	Czech Republic	KT711018	KT711047	–	MG787775	–	–	KT711055	Chen (2018)
Resinoporia piceata	Spirin 4384	Russia	KJ028054	KT711046	–	–	–	–	KT711057	Chen (2018)
Resinoporia pinea	Cui 6522	China	KC951148	MG787649	ON417094	MG787776	–	MG787829	MG787872	Chen (2018)
Resinoporia pinea	Cui 6529	China	KC951149	MG787650	MG787707	MG787777	–	MG787830	MG787871	Chen (2018)
Resinoporia pini cubensis	JV 1008/66	USA	KT711020	KT711049	–	–	–	–	KT711076	Spirin et al. (2015a)
Resinoporia sitchensis	JV 1008/67	USA	KT711025	KT711052	–	–	–	–	–	Spirin et al. (2015a)
Resinoporia sitchensis	VS 8782	USA	KT711024	KT711051	–	–	–	–	–	Spirin et al. (2015a)
Resinoporia sordida	Miettinen 16954	USA	KT711026	KT711053	–	–	–	–	KT711063	Spirin et al. (2015a)
Resinoporia sordida	JV 0509/190	USA	KT711027	KT711054	–	–	–	–	KT711064	Spirin et al. (2015a)
Resinoporia sordida	Cui 16469	Vietnam	ON417186	ON417237	ON417095	ON417050	ON424730	ON424806	ON424870	Liu et al. (2023a)
Resinoporia sordida	Dai 23393	China	ON682368	ON680820	**OQ534092**	**OQ518683**	ON688475	ON688496	ON688516	Liu et al. (2023a); Present study
Resupinopostia lateritia	Dai 2652	China	KX900913	KX900983	–	–	–	–	–	Shen et al. (2019)
Resupinopostia lateritia	KUO 0211531	Finland	JF950567	–	–	–	–	–	–	Shen et al. (2019)
Resupinopostia lateritia	SFC20170811 15	Russia	MT044425	–	–	–	–	–	–	Shen et al. (2019)
Resupinopostia lateritia	JV 0809/65A	USA	KJ509195	–	–	–	–	–	–	Vampola et al. (2014)
Resupinopostia sublateritia	Cui 17519	China	**OQ476279**	**OQ476338**	**OQ476445**	**OQ476394**	**OQ506086**	**OQ511185**	**OQ511239**	Present study
Resupinopostia sublateritia	Dai 22760	China	**OQ476281**	**OQ476340**	**OQ476447**	**OQ476396**	**OQ506088**	**OQ511187**	**OQ511241**	Present study
Resupinopostia sublateritia	Dai 22761	China	**OQ476282**	**OQ476341**	**OQ476448**	**OQ476397**	**OQ506089**	**OQ511188**	**OQ511242**	Present study
Rhizochaete chinensis	Wu 0910-45	China	LC387335	MF110294	–	–	LC387348	LC387370	LC270925	Chen et al. (2018)
Rhizoporia hyalina	VS 2532	Russia	JQ700267	JQ700267	–	–	–	–	–	Spirin et al. (2013b)
Rhizoporia hyalina	Kotiranta-19668	Russia	JQ700284	JQ700284	–	–	KY949008	–	–	Spirin et al. (2013b)

Table 1 Continued.

Species name	Sample no.	Locality	GenBank accessions							References
			ITS	nLSU	mtSSU	nSSU	RPB1	RPB2	TEF1	
Rhodoantrodia subtropica	Cui 18021	China	**OQ476259**	**OQ476318**	**OQ476425**	**OQ476376**	**OQ506071**	–	**OQ511221**	Present study
Rhodoantrodia subtropica	Dai 19798	China	**OQ476260**	**OQ476319**	**OQ476426**	**OQ476377**	**OQ506072**	–	**OQ511222**	Present study
Rhodoantrodia tropica	Dai 13428	China	MG787605	MG787652	MG787708	MG787778	–	MG787823	MG787867	Chen (2018)
Rhodoantrodia tropica	Dai 13434	China	MG817481	MG817479	MG787709	MG787779	–	MG787824	–	Chen (2018)
Rhodoantrodia yunnanensis	Han 1157	China	MT497886	MT497884	–	–	–	–	–	Han et al. (2020)
Rhodoantrodia yunnanensis	Zhao 4566	China	MT497887	MT497885	–	–	–	–	–	Han et al. (2020)
Rhodoantrodia yunnanensis	Cui 18173	China	**OQ476263**	**OQ476322**	**OQ476429**	**OQ476378**	–	**OQ511169**	**OQ511223**	Present study
Rhodofomes cajanderi	Cui 9888	China	KC507156	KC507166	KR605936	KR605828	–	KR610764	KR610662	Han et al. (2016)
Rhodofomes cajanderi	Cui 9879	China	KC507157	KC507167	KR605935	KR605827	–	KR610763	KR610663	Han et al. (2016)
Rhodofomes carneus	O 15519	Tanzania	KC507155	KC507165	–	KR605830	–	–	KR610665	Han et al. (2016)
Rhodofomes incarnatus	Cui 10348	China	KC844848	KC844853	KR605949	KR605844	–	KR610773	KR610679	Han et al. (2016)
Rhodofomes incarnatus	Yuan 2653	China	KC844849	KC844854	KR605950	KR605845	–	–	KR610678	Han et al. (2016)
Rhodofomes roseus	Cui 17046	China	ON417187	ON417238	ON417096	ON417051	ON424731	ON424807	ON424871	Liu et al. (2023a)
Rhodofomes roseus	Dai 19059	China	**OQ476266**	**OQ476325**	**OQ476432**	**OQ476381**	**OQ506075**	**OQ511172**	**OQ511226**	Present study
Rhodofomes subfeei	Cui 9229	China	KR605789	KR605728	ON417098	KR605869	–	KR610793	KR610701	Han et al. (2016)
Rhodofomes subfeei	Dai 10430	China	KR605788	KR605727	KR605972	KR605868	–	KR610792	KR610702	Han et al. (2016)
Rhodofomitopsis africana	Cui 16362	Vietnam	ON417189	ON417240	ON417099	ON417053	ON424733	ON424809	ON424873	Liu et al. (2023a)
Rhodofomitopsis africana	MUCL 43284	Cameroon	DQ491422	–	DQ491449	–	–	DQ491395	–	Kim et al. (2007)
Rhodofomitopsis cupreorosea	CBS 23687	Costa Rica	DQ491400	AY515325	DQ491427	–	–	DQ491373	–	Kim et al. (2007)
Rhodofomitopsis feei	Oinonen 6011906	Brazil	KC844851	KC844856	KR605943	KR605837	–	KR610767	KR610671	Han et al. (2016)
Rhodofomitopsis feei	Ryvarden 37603	Venezuela	KC844850	KC844855	KR605944	KR605838	–	KR610768	KR610670	Han et al. (2016)
Rhodofomitopsis lilacinogilva	Schigel 5193	Australia	KR605773	KR605712	KR605945	KR605846	–	KR610774	KR610680	Han et al. (2016)
Rhodofomitopsis monomitic	Dai 10630	China	KY421732	KY421734	MG787710	MG787780	–	MG787825	MG787868	Chen (2018)
Rhodofomitopsis monomitic	Dai 16894	China	KY421733	KY421735	MG787711	MG787781	–	MG787826	MG787869	Chen (2018)
Rhodofomitopsis oleracea	RLG 3818	Unknown	EU232198	EU232291	–	EU232249	–	–	–	Unpublished
Rhodofomitopsis oleracea	MD 177	USA	KC585296	KC585120	–	–	–	–	–	Ortiz-Santana et al. (2013)
Rhodofomitopsis pseudofeei	Cui 16794	Australia	MK461952	MK461956	MK461960	MK461964	ON424735	MK463984	MK463986	Yuan et al. (2020)
Rhodofomitopsis pseudofeei	Cui 16803	Australia	MK461953	MK461957	MK461961	MK461965	ON424734	ON424810	MK463987	Yuan et al. (2020)
Rhodonia obliqua	Cui 17704	China	OM039297	OM039197	–	OM039263	ON424736	–	ON424874	Liu et al. (2023a)
Rhodonia obliqua	Dai 23399	China	ON417190	ON417241	–	ON417054	ON424737	–	ON424875	Liu et al. (2023a)
Rhodonia placenta	TN 7609	Finland	JX109846	JX109846	–	–	–	JX109872	JX109900	Binder et al. (2013)
Rhodonia placenta	Wei 1406	China	KF699129	KT893750	–	–	ON424739	KT893746	KT893748	Shen et al. (2015)

Table 1 Continued.

Species name	Sample no.	Locality	GenBank accessions							References
			ITS	nLSU	mtSSU	nSSU	RPB1	RPB2	TEF1	
Rhodonia rancida	Cui 12339	China	KX900929	KX900999	KX901072	KX901148	–	KX901242	KX901279	Shen et al. (2019)
Rhodonia rancida	Cui 12317	China	KX900928	KX900998	–	KX901147	–	KX901241	KX901278	Shen et al. (2019)
Rhodonia subplacenta	Cui 9818	China	KX900930	KX901000	KX901073	KX901149	–	–	–	Shen et al. (2019)
Rhodonia subplacenta	Dai 13456	China	KX900931	KX900974	KX901074	KX901150	–	–	–	Shen et al. (2019)
Rhodonia subrancida	Cui 16462	Vietnam	MW377322	ON417243	–	MW377479	MW337202	MW337075	ON424877	Liu et al. (2023a)
Rhodonia tianshanensis	Dai 15915	China	MF462023	MG210493	–	–	–	MG199963	–	Yuan & Shen (2017)
Rhodonia tianshanensis	Dai 15934	China	MF462024	MG210494	–	–	–	–	–	Yuan & Shen (2017)
Rigidoporus sp.	Cui 16852	Puerto Rico	ON417179	ON417229	–	ON417043	ON424719	ON424797	ON424858	Liu et al. (2023a)
Rigidoporus sp.	Cui 16859	Puerto Rico	ON417180	ON417230	–	ON417044	ON424720	ON424798	ON424859	Liu et al. (2023a)
Rigidoporus undatus	Miettinen 13591	Finland	KY948731	KY948870	–	–	KY948945	–	–	Justo et al. (2017)
Rubellofomes cystidiatus	Cui 5481	China	KF937288	KF937291	KR605938	KR605832	–	KR610765	KR610667	Han et al. (2016)
Rubellofomes cystidiatus	Yuan 6304	China	KR605769	KR605708	KR605939	KR605833	–	–	KR610668	Han et al. (2016)
Rubellofomes minutisporus	Rajchenberg 10661	Argentina	KR605777	KR605716	–	KR605850	–	–	–	Han et al. (2016)
Russula emeticicolor	FH12253	Germany	KT934011	KT933872	–	–	KT957382	KT933943	–	Looney et al. (2016)
Ryvardenia campyla	Cui 16674	Australia	MW377323	MW377400	–	MW377480	MW337203	MW337076	MW337143	Liu et al. (2023a)
Ryvardenia campyla	CIEFAP 197	Unknown	JX090118	JX090141	–	–	–	–	–	Pildain & Rajchenberg (2013)
Ryvardenia cretacea	Cui 16731	Australia	MW377324	MW377401	MW382102	MW377481	MW337204	MW337077	MW337144	Liu et al. (2023a)
Ryvardenia cretacea	Cui 16732	Australia	MW377325	MW377402	MW382103	MW377482	MW337205	MW337078	MW337145	Liu et al. (2023a)
Sarcoporia longitubulata	JV 0809/8	USA	KM207860	KM207863	–	–	–	–	–	Vlasák et al. (2015)
Sarcoporia longitubulata	JV 1009/8A	USA	KM207862	KM207864	–	–	–	–	–	Vlasák et al. (2015)
Sarcoporia polyspora	Cui 16977	China	MW377326	MW377403	–	MW377483	MW337206	MW337079	MW337146	Liu et al. (2023a)
Sarcoporia polyspora	Cui 16995	China	OM039299	OM039199	–	OM039264	OM037761	ON424811	OM037817	Liu et al. (2023a)
Sarcoporia polyspora	Cui 17165	China	ON417192	ON417244	–	ON417056	ON424740	ON424812	ON424878	Liu et al. (2023a)
Scopuloides allantoidea	WEI 16-060	China	MZ637081	MZ637279	–	–	MZ748463	OK136047	MZ913664	Chen et al. (2021)
Serpula himantioides	MUCL:30528	Belgium	GU187545	GU187600	–	GU187651	GU187480	GU187808	GU187748	Binder et al. (2010)
Skeletocutis coprosmae	Cui 16623	Australia	ON417193	ON417245	ON417100	ON417057	ON424741	ON424813	ON424879	Liu et al. (2023a)
Skeletocutis yuchengii	FBCC 1132	China	KY953045	KY953045	KY953142	–	KY953143	–	KY953109	Korhonen et al. (2018)
Sparassis americana f *americana*	OKM 7058	USA	KC987581	KF053389	–	–	–	–	–	Unpublished
Sparassis americana f *americana*	TENN 66366	USA	KC987594	KF053388	–	–	–	–	–	Unpublished
Sparassis brevipes	GER ILKKA-96-1044	GERMANY	AY218441	AY218403	–	–	–	AY218543	–	Wang et al. (2004)

Table 1 Continued.

Species name	Sample no.	Locality	GenBank accessions							References
			ITS	nLSU	mtSSU	nSSU	RPB1	RPB2	TEF1	
Sparassis crispa	GER23	Germany	AY218440	AY218402	–	–	–	–	–	Wang et al. (2004)
Sparassis crispa	IB98-129	Sweden	KC987584	KF053382	–	–	–	–	–	Unpublished
Sparassis cystidiosa f *flabelliformis*	HKAS 59856	China	JQ743079	JQ743089	–	–	–	JQ743099	–	Zhao et al. (2013)
Sparassis cystidiosa f *flabelliformis*	HKAS 59857	China	JQ743080	JQ743090	–	–	–	JQ743100	–	Zhao et al. (2013)
Sparassis latifolia	HKAS 15728	China	AY218436	AY218398	–	–	–	–	–	Wang et al. (2004)
Sparassis latifolia	YCDA 12145	China	AY218423	AY218385	–	–	–	–	–	Wang et al. (2004)
Sparassis miniensis	Lou-Fungi 18390	SPAIN	DQ270675	DQ270676	–	–	–	DQ270674	–	Blanco-Dios et al. (2006)
Sparassis radicata	SS 29	Unknown	AY218446	AY218408	–	–	–	DQ270672	–	Wang et al. (2004)
Sparassis radicata	OKM 4756	USA	KC987580	KF053407	–	–	KY949023	–	–	Justo et al. 2017
Sparassis spathulata	AME7 ZW-Clarku 001	USA	AY218428	AY218391	–	–	–	AY218535	–	Wang et al. (2004)
Sparassis spathulata	AME8 ZW-Clarku 002	USA	AY218429	AY218392	–	–	–	AY218536	–	Wang et al. (2004)
Sparassis subalpina	HKAS 57511	China	JN387094	JN387105	–	–	–	JN387116	–	Zhao et al. (2013)
Sparassis subalpina	HKAS 55936	China	JN387095	JN387106	–	–	–	JN387117	–	Zhao et al. (2013)
Spongiporus balsameus	Dai 22714	China	ON417194	ON417246	ON417101	ON417058	–	ON424814	ON424880	Liu et al. (2023a)
Spongiporus balsameus	Cui 9835	China	KX900916	KX900986	KX901061	KX901134	–	KX901233	–	Shen et al. (2019)
Spongiporus floriformis	Cui 10292	China	KM107899	KM107904	KX901058	KX901131	KX901178	KX901230	KX901274	Shen et al. (2019)
Spongiporus floriformis	Dai 13887	China	KX900914	KX900984	KX901057	KX901130	KX901177	KX901229	KX901273	Shen et al. (2019)
Spongiporus gloeoporus	Cui 10401	China	KX900915	KX900985	KX901060	KX901133	ON424742	KX901232	ON424881	Shen et al. (2019)
Spongiporus gloeoporus	Cui 17813	China	OM039301	OM039201	OM039232	OM039266	OM037763	ON424816	OM037819	Liu et al. (2023a)
Spongiporus zebra	Cui 9973	China	KX900917	KX900987	KX901062	KX901135	KX901179	KX901234	–	Shen et al. (2019)
Spongiporus zebra	Dai 7131	China	KF727430	KM190902	KX901063	KX901136	KX901180	KX901235	–	Shen et al. (2019)
Steccherinum larssonii	MCW 593/17	Unknown	MT849306	MT849306	–	–	MT833956	–	MT833941	Westphalen et al. (2021)
Steccherinum meridionale	Cui 16691	Australia	ON417195	ON417247	ON417102	ON417059	ON424743	ON424817	ON424882	Liu et al. (2023a)
Stereopsis radicans	OLR 45395	Unknown	–	KC203496	–	–	–	KC203502	KC203516	Unpublished
Stereopsis sp.	OKHL 15544	Unknown	–	–	–	–	–	KC203505	KC203519	Unpublished
Stereum hirsutum	AFTOL-ID 492	Unknown	AY854063	AF393078	U27076	AF026588	AY864885	AY218520	AY885159	Lutzoni et al. (2004)
Subantrodia juniperina	03010/1a	USA	MG787606	MG787653	MG787712	MG787782	ON424744	MG787831	MG787873	Chen (2018)
Subantrodia juniperina	SRM-403	USA	KC585285	KC585109	–	–	KY948991	–	–	Justo et al. (2017)
Subantrodia uzbekistanica	Dai 17104	Uzbekistan	KX958182	KX958186	ON417103	–	ON424745	–	ON424883	Liu et al. (2023a)

Table 1 Continued.

Species name	Sample no.	Locality	GenBank accessions							References
			ITS	nLSU	mtSSU	nSSU	RPB1	RPB2	TEF1	
Subantrodia uzbekistanica	Dai 17105	Uzbekistan	KX958183	KX958187	ON417104	–	ON424746	–	ON424884	Liu et al. (2023a)
Suillus pictus	AFTOL 717	Unknown	AY854069	AY684154	–	AY662659	AY858965	AY786066	AY883429	Unpublished
Taiwanofungus camphoratus	Cui 17234	China	MW377327	MW377404	MW382104	MW377484	ON424747	–	MW337147	Liu et al. (2023a)
Taiwanofungus camphoratus	Cui 17235	China	MW377328	MW377405	MW382105	MW377485	ON424748	–	MW337148	Liu et al. (2023a)
Taiwanofungus camphoratus	ACT 1	China	EU232205	EU232281	–	–	–	–	–	Ortiz-Santana et al. (2013)
Taiwanofungus salmoneus	B 147	China	EU232202	EU232278	–	–	–	–	–	Ortiz-Santana et al. (2013)
Taiwanofungus salmoneus	B 492	China	EU232203	EU232279	–	–	–	–	–	Ortiz-Santana et al. (2013)
Tenuipostia dissecta	Cui 16555	Australia	MW377330	MW377406	MW382106	MW377487	MW337207	ON424818	MW337149	Liu et al. (2023a)
Tenuipostia dissecta	Cui 16560	Australia	MW377331	MW377407	MW382107	MW377488	MW337208	ON424819	MW337150	Liu et al. (2023a)
Tenuipostia dissecta	Dai 18744	Australia	**OQ476302**	**OQ476361**	**OQ476468**	**OQ476417**	**OQ506109**	**OQ511207**	**OQ511262**	Present study
Thelephora ganbajun	ZRL20151295	Unknown	LT716082	KY418908	–	–	KY418987	KY419043	KY419093	Zhao et al. (2017)
Tomentella sp.	AFTOL-ID 1016	USA	DQ835998	DQ835997	–	DQ092920	–	DQ835999	–	Matheny et al. (2007a)
Trametes cinnabarina	Dai 14386	China	KX880629	KX880667	KX880712	MG847264	KX880818	KX880854	KX880885	Cui et al. (2019)
Trametes sanguinea	Cui 7091	China	KX880628	KX880666	KX880711	MG847266	KX880817	MG867689	KX880884	Cui et al. (2019)
Tyromyces chioneus	FD 4	USA	KP135311	KP135291	–	–	KP134891	KP134977	–	Floudas & Hibbett (2015)
Tyromyces sp.	Cui 16652	Australia	ON417196	ON417248	–	ON417060	ON424749	ON424820	ON424885	Liu et al. (2023a)
Ungulidaedalea fragilis	Cui 10919	China	KF937286	KF937290	KR605946	KR605840	–	KR610770	KR610674	Han et al. (2016)
Wolfiporia cocos	CBS 27955	USA	MW251869	MW251858	–	–	–	MW250264	MW250253	Wu et al. (2020)
Wolfiporia cocos	MRM 011	USA	MT241733	–	–	–	–	–	–	Unpublished
Wolfiporia hoelen	CBK 1	China	KX354453	KX354689	–	KX354690	–	KX354685	KX354688	Song & Cui (2017)
Wolfiporia hoelen	Dai 20036	China	MW251877	MW251866	–	ON417061	–	MW250272	MW250261	Liu et al. (2023a)
Wolfiporia pseudococos	Dai 15269	China	KX354451	–	–	–	–	–	–	Wu et al. (2020)
Wolfiporiella cartilaginea	Dai 3764	China	KX354456	–	–	–	–	–	–	Unpublished
Wolfiporiella cartilaginea	O 913120	Japan	KX354455	–	–	–	–	–	–	Unpublished
Wolfiporiella dilatohypha	FP 72162 R	USA	EU402556	KC585235	–	–	–	–	–	Lindner & Banik (2008)
Wolfiporiella dilatohypha	CS-635913-AR	USA	KC585400	KC585234	–	–	–	–	–	Lindner & Banik (2008)
Wolfiporiopsis castanopsidis	Cui 16295	China	–	MW377408	MW382108	MW377489	MW337209	MW337080	MW337151	Liu et al. (2023a)
Wolfiporiopsis castanopsidis	Cui 16296	China	–	MW377409	MW382109	MW377490	MW337210	MW337081	MW337152	Liu et al. (2023a)

Heterobasidion annosum (Fr.) Bref. and *Stereum hirsutum* (Willd.) Pers. were selected as outgroups following Justo et al. (2017) and Liu et al. (2023a). Maximum parsimony analysis was applied to the combined multiple genes dataset and the tree construction procedure was performed in PAUP* version 4.0b10. All characters were equally weighted and gaps were treated as missing data. Trees were inferred using the heuristic search option with TBR branch swapping and 1000 random sequence additions. Max-trees were set to 5000, branches of zero length were collapsed and all parsimonious trees were saved. Clade robustness was assessed using a bootstrap (BT) analysis with 1000 replicates (Felsenstein 1985). Descriptive tree statistics tree length (TL), consistency index (CI), retention index (RI), rescaled consistency index (RC), and homoplasy index (HI) were calculated for each Most Parsimonious Tree (MPT) generated.

The maximum likelihood (ML) and Bayesian Inference (BI) analyses were performed based on the combined multiple genes datasets respectively. ML researches were conducted with RAxML-HPC v. 8.2.3 (Stamatakis 2014) involved 1000 ML searches under the GTRGAMMA model, and only the maximum likelihood best tree from all searches was kept. In addition, 1000 rapid bootstrap replicates were run with the GTRCAT model to assess ML bootstrap values of the nodes. The best-fit evolutionary models for each gene region were selected by hierarchical likelihood ratio tests (hLRT) and Akaike information criterion (AIC) in MrModeltest2 v. 2.3 (Nylander 2008) after scoring 24 models of evolution by PAUP* v. 4.0b10., and these models were applied in BI analyses for the combined datasets. BI were performed using MrBayes v. 3.2 (Ronquist & Huelsenbeck 2003) with four simultaneous independent chains for all datasets, performing five million generations until the split deviation frequencies reached appropriate levels, and sampled every 100th generation. The first 25 % sampled trees were discarded as burn-in, while the remaining ones were used to calculate Bayesian posterior probabilities (BPP) of the clades. The ML bootstrap (ML) ≥ 50 % and Bayesian posterior probabilities (BPP) ≥ 0.95 were presented on topologies from ML analyses, respectively. The final alignments and the retrieved topologies were deposited in TreeBASE (http://www.treebase.org), under accession ID: 30660.

Trees were viewed in FigTree v1.4.4 (http://tree.bio.ed. ac.uk/software/figtree/). Branches that received bootstrap supports for maximum parsimony (MP), maximum likelihood (ML) and Bayesian posterior probabilities (BPP) greater than or equal to 75% (MP and ML) and 0.95 (BPP) were considered as significantly supported, respectively.

Molecular clock analysis

Two fossil calibrations, *Archaeomarasmius leggetti* Hibbett, D. Grimaldi & Donoghue and *Quatsinoporites cranhamii* S.Y. Sm., Currah & Stockey were used in the divergence time estimating. *Archaeomarasmius leggetti* was treated as the representative of the minimum age of Agaricales at 90–94 Mya (Hibbett et al. 1997), and *Q. cranhamii* was the representative of the minimum age of Hymenochaetales at 113 Mya (Smith et al. 2004). Divergence time is estimated with the BEAST version 2.6.5 software package (Bouckaert et al. 2014) with ITS, nLSU, mtSSU, nuSSU, RPB1, RPB2 and TEF1 sequences representing main lineages in Agaricomycetes.

All the DNA sequences were aligned in MAFFT 7 (Katoh & Standley 2013; http://mafft.cbrc.jp/alignment/server/) and manually adjusted in BioEdit (Hall 1999). The estimation of rates of evolutionary changes at nuclear acids is using ModelTest 3.7 with the GTR substitution model (Posada & Crandall 1998). A BEAST XML input file is generated with BEATUti v2. A log-normal distribution is employed for molecular clock analysis (Drummond & Rambaut 2007). The clock model was set to uncorrelated lognormal relaxed clock (Drummond et al. 2006, Lepage et al. 2007). A Yule speciation model is selected as prior assuming a constant speciation rate per lineage. Gamma priors distribution was used for fossil node calibrations, set shape = 1.0, scale = 50.0, offset = 90.0 for Agaricales clade and 113.0 for Hymenochaetales clade. All the ucld. mean parameters for different genes were set to gamma priors distribution, shape = 1.0, scale = 0.001 and offset = 0.0 (Sánchez-Ramírez et al. 2014). Four independent Markov chain Monte Carlo (MCMC) chains of 100 million generations were conducted and saving trees every 5000th generation. The log file is analyzed in Tracer v1.6 (http://tree.bio.ed.ac.uk/software/tracer/)

and a maximum clade credibility (MCC) tree is interpreted in TreeAnnotator by trees file, removing the first 10% of the sampled trees as burn-in and setting posterior probability limit 0.80, and viewed in FigTree v1.4.4.

Results

Global diversity

Through years of extensive field trip investigations, combined with relevant literature and authoritative databases of Index Fungorum (http://www.indexfungorum.org/) and MycoBank (https://www.mycobank.org/), this study concluded that there are a grand total of 383 brown-rot fungi species within the Polyporales worldwide, belonging to 14 families and 69 genera, including two new genera, nine new species, and five new combinations. Species compositions, geographical distributions, host trees and the main morphological characteristics of brown-rot fungi within the Polyporales were summarized in Table 2.

Phylogeny

In this study, 3083 sequences derived from seven gene loci (ITS, nLSU, mtSSU, nuSSU, RPB1, RPB2 and TEF1) were used to reconstruct phylogenetic tree of the brown-rot fungi within the Polyporales, including 625 sequences of ITS, 574 sequences of nLSU, 369 sequences of mtSSU, 406 sequences of nuSSU, 273 sequences of RPB1, 398 sequences of RPB2 and 438 sequences of TEF1; 237 of them were newly generated, including 35 sequences of ITS, 35 of nLSU, 34 of mtSSU, 41 of nuSSU, 29 of RPB1, 29 of RPB2 and 34 of TEF1. The combined 7-gene (ITS+nLSU+mtSSU+nuSSU+RPB1+RPB2+TEF1) sequences dataset had an aligned length of 6177 characters, including gaps (762 characters for ITS, 1352 characters for nLSU, 533 characters for mtSSU, 1009 characters for nuSSU, 1276 characters for RPB1, 651 characters for RPB2, 594 characters for TEF1), of which 2485 characters were constant, 343 were variable and parsimony-uninformative, and 3349 were parsimony-informative. MP analysis yielded 189 equally parsimonious trees (TL = 13192, CI = 0.236, RI = 0.764, RC = 0.180, HI = 0.764). The best model for the concatenate sequence dataset estimated and applied in the Bayesian inference was GTR+I+G with equal frequency of nucleotides. ML analysis resulted in a similar topology as MP and Bayesian analyses, and only the ML topology is shown in Fig. 1.

The phylogenetic tree inferred from ITS+nLSU+mtSSU+nuSSU+RPB1+RPB2+TEF1 gene sequences were obtained from 553 fungal samples representing 293 taxa of Polyporales and two taxa of Russulales Kreisel ex P.M. Kirk, P.F. Cannon & J.C. David. Among them, 478 fungal samples representing 241 taxa of the brown-rot fungi within the antrodia clade, which gathered together and formed 14 highly supported family-level lineages (Fig. 1).

Divergence time estimation

The combined dataset (ITS, nLSU, mtSSU, nuSSU, RPB1, RPB2 and TEF1) for the molecular clock analysis includes 421 fungal samples representing 384 taxa, of which 341 fungal samples representing 315 taxa of the brown-rot fungi within the antrodia clade. The MCMC tree (Fig. 2) shows that the ancestor of Polyporales evolved during the early Cretaceous, approximately 144.94 Mya with a 95% highest posterior density (HPD) of 135.5–154.34 Mya. Most of the brown-rot fungi within the Polyporales are clustered in the antrodia clade, the ancestor of this clade evolved during the early Cretaceous, approximately 119.25 Mya with a 95% highest posterior density (HPD) of 109.63–144.6 Mya. The brown-rot families of Polyporales were centralized differentiation in the middle Cretaceous (about 81.48–99.54 Mya), among them, Sparassidaceae (about 99.54 Mya) was the first to appear and the latest were Adustoporiaceae and Fibroporiaceae (about 81.48 Mya). The estimated divergence times of estimated taxa of brown-rot fungi within the Polyporales are summarized in Table 3.

Table 2 An annotated checklist of the species composition, geographical distribution, host trees and some morphological characteristics of brown-rot fungi within the Polyporales.

Family	Species	Distribution	Host	Pores (per mm)	Hyphal system (µm)	Generative hyphae (µm)	Basidiospores(µm)	References
Adustoporiaceae	*Adustoporia sinuosa*	Belarus, China (widespread), Estonia, France, Finland, Italy, Russia, Spain, Sweden, USA, Vietnam	Angiosperm (*Cryptomeria*, *Fagus*, *Populus*, *Quercus*) and Gymnosperm (*Larix*, *Picea*, *Pinus*)	1–4	Dimitic	Clamped	4–6 × 1–2	Rajchenberg et al. (2011)
Adustoporiaceae	*Amyloporia alpina*	Austria, Italy, Switzerland, Germany, USA, France	Gymnosperm (*Larix*, *Picea*, *Pinus*)	2–5	Dimitic	Clamped	4–5 × 2–2.5	Domanski (1974)
Adustoporiaceae	*Amyloporia nivea*	Vietnam	Gymnosperm (*Pinus*)	6–9	Dimitic	Clamped	4–4.4 × 1.5–1.8	Liu et al. (2023a)
Adustoporiaceae	*Amyloporia nothofaginea*	Argentina	Angiosperm (*Nothofagus*)	1.5–2	Dimitic	Clamped	4.5–6 × 2–2.5	Rajchenberg et al. (2011)
Adustoporiaceae	*Amyloporia subxantha*	China (Sichuan, Yunnan)	Gymnosperm (*Cupressus*, *Sabina*, *Thuja*)	5–8	Dimitic	Clamped	3–4 × 1.6–2.2	Cui & Dai (2013)
Adustoporiaceae	*Amyloporia turkestanica*	Russia	Gymnosperm (*Picea*)	4–6	Dimitic	Clamped	4.2–5.8 × 2–2.5	Bondartsev (1953)
Adustoporiaceae	*Amyloporia xantha*	Argentina, Australia, China (widespread), Finland, India, Japan, New Zealand, Portugal, Yugoslavia	Angiosperm (*Acer*, *Betula*, *Fagus*, *Populus*, *Quercus*, *Salix*, *Tilia*) and Gymnosperm (*Abies*, *Cryptomeria*, *Cunninghamia*, *Juniperus*, *Larix*, *Picea*, *Pinus*)	5–7	Dimitic	Clamped	4–5 × 1–1.6	Bondartsev (1953)
Adustoporiaceae	*Austroporia stratosa*	Argentina, Australia	Angiosperm (*Eucalyptus*)	4.5–6	Dimitic	Clamped	4–5 × 2–2.5	Rajchenberg et al. (2011)
Adustoporiaceae	*Lentoporia carbonica*	Canada, Guatemala, Japan, USA	Gymnosperm (*Picea*, *Pinus*)	3–5	Dimitic	Clamped	5–6.5 × 2–3	Ryvarden & Gilbertson (1984)
Adustoporiaceae	*Lentoporia subcarbonica*	China (Jilin, Sichuan, Xizang)	Gymnosperm (*Abies*, *Larix*, *Picea*, *Pinus*)	2–3	Dimitic	Clamped	4–5.6 × 2.2–3	Liu et al. (2023a)
Adustoporiaceae	*Resinoporia cincta*	USA	Gymnosperm (*Tsuga*)	6–7	Dimitic	Clamped	3.7–7.2 × 2.5–3.4	Spirin et al. (2015a)
Adustoporiaceae	*Resinoporia crassa*	China (Heilongjiang, Jilin, Inner Mongolia, Yunnan), Finland, Russia, Sweden	Gymnosperm (*Larix*, *Picea*, *Pinus*)	6–7	Dimitic	Clamped	4.9–8.2 × 3–3.7	Spirin et al. (2015a)
Adustoporiaceae	*Resinoporia cretacea*	Croatia, Czech Republic, Estonia, Finland, Poland, Russia, Sweden, USA	Gymnosperm (*Picea*, *Pinus*)	4–6	Dimitic	Clamped	4.6–7.9 × 2.7–4	Spirin et al. (2015a)
Adustoporiaceae	*Resinoporia ferox*	Türkiye, USA	Gymnosperm (*Juniperus*)	4–6	Dimitic	Clamped	7–10 × 3–4	Spirin et al. (2015a)
Adustoporiaceae	*Resinoporia ignobilis*	USA	Gymnosperm (*Pinus*)	6–8	Dimitic	Clamped	3.7–5.3 × 2–2.4	Spirin et al. (2015a)

Table 2 Continued.

Family	Species	Distribution	Host	Pores (per mm)	Hyphal system (µm)	Generative hyphae (µm)	Basidiospores(µm)	References
Adustoporiaceae	*Resinoporia ladiana*	USA	Gymnosperm (*Pinus*)	4–6	Dimitic	Clamped	4.5–6.1 × 1.6–2.1	Spirin et al. (2015a)
Adustoporiaceae	*Resinoporia luteola*	Vietnam	Gymnosperm (*Pinus*)	7–9	Dimitic	Clamped	4.6–5.3 × 1.9–2.3	Liu et al. (2023a)
Adustoporiaceae	*Resinoporia piceata*	Croatia, Czech Republic, Finland, France, Japan, Poland, Russia, Slovakia	Gymnosperm (*Picea*)	5–7	Dimitic	Clamped	3.9–6.8 × 1.7–2.8	Spirin et al. (2015a)
Adustoporiaceae	*Resinoporia pinea*	China (Guangdong, Hainan, Taiwan), Russia	Gymnosperm (*Pinus*)	5–7	Dimitic	Clamped	5–6 × 1.8–2	Spirin et al. (2015a)
Adustoporiaceae	*Resinoporia pini-cubensis*	Cuba, USA	Gymnosperm (*Pinus*)	6–7	Dimitic	Clamped	5.2–6.2 × 2–2.2	Spirin et al. (2015a)
Adustoporiaceae	*Resinoporia sitchensis*	Canada, USA	Gymnosperm (*Cunninghamia*, *Larix*, *Picea*, *Pinus*, *Tsuga*)	4–6	Dimitic	Clamped	4.1–6.8 × 1.9–2.9	Spirin et al. (2015a)
Adustoporiaceae	*Resinoporia sordida*	USA	Gymnosperm (*Picea*)	6–8	Dimitic	Clamped	3.7–6 × 1.7–2.2	Spirin et al. (2015a)
Adustoporiaceae	*Rhodonia obliqua*	China (Sichuan, Xizang, Yunnan)	Gymnosperm (*Larix*, *Picea*, *Pinus*)	2–3	Monomitic	Clamped	4.8–6.2 × 2–2.5	Wei & Qin (2010)
Adustoporiaceae	*Rhodonia placenta*	Belarus, China (Sichuan, Xinjiang), Finland	Gymnosperm (*Larix*, *Picea*, *Pinus*)	3–4	Monomitic	Clamped	5–7 × 2.5–3	Ryvarden & Melo (2014)
Adustoporiaceae	*Rhodonia rancida*	Austria, China (Beijing, Hebei, Xizang), Italy, Norway	Angiosperm (*Prunus*)	2–4	Monomitic	Clamped	5–6.2 × 2–2.3	Ryvarden & Melo (2014)
Adustoporiaceae	*Rhodonia subplacenta*	China (Heilongjiang, Jilin, Xizang)	Gymnosperm (*Castanopsis*, *Pinus*)	3–5	Monomitic	Clamped	4.2–6.2 × 2–2.3	Cui & Li (2012)
Adustoporiaceae	*Rhodonia subrancida*	Vietnam	Gymnosperm (*Pinus*)	3–4	Monomitic	Clamped	5.2–6.2 × 2.2–3	Liu et al. (2023a)
Adustoporiaceae	*Rhodonia tianshanensis*	China (Xinjiang)	Gymnosperm (*Picea*)	3–4	Monomitic	Clamped	5.2–5.5 × 2.5–2.8	Yuan & Shen (2017)
Auriporiaceae	*Auriporia aurea*	China (Beijing, Hunan, Liaoning, Sichuan), Japan, South Korea, USA	Angiosperm (undetermined) and Gymnosperm (*Abies*, *Pinus*)	2–4	Dimitic	Clamped	5–10 × 3–4.5	Ryvarden (1973)
Auriporiaceae	*Auriporia aurulenta*	Austria, China (Anhui, Guangxi, Guizhou, Heilongjiang, Jiangxi, Zhejiang), Czechoslovakia, France, Yugoslavia, Switzerland, Italy	Angiosperm (undetermined) and Gymnosperm (*Pinus*)	2–3	Monomitic	Clamped	4–8 × 2–4	Coelho (2005)
Auriporiaceae	*Auriporia brasilica*	Brazil	Angiosperm (*Luehea*)	0.5–1	Dimitic	Clamped	3.2–4 × 1.6–1.8	Coelho (2005)
Auriporiaceae	*Auriporia pileata*	Japan, Russia	Angiosperm (undetermined)	3.5–4	Monomitic	Clamped	4.5–5.2 × 0.8–1.2	Parmasto (1980)
Dacryobolaceae	*Dacryobolus*	China (Anhui, Beijing,	Angiosperm (undetermined)	–	Dimitic	Clamped	5–6 × 1.2–1.8	Xu et al. (2018)

Table 2 Continued.

Family	Species	Distribution	Host	Pores (per mm)	Hyphal system (µm)	Generative hyphae (µm)	Basidiospores(µm)	References
	angiospermarum	Fujian, Hunan, Jiangxi, Zhejiang, Taiwan)						
Dacryobolaceae	*Dacryobolus costratus*	India	Gymnosperm (*Picea*)	–	Monomitic	Clamped	5.25–7 × 1.75–2.62	Rattan (1977)
Dacryobolaceae	*Dacryobolus gracilis*	China (Chongqing, Hubei, Hainan), Thailand	Gymnosperm (undetermined)	–	Monomitic	Clamped	4.8–5.2 × 1–1.2	Yuan et al. (2016)
Dacryobolaceae	*Dacryobolus incarnatus*	France	Gymnosperm (undetermined)	–	Dimitic	Clamped	4.5–6 × 1.2–1.5	Quélet (1885)
Dacryobolaceae	*Dacryobolus karstenii*	China (Anhui, Guizhou, Hainan, Jiangxi, Yunnan), Hungary, Sweden	Angiosperm (undetermined) and Gymnosperm (*Abies*, *Pinus*)	–	Dimitic	Clamped	4.5–6 × 1.2–1.5	Parmasto (1968)
Dacryobolaceae	*Dacryobolus montanus*	China (Guangxi, Hubei, Yunnan, Hainan)	Angiosperm (undetermined)	–	Monomitic	Clamped	5–5.6 × 1–1.3	Yuan et al. (2016)
Dacryobolaceae	*Dacryobolus phalloides*	Spain	Gymnosperm (*Pinus*)	–	Monomitic	Clamped	7–8 × 1.5–2	Manjón et al. (1984)
Dacryobolaceae	*Dacryobolus sudans*	China (Guizhou, Hainan, Hebei, Jiangxi), widely distributed in the Northern Hemisphere	Angiosperm (*Cerasus*) and Gymnosperm (*Pinus*)	–	Monomitic	Clamped	5.5–7 × 1.4–1.9	Fries (1849)
Fibroporiaceae	*Fibroporia albicans*	China (Hubei, Jiangxi, Xizang, Yunnan), Vietnam	Gymnosperm (*Pinus*)	6–8	Dimitic	Clamped	4–5.3 × 3–3.7	Chen et al. (2015b)
Fibroporiaceae	*Fibroporia bambusae*	China (Hainan)	Angiosperm (*Bamboo*)	3–4	Dimitic	Clamped	3.8–5 × 2.5–3	Chen et al. (2017)
Fibroporiaceae	*Fibroporia bohemica*	Czech Republic, Italy	Gymnosperm (*Picea*)	2–4	Dimitic	Clamped	5–5.5 × 2.8–3	Bernicchia et al. (2012)
Fibroporiaceae	*Fibroporia ceracea*	China (Sichuan, Yunnan)	Angiosperm (*Quercus*) and Gymnosperm (*Pinus*)	2–4	Monomitic	Clamped	4.2–5 × 2.5–3	Chen et al. (2017)
Fibroporiaceae	*Fibroporia citrina*	China (Heilongjiang, Sichuan, Xizang, Yunnan), France, Luxembourg, Italy	Gymnosperm (*Abies*, *Picea*, *Pinus*)	4–5	Dimitic	Clamped	4–5 × 3–3.6	Bernicchia et al. (2012)
Fibroporiaceae	*Fibroporia gossypium*	Argentina, China (Sichuan, Xizang, Yunnan), France, Thailand	Gymnosperm (*Abies*, *Cupressus*, *Larix*, *Picea*, *Pinus*)	3–6	Dimitic	Clamped	4.5–6 × 2.2–2.6	Chen et al. (2017)
Fibroporiaceae	*Fibroporia norrlandica*	Finland, France, Sweden	Gymnosperm (*Picea*, *Pinus*)	3–6	Monomitic	Clamped	4.9–6.2 × 2.7–3.5	Niemelä et al. (2001)
Fibroporiaceae	*Fibroporia pseudorennyi*	France, Russia	Gymnosperm (*Picea*)	1–2	Monomitic	Clamped	4.3–5.6 × 2.4–3.2	Spirin (2007)

Table 2 Continued.

Family	Species	Distribution	Host	Pores (per mm)	Hyphal system (µm)	Generative hyphae (µm)	Basidiospores(µm)	References
Fibroporiaceae	*Fibroporia radiculosa*	China (Fujian, Guangdong, Hunan, Jilin, Sichuan, Yunnan, Zhejiang), USA, Vietnam	Angiosperm (*Bamboo*) and Gymnosperm (*Pinus*)	1–2	Monomitic to dimitic	Clamped	6–7 × 3–3.6	Parmasto (1968)
Fibroporiaceae	*Fibroporia vaillantii*	USA, Canada, China (Jilin, Sichuan, Xizang, Yunnan), Mexico, France	Angiosperm (*Quercus*) and Gymnosperm (*Cupressus*, *Picea*, *Pinus*)	2–4	dimitic	Clamped	5–7 × 3–4	Parmasto (1968)
Fibroporiaceae	*Pseudofibroporia citrinella*	China (Guangxi)	Angiosperm (undetermined)	3–4	Monomitic to dimitic	Clamped	4–4.4 × 2.2–2.7	Chen et al. (2017)
Fomitopsidaceae	*Anthoporia albobrunnea*	Alaska, Canada, China (Jilin, Heilongjiang, Xizang), France, Norway, Poland, Sweden, USA	Gymnosperm (*Pinus*, *Picea*, *Larix*)	3–5	Dimitic	Clamped	5.4–6.8 × 1.6–1.8	Karasiński & Niemelä (2016)
Fomitopsidaceae	*Antrodia afrosinuosa*	Ethiopia	Gymnosperm (*Juniperus*)	0.5–1	Dimitic	Clamped	5–6 × 2.5–3	Ryvarden (2019)
Fomitopsidaceae	*Antrodia aridula*	China (Inner Mongolia)	Gymnosperm (*Picea*, *Pinus*)	2–3	Dimitic	Clamped	9–12 × 4.2–5.3	Zhou et al. (2023)
Fomitopsidaceae	*Antrodia bambusicola*	China (Anhui, Fujian, Xizang)	Angiosperm (*Bamboo*)	2–3	Dimitic	Clamped	5–6 × 3–3.4	Cui et al. (2011)
Fomitopsidaceae	*Antrodia favescens*	Costa Rica, Pennsylvania, USA	Angiosperm (*Acer*, *Betula*, *Quercus*, *Liriodendron*) and Gymnosperm (*Juniperus*, *Pinus*)	1.3–2	Dimitic	Clamped	6.3–10.3 × 2.7–4.3	Spirin et al. (2013b)
Fomitopsidaceae	*Antrodia griseoflavescens*	Macedonia, Norway, Russia, Sweden, Switzerland, Yugoslavia	Angiosperm (*Fagus*, *Populus*)	–	Monomitic	Clamped	6.5–9.5 × 3–4	Runnel et al. (2019)
Fomitopsidaceae	*Antrodia heteromorpha*	China (Anhui, Gansu, Heilongjiang, Jilin, Liaoning, Shandong, Shanxi, Sichuan, Xizang, Yunnan, Zhejiang), Finland, Sweden, USA	Angiosperm (*Alnus*, *Betula*, *Cryptomeria*, *Corylus*, *Quercus*, *Malus*, *Salix*) and Gymnosperm (*Abies*, *Cryptomeria*, *Larix*, *Picea*, *Pinus*, *Tsuga*)	0.7–1.7	Dimitic	Clamped	7.6–12.6 × 3.6–5.4	Spirin et al. (2013b)
Fomitopsidaceae	*Antrodia latebrosa*	Kenya, Tanzania	Angiosperm (undetermined)	1.5–2.5	Dimitic	Clamped	7.2–10.2 × 3.6–5.2	Runnel et al. (2019)
Fomitopsidaceae	*Antrodia macra*	China (Hebei), Costa Rica, Norway, Finland, Russia	Angiosperm (*Populus*, *Salix*)	2–3	Dimitic	Clamped	9–12 × 3.5–4.5	Spirin et al. (2013b)
Fomitopsidaceae	*Antrodia madronae*	USA	Angiosperm (*Arbutus*)	1–3	Dimitic	Clamped	10–12 × 2.8–3.8	Vlasák et al. (2012)
Fomitopsidaceae	*Antrodia mappa*	Canada, Finland, Italy, USA	Angiosperm (*Populus*) and Gymnosperm (*Juniperus*,	2–4	Monomitic	Clamped	7–10 × 2.5–3	Spirin et al. (2013b)

Table 2 Continued.

Family	Species	Distribution	Host	Pores (per mm)	Hyphal system (µm)	Generative hyphae (µm)	Basidiospores(µm)	References
			Picea)					
Fomitopsidaceae	*Antrodia multiformis*	USA	Gymnosperm (*Juniperus*, *Pinus*)	2–3	Dimitic	Clamped	8–12 × 4–5	Kout et al. (2017)
Fomitopsidaceae	*Antrodia neotropica*	Australia, Brazil, China (Yunnan)	Angiosperm (*Baccharis*, *Nothofagus*)	1–2	Dimitic	Clamped	8–14.2 × 4–5	Kaipperfigueiró et al. (2016)
Fomitopsidaceae	*Antrodia parvula*	Indonesia, Malawi, Florida	Angiosperm (undetermined)	3–4	Dimitic	Clamped	7–8 × 3.5–4	Runnel et al. (2019)
Fomitopsidaceae	*Antrodia peregrina*	China (Jilin), Russia	Angiosperm (*Quercus*)	1.5–3	Dimitic	Clamped	8.1–12.4 × 4.2–5.7	Runnel et al. (2019)
Fomitopsidaceae	*Antrodia serpens*	Austria, France, Georgia, Italy, Luxembourg, Poland, Romania, Slovakia, Slovenia, Sweden, UK, Ukraine	Angiosperm (*Carpinus*, *Cornus*, *Corylus*, *Crataegus*, *Ligustrum*, *Fagus*, *Fraxinus*, *Quercus*)	1.2–1.7	Dimitic	Clamped	7.3–13.4 × 3.1–5.4	Spirin et al. (2013b)
Fomitopsidaceae	*Antrodia subheteromorpha*	China (Xizang)	Gymnosperm (*Cupressus*, *Picea*)	1–2	Dimitic	Clamped	10.2–12.9 × 4–5.1	Liu et al. (2023a)
Fomitopsidaceae	*Antrodia subserpens*	China (Anhui, Yunnan, Zhejiang)	Angiosperm (*Nothofagus*, *Quercus*) and Gymnosperm (*Pinus*)	1–2.5	Dimitic	Clamped	6.6–9 × 3.6–4.9	Chen & Cui (2016)
Fomitopsidaceae	*Antrodia tanakae*	China (widespread), Japan, Finland, Norway, Russia	Angiosperm (*Bamboo*, *Cyclobalanopsis*, *Liquidambar*, *Populus*, *Quercus*, *Salix*) and Gymnosperm (*Abies*, *Picea*, *Pinus*)	0.6–1.8	Dimitic	Clamped	6.4–10.4 × 2.8–4.3	Spirin et al. (2013b)
Fomitopsidaceae	*Antrodia tenerifensis*	Spain	Angiosperm (*Cistus*, *Plocama*)	3–4	Dimitic	Clamped	9.5–11.6 × 6–7	Kout et al. (2017)
Fomitopsidaceae	*Antrodia variispora*	China (Qinghai)	Gymnosperm (*Picea*)	1–1.5	Dimitic	Clamped	11.5–16 × 4.5–5.5	Zhou et al. (2023)
Fomitopsidaceae	*Brunneoporus cyclopis*	Indonesia	Angiosperm (undetermined)	2–3	Dimitic	Clamped	8.9–10.9 × 4–4.9	Spirin et al. (2016)
Fomitopsidaceae	*Brunneoporus kuzyanus*	Australian, Croatian, Czech Republic, French, German, Moroccan, Polish, Russian, Slovak, South Moravia	Angiosperm (*Castanea*, *Carpinus*, *Celtis*, *Eucalyptus*, *Fagus*, *Fraxinus*, *Populus*, *Quercus*, *Salix*, *Tiliacordata*) and Gymnosperm (*Pinus*)	2–3	Dimitic	Clamped	6.3–10.2 × 2.6–3.8	Spirin et al. (2016)
Fomitopsidaceae	*Brunneoporus malicolus*	Canada, China (widespread), Dominican Republic,	Angiosperm (*Acer*, *Alnus*, *Betula*, *Fagus*, *Fraxinus*, *Populus*, *Prunus*, *Quercus*,	3–4	Dimitic	Clamped	6.2–10.2 × 2.7–4	Spirin et al. (2016)

Table 2 Continued.

Family	Species	Distribution	Host	Pores (per mm)	Hyphal system (µm)	Generative hyphae (µm)	Basidiospores(µm)	References
		Martinique, USA, Tanzania	*Salix*, *Ulmus*) and Gymnosperm (*Cupressus*, *Picea*, *Pinus*)					
Fomitopsidaceae	*Brunneoporus minutus*	Russia, Czech Republic, France	Angiosperm (*Populus*, *Quercus*, *Salix*)	3–5	Dimitic	Clamped	6.2–10.6 × 2.6–4.2	Spirin (2007)
Fomitopsidaceae	*Brunneoporus tuvensis*	Russia	Angiosperm (*Populus*)	3–5	Dimitic	Clamped	7.3–10.2 × 3.2–4	Spirin et al. (2016)
Fomitopsidaceae	*Buglossoporus americanus*	Costa Rica	Angiosperm (undetermined)	4–5	Monomitic to dimitic	Clamped	3.2–4 × 1.2–1.5	Reid (1976)
Fomitopsidaceae	*Buglossoporus brunneiflavus*	Malaysia	Angiosperm (undetermined)	0.5–2	Monomitic to dimitic	Clamped	4–5 × 2.5–3	Corner (1984)
Fomitopsidaceae	*Buglossoporus eucalypticola*	China (Hainan)	Angiosperm (*Eucalyptus*)	2–6	Monomitic to dimitic	Clamped	4.5–6.8 × 2–2.8	Han et al. (2016)
Fomitopsidaceae	*Buglossoporus flavus*	Singapore	Angiosperm (undetermined)	2–3	Monomitic to dimitic	Clamped	3.2–3.7 × 2.2–2.5	Corner (1984)
Fomitopsidaceae	*Buglossoporus heritierae*	Singapore	Angiosperm (*Heritiera*)	3–6	Monomitic to dimitic	Clamped	3.2–4.5 × 2.2–2.8	Corner (1984)
Fomitopsidaceae	*Buglossoporus magnus*	Singapore	Angiosperm (undetermined)	6–8	Monomitic to dimitic	Clamped	5.5–6.5 × 4–4.5	Corner (1984)
Fomitopsidaceae	*Buglossoporus malesianus*	Malaysia	Angiosperm (undetermined)	3–4	Monomitic to dimitic	Clamped	6.5–9 × 2.7–4	Corner (1984)
Fomitopsidaceae	*Buglossoporus marmoratus*	Singapore	Angiosperm (undetermined)	4–5	Monomitic to dimitic	Clamped	9–12 × 7–10	Corner (1984)
Fomitopsidaceae	*Buglossoporus persicinus*	Puerto Rico, USA	Angiosperm (*Quercus*) and Gymnosperm (*Pinus*)	3–4	Monomitic to dimitic	Clamped	6.5–8 × 4–5	Corner (1984)
Fomitopsidaceae	*Buglossoporus pulvinus*	Germany	Angiosperm (*Quercus*)	2–4	Monomitic to dimitic	Clamped	6–8 × 2.5–3.5	Teixeira (1992)
Fomitopsidaceae	*Buglossoporus quercinus*	Widely distributed in the Northern Hemisphere	Angiosperm (*Quercus*)	2–4	Monomitic to dimitic	Clamped	6–8 × 2.5–3.5	Han et al. (2016)
Fomitopsidaceae	*Cartilosoma ramentacea*	Brazil, China (Anhui, Fujian, Gansu, Jilin, Sichuan, Yunnan, Zhejiang), Finland, Russia, UK, Vietnam	Angiosperm (*Castanopsis*) and Gymnosperm (*Picea*, *Pinus*)	1–3	Dimitic	Clamped	5.1–6.6 × 1.7–2	Spirin (2007)
Fomitopsidaceae	*Cartilosoma rene-hentic*	Czech Republic, France	Angiosperm (*Corylus*, *Fagus*, *Syringa*, *Salix*)	2–3	Monomitic to dimitic	Clamped	6.5–9.1 × 2.4–3.4	Rivoire et al. (2015)

Table 2 Continued.

Family	Species	Distribution	Host	Pores (per mm)	Hyphal system (µm)	Generative hyphae (µm)	Basidiospores(µm)	References
Fomitopsidaceae	*Daedalea aethalodes*	Argentina, Brazil, Paraguay	Angiosperm (undetermined)	1–3	Trimitic	Clamped	6–8 × 2.5–3	Rajchenberg (1986)
Fomitopsidaceae	*Daedalea africana*	Kenya	Angiosperm (undetermined)	1–1.3	Trimitic	Clamped	4.5–6 × 2.5–5	Ryvarden & Johansen (1980)
Fomitopsidaceae	*Daedalea allantoidea*	Australia, China (Yunnan)	Angiosperm (undetermined)	1–3	Dimitic	Clamped	4.6–6 × 2–2.8	Han et al. (2016)
Fomitopsidaceae	*Daedalea americana*	Costa Rica, USA	Angiosperm (undetermined)	4–5	Trimitic	Clamped	4–5.1 × 2.1–3	Han et al. (2015)
Fomitopsidaceae	*Daedalea circularis*	China (Fujian, Guangdong, Guangxi, Hainan, Yunnan)	Angiosperm (*Castanea*)	4–6	Dimitic	Clamped	4.1–6 × 2.1–2.7	Li & Cui (2013)
Fomitopsidaceae	*Daedalea dickinsii*	China (Hebei, Henan, Heilongjiang, Jilin, Jiangsu, Jiangxi, Liaoning, Shaanxi, Shanxi, Sichuan, Zhejiang), India, Japan	Angiosperm (*Castanopsis*, *Quercus*)	1–2	Dimitic	Clamped	4.8–6 × 2–3	Han et al. (2016)
Fomitopsidaceae	*Daedalea dochmia*	Australia, Belize, Latin, Malaysia, Pakistan, Panama, Philippines, Sri Lanka	Angiosperm (undetermined)	5–8	Trimitic	Clamped	4–6 × 2–2.5	Hattori (2005)
Fomitopsidaceae	*Daedalea fulvirubida*	Malaysia	Angiosperm (undetermined)	1–3	Trimitic	Clamped	4.5–6.5 × 2–2.8	Hattori (2005)
Fomitopsidaceae	*Daedalea hydnoides*	Costa Rica	Angiosperm (undetermined)	1–2	Trimitic	Clamped	6–7 × 2–2.5	Han et al. (2016)
Fomitopsidaceae	*Daedalea modesta*	Australia, Burundi, China (Fujian, Guangdong, Guangxi, Hainan, Hunan, Yunnan, Taiwan), Kenya, Malaysia, Suriname, Thailand, USA, Vietnam	Angiosperm (*Cyclobalanopsis*)	5–7	Trimitic	Clamped	3–3.2 × 2–2.1	Han et al. (2016)
Fomitopsidaceae	*Daedalea neotropica*	Belize, Costa Rica	Angiosperm (*Quercus*)	3–5	Trimitic	Clamped	5–5.5 × 2–3	Lindner et al. (2011)
Fomitopsidaceae	*Daedalea pseudodochmia*	India, Japan, Malaysia, Nepal, Philippines, Sri Lanka	Angiosperm (undetermined)	1–2	Trimitic	Clamped	5.5–6 × 3–3.5	Lindner et al. (2011)
Fomitopsidaceae	*Daedalea quercina*	Czech Republic, Finland, Sweden	Angiosperm (*Quercus*, *Prunus*)	1–2	Trimitic	Clamped	6–8 × 2.5–3	Han et al. (2016)
Fomitopsidaceae	*Daedalea radiata*	China (Yunnan), Malaysia, Vietnam	Angiosperm (undetermined)	2–4	Trimitic	Clamped	4.5–5 × 2.4–2.9	Han et al. (2016)
Fomitopsidaceae	*Daedalea rajchenbergiana*	Brazil	Angiosperm (undetermined)	5–8	Dimitic	Clamped	3.3–4.3 × 1.7–2.2	Cristaldo et al. (2022)
Fomitopsidaceae	*Daedalea ryvardeniana*	Brazil	Angiosperm (undetermined)	1–3	Dimitic	Clamped	7.5–11 × 2.5–3.5	Drechsler-Santos et al. (2012)

Table 2 Continued.

Family	Species	Distribution	Host	Pores (per mm)	Hyphal system (µm)	Generative hyphae (µm)	Basidiospores(µm)	References
Fomitopsidaceae	*Daedalea sprucei*	Brazil	Angiosperm (*Guazuma*)	5–7	Trimitic	Clamped	4.5–5.6 × 2.5–3	Berkeley (1856)
Fomitopsidaceae	*Daedalea stereoides*	Costa Rica	Angiosperm (undetermined)	1–3	Trimitic	Clamped	4.5–5.5 × 2–2.5	Han et al. (2016)
Fomitopsidaceae	*Daedalea stevensonii*	Malaysia	Angiosperm (undetermined)	1–1.5	Trimitic	Clamped	4–5 × 2–3.5	Petrak (1959)
Fomitopsidaceae	*Daedalea submodesta*	Australia	Angiosperm (undetermined)	6–8	Dimitic	Clamped	3.9–5.3 × 2.6–3	**Present study**
Fomitopsidaceae	*Daedalea vinacea*	Malaysia, Singapore	Angiosperm (undetermined)	7–10	Dimitic	Clamped	3.4–4.2 × 2–2.3	**Present study**
Fomitopsidaceae	*Daedalella micropora*	Malaysia	Angiosperm (undetermined)	8–11	Dimitic	Clamped	2.9–3.2 × 2–2.2	Liu et al. (2023a)
Fomitopsidaceae	*Dentiporus albidoides*	France, Norway, Greece, Italy, Portugal	Angiosperm (*Fraxinus*, *Phillyrea*, *Quercus*, *Rhamnus*)	0.7–1.4	Dimitic	Clamped	9.1–17.3 × 3.1–5.4	Spirin et al. (2013b)
Fomitopsidaceae	*Eucalyptoporia tasmanica*	Australia	Angiosperm (*Eucalyptus*)	4–6	Dimitic	Clamped	4–5 × 2–2.8	**Present study**
Fomitopsidaceae	*Flavidoporia mellita*	Finland, Poland, Norway	Angiosperm (*Fagus*, *Populus*, *Salix*)	1–1.5	Dimitic	Clamped	5–9 × 3–4.5	Niemelä & Pentillä (1992)
Fomitopsidaceae	*Flavidoporia pulverulenta*	China (Xinjiang), France	Angiosperm (*Sorbus*) and Gymnosperm (*Picea*)	2–3	Dimitic	Clamped	5.4–8.3 × 3–4	Rivoire (2010)
Fomitopsidaceae	*Flavidoporia pulvinascens*	Austria, China (Xizang, Yunnan), Czechoslovakia, Finland, Germany, Poland, Russia, Spain, Switzerland, Yugoslavia	Angiosperm (*Populus*, *Salix*) and Gymnosperm (*Pinus*)	4–5	Dimitic	Clamped	6–7.5 × 2.4–3.2	Pilát (1953)
Fomitopsidaceae	*Fomitopsis abieticola*	China (Yunnan)	Gymnosperm (*Abies*)	2–4	Dimitic	Clamped	7–9 × 4–5	Liu et al. (2021a)
Fomitopsidaceae	*Fomitopsis bambusae*	China (Hainan)	Angiosperm (*Bamboo*)	6–9	Dimitic	Clamped	4.2–6.1 × 2–2.3	Zhou et al. (2021)
Fomitopsidaceae	*Fomitopsis betulina*	China (widespread), widely distributed in the Northern Hemisphere	Angiosperm (*Betula*)	5–7	Dimitic	Clamped	4.3–5 × 1.5–2	Han et al. (2016)
Fomitopsidaceae	*Fomitopsis bondartsevae*	China (Beijing), Russia	Angiosperm (*Prunus*)	4–5	Dimitic	Clamped	6.3–7.8 × 2.1–2.6	Soares et al. (2017)
Fomitopsidaceae	*Fomitopsis cana*	China (Hainan)	Angiosperm (*Delonix*)	5–8	Dimitic	Clamped	5–6.2 × 2.1–3	Han et al. (2016)
Fomitopsidaceae	*Fomitopsis caribensis*	Puerto Rico	Angiosperm (undetermined)	6–9	Dimitic	Clamped	6–7.5 × 2.3–3.1	Liu et al. (2019)
Fomitopsidaceae	*Fomitopsis durescens*	USA, Venezuela	Angiosperm (*Fagus*) and Gymnosperm (*Pinus*)	4–5	Dimitic	Clamped	6–8 × 1.5–2.5	Gilbertson & Ryvarden (1986)
Fomitopsidaceae	*Fomitopsis eucalypticola*	Australia	Angiosperm (*Eucalyptus*)	3–5	Trimitic	Clamped	5.8–9.1 × 2.7–5	Liu et al. (2019)
Fomitopsidaceae	*Fomitopsis ginkgonis*	China (Hubei)	Gymnosperm (*Ginkgo*)	3–6	Trimitic	Clamped	7.2–9 × 2.2–3	Liu et al. (2019)

Table 2 Continued.

Family	Species	Distribution	Host	Pores (per mm)	Hyphal system (µm)	Generative hyphae (µm)	Basidiospores(µm)	References
Fomitopsidaceae	*Fomitopsis hemitephra*	Australia, New Zealand, Samoa	Angiosperm (*Nothofagus*)	6–7	Trimitic	Clamped	4–6 × 2–2.5	Cunningham (1948)
Fomitopsidaceae	*Fomitopsis hengduanensis*	China (Yunnan)	Gymnosperm (*Picea*)	6–8	Dimitic	Clamped	5.2–6 × 3.2–3.6	Liu et al. (2021a)
Fomitopsidaceae	*Fomitopsis iberica*	China (Beijing), France, Italy, Portugal	Angiosperm (*Betula*, *Broussonetia*, *Prunus*) and Gymnosperm (*Pinus*)	3–4	Trimitic	Clamped	6–8 × 2.8–3.7	Melo & Ryvarden (1989)
Fomitopsidaceae	*Fomitopsis kesiyae*	Vietnam	Gymnosperm (*Pinus*)	6–8	Dimitic	Clamped	4.8–5.3 × 3–3.5	Liu et al. (2021a)
Fomitopsidaceae	*Fomitopsis massoniana*	China (Fujian, Guangdong)	Gymnosperm (*Pinus*)	5–7	Dimitic	Clamped	6.2–7.3 × 3.3–4	Liu et al. (2021a)
Fomitopsidaceae	*Fomitopsis meliae*	UK, USA	Angiosperm (undetermined)	5–7	Trimitic	Clamped	6–8 × 2.5–3	Gilbertson (1981)
Fomitopsidaceae	*Fomitopsis mounceae*	Canada	Angiosperm (*Betula Populus*) and Gymnosperm (*Abies*, *Larix*, *Picea*, *Pseudotsuga*)	3–5	Dimitic	Clamped	6–7 × 3.5–4	Haight et al. (2019)
Fomitopsidaceae	*Fomitopsis nivosa*	Brazil, China (Guangxi, Sichuan), USA, Japan, Guatemala	Angiosperm (*Cinnamomum*, *Plum*)	4–5	Dimitic	Clamped	6–7 × 2.5–2.9	Han et al. (2016)
Fomitopsidaceae	*Fomitopsis ochracea*	Canada, USA	Angiosperm (*Betula*, *Populus*) and Gymnosperm (*Abies*, *Picea*, *Tsuga*)	4–5	Trimitic	Clamped	4.5–6.5 × 3.5–4.5	Han et al. (2016)
Fomitopsidaceae	*Fomitopsis ostreiformis*	Indonesia, Malaysia, Thailand	Angiosperm (*Bamboo*)	3–4	Trimitic	Clamped	4.2–5.6 × 1.4–2.6	Han et al. (2016)
Fomitopsidaceae	*Fomitopsis palustris*	China (Guangdong, Guizhou, Hainan, Hubei, Sichuan), USA	Angiosperm (*Ligustrum*, *Mangifera*)	2–4	Dimitic	Clamped	5–6.2 × 2–2.5	Han et al. (2016)
Fomitopsidaceae	*Fomitopsis pinicola*	Estonia, Finland, Italy, Russia, Sweden	Gymnosperm (*Picea*)	4–6	Dimitic	Clamped	6–9 × 3–4.5	Han et al. (2016)
Fomitopsidaceae	*Fomitopsis resupinata*	China (Hainan)	Angiosperm (undetermined)	4–6	Dimitic	Clamped	7.2–9 × 2.7–3.3	Liu et al. (2022a)
Fomitopsidaceae	*Fomitopsis roseoalba*	Brazil	Angiosperm (undetermined)	4–6	Trimitic	Clamped	3–4 × 1.8–2	Han et al. (2016)
Fomitopsidaceae	*Fomitopsis schrenkii*	USA	Gymnosperm (*Abies*, *Picea*, *Pinus*, *Pseudotsuga*)	3–4	Dimitic	Clamped	5–7 × 3.5–4.5	Haight et al. (2019)
Fomitopsidaceae	*Fomitopsis srilankensis*	Sri Lanka	Angiosperm (undetermined)	5–8	Dimitic	Clamped	5.5–6.6 × 1.9–2.5	Liu et al. (2022a)
Fomitopsidaceae	*Fomitopsis submeliae*	China (Hainan), Malaysia, Vietnam	Angiosperm (undetermined)	4–7	Dimitic	Clamped	4–5 × 1.9–2.4	Liu et al. (2022a)

Table 2 Continued.

Family	Species	Distribution	Host	Pores (per mm)	Hyphal system (µm)	Generative hyphae (µm)	Basidiospores(µm)	References
Fomitopsidaceae	*Fomitopsis subpinicola*	China (Heilongjiang, Inner Mongolia, Jilin)	Angiosperm (*Betula*) and Gymnosperm (*Larix*, *Pinus*)	6–8	Dimitic	Clamped	4.3–5.5 × 2.7–3.3	Liu et al. (2021a)
Fomitopsidaceae	*Fomitopsis subtropica*	China (Guangdong, Guangxi, Yunnan, Zhejiang), Malaysia, Singapore	Angiosperm (*Castanopsis*)	6–9	Dimitic	Clamped	3.2–4 × 1.8–2.1	Han et al. (2016)
Fomitopsidaceae	*Fomitopsis tianshanensis*	China (Xinjiang)	Gymnosperm (*Picea*)	1–3	Dimitic	Clamped	6.3–7 × 3.2–3.8	Liu et al. (2021a)
Fomitopsidaceae	*Fomitopsis yimengensis*	China (Shandong)	Gymnosperm (*Pinus*)	4–6	Dimitic	Clamped	6–7.2 × 2–3	Liu et al. (2022a)
Fomitopsidaceae	*Fragifomes niveomarginatus*	China (Jilin)	Angiosperm (*Acer*, *Tilia*)	5–6	Dimitic	Clamped	3.2–4.7 × 1.7–2.1	Han et al. (2016)
Fomitopsidaceae	*Melanoporia castanea*	China (Jilin), Japan, Russia	Angiosperm (*Quercus*)	5–6	Dimitic	Clamped	4–5 × 1.8–2.5	Hattori & Ryvarden (1994)
Fomitopsidaceae	*Melanoporia condensa*	Costa Rica	Angiosperm (*Oaks*)	6–7	Dimitic	Clamped	3–4 × 2–2.5	Vlasák et al. (2016)
Fomitopsidaceae	*Melanoporia nigra*	Germany, the United States, Russia	Angiosperm (*Chestnut*, *Oak*)	4–8	Dimitic	Clamped	3–4 × 2–3	Murrill (1907)
Fomitopsidaceae	*Melanoporia tropica*	Vietnam	Angiosperm (undetermined)	7–10	Dimitic	Clamped	3.5–4 × 2.3–2.9	Liu et al. (2023a)
Fomitopsidaceae	*Neoantrodia alaskana*	USA	Gymnosperm (*Picea*)	1–2	Dimitic	Clamped	5.2–7.3 × 2.2–3	Spirin et al. (2017)
Fomitopsidaceae	*Neoantrodia angusta*	China (Gansu, Yunnan, Sichuan), Russia	Gymnosperm (*Abies*, *Juniperus*, *Picea*)	4–5	Dimitic	Clamped	5.2–7.8 × 2.1–2.6	Spirin et al. (2017)
Fomitopsidaceae	*Neoantrodia calcitrosa*	Canada, USA	Gymnosperm (*Picea*)	4–5	Dimitic	Clamped	6.1–11.6 × 2.7–3.8	Spirin et al. (2017)
Fomitopsidaceae	*Neoantrodia flavimontis*	USA	Gymnosperm (*Pinus*)	4–6	Dimitic	Clamped	5.8–8.2 × 2.4–3.2	Spirin et al. (2017)
Fomitopsidaceae	*Neoantrodia infirma*	Finland, Russia, Sweden	Gymnosperm (*Pinus*)	3–4	Dimitic	Clamped	6.3–8.5 × 2.2–3	Spirin et al. (2017)
Fomitopsidaceae	*Neoantrodia kmetii*	France, Croatia, Slovakia, Spain	Gymnosperm (*Abies*)	0.8–1	Dimitic	Clamped	5–6 × 1.9–2.2	Spirin et al. (2017)
Fomitopsidaceae	*Neoantrodia leucaena*	China (Heilongjiang, Jilin), Estonia, Finland, Russia, Slovakia	Angiosperm (*Populus*)	3–5	Dimitic	Clamped	6.4–9 × 2.8–3.7	Spirin et al. (2017)
Fomitopsidaceae	*Neoantrodia morganii*	Canada	Angiosperm (*Populus*)	3–4	Dimitic	Clamped	5.1–8.5 × 2.6–3.2	Spirin et al. (2017)

Table 2 Continued.

Family	Species	Distribution	Host	Pores (per mm)	Hyphal system (μm)	Generative hyphae (μm)	Basidiospores(μm)	References
Fomitopsidaceae	*Neoantrodia primaeva*	China (Jilin, Inner Mongolia), Finland (Jilin, Inner Mongolia), Norway, Russia, Sweden	Gymnosperm (*Abies*, *Picea*, *Pinus*)	2–4	Dimitic	Clamped	6.2–9 × 2.5–3.3	Spirin et al. (2017)
Fomitopsidaceae	*Neoantrodia serialiformis*	USA	Angiosperm (*Oak*, *Quercus*)	3–4	Dimitic	Clamped	4.5–5.5 × 2–2.3	Spirin et al. (2017)
Fomitopsidaceae	*Neoantrodia serialis*	China (Heilongjiang, Jilin, Xizang, Yunnan), Czech Republic, Finland, Italy, Norway, USA	Gymnosperm (*Abies*, *Larix*, *Picea*, *Pinus*)	2–3	Dimitic	Clamped	5.9–8.2 × 2.4–3.2	Spirin et al. (2017)
Fomitopsidaceae	*Neoantrodia serrata*	China (Xinjiang), USA	Gymnosperm (*Picea*)	3–4	Dimitic	Clamped	5.1–7.2 × 2.1–2.7	Spirin et al. (2017)
Fomitopsidaceae	*Neoantrodia variiformis*	USA	Gymnosperm (*Picea*)	2–3	Dimitic	Clamped	6.8–12.2 × 2.7–4	Spirin et al. (2017)
Fomitopsidaceae	*Neolentiporus maculatissimus*	Argentina, Australia	Angiosperm (*Eucalyptus*, *Nothufugus*)	2–3	Dimitic	Clamped	12–16 × 3.5–4.5	Lloyd (1922)
Fomitopsidaceae	*Neolentiporus squamosellus*	Italy	Gymnosperm (*Juniperus*)	2–3	Dimitic	Clamped	10–12 × 4.5–5	Bernicchia & Ryvarden (1996)
Fomitopsidaceae	*Neolentiporus tropicus*	China (Hainan)	Angiosperm (undetermined)	2–4	Dimitic	Clamped	8–9.2 × 3–4	Liu et al. (2023a)
Fomitopsidaceae	*Niveoporofomes globosporus*	Belize, Mexico	Angiosperm (undetermined)	3–5	Trimitic	Clamped	4.5–6 × 4.5–6	Decock et al. (2022)
Fomitopsidaceae	*Niveoporofomes oboensis*	Sao Tomé and Príncipe	Angiosperm (*Olea*)	3.5–4	Trimitic	Clamped	4.7–5.5 × 4–4.5	Decock et al. (2022)
Fomitopsidaceae	*Niveoporofomes orientalis*	China (Fujian, Guangdong, Guangxi, Hainan, Jiangxi, Hubei, Hunan, Yunnan), Japan	Angiosperm (*Castanea*, *Castanopsis*, *Cyclobalanopsis*)	5–7	Dimitic	Clamped	4.8–5.8 × 4–4.6	Liu et al. (2023a)
Fomitopsidaceae	*Niveoporofomes spraguei*	France, USA, Yugoslavia, Japan, Spain, Italy	Angiosperm (*Quercus*)	3–6	Trimitic	Clamped	5.5–7 × 4–5	Berkeley (1872)
Fomitopsidaceae	*Niveoporofomes widdringtoniae*	Malawi	Gymnosperm (*Widdringtonia*)	5–6	Trimitic	Clamped	4.5–5 × 4.5–5	Decock et al. (2022)
Fomitopsidaceae	*Pseudoantrodia monomitica*	China (Anhui, Hainan, Fujian, Guangdong)	Angiosperm (undetermined) and Gymnosperm (*Pinus*)	3–5	Monomitic	Clamped	4–5 × 2–2.4	Liu et al. (2023a)
Fomitopsidaceae	*Pseudofomitopsis microcarpa*	Vietnam	Angiosperm (undetermined)	7–8	Dimitic	Clamped	4.2–4.8 × 2.3–3.2	Liu et al. (2023a)
Fomitopsidaceae	*Rhizoporia hyalina*	Czech Republic, Russia	Angiosperm (*Acer*, *Populus*)	3–5	Dimitic	Clamped	5.2–8.6 × 2–2.8	Spirin et al. (2013a)

Table 2 Continued.

Family	Species	Distribution	Host	Pores (per mm)	Hyphal system (µm)	Generative hyphae (µm)	Basidiospores(µm)	References
Fomitopsidaceae	*Rhodoantrodia subtropica*	China (Yunnan)	Angiosperm (undetermined)	3–4	Dimitic	Clamped	7–8.4 × 2.6–3.3	**Present study**
Fomitopsidaceae	*Rhodoantrodia tropica*	China (Guangdong, Hainan, Hubei, Jiangxi, Zhejiang)	Angiosperm (*Engelhardtia*)	3–4	Dimitic	Clamped	8.3–10 × 2.4–3	Cui (2013)
Fomitopsidaceae	*Rhodoantrodia yunnanensis*	China (Yunnan)	Angiosperm (undetermined)	2–3	Dimitic	Clamped	7–9.9 × 2.5–3.1	Han et al. (2020)
Fomitopsidaceae	*Rhodofomes cajanderi*	China (Heilongjiang, Jilin, Inner Mongolia, Sichuan, Yunnan), Finland, Japan, Inner Mongolia, Italy, Russia, USA, Vietnam	Gymnosperm (*Abies*, *Larix*, *Picea*, *Pinus*)	5–7	Dimitic	Clamped	4.9–5.8 × 1.8–2	Han et al. (2016)
Fomitopsidaceae	*Rhodofomes carneus*	Japan, Tanzania, Kenya, Malawi, Mexico	Angiosperm (*Prunus*)	5–6	Dimitic	Clamped	5–8 × 2–2.5	Han et al. (2016)
Fomitopsidaceae	*Rhodofomes incarnatus*	China (Henan, Hunan, Shaanxi, Xizang, Yunnan), Korea	Angiosperm (*Quercus*)	5–7	Dimitic	Clamped	4–4.8 × 2–2.1	Kim et al. (2007)
Fomitopsidaceae	*Rhodofomes roseus*	China (widespread), widely distributed in the Northern Hemisphere	Gymnosperm (*Abies*, *Cunninghamia*, *Larix*, *Picea*, *Pinus*, *Spruce*)	4–6	Dimitic	Clamped	4.8–6 × 2–2.4	Han et al. (2016)
Fomitopsidaceae	*Rhodofomes subfeei*	China (Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Henan, Hubei, Hunan, Jiangxi, Shaanxi, Sichuan, Zhejiang)	Gymnosperm (*Cunninghamia*, *Cryptomeria*, *Pinus*)	4–6	Dimitic	Clamped	4–5 × 1.9–2.4	Han et al. (2016)
Fomitopsidaceae	*Rhodofomitopsis africana*	Cameroon	Angiosperm (*Eucalyptus*)	3–4	Dimitic	Clamped	6–7 × 2–2.5	Mossebo & Ryvarden (1997)
Fomitopsidaceae	*Rhodofomitopsis cupreorosea*	Belize, Brazil	Angiosperm (undetermined)	1–3	Dimitic	Clamped	5–7 × 2.5–3.5	Berkeley (1856)
Fomitopsidaceae	*Rhodofomitopsis feei*	Australia, Brazil, Costa Rica, Japan, Latin, India, Indonesia, Malaysia, Mexico, Singapore, Sri Lanka, Thailand, UK, Venezuela	Angiosperm (undetermined)	4–7	Dimitic	Clamped	5–7 × 2–3.5	Fries (1830)
Fomitopsidaceae	*Rhodofomitopsis flabellata*	Brazil	Angiosperm (undetermined)	3–4	Dimitic	Clamped	4–5 × 2 –2.5	Soares et al. (2017)

Table 2 Continued.

Family	Species	Distribution	Host	Pores (per mm)	Hyphal system (µm)	Generative hyphae (µm)	Basidiospores(µm)	References
Fomitopsidaceae	*Rhodofomitopsis lilacinogilva*	Argentina, Australia	Angiosperm (undetermined)	3–5	Dimitic	Clamped	5–12 × 2.5–5	Berkeley (1839)
Fomitopsidaceae	*Rhodofomitopsis monomitica*	China (Heilongjiang, Jiangxi)	Angiosperm (*Morus*)	3–4	Monomitic	Clamped	6–7.5 × 2.3–3	Chen & Wu (2017)
Fomitopsidaceae	*Rhodofomitopsis oleracea*	Ethiopia, Norway, USA, Vietnam, Kenya, Tanzania, Zaire	Angiosperm (undetermined)	3–4	Dimitic	Clamped	5–7.5 × 2–3	Davidson et al. (1947)
Fomitopsidaceae	*Rhodofomitopsis pseudofeei*	Australia	Angiosperm (undetermined)	5–7	Dimitic	Clamped	5.9–7 × 2.5–3.2	Yuan et al. (2020)
Fomitopsidaceae	*Rhodofomitopsis roseomagna*	Brazil	Angiosperm (undetermined)	3–4	Dimitic	Clamped	4–5 × 2–2.5	Soares et al. (2017)
Fomitopsidaceae	*Rubellofomes cystidiatus*	China (Guangxi, Hainan)	Angiosperm (undetermined)	0.5–1	Dimitic	Clamped	5–6.2 × 2–2.8	Han et al. (2016)
Fomitopsidaceae	*Rubellofomes minutisporus*	Argentina	Angiosperm (*Nothofagus*)	6.5–7.5	Dimitic	Clamped	4–5 × 2–3	Rajchenberg (1995b)
Fomitopsidaceae	*Subantrodia juniperina*	Ethiopia, USA, Tanzania, Kenya	Gymnosperm (*Juniperus*)	0.5–1	Dimitic	Clamped	6.5–9 × 2.5–3.5	Niemelä & Ryvarden (1975)
Fomitopsidaceae	*Subantrodia uzbekistanica*	Uzbekistan	Gymnosperm (*Juniperus*)	1–2	Dimitic	Clamped	6.5–8 × 2.7–3	Yuan et al. (2017b)
Fomitopsidaceae	*Ungulidaedalea fragilis*	China (Hainan)	Angiosperm (undetermined)	1–2	Dimitic	Clamped	4–5.2 × 2.2–2.8	Han & Cui (2014)
Laetiporaceae	*Kusaghiporia usambarensis*	Tanzania	Angiosperm (*Ficus*, *Maesopsis*)	–	Dimitic	Simple-septate	2.7–8.1 × 2.7–7.2	Hussein et al. (2018)
Laetiporaceae	*Laetiporus ailaoshanensis*	China (Yunnan)	Angiosperm (*Castanopsis*) and Gymnosperm (*Pinus*)	3–5	Dimitic	Simple-septate	5–6.2 × 4–5	Song et al. (2014b)
Laetiporaceae	*Laetiporus caribensis*	Puerto Rico	Angiosperm (*Guarea*, *Parmentiera*)	4–5	Dimitic	Simple-septate	4–4.5 × 2.7–3.6	Banik et al. (2012)
Laetiporaceae	*Laetiporus cincinnatus*	USA, Canada	Angiosperm (*Oak*, *Quercus*)	2–4	Dimitic	Simple-septate	4.5–5.5 × 3.5–4	Banik et al. (1998)
Laetiporaceae	*Laetiporus conifericola*	USA, Canada	Gymnosperm (*Spruce*, *Tsuga*)	2–4	Dimitic	Simple-septate	6.5–8 × 4–5	Burdsall & Banik (2001)
Laetiporaceae	*Laetiporus cremeiporus*	China (widespread), Mongolia, Japan, Korea	Angiosperm (*Acer*, *Castanea*, *Lagerstroemia*, *Populus*, *Quercus*)	2–4	Dimitic	Simple-septate	5.6–7 × 3.9–4.7	Ota et al. (2009)
Laetiporaceae	*Laetiporus discolor*	Mauritius	Angiosperm (undetermined)	–	Dimitic	Simple-septate	–	Corner (1984)

Table 2 Continued.

Family	Species	Distribution	Host	Pores (per mm)	Hyphal system (µm)	Generative hyphae (µm)	Basidiospores(µm)	References
Laetiporaceae	*Laetiporus flos-musae*	Indonesia	Angiosperm (undetermined)	–	Dimitic	Simple-septate	–	Heyne (1927)
Laetiporaceae	*Laetiporus gilbertsonii*	Argentina, Belize, Brazil, Costa Rica, Mexico, Uruguay, USA	Angiosperm (*Eucalyptus*, *Oak*)	2–4	Dimitic	Simple-septate	5–7 × 3.5–5	Burdsall et al. (2001)
Laetiporaceae	*Laetiporus huroniensis*	Canada, USA	Gymnosperm (*Tsuga*)	2–4	Dimitic	Simple-septate	5–7 × 3.8–5	Burdsall et al. (2001)
Laetiporaceae	*Laetiporus lobatus*	Costa Rica, Czech Republic	Angiosperm (*Quercus*, *Robinia*)	6–8	Dimitic	Simple-septate	3.9–4.4 × 2.8–3.2	Kout et al. (2019)
Laetiporaceae	*Laetiporus medogensis*	China (Xizang)	Gymnosperm (*Abies*)	2–4	Dimitic	Simple-septate	5–6.2 × 4.2–5.2	Song et al. (2018)
Laetiporaceae	*Laetiporus miniatus*	Indonesia	Angiosperm (undetermined)	5–7	Dimitic	Simple-septate	4–5.5 × 3–3.7	Overeem (1925)
Laetiporaceae	*Laetiporus montanus*	China (Heilongjiang, Jilin, Liaoning, Gansu, Inner Mongolia, Xinjiang), Czech Republic, Europe, Japan, Korea, Mongolia	Gymnosperm (*Abies*, *Larix*, *Picea*)	2–4	Dimitic	Simple-septate	6–8 × 4–5.5	Tomsovský & Jankovský (2008)
Laetiporaceae	*Laetiporus persicinus*	Puerto Rico, United States	Angiosperm (*Quercus*) and Gymnosperm (*Pinus*)	2–4	Dimitic	Simple-septate	5.5–7 × 4.5–6	Gilbertson (1981)
Laetiporaceae	*Laetiporus portentosus*	New Zealand, Australia, New Guinea, New Caledonia	Angiosperm (*Nothofagus*)	1–3	Dimitic	Simple-septate	7–9 × 7–8	Rajchenberg (1995a)
Laetiporaceae	*Laetiporus squalidus*	Brazil, Argentina	Angiosperm (undetermined)	3–5	Dimitic	Simple-septate	6.5−7 × 4−5	Pires et al. (2016)
Laetiporaceae	*Laetiporus sulphureus*	Canada, China (Xinjiang), Czech Republic, Finland, Germany, USA	Angiosperm (*Acer*, *Oak*, *Quercus*, *Salix*, *Taxus*) and Gymnosperm (*Larix*)	2–4	Dimitic	Simple-septate	5.5–7.2 × 4–5	Murrill (1920)
Laetiporaceae	*Laetiporus versisporus*	China (Beijing, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangxi, Taiwan, Yunnan, Zhejiang), Korea, Japan	Angiosperm (*Alnus*, *Castanopsis*, *Eucalyptus*, *Quercus*)	3–6	Dimitic	Simple-septate	5.2–6.8 × 4–5.5	Imazeki (1943)
Laetiporaceae	*Laetiporus xinjiangensis*	China (Xinjiang)	Angiosperm (*Betula*, *Populus*, *Salix*)	2–3	Dimitic	Simple-septate	4.5–5 × 3–4.2	Song et al. (2018)

Table 2 Continued.

Family	Species	Distribution	Host	Pores (per mm)	Hyphal system (µm)	Generative hyphae (µm)	Basidiospores(µm)	References
Laetiporaceae	*Laetiporus zonatus*	China (Sichuan, Yunnan)	Angiosperm (*Castanopsis*, *Hippophae*, *Prunus*, *Quercus*) and Gymnosperm (*Abies*)	2–5	Dimitic	Simple-septate	5.8–7.2 × 4–5.5	Song et al. (2014b)
Laetiporaceae	*Macrohyporia dictyopora*	Australia, Malawi	Angiosperm (undetermined)	3–4	Dimitic	Simple-septate	4.5–6 × 4.5–6	Johansen & Ryvarden (1979)
Laetiporaceae	*Macrohyporia inflata*	Bolivia, USA	Angiosperm (*Oaks*)	3–5	Monomitic	Simple-septate	4–5 × 2.5–3.5	Johansen & Ryvarden (1979)
Laetiporaceae	*Macrohyporia pileata*	Panama	Angiosperm (undetermined)	1–3	Monomitic	Simple-septate	5–6 × 4–4.5	Núñez & Ryvarden (1999)
Laetiporaceae	*Wolfiporiella cartilaginea*	China (Jilin)	Angiosperm (*Ouerus*)	3–4	Dimitic	Simple-septate	4–5 × 2–2.5	Ryvarden et al. (1986)
Laetiporaceae	*Wolfiporiella curvispora*	China (Jilin)	Gymnosperm (*Pinus*)	6–8	Dimitic	Simple-septate	3.3–4.1 × 1.2–1.8	Dai (1998)
Laetiporaceae	*Wolfiporiella dilatohypha*	China (Hubei, Jilin), USA	Angiosperm (*Acer*)	4–5	Dimitic	Simple-septate	3.8–4.7 × 2.9–3.1	Ryvarden & Gilbertson (1984)
Laetiporaceae	*Wolfiporiopsis castanopsidis*	China (Yunnan)	Angiosperm (*Castanopsis*)	2–3	Dimitic	Simple-septate	7.6–10 × 5–7	Dai et al. (2011)
Laricifomitaceae	*Gilbertsonia angulopora*	USA, Canada	Gymnosperm (*Pseudotsuga*)	0.7–1.2	Dimitic	Clamped	5.2–6.5 × 3.5–4.5	Larsen et al. (1983)
Laricifomitaceae	*Laricifomes officinalis*	China (Heilongjiang, Jilin), USA, Slovakia, Russia, Japan, France, Italy	Gymnosperm (*Abies*, *Cedrus*, *Pinus*, *Picea*, *Pseudotsuga*, *Tsuga*)	4–5	Dimitic	Clamped	6–9 × 3–4	Kotlába & Pouzar (1957)
Laricifomitaceae	*Ryvardenia campyla*	Argentina, Australia, New Zealand	Angiosperm (*Eucalyptus*, *Nothqfagus*)	1–3	Dimitic	Clamped	5–6.5 × 3.5–4	Rajchenberg (1994)
Laricifomitaceae	*Ryvardenia cretacea*	Argentina, Australia	Angiosperm (*Eucalyptus*, *Nothqfagus*)	2–3	Dimitic	Clamped	5–6.5 × 4–4.5	Rajchenberg (1994)
Phaeolaceae	*Melanoporella carbonacea*	Cuba, Jamaica, Brazil, Sierra Leone, Costa Rica	Angiosperm (undetermined)	1–2	Dimitic	Simple-septate	6.5–7.5 × 2.5–4	Murrill (1907)
Phaeolaceae	*Phaeolus amazonicus*	Brazil	Angiosperm (undetermined)	2–4	Dimitic	Simple-septate	5–6 × 4–4.3	De et al. (2010)
Phaeolaceae	*Phaeolus asiae-orientalis*	China (Heilongjiang, Inner Mongolia, Jilin)	Gymnosperm (*Larix*, *Picea*, *Pinus*)	1–2	Monomitic	Simple-septate	6–7 × 3.5–4.2	Yuan et al. (2022)
Phaeolaceae	*Phaeolus fragilis*	Australia	Gymnosperm (*Picea*)	1–3	Dimitic	Simple-septate	7–11 × 3.8–5	Liu et al. (2023a)

Table 2 Continued.

Family	Species	Distribution	Host	Pores (per mm)	Hyphal system (µm)	Generative hyphae (µm)	Basidiospores(µm)	References
Phaeolaceae	*Phaeolus manihotis*	Madagascar	Angiosperm (*Manihot*, *Urena*, *Gossypium*)	2.5–3	Monomitic	Simple-septate	5.5–7 × 3.2–4.3	Heim (1931)
Phaeolaceae	*Phaeolus schweinitzii*	China (Fujian, Hainan, Heilongjiang, Jilin, Inner Mongolia, Xizang, Yunnan), Finland, Norway, Sweden	Gymnosperm (*Abies*, *Cedrus*, *Cryptomeria*, *Larix*, *Picea*, *Pinus*)	1–2	Dimitic	Simple-septate	6–9 × 4.5–5	Patouillard (1900)
Phaeolaceae	*Phaeolus sharmae*	India	Gymnosperm (*Abies*)	1–2	Monomitic	Simple-septate	6–11 × 6–7.8	Buyck et al. (2022)
Phaeolaceae	*Phaeolus tabulaeformis*	USA	–	2–3	Monomitic	Simple-septate	6–7 × 4–5	Patouillard (1900)
Phaeolaceae	*Phaeolus yunnanensis*	China (Yunnan)	Gymnosperm (*Pinus*)	0.5–1	Monomitic	Simple-septate	5.5–6.2 × 3.6–4	Yuan et al. (2022)
Phaeolaceae	*Wolfiporia cocos*	USA, Zambia	Angiosperm (*Populus*) and Gymnosperm (*Metasequoia*, *Pinus*)	1–3	Dimitic	Simple-septate	6–11 × 2.5–3.5	Ryvarden & Gilbertson (1984)
Phaeolaceae	*Wolfiporia hoelen*	China (Guangxi, Yunnan), Japan	Gymnosperm (*Pinus*)	1–2	Dimitic	Simple-septate	7–9.6 × 2.9–4	Wu et al. (2020)
Phaeolaceae	*Wolfiporia pseudococos*	China (Hainan)	Angiosperm (undetermined)	1.5–2.5	Dimitic	Simple-septate	7.9–9.5 × 3–3.8	Tibpromma et al. (2017)
Piptoporellaceae	*Piptoporellus baudonii*	Congo, Tanzania, Zimbabwe	Angiosperm (*Albizia*, *Anacardium*, *Annona*, *Cassia*, *Corymbia*, *Croton*, *Discores*, *Eucalyptus*, *Julbernadia*, *Manihot*, *Markhamia*, *Panicum*)	2–3	Dimitic	Clamped	6–7 × 3.5–4	Tibuhwa et al. (2020)
Piptoporellaceae	*Piptoporellus hainanensis*	China (Hainan)	Angiosperm (undetermined)	4–5	Dimitic	Clamped	4–5 × 2–2.8	Han et al. (2016)
Piptoporellaceae	*Piptoporellus soloniensis*	China (Anhui, Beijing, Fujian, Jiangxi, Sichuan, Zhejiang), France	Angiosperm (*Castanopsis*)	2–4	Dimitic	Clamped	4.5–5.5 × 2–2.9	Dubois (1803)
Piptoporellaceae	*Piptoporellus triqueter*	China (Yunnan)	Angiosperm (*Castanopsis*)	3–4	Dimitic	Clamped	4–6 × 2.8–3.1	Han et al. (2016)
Postiaceae	*Amaropostia hainanensis*	China (Hainan)	Angiosperm (undetermined)	7–9	Monomitic	Clamped	4.5–5.5 × 1.5–2	Shen et al. (2015)

Table 2 Continued.

Family	Species	Distribution	Host	Pores (per mm)	Hyphal system (µm)	Generative hyphae (µm)	Basidiospores(µm)	References
Postiaceae	*Amaropostia stiptica*	Belarus, Canada, China (Beijing, Heilongjiang, Jilin, Shandong, Sichuan, Xizang, Yunnan), Czech Republic, Finland, Norway, USA	Angiosperm (*Populus*) and Gymnosperm (*Abies*, *Cunninghamia*, *Larix*, *Picea*, *Pinus*, *Tsuga*)	5–6	Monomitic	Clamped	4–4.5 × 1.5–2	Shen et al. (2015)
Postiaceae	*Amylocystis lapponica*	Australia, China (Heilongjiang, Jilin), Czechoslovakia, Estonia, Finland, Italy, Norway, Poland, Russia, Sweden, Ukraine, USA, Yugoslavia	Angiosperm (*Nothofagus*)	3–4	Monomitic	Clamped	8–11 × 2.5–3.5	Singer (1944)
Postiaceae	*Aurantipostia macrospora*	Australia	Angiosperm (*Eucalyptus*)	3–4	Monomitic	Clamped	7–9.8 × 4–4.9	Liu et al. (2023a)
Postiaceae	*Austropostia brunnea*	Australia, New Zealand	Angiosperm (*Eucalyptus*, *Metrosideros*)	3.5–4.5	Monomitic	Clamped	4–5.5 × 2.5–3.5	Rajchenberg & Buchanan (1996)
Postiaceae	*Austropostia hirsuta*	Australia	Angiosperm (*Eucalyptus*, *Nothofagus*)	3–6	Monomitic	Clamped	5.5–6.1 × 2.9–3.7	Liu et al. (2023a)
Postiaceae	*Austropostia pelliculosa*	Argentina, Australia, New Zealand	Angiosperm (*Eucalyptus*, *Nothofagus*)	2–5	Monomitic	Clamped	5–7 × 3–4	Rajchenberg (1987)
Postiaceae	*Austropostia plumbeus*	Australia	Angiosperm (*Eucalyptus*)	3–5	Monomitic	Clamped	6.2–7 × 3–3.8	Liu et al. (2023a)
Postiaceae	*Austropostia punctata*	Argentina, Australia, Chile	Angiosperm (*Eucalyptus*, *Nothofagus*)	2–3	Monomitic	Clamped	5–6.5 × 3–3.5	Rajchenberg & Buchanan (1996)
Postiaceae	*Austropostia subpunctata*	Australia, China (Yunnan), Vietnam	Angiosperm (*Bamboo*, *Castanopsis*, *Eucalyptus*)	3–5	Monomitic	Clamped	5.2–6.2 × 3–3.4	Liu et al. (2023a)
Postiaceae	*Calcipostia guttulata*	China (Jilin, Heilongjiang, Liaoning, Xizang, Yunnan), Finland, Poland, USA	Gymnosperm (*Abies*, *Larix*, *Picea*, *Pinus*)	3–6	Monomitic	Clamped	3–4 × 1.8–2.3	Shen et al. (2019)
Postiaceae	*Cyanosporus alni*	China (Guizhou, Hebei), Czech Republic, Denmark, Finland, Germany, Norway, Poland, Russia, Slovakia	Angiosperm (*Alnus*, *Betula*, *Corylus*, *Fagus*, *Populus*, *Quercus*)	4–6	Monomitic	Clamped	4.3–6.1 × 1.1–1.3	Miettinen et al. (2018)
Postiaceae	*Cyanosporus arbuti*	USA	Angiosperm (*Arbutus*)	6–8	Monomitic	Clamped	4.1–5.1 × 1–1.2	Miettinen et al. (2018)

Table 2 Continued.

Family	Species	Distribution	Host	Pores (per mm)	Hyphal system (µm)	Generative hyphae (µm)	Basidiospores(µm)	References
Postiaceae	*Cyanosporus auricoma*	China (Inner Mongolia), Finland, Poland, Russia	Gymnosperm (*Picea*, *Pinus*)	4–6	Monomitic	Clamped	4.4–5.6 × 1.5–1.8	Miettinen et al. (2018)
Postiaceae	*Cyanosporus bifaria*	China (Sichuan, Yunnan), Russia, Japan	Gymnosperm (*Larix*, *Picea*, *Pinus*)	6–8	Monomitic	Clamped	3.7–4.4 × 1–1.2	Miettinen et al. (2018)
Postiaceae	*Cyanosporus bubalinus*	China (Yunnan)	Gymnosperm (*Pinus*)	5–8	Monomitic	Clamped	4.3–4.8 × 1.5–2	Liu et al. (2021b)
Postiaceae	*Cyanosporus caesiosimulans*	Finland, Russia, USA	Angiosperm (*Fagus*, *Populus*) and Gymnosperm (*Abies*, *Picea*)	5–7	Monomitic	Clamped	4.2–5.5 × 1.1–1.4	Miettinen et al. (2018)
Postiaceae	*Cyanosporus caesius*	Czech Republic, Denmark, Finland, France, Germany, Russia, Slovakia, Spain, UK	Angiosperm (*Betula*, *Fagus*, *Salix*) and Gymnosperm (*Abies*, *Picea*)	4–5	Monomitic	Clamped	4.1–5.3 × 1.3–1.7	Miettinen et al. (2018)
Postiaceae	*Cyanosporus coeruleivirens*	China (Hunan, Jilin, Zhejiang), Indonesia, Malaysia, Russia	Angiosperm (*Tilia Ulmus*)	6–8	Monomitic	Clamped	3.8–4.8 × 1–1.3	Miettinen et al. (2018)
Postiaceae	*Cyanosporus comata*	China (Sichuan, Xizang), USA	Angiosperm (*Acer*) and Gymnosperm (*Abies*, Picea, *Tsuga*)	4–6	Monomitic	Clamped	4.1–4.9 × 1.1–1.3	Miettinen et al. (2018)
Postiaceae	*Cyanosporus cyanescens*	Estonia, Finland, France, Poland, Russia, Spain, Sweden	Gymnosperm (*Abies*, *Picea*, *Pinus*)	5–6	Monomitic	Clamped	4.7–6.1 × 1.1–1.6	Miettinen et al. (2018)
Postiaceae	*Cyanosporus flavus*	China (Sichuan)	Gymnosperm (*Abies*, *Picea*)	5–7	Monomitic	Clamped	4.6–5.2 × 0.8–1.3	Liu et al. (2022b)
Postiaceae	*Cyanosporus fusiformis*	China (Guizhou, Sichuan)	Angiosperm (*Rhododendron*)	4–5	Monomitic	Clamped	4.5–5.2 × 0.8–1.1	Shen et al. (2019)
Postiaceae	*Cyanosporus glauca*	Russia	Gymnosperm (*Abies*, *Picea*)	5–8	Monomitic	Clamped	4.1–5.4 × 1.1–1.5	Miettinen et al. (2018)
Postiaceae	*Cyanosporus gossypina*	France	Gymnosperm (*Cedrus*)	4–6	Monomitic	Clamped	4.1–5.1 × 1.2–1.7	Miettinen et al. (2018)
Postiaceae	*Cyanosporus hirsutus*	China (Yunnan, Qinghai, Sichuan)	Gymnosperm (*Abies*, *Picea*)	5–7	Monomitic	Clamped	4–4.7 × 1.2–1.5	Liu et al. (2021b)
Postiaceae	*Cyanosporus livens*	Canada, USA	Angiosperm (*Acer*, *Betula*, *Fagus*) and Gymnosperm (*Abies*, *Larix*, *Picea*, *Tsuga*)	4–6	Monomitic	Clamped	4.1–5.7 × 1.1–1.5	Miettinen et al. (2018)
Postiaceae	*Cyanosporus luteocaesius*	France	Gymnosperm (*Pinus*)	3–5	Monomitic	Clamped	4.3–6.1 × 1.5–1.9	Shen et al. (2019)

Table 2 Continued.

Family	Species	Distribution	Host	Pores (per mm)	Hyphal system (µm)	Generative hyphae (µm)	Basidiospores(µm)	References
Postiaceae	*Cyanosporus magna*	China (Hainan, Jilin, Yunnan, Chongqing), Korea	Angiosperm (*Populus*) and Gymnosperm (*Cunninghamia*)	4–5	Monomitic	Clamped	3.6–4.4 × 1–1.2	Miettinen et al. (2018)
Postiaceae	*Cyanosporus mediterraneocaesius*	France, Spain	Angiosperm (*Buxus*, *Erica*, *Populus*, *Quercus*) and Gymnosperm (*Cedrus*, *Juniperus*, *Pinus*)	5–6	Monomitic	Clamped	4.2–5.8 × 1.3–1.7	Shen et al. (2019)
Postiaceae	*Cyanosporus microporus*	China (Yunnan)	Angiosperm (undetermined)	6–8	Monomitic	Clamped	4.5–4.9 × 1–1.2	Shen et al. (2019)
Postiaceae	*Cyanosporus nothofagicola*	Australia	Angiosperm (*Nothofagus*)	4–6	Monomitic	Clamped	3.8–5 × 1–1.7	Liu et al. (2021b)
Postiaceae	*Cyanosporus piceicola*	China (Sichuan, Xizang, Yunnan)	Gymnosperm (*Picea*)	3–5	Monomitic	Clamped	4–4.5 × 0.9–1.3	Shen et al. (2019)
Postiaceae	*Cyanosporus populi*	China (Jilin, Qinghai, Sichuan, Yunnan), Finland, Norway, Poland, Russia, USA	Angiosperm (*Acer*, *Alnus*, *Betula*, *Populus*, *Salix*) and Gymnosperm (*Picea Pinus*)	5–7	Monomitic	Clamped	4.2–5.6 × 1–1.3	Miettinen et al. (2018)
Postiaceae	*Cyanosporus rigidus*	China (Yunnan)	Gymnosperm (*Abies*)	5–8	Monomitic	Clamped	3.7–4.2 × 0.9–1.3	Liu et al. (2022b)
Postiaceae	*Cyanosporus simulans*	Estonia, Finland, France, Germany, Norway, Russia, Canada, USA	Angiosperm (*Corylus*, *Fagus*, *Populus*, *Sorbus*, *Ulmus*) and Gymnosperm (*Abies*, *Cedrus*, *Juniperus*, *Picea*, *Pinus*, *Thuja*, *Tsuga*)	5–7	Monomitic	Clamped	4.4–6.3 × 1.3–1.8	Miettinen et al. (2018)
Postiaceae	*Cyanosporus subcaesius*	Czech Republic, Finland, France, Russia, UK	Angiosperm (*Alnus*, *Carpinus*, *Crataegus*, Corylus, *Fagus*, *Fraxinus*, *Malus*, *Populus*, *Quercus*, *Salix*, *Ulmus*)	4–6	Monomitic	Clamped	4–5.3 × 1–1.4	Shen et al. (2019)
Postiaceae	*Cyanosporus subhirsutus*	China (Guizhou, Fujian, Yunnan)	Angiosperm (*Pterocarya*)	2–3	Monomitic	Clamped	4–4.5 × 0.9–1.3	Shen et al. (2019)
Postiaceae	*Cyanosporus submicroporus*	China (Yunnan, Sichuan, Zhejiang)	Angiosperm (*Cyclobalanopsis*)	6–9	Monomitic	Clamped	3.6–4.7 × 1–1.3	Liu et al. (2021b)
Postiaceae	*Cyanosporus subungulatus*	China (Yunnan)	Angiosperm (undetermined) and Gymnosperm (*Pinus*)	4–6	Monomitic	Clamped	4.5–5.2 × 1.1–1.4	Liu et al. (2022b)
Postiaceae	*Cyanosporus subviridis*	Finland, Mexico, USA	Gymnosperm (*Picea*, *Pinus*)	6–8	Monomitic	Clamped	3.8–4.5 × 1–1.3	Miettinen et al. (2018)

Table 2 Continued.

Family	Species	Distribution	Host	Pores (per mm)	Hyphal system (µm)	Generative hyphae (µm)	Basidiospores(µm)	References
Postiaceae	*Cyanosporus tenuicontextus*	China (Yunnan)	Angiosperm (undetermined) and Gymnosperm (*Pinus*)	6–8	Monomitic	Clamped	3.8–4.3 × 0.8–1.2	Liu et al. (2022b)
Postiaceae	*Cyanosporus tenuis*	China (Sichuan)	Gymnosperm (*Picea*)	5–7	Monomitic	Clamped	4.7–6 × 1.3–2	Liu et al. (2021b)
Postiaceae	*Cyanosporus tricolor*	China (Sichuan, Xizang)	Gymnosperm (*Abies*, *Picea*)	4–5	Monomitic	Clamped	4–4.8 × 0.8–1.2	Shen et al. (2019)
Postiaceae	*Cyanosporus ungulatus*	China (Sichuan)	Angiosperm (*Castanopsis*), Gymnosperm (*Abies*)	4–6	Monomitic	Clamped	4.5–5 × 0.9–1.2	Shen et al. (2019)
Postiaceae	*Cyanosporus yanae*	Russia	Gymnosperm (*Larix*, *Pinus*)	5–7	Monomitic	Clamped	4.3–5.8 × 1.2–1.6	Miettinen et al. (2018)
Postiaceae	*Cystidiopostia hibernica*	China (Jilin, Zhejiang), Finland, Australia, Ireland	Angiosperm (*Betula*) and Gymnosperm (*Abies*, *Juniperus*, *Larix*, *Picea*, *Pinus*)	4–5	Monomitic	Clamped	4.9–5.5 × 1–1.2	Shen et al. (2015)
Postiaceae	*Cystidiopostia inocybe*	China (Heilongjiang), France	Angiosperm (*Populus*, *Rosmarinus*) and Gymnosperm (*Cupressus*, *Juniperus*, *Pinus*)	4–6	Monomitic	Clamped	5–5.8 × 1.5–1.9	Shen et al. (2015)
Postiaceae	*Cystidiopostia pileata*	Japan (Anhui, Jilin, Liaoning), Russia	Angiosperm (*Populus*, *Tilia*) and Gymnosperm (*Abies*, *Pinus*)	3–5	Monomitic	Clamped	4.5–5 × 0.9–1.2	Shen et al. (2015)
Postiaceae	*Postia simanii*	China (Anhui, Jilin, Zhejiang), Czechoslovakia	Angiosperm (*Alnus*, *Betula*, *Populus*, *Salix*) and Gymnosperm (*Abies*, *Picea*)	4–5	Monomitic	Clamped	4.5–5 × 0.9–1.1	Jülich (1982)
Postiaceae	*Cystidiopostia subhibernica*	China (Yunnan)	Angiosperm (undetermined) and Gymnosperm (*Abies*, *Picea*)	4–6	Monomitic	Clamped	3.9–4.2 × 1–1.4	Liu et al. (2023a)
Postiaceae	*Fuscopostia avellanea*	China (Yunnan)	Gymnosperm (*Pinus*)	4–7	Monomitic	Clamped	3.8–5.2 × 0.9–1.5	**Present study**
Postiaceae	*Fuscopostia duplicata*	China (Xizang, Yunnan, Zhejiang)	Angiosperm (undetermined) and Gymnosperm (*Pinus*)	3–4	Monomitic	Clamped	3.8–5.8 × 1.8–2.5	Shen et al. (2015)
Postiaceae	*Fuscopostia fragilis*	Belarus, Czech Republic, Finland, France, Russia, Slovakia, Sweden, USA	Gymnosperm (*Abies*, *Picea*, *Pinus*)	2–4	Monomitic	Clamped	3.9–5 × 1.7–2.1	Shen et al. (2015)
Postiaceae	*Fuscopostia leucomallella*	China (Heilongjiang, Jilin, Jiangxi, Sichuan, Xizang, Yunnan), Finland, USA	Gymnosperm (*Abies*, *Pinus*)	3–4	Monomitic	Clamped	4.5–6 × 1–1.7	Shen et al. (2015)
Postiaceae	*Fuscopostia persicina*	China (Xizang, Yunnan)	Gymnosperm (*Abies*, *Picea*)	6–8	Monomitic	Clamped	4.4–5.3 × 1.5–2.3	**Present study**

Table 2 Continued.

Family	Species	Distribution	Host	Pores (per mm)	Hyphal system (µm)	Generative hyphae (µm)	Basidiospores(µm)	References
Postiaceae	*Fuscopostia subfragilis*	China (Sichuan, Yunnan)	Angiosperm (undetermined) and Gymnosperm (*Picea*, *Pinus*)	4–6	Monomitic	Clamped	4.3–5.2 × 1.7–2.5	Shen et al. (2015)
Postiaceae	*Fuscopostia tomentosa*	China (Sichuan, Yunnan)	Gymnosperm (*Abies*, *Picea*)	3–5	Monomitic	Clamped	3.9–6.2 × 1.8–2.5	**Present study**
Postiaceae	*Jahnoporus brachiatus*	China (Heilongjiang), Russia	Angiosperm (*Betula*)	2–3	Monomitic	Clamped	13–17 × 4–5	Spirin et al. (2015b)
Postiaceae	*Jahnoporus hirtus*	Europe, France, Switzerland	Gymnosperm (*Pinus*)	1–2	Monomitic	Clamped	10.4–15.4 × 4–5.8	Spirin et al. (2015b)
Postiaceae	*Jahnoporus oreinus*	Russia	Gymnosperm (*Picea*)	2–3	Monomitic	Clamped	13.2–17.3 × 4.6–6	Spirin et al. (2015b)
Postiaceae	*Nothofagiporus venata*	Australia, Argentina, New Zealand	Angiosperm (*Nothofagus*)	4–6	Monomitic	Clamped	4–5 × 0.8–1	Rajchenberg (1987)
Postiaceae	*Oligoporus podocarpi*	China (Hainan)	Gymnosperm (*Podocarpus*)	5–6	Monomitic	Clamped	3.8–4.2 × 2–2.3	Zhou et al. (2021)
Postiaceae	*Oligoporus rennyi*	China (Heilongjiang, Yunnan), Russia, UK	Gymnosperm (*Abies*, *Pinus*)	4–5	Monomitic	Clamped	4.8–6 × 2.5–3.5	Donk (1971)
Postiaceae	*Oligoporus romellii*	Belarus, China (Xizang), Sweden	Gymnosperm (*Abies*, *Picea*)	4–6	Monomitic	Clamped	4–4.4 × 1.9–2.3	Liu et al. (2023a)
Postiaceae	*Oligoporus sericeomollis*	Belgium, China (Hainan, Heilongjiang, Jilin, Inner Mongolia, Xizang, Yunnan), Finland, Norway, Sweden	Gymnosperm (*Abies*, *Larix*, *Picea*, *Pinus*)	4–6	Monomitic	Clamped	4–5 × 2–2.5	Donk (1971)
Postiaceae	*Osteina obducta*	China (Heilongjiang, Jilin, Yunnan), Czech Republic, Russia, USA	Angiosperm (*Betula*) and Gymnosperm (*Larix*, *Picea*, *Pinus*)	3–5	Monomitic	Clamped	4.5–4.9 × 2–2.5	Donk (1966)
Postiaceae	*Osteina subundosa*	China (Heilongjiang, Fujian)	Gymnosperm (*Picea*)	3–4	Monomitic	Clamped	4–5.5 × 1.8–2	Wei & Dai (2006)
Postiaceae	*Osteina undosa*	China (Jilin, Sichuan), Finland, USA	Gymnosperm (*Picea*)	2–3	Monomitic	Clamped	5–5.5 × 1–1.5	Shen et al. (2019)
Postiaceae	*Postia amurensis*	China (Jilin, Liaoning)	Angiosperm (*Acer*, *Alnus*)	3–4	Monomitic	Clamped	4.2–5 × 1–1.2	Dai & Penttilä (2006)
Postiaceae	*Postia calcarea*	China (Anhui, Zhejiang)	Angiosperm (undetermined) and Gymnosperm (*Larix*, *Tsuga*)	3–5	Monomitic	Clamped	4.2–4.8 × 1.2–1.3	Wei & Dai (2006)
Postiaceae	*Postia cana*	China (Shanxi)	Gymnosperm (*Picea*)	4–5	Monomitic	Clamped	4.2–5 × 1–1.2	Yuan et al. (2010)

Table 2 Continued.

Family	Species	Distribution	Host	Pores (per mm)	Hyphal system (µm)	Generative hyphae (µm)	Basidiospores(µm)	References
Postiaceae	*Postia carbophila*	Argentina	Angiosperm (*Nothofagus*)	1.5–2	Monomitic	Clamped	4–5 × 1.9–2.1	Rajchenberg (1995b)
Postiaceae	*Postia crassicontextum*	Australia	Angiosperm (*Nothofagus*)	4–6	Monomitic	Clamped	4.8–6 × 1.2–2	Liu et al. (2023a)
Postiaceae	*Postia cylindrica*	China (Hubei, Jiangxi, Yunnan)	Angiosperm (undetermined) and Gymnosperm (*Pinus*)	3–4	Monomitic	Clamped	4.7–5.2 × 1.3–1.5	Yuan et al. (2017a)
Postiaceae	*Postia folliculocystidiata*	Czech Republic, Estonia, Finland	Gymnosperm (*Picea*)	3–5	Monomitic	Clamped	4.3–6.3 × 2–2.8	Niemelä et al. (2001)
Postiaceae	*Postia gloeocystidiata*	China (Zhejiang)	Gymnosperm (*Pinus*)	3–4	Monomitic	Clamped	3.5–4.8 × 1–1.2	Wei & Dai (2006)
Postiaceae	*Postia hirsuta*	China (Henan, Guangdong, Hunan, Shaanxi, Zhejiang)	Angiosperm (*Quercus*) and Gymnosperm (*Pinus*)	3–4	Monomitic	Clamped	4–4.8 × 1–1.2	Shen & Cui (2014)
Postiaceae	*Postia lactea*	China (widespread), Finland	Angiosperm (*Betula*, *Populus*, *Quercus*, *Tilia*) and Gymnosperm (*Abies*, *Cunninghamia*, *Picea*, *Pinus*)	4–6	Monomitic	Clamped	4–5 × 1–1.3	Karsten (1881)
Postiaceae	*Postia lowei*	China (Heilongjiang, Jilin, Xizang, Sichuan), Russia, Ukraine	Gymnosperm (*Abies*, *Picea*, *Pinus*)	3–4	Monomitic	Clamped	4.8–5 × 1.8–2.2	Jülich (1982)
Postiaceae	*Postia ochraceoalba*	China (Sichuan, Xizang, Yunnan)	Angiosperm (*Quercus*) and Gymnosperm (*Abies*, *Picea*)	6–7	Monomitic	Clamped	4–4.5 × 1–1.5	Shen et al. (2015)
Postiaceae	*Postia qinensis*	China (Shaanxi)	Gymnosperm (*Pinus*)	3–5	Monomitic	Clamped	4.2–4.6 × 1.2–1.5	Dai et al. (2009b)
Postiaceae	*Postia stellifera*	Malaysia	–	2–3	Monomitic	Clamped	4.5–5.5 × 1.8–2.3	Hattori et al. (2010)
Postiaceae	*Postia sublowei*	China (Sichuan, Xizang, Yunnan)	Gymnosperm (*Picea*, *Pinus*)	3–4	Monomitic	Clamped	4–4.5 × 1–1.5	Shen et al. (2015)
Postiaceae	*Postia tephroleuca*	China (Fujian, Hainan, Jilin, Jiangxi, Sichuan, Xizang, Yunnan, Zhejiang), Finland, Sweden, Nepal	Angiosperm (*Betula*) and Gymnosperm (*Abies*, *Picea*, *Pinus*)	3–4	Monomitic	Clamped	4.5–6 × 1–1.5	Jülich (1982)
Postiaceae	*Ptychogaster albus*	Belarus, China (Xizang), Germany	Gymnosperm (*Picea*, *Pinus*)	3–4	Monomitic	Clamped	4.5–5.5 × 2–3	Liu et al. (2023a)
Postiaceae	*Resupinopostia lateritia*	China (Jilin), Finland, Norway, Sweden, Denmark, Canada, Russia	Gymnosperm (*Picea*, *Pinus*)	3–4	Monomitic	Clamped	4.5–5.5 × 1.2–1.6	Shen et al. (2015)
Postiaceae	*Resupinopostia sublateritia*	China (Sichuan, Yunnan)	Gymnosperm (*Pinus*)	6–8	Monomitic	Clamped	4.3–5 × 1.3–2	**Present study**

Table 2 Continued.

Family	Species	Distribution	Host	Pores (per mm)	Hyphal system (µm)	Generative hyphae (µm)	Basidiospores(µm)	References
Postiaceae	*Spongiporus balsameus*	China (Beijing, Hebei, Heilongjiang, Jilin, Yunnan), Czech Republic, Japan, Russia, South Korea, USA, Vietnam	Angiosperm (*Cupressus*, *Quercus*) and Gymnosperm (*Larix*, *Picea*, *Pinus*)	5–6	Monomitic	Clamped	4–5 × 2.5–3	David (1980)
Postiaceae	*Spongiporus cerifluus*	China (Heilongjiang, Xizang), USA	Gymnosperm (*Picea*)	3–5	Monomitic	Clamped	4–4.5 × 2–2.6	David (1980)
Postiaceae	*Spongiporus florifomis*	China (Heilongjiang, Yunnan), Canada, Spain, Japan, Russia, USA	Gymnosperm (*Abies*, *Cupressus*, *Picea*, *Pinus*)	6–8	Monomitic	Clamped	3.5–4.5 × 2–2.5	Shen et al. (2015)
Postiaceae	*Spongiporus gloeoporus*	China (Gansu, Sichuan, Xizang, Yunnan)	Gymnosperm (*Pinus*)	3–4	Monomitic	Clamped	4–4.5 × 2–2.5	Shen et al. (2015)
Postiaceae	*Spongiporus japonica*	China (Yunnan), Japan	Angiosperm (*Castanopsis*)	2–3	Monomitic	Clamped	4.2–5.8 × 2.8–3.6	Dai & Hattori (2007)
Postiaceae	*Spongiporus leucospongia*	USA	Gymnosperm (*Picea*)	2–4	Monomitic	Clamped	5–8 × 1–1.5	Murrill (1905)
Postiaceae	*Spongiporus persicinus*	China (Xinjiang), Finland, Russia	Gymnosperm (*Larix*, *Picea*)	3–5	Monomitic	Clamped	4.2–5 × 2–2.5	Niemelä et al. (2004)
Postiaceae	*Spongiporus zebra*	China (Jilin, Heilongjiang)	Gymnosperm (*Abies*, *Pinus*)	7–8	Monomitic	Clamped	3.6–4.5 × 2–2.5	Wei & Qin (2010)
Postiaceae	*Tenuipostia dissecta*	Australia, Chile, France	Angiosperm (*Eucalyptus*, *Nothofagus*, *Olearia*)	4–5	Monomitic	Clamped	4–5 × 2–2.5	Rajchenberg (1987)
Pycnoporellaceae	*Crustoderma borbonicum*	France	Gymnosperm (undetermined)	–	Monomitic	Clamped	8–10 × 4–5	Nakasone (1984)
Pycnoporellaceae	*Crustoderma carolinense*	USA	Angiosperm (*Castaneum*)	–	Monomitic	Clamped	8–9 × 6–6.5	Nakasone (1984)
Pycnoporellaceae	*Crustoderma corneum*	Canada, USA, Sweden	Gymnosperm (*Pinus*)	–	Monomitic	Clamped	8–12 × 4–5.5	Nakasone (1984)
Pycnoporellaceae	*Crustoderma cryptocallimon*	Belgium, France, Italy, Spain, Germany	Gymnosperm (*Juniperus*, *Pinus*)	–	Monomitic	Clamped	9.5–11 × 5–5.5	Larsson et al. (2020)
Pycnoporellaceae	*Crustoderma dryinum*	USA, Finland, Sweden, Finland, Scandinavia	Angiosperm (*Oak*) and Gymnosperm (*Picea*, *Pinus*)	–	Monomitic	Clamped	7–8 × 2.5–3.5	Parmasto (1968)
Pycnoporellaceae	*Crustoderma efibulatum*	Finland	Gymnosperm (*Pinus*)	–	Monomitic	Clamped	6.7–8.7 × 1.7–2.1	Kotiranta & Saarenoksa (2006)
Pycnoporellaceae	*Crustoderma fibuligerum*	India	Gymnosperm (*Cedrus*)	–	Monomitic	Clamped	4–5 × 2–3	Thind & Rattan (1973)

Table 2 Continued.

Family	Species	Distribution	Host	Pores (per mm)	Hyphal system (µm)	Generative hyphae (µm)	Basidiospores(µm)	References
Pycnoporellaceae	*Crustoderma flavescens*	Australia, Norway, USA	Angiosperm (*Quercus*)	–	Monomitic	Clamped	7–9 × 6.5–7	Nakasone (1984)
Pycnoporellaceae	*Crustoderma fuscatum*	Hawaii	Angiosperm (*Eucalyptus*)	–	Monomitic	Clamped	4.5–5.5 × 2.5–3	Gilbertson & Nakasone (2003)
Pycnoporellaceae	*Crustoderma gigacystidium*	Hawaii	Angiosperm (*Myoporum*)	–	Monomitic	Clamped	7–9 × 2.5–3	Gilbertson et al. (2001)
Pycnoporellaceae	*Crustoderma longicystidiatum*	Austria, Finland, Italy, Norway, Spain, Sweden	Angiosperm (*Arbutus*) and Gymnosperm (*Pinus*)	–	Monomitic	Clamped	7–8 × 4–5	Nakasone (1984)
Pycnoporellaceae	*Crustoderma marianum*	USA	Angiosperm (*Robinia*) and Gymnosperm (*Pinus*)	–	Monomitic	Clamped	10–12 × 5.5–6.5	Nakasone (1984)
Pycnoporellaceae	*Crustoderma nakasoneae*	USA	Gymnosperm (*Pinus*)	–	Monomitic	Clamped	7–8 × 2.5–3	Gilbertson & Blackwell (1988)
Pycnoporellaceae	*Crustoderma opuntiae*	USA	Angiosperm (*Opuntia*)	–	Monomitic	Clamped	7–8 × 4–5	Nakasone & Gilbertson (1982)
Pycnoporellaceae	*Crustoderma patricium*	Australia, New Zealand	Angiosperm (*Nothofagus*)	–	Monomitic	Clamped	10–16 × 4–6	Nakasone (1984)
Pycnoporellaceae	*Crustoderma resinosum*	Canada	Gymnosperm (*Picea*, *Pseudotsuga*)	–	Monomitic	Clamped	8–12 × 4.5–6	Gilbertson (1981)
Pycnoporellaceae	*Crustoderma testatum*	Canada, USA	Gymnosperm (*Pseudotsuga*)	–	Monomitic	Clamped	6–7 × 4–5	Duhem (2009)
Pycnoporellaceae	*Crustoderma triste*	Sweden	Gymnosperm (undetermined)	–	Monomitic	Clamped	6.5–8 × 2–2.5	Duhem (2009)
Pycnoporellaceae	*Crustoderma vulcanense*	Hawaii	Angiosperm (*Terminalia*)	–	Monomitic	Clamped	6.5–8 × 2–2.5	Gilbertson & Nakasone (2003)
Pycnoporellaceae	*Pycnoporellus alboluteus*	USA	Angiosperm (*Populus*) and Gymnosperm (*Abies*, *Picea*)	1–3	Monomitic	Simple-septate	9–12 × 3–3.5	Kotlába & Pouzar (1963)
Pycnoporellaceae	*Pycnoporellus fulgens*	Belarus, China (Jilin, Heilongjiang, Guangdong, Yunnan), Finland, Sweden, Vietnam	Angiosperm (*Populus*) and Gymnosperm (*Abies*, *Larix*, *Picea*, *Pinus*)	2–3	Monomitic	Simple-septate	6–10 × 3–4	Donk (1971)
Sarcoporiaceae	*Sarcoporia longitubulata*	Portugal, USA	Angiosperm (*Fagus*, *Quercus*)	3–5	Monomitic	Clamped	4.4–6.2 × 2.5–3.3	Vlasák et al. (2015)
Sarcoporiaceae	*Sarcoporia neotropica*	Costa Rica	Angiosperm (undetermined)	3–4	Monomitic	Clamped	4–5 × 2.8–3.3	Ryvarden (2012)
Sarcoporiaceae	*Sarcoporia polyspora*	Brazil, China (Fujian, Yunnan, Heilongjiang, Sichuan, Xizang), France,	Angiosperm (undetermined) and Gymnosperm (*Pinus*)	1–3	Monomitic	Clamped	4.4–5.6 × 2.4–2.8	Karsten (1894)

Table 2 Continued.

Family	Species	Distribution	Host	Pores (per mm)	Hyphal system (µm)	Generative hyphae (µm)	Basidiospores(µm)	References
		Finland, USA, Vietnam						
Sparassidaceae	*Sparassis americana* f. *americana*	USA	Gymnosperm (*Pinus*)	–	Monomitic	Clamped	4.5–6 × 3.5–4	Hughes et al. (2014)
Sparassidaceae	*Sparassis americana* f. *arizonica*	USA	Gymnosperm (*Abies*, *Pinus*, *Pseudotsuga*)	–	Monomitic	Clamped	5–6 × 3.5–4	Hughes et al. (2014)
Sparassidaceae	*Sparassis americana*	USA	–	–	Monomitic	Clamped	4.5–6 × 3.5–4	Hughes et al. (2014)
Sparassidaceae	*Sparassis brevipes* f. *nemecii*	Austria, Czechoslovakia	–	–	Monomitic	Simple-septate	5.5–6.5 × 4–4.5	Petersen et al. (2015)
Sparassidaceae	*Sparassis brevipes*	Austria, Czechoslovakia, Germany, Ukraine	Angiosperm (*Fagus*, *Quercus*) and Gymnosperm (*Abies*, *Picea*)	–	Monomitic	Simple-septate	6–6.5 × 4–4.5	Petersen et al. (2015)
Sparassidaceae	*Sparassis crispa*	Austria, Belgium, Czech Republic, France, Germany, Netherlands, Sweden, UK	Gymnosperm (*Larix*, *Pinus*)	–	Monomitic	Clamped	4.5–5 × 3.5–4	Hughes et al. (2014)
Sparassidaceae	*Sparassis cystidiosa*	Thailand	Angiosperm (*Acer*, *Quercus*, *Symingtonia*)	–	Monomitic	Clamped	7–9 × 6–7	Desjardin et al. (2004)
Sparassidaceae	*Sparassis cystidiosa* f. *flabelliformis*	China (Yunnan)	Angiosperm (*Oak*, *Quercus*)	–	Monomitic	Clamped	7–9 × 6–7	Zhao et al. (2013)
Sparassidaceae	*Sparassis latifolia*	China (Jilin, Yunnan, Sichuan), Japan, Russia	Gymnosperm (*Larix*)	–	Monomitic	Clamped	4.5–5.5 × 3.5–4	Zhao et al. (2013)
Sparassidaceae	*Sparassis minoensis*	Spain	Gymnosperm (*Pinus*)	–	Monomitic	Simple-septate	6.4–7.6 × 4.4–5.2	Blanco-Dios et al. (2006)
Sparassidaceae	*Sparassis radicata*	USA, Canada	Gymnosperm (*Pseudotsuga*)	–	Monomitic	Clamped	5–6.5 × 3.5–4	Hughes et al. (2014)
Sparassidaceae	*Sparassis spathulata*	USA	–	–	Monomitic	Simple-septate	6–7 × 4.5–5	Fries (1828)
Sparassidaceae	*Sparassis spathulata* f. *herbstii*	USA	Angiosperm (*Quercus*) and Gymnosperm (*Pinus*)	–	Monomitic	Simple-septate	6–7.5 × 4–5	Petersen et al. (2015)
Sparassidaceae	*Sparassis subalpina*	China (Yunnan)	Angiosperm (*Rhododendron*, *Quercus*) and Gymnosperm (*Picea*)	–	Monomitic	Simple-septate	5.5–6.5 × 4–5	Zhao et al. (2013)
Taiwanofungaceae	*Taiwanofungus camphoratus*	China (Taiwan)	Angiosperm (*Cinnamomum*)	4–6	Dimitic to trimitic	Clamped	2.8–3 × 1.6–2	Wu et al. (2012)
Taiwanofungaceae	*Taiwanofungus salmoneus*	China (Taiwan)	Angiosperm (*Cinnamomum*) and Gymnosperm (*Pinus*)	4–7	Dimitic to trimitic	Clamped	3.5–5 × 1.5–2	Wu et al. (2012)

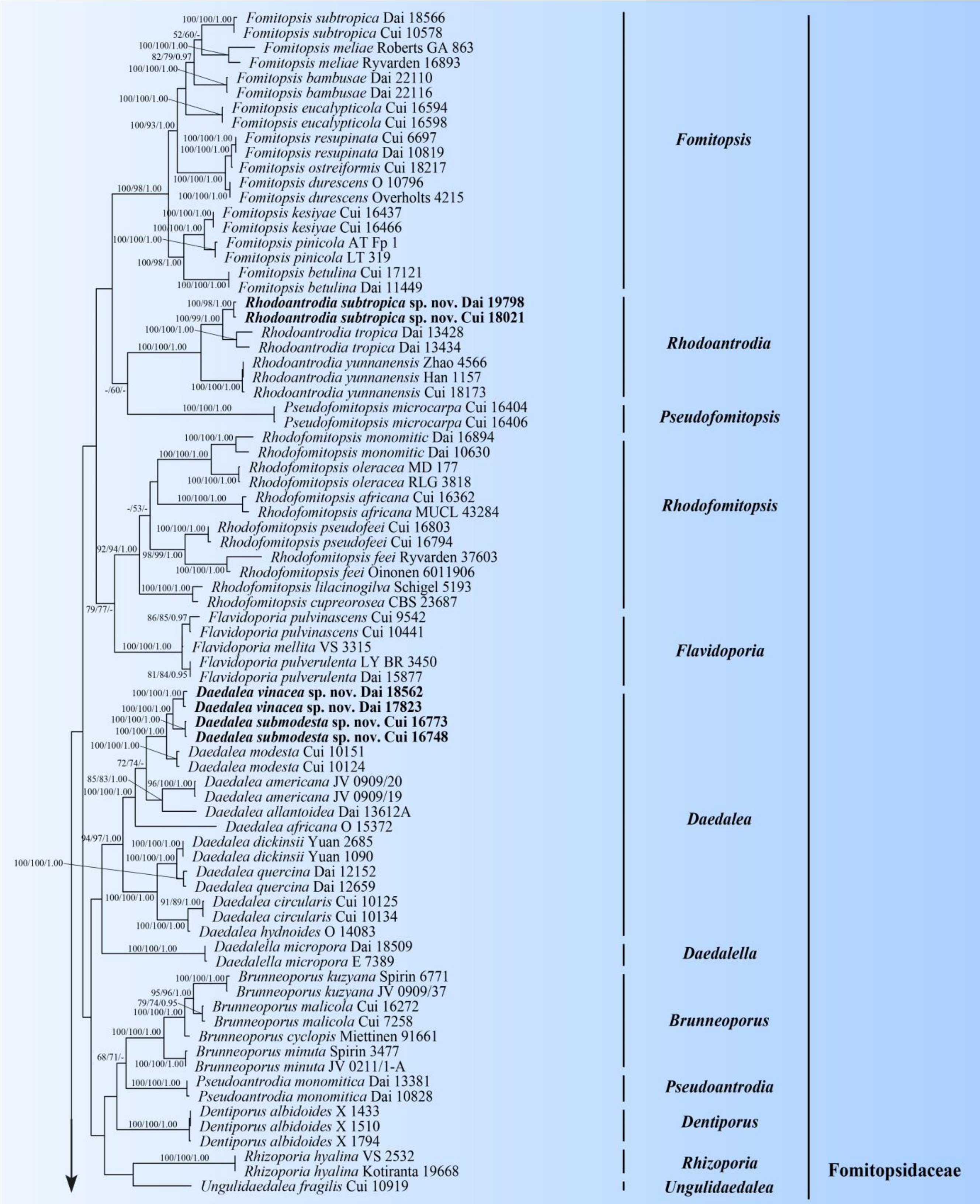


Figure 1 – Maximum likelihood tree illustrating the phylogeny of the brown-rot fungi within the Polyporales based on the combined sequence dataset of ITS+nLSU+mtSSU+nuSSU+RPB1+RPB2+TEF1. Branches are labeled with parsimony bootstrap proportions higher than 50%, maximum likelihood bootstrap higher than 50% and Bayesian posterior probabilities more than 0.95 respectively. Bold names = New species.

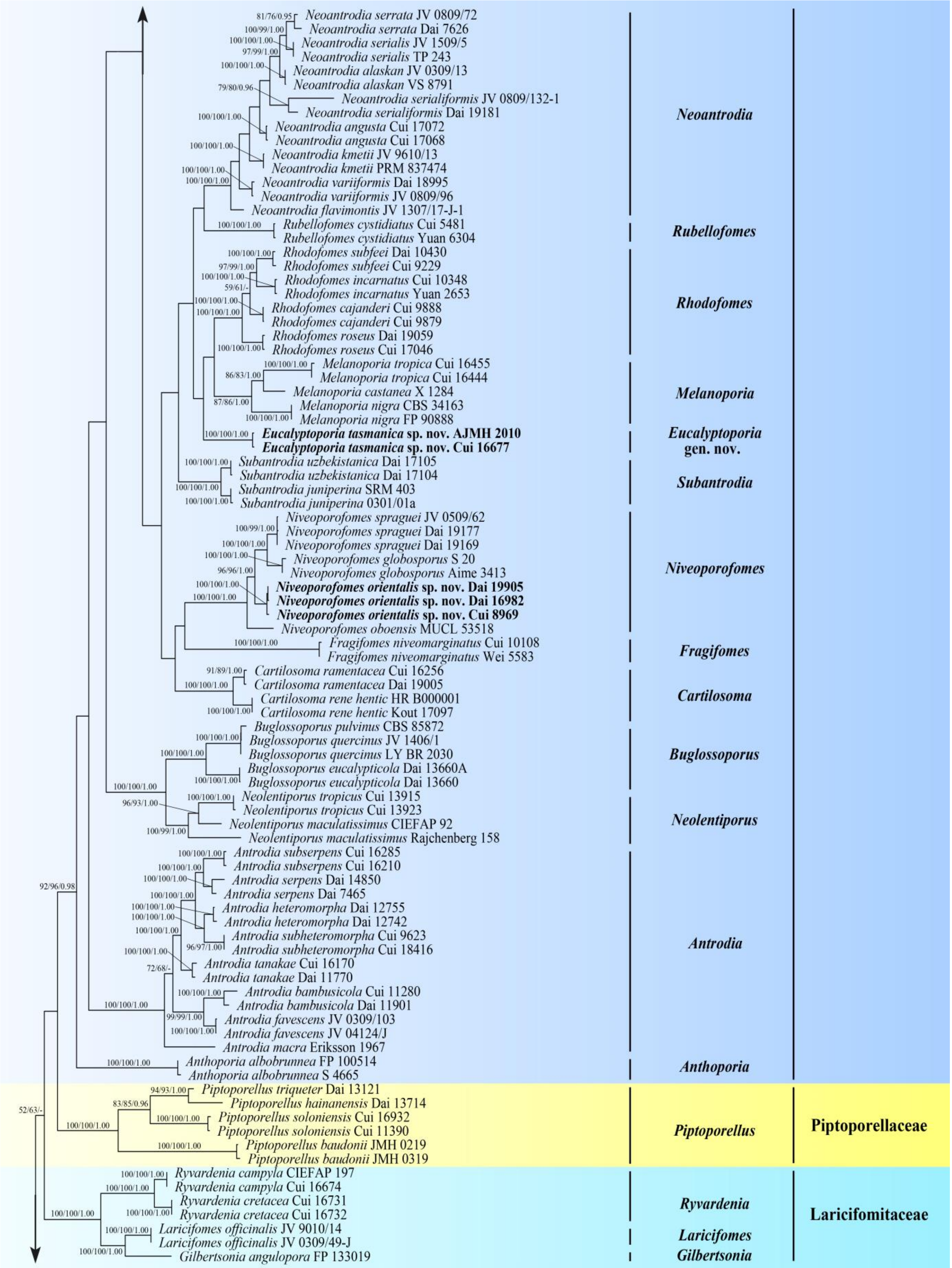
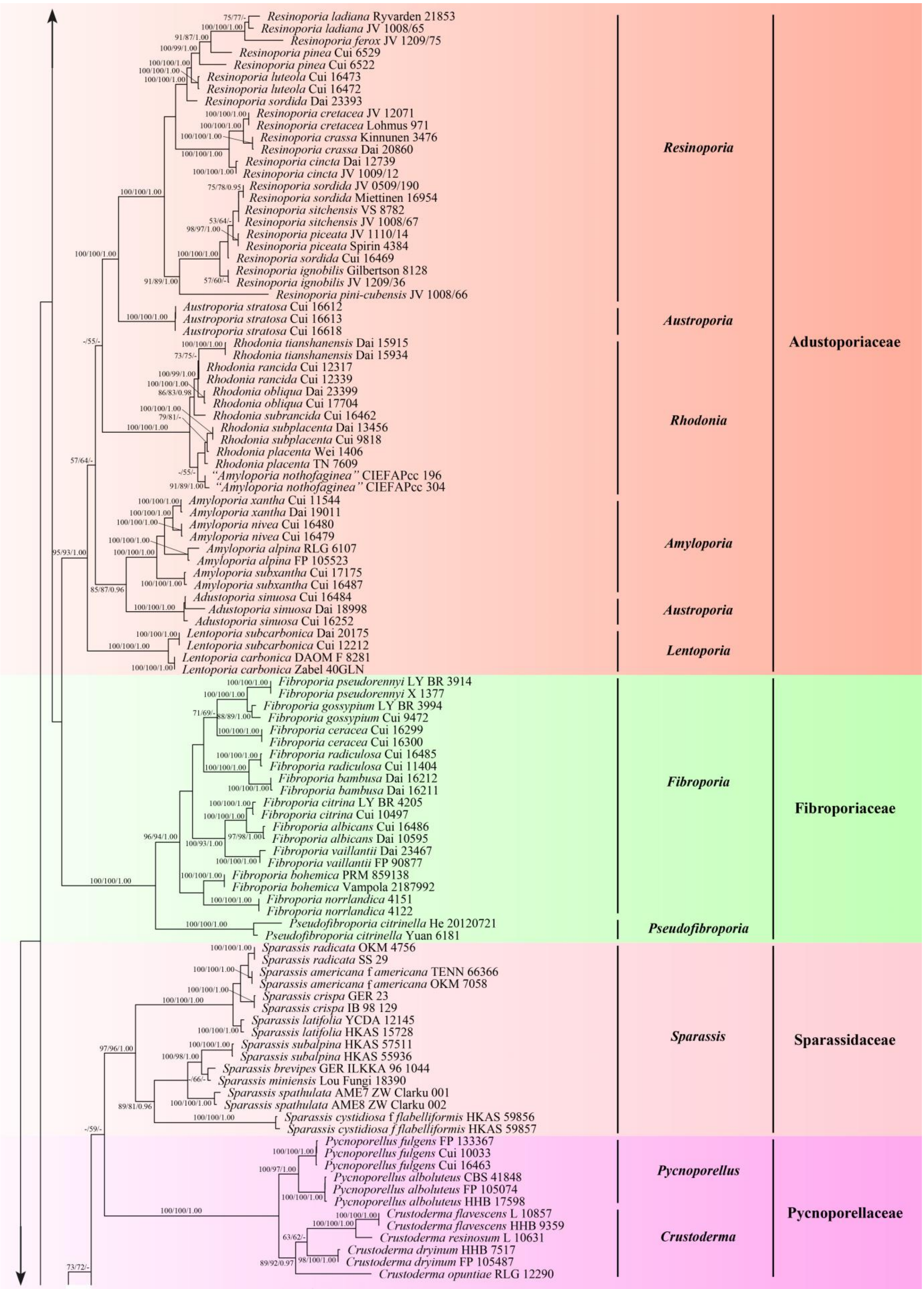


Figure 1 – Continued.



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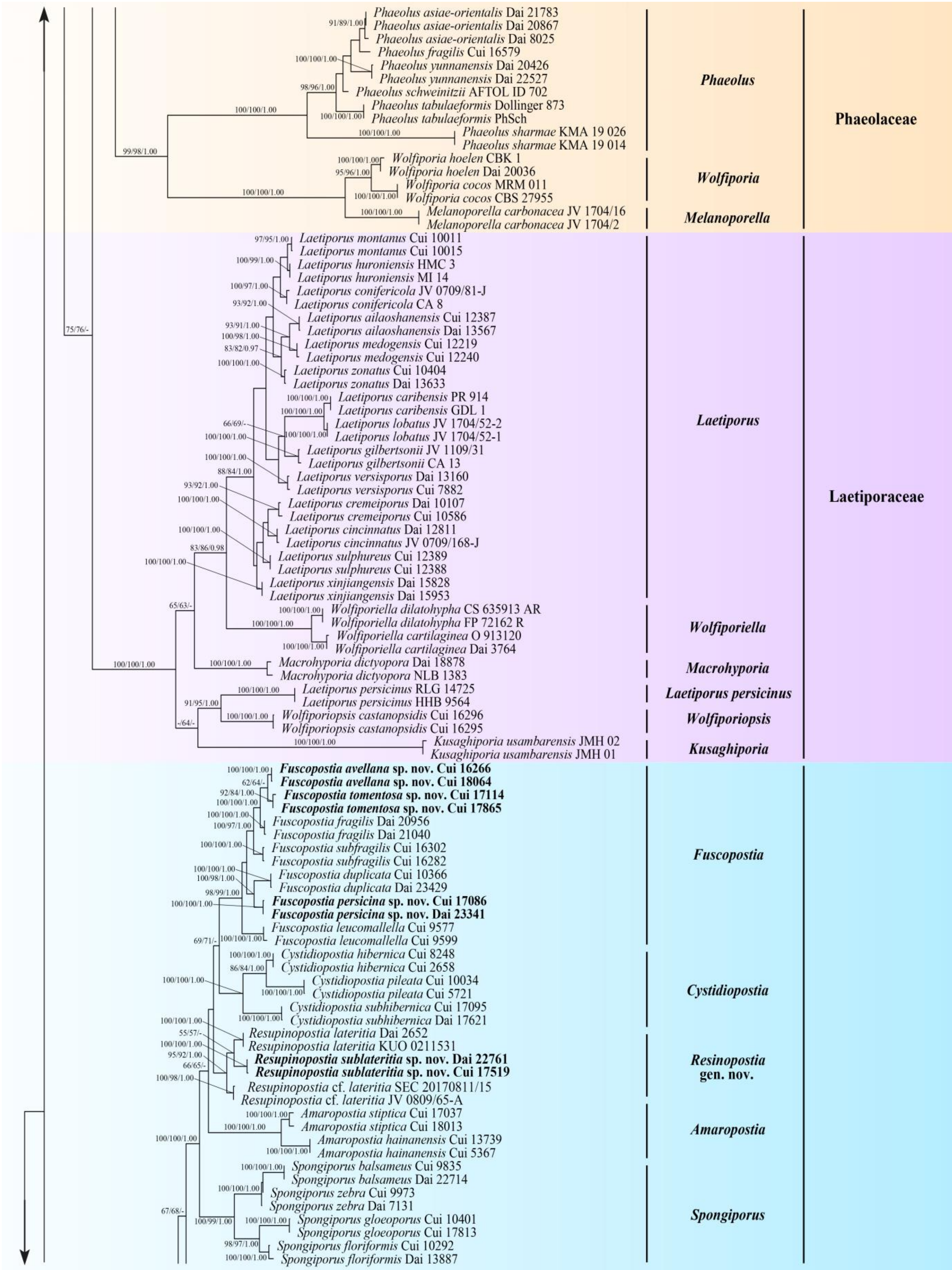

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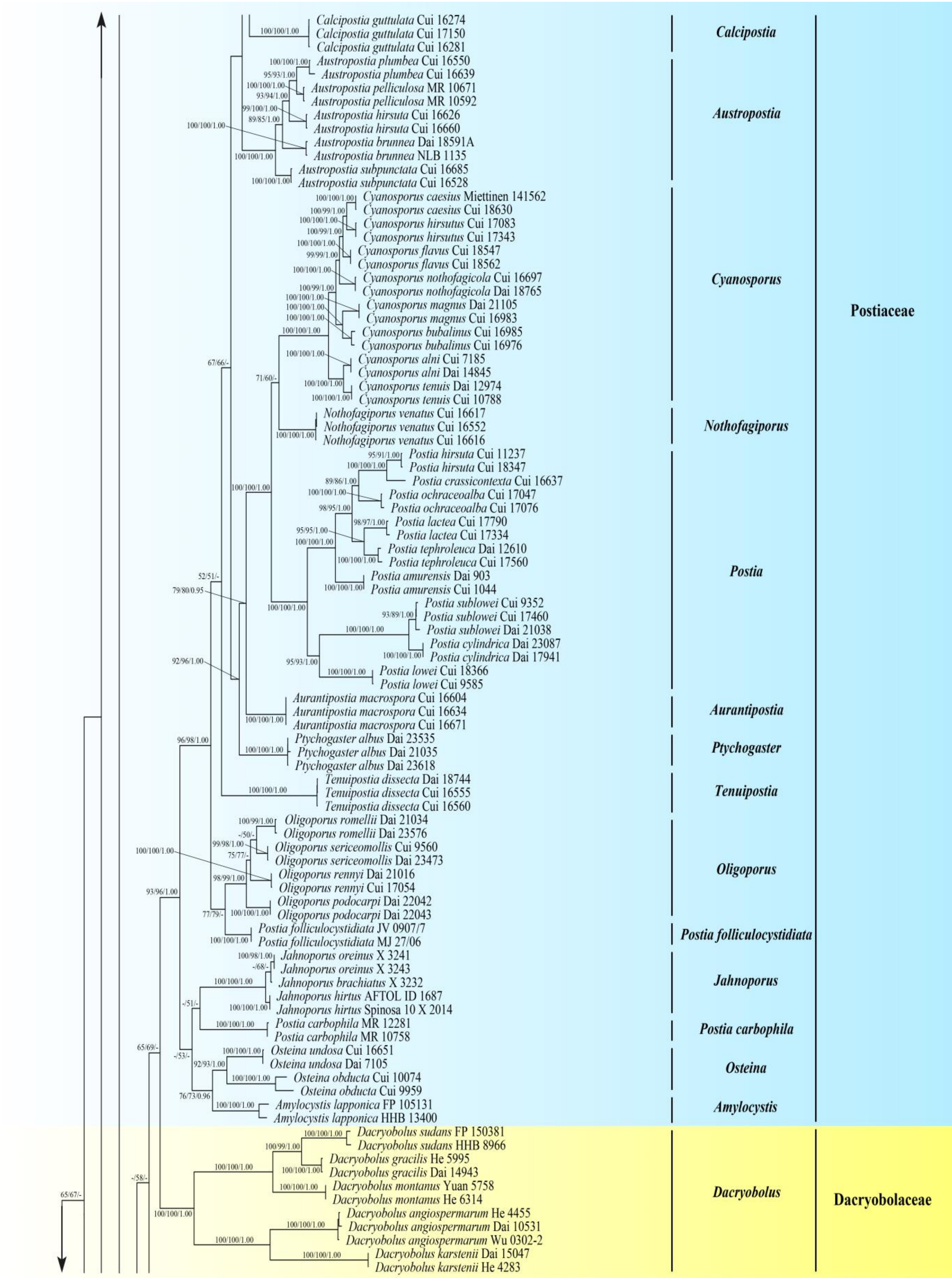

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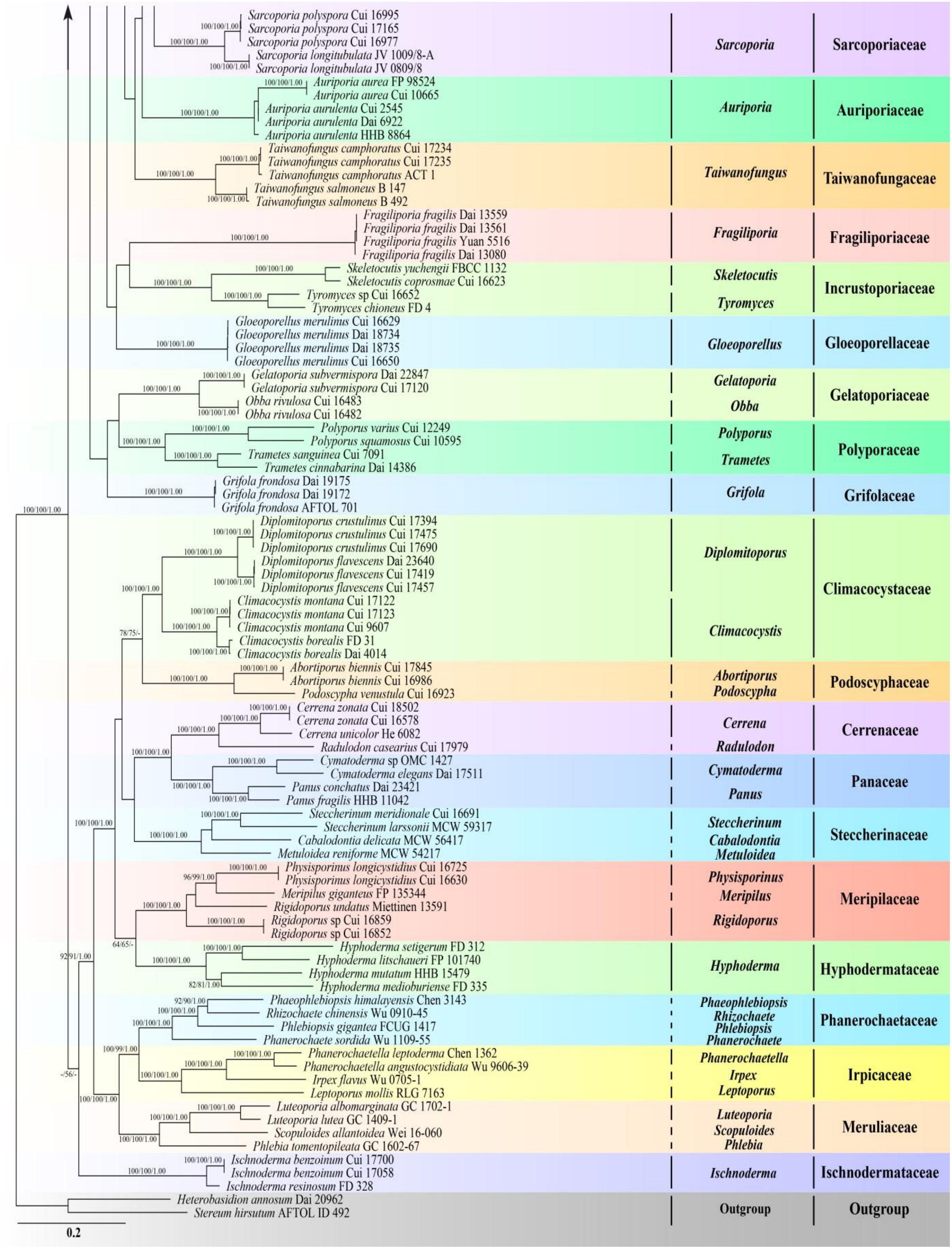

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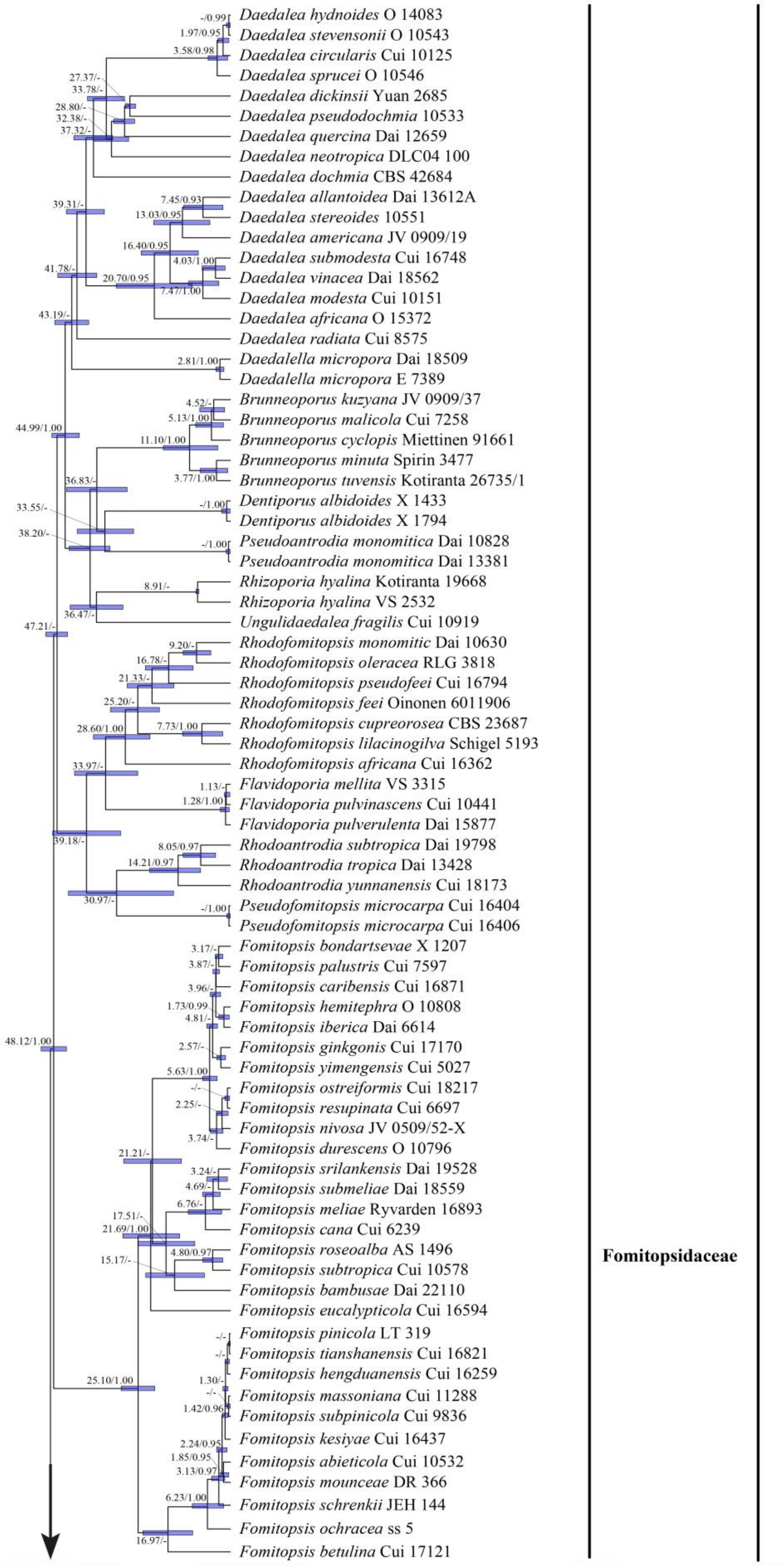
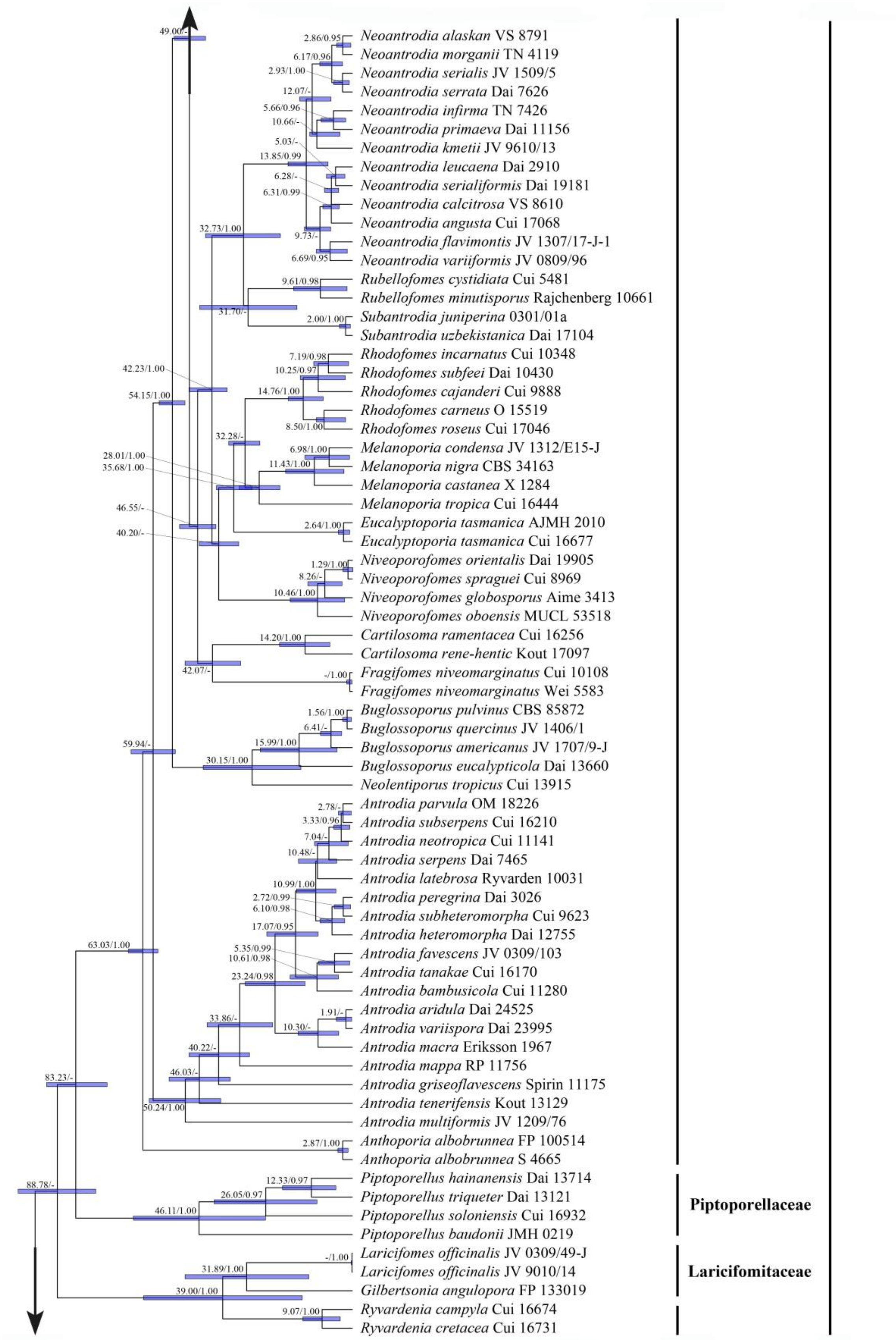


Figure 2 – Divergence time estimation of brown-rot fungi within the Polyporales from Bayesian evolutionary analysis sampling tree based on ITS, nLSU, mtSSU, nuSSU, RPB1, RPB2 and TEF1

multiple datasets. Posterior probabilities not less than 0.80 and the mean ages of each node are annotated. The 95% highest posterior densities of divergence time estimation are marked by horizontal bars.



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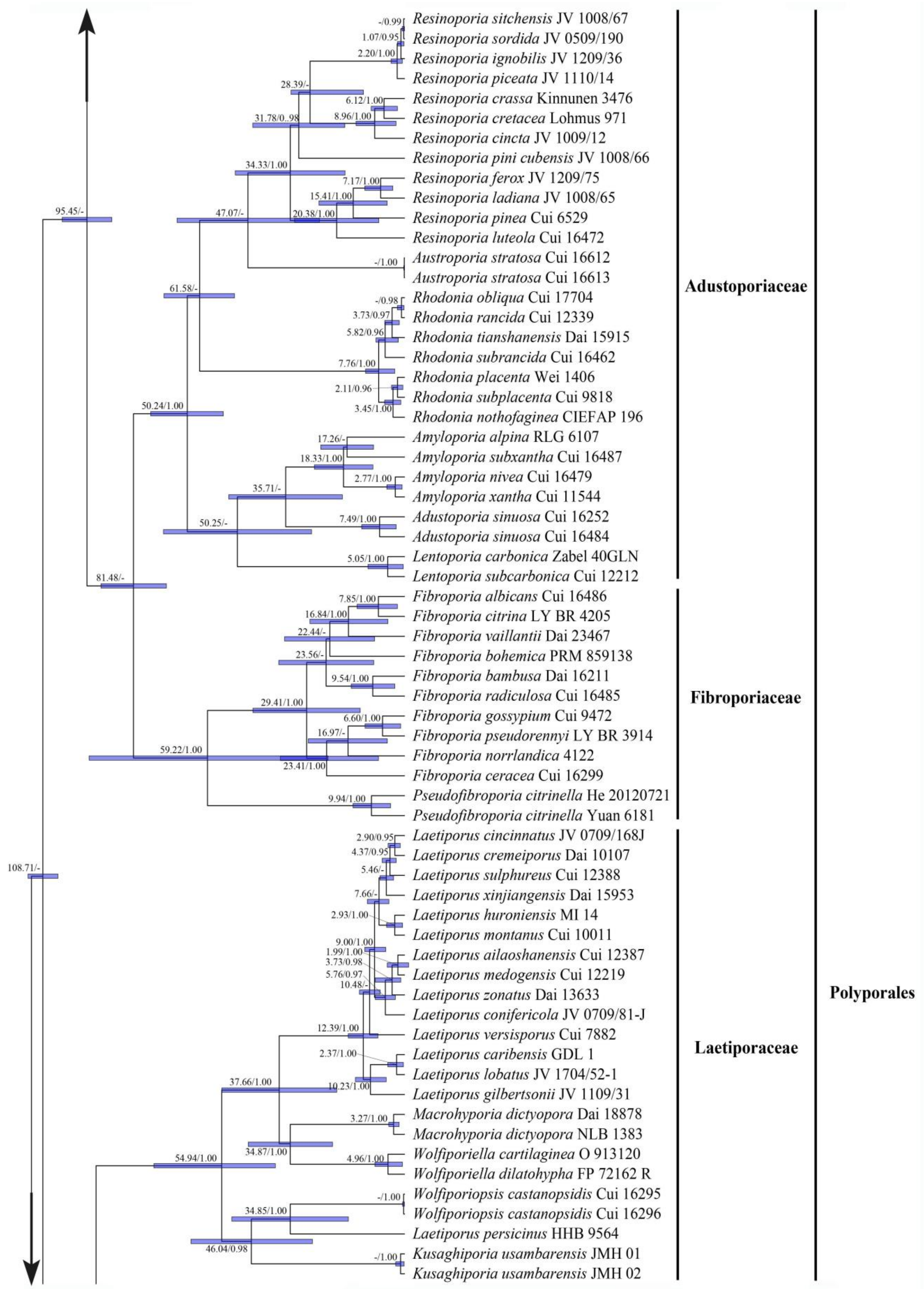

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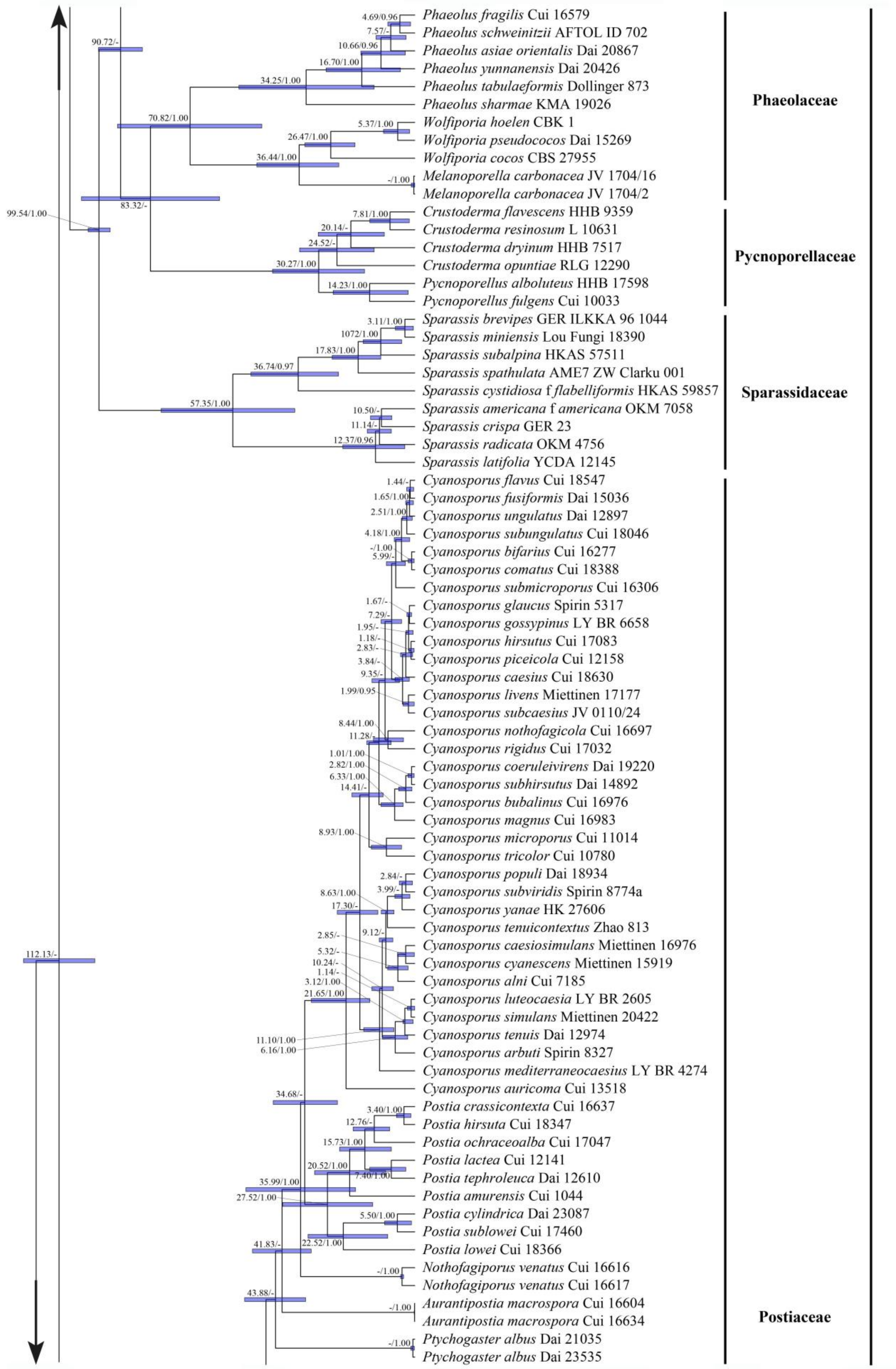

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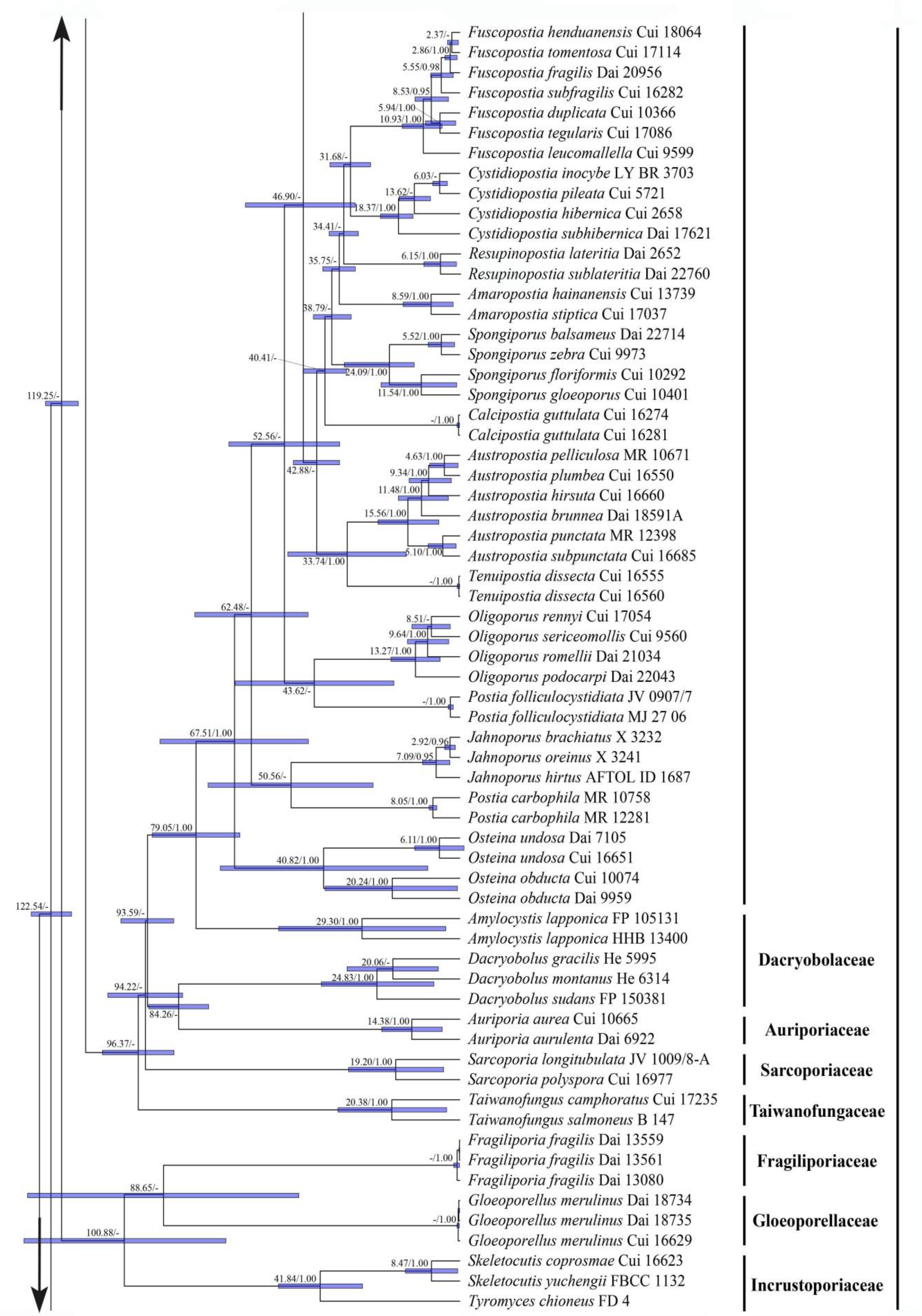

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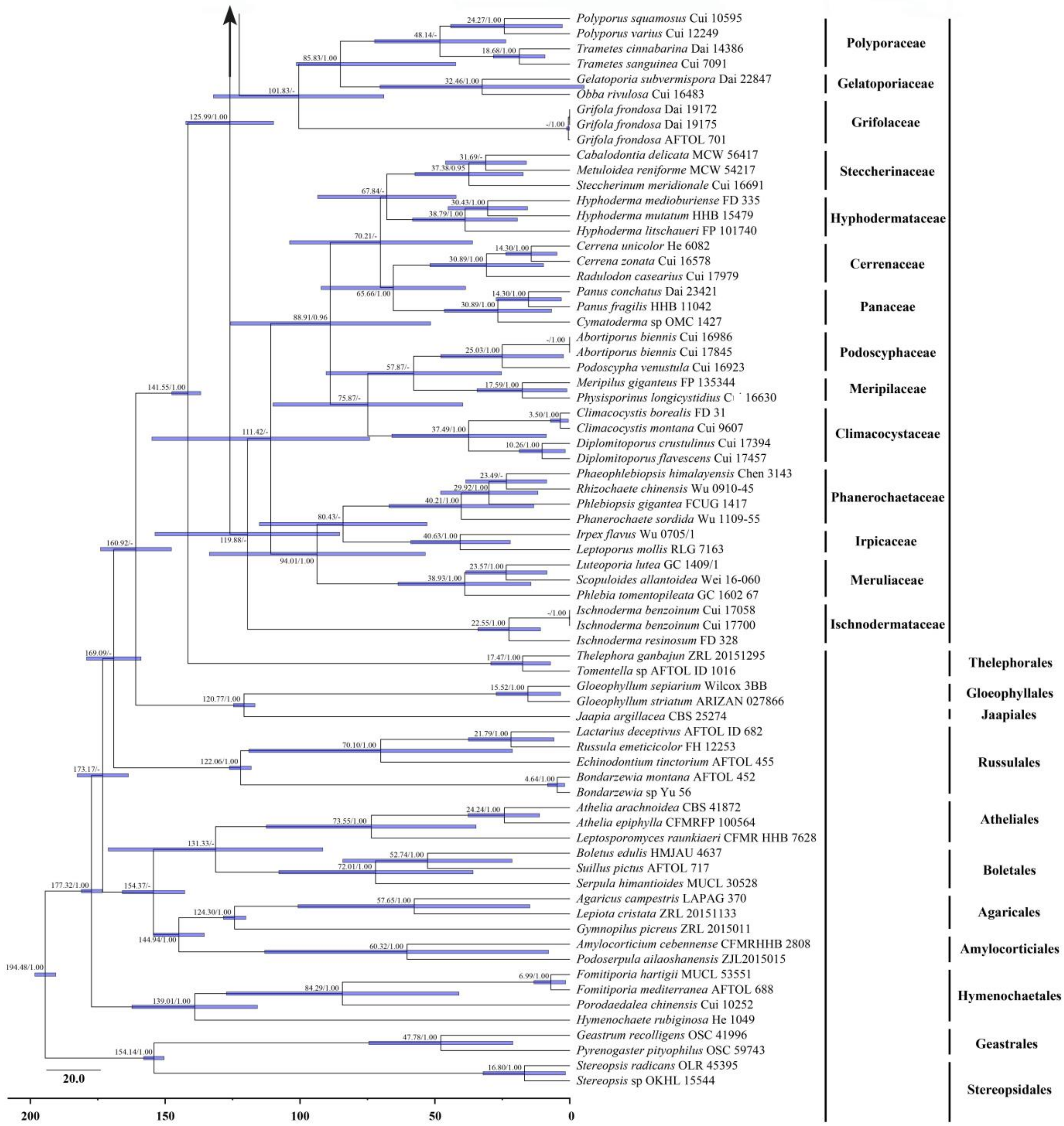

Figure 2 – Continued.

Table 3 The divergence times of estimated taxa of brown-rot fungi within the Polyporales.

Node	Mean of stem age (Mya)	95% HPD (Mya)
Adustoporiaceae/Fibroporiaceae	81.48	55.08–104.49
Auriporiaceae (*Auriporia*)/Dacryobolaceae (*Dacryobolus*)	84.26	47.11–114.6
Fomitopsidaceae/Piptoporellaceae (*Piptoporellus*)	83.23	62.49–123.64
Laetiporaceae	90.72	84.61–102.33
Laricifomitaceae	88.78	64.7–123.68
Phaeolaceae/Pycnoporellaceae	83.32	55.53–102.33
Postiaceae	93.59	55.5–114.14
Sarcoporiaceae (*Sarcoporia*)	94.22	55.5–114.14
Sparassidaceae (*Sparassis*)	99.54	96.02–102.95

Table 3 Continued.

Node	Mean of stem age (Mya)	95% HPD (Mya)
Taiwanofungaceae (*Taiwanofungus*)	96.37	55.5–114.14
Adustoporia/Amyloporia	35.71	13.7–54.7
Amaropostia	35.75	15.36–38.57
Amylocystis	79.05	51.49–112.46
Anthoporia	63.03	58.01–66.89
Antrodia	59.94	51.98–65.18
Aurantipostia	41.83	21.55–54.52
Austroporia/Resinoporia	47.07	17.33–65.89
Austropostia/Tenuipostia	33.74	9.89–45.42
Brunneoporus	36.83	31.89–41.56
Buglossoporus/Neolentiporus	30.15	13.134–43.02
Calcipostia	40.41	19.12–51.14
Cartilosoma/Fragifomes	42.07	31.2–53.04
Crustoderma/Pycnoporellus	30.27	14.37–43.36
Cyanosporus/Postia	34.68	15.49–49.04
Cystidiopostia/Fuscopostia	31.68	14.79–38.42
Daedalea/Daedalella	43.19	35.14–52.91
Dentiporus/Pseudoantrodia	33.55	28.74–38.61
Eucalyptoporia	35.68	25–47.75
Fibroporia/Pseudofibroporia	59.22	19.11–90.49
Fomitopsis	48.12	17.03–57.75
Jahnoporus	50.56	19.88–70.8
Kusaghiporia	46.04	24.28–61.36
Laetiporus	37.66	17.19–56.34
Laricifomes/Gilbertsonia	31.89	8.49–43.75
Lentoporia	50.25	21.62–70.34
Macrohyporia/Wolfiporiella	34.87	12.77–41.59
Melanoporella/Wolfiporia	36.44	23.94–49.78
Melanoporia/Rhodofomes	32.28	22.86–47.07
Neoantrodia	32.73	12.86–44.38
Niveoporofomes	40.2	28.92–50.31
Nothofagiporus	35.99	15.48–50.03
Oligoporus	43.62	12.66–65.95
Osteina	67.51	40.42–85.82
Phaeolus	70.82	38.54–91
Ptychogaster	43.88	21.54–57.88
Resupinopostia	34.41	17.57–42.48
Rhizoporia/Ungulidaedalea	36.47	23.11–43.59
Rhodoantrodia/Pseudofomitopsis	30.97	15.48–44.03
Rhodofomitopsis/Flavidoporia	33.97	20.18–45.15
Rhodonia	61.58	26.32–78.85
Rubellofomes/Subantrodia	31.7	25.41–39.47
Ryvardenia	39	12.37–60.1
Spongiporus	38.79	15.14–39.72
Wolfiporiopsis	34.85	10–45.04

New taxa

Daedalea Pers., Synopsis Methodica Fungorum (Göttingen) 2: 500, 1801.

Type species – *Daedalea quercina* (L.) Pers.

Basidiomata annual to perennial, pileate or effused-reflexed, coriaceous to corky or hard corky when dry. Pileal surface cream, curry yellow to fawn. Pore surface ochraceous to dark brown or grey; pore irregular, labyrinthine or daedaleoid to lamellate, hydnoid or poroid. Hyphal system dimitic, generative hyphae with clamp connections, skeletal hyphae IKI–, CB–. Cystidia occasionally present, cystidioles usually present. Basidiospores cylindrical to ellipsoid, hyaline, thin-walled, smooth, IKI–, CB–. Causing a brown rot.

Notes – *Daedalea* was established earlier and typified by *D. quercina* (Persoon 1801). This genus belongs to Fomitopsidaceae which has received some attention and added several new species recently (Lindner et al. 2011, Li & Cui 2013, Han et al. 2015, 2016). *Ranadivia* Zmitr. was separated from *Daedalea* by Zmitrovich (2018) with *Daedalea allantoidea* M.L. Han, B.K. Cui & Y.C. Dai as the type species. However, *Daedalea* and *Ranadivia* share some similar morphological characteristics and are clustered together in phylogenetic tree, so *Ranadivia* was treated as synonym of *Daedalea* (Liu et al. 2023a).

Daedalea submodesta B.K. Cui & Shun Liu, sp. nov. Figs 3a–b, 4

Index Fungorum number: IF900934; Facesoffungi number: FoF 14701

Differs from other *Daedalea* spp. by its cinnamon brown to apricot orange pileal surface when fresh, pinkish buff to brownish vinaceous upon drying, buff to pinkish buff pore surface when fresh, faint yellow to light pink upon drying, and oblong to oblong-ellipsoid basidiospores (4–5 × 2.5–3 µm).

Type – AUSTRALIA. Queensland, Cairns, Crater Lakes National Park, on fallen angiosperm trunk, 17 May 2018, Cui 16773 (BJFC 030072, holotype).

Etymology – *Submodesta* (Lat.): refers to the new species resembling *Daedalea modesta* (Kunze ex Fr.) Aoshima in morphology.

Fruiting body – Basidiomata annual, pileate, single or imbricate, corky, without odor or taste when fresh, hard corky and light in weight upon drying. Pileus applanate to semicircular, sometimes dimidiate, or laterally elongated, projecting up to 6.5 cm long, 12.5 cm wide, 2 cm thick at base. Pileal surface cinnamon brown to apricot orange when fresh, becoming pinkish buff to brownish vinaceous upon drying, glabrous to slightly velutinate, tuberculate, concentrically sulcate and zonate. Pileal margin cream to buff, distinctly paler than the pileus, acute. Pore surface buff to pinkish buff when fresh, becoming faint yellow to light pink upon drying; sterile margin distinct, cream to buff, up to 3 mm wide; pores round, 6–8 per mm; dissepiments thick, entire. Context cream to clay-buff, corky, up to 1.3 cm thick. Tubes concolorous with pore surface, corky, up to 0.5 cm long.

Hyphal structure – Hyphal system dimitic; generative hyphae with clamp connections; skeletal hyphae IKI–, CB–; tissues unchanged in KOH.

Context – Generative hyphae infrequent, hyaline, thin- to slightly thick-walled, rarely branched, 2–4 µm in diam; skeletal hyphae dominant, hyaline to pale yellowish, thick-walled with a wide to narrow lumen, occasionally branched, straight to flexuous, interwoven, 2.2–6.2 µm in diam.

Tubes – Generative hyphae infrequent, hyaline, thin-walled, rarely branched, 1.9–3.8 µm in diam; skeletal hyphae dominant, hyaline to pale yellowish, thick-walled with a wide to narrow lumen, occasionally branched, straight to flexuous, interwoven, 2–5.3 µm in diam. Cystidia absent; fusoid cystidioles present, hyaline, thin-walled, 12.5–17.7 × 2.3–4.7 µm. Basidia clavate, with four sterigmata and a basal clamp connection, 9.7–21.5 × 4–6.2 µm; basidioles dominant, in shape similar to basidia, but smaller.

Spores – Basidiospores oblong to oblong-ellipsoid, hyaline, thin-walled, smooth, IKI–, CB–, (3.5–)4–5(–6) × (2–)2.5–3(–3.5) µm, L = 4.55 µm, W = 2.8 µm, Q = 1.59–1.65 (n = 90/3).

Type of rot – Brown rot.

Notes – Phylogenetically, *Daedalea submodesta* grouped with *D. modesta* and *D. vinacea* and formed a highly supported lineage (100% MP, 100% ML, 1.00 BPP; Fig. 1). Morphologically, they share an annual growth habit with applanate to semicircular pileus, but *D. modesta* has smaller basidiomata (6 cm wide, 7 cm long, 3–4 mm thick), narrower and cylindrical basidiospores (4.5–6 × 1.5–2 µm; Ryvarden & Johansen 1980); *D. vinacea* differs by its flesh pink to vinaceous pileal surface when fresh, buff, brownish vinaceous to clay-pink upon drying, smaller pores (7–10 per mm), cylindrical to ellipsoid and smaller basidiospores (3.4–4.2 × 2–2.3 µm). *Daedalea allantoidea*

M.L. Han, B.K. Cui & Y.C. Dai resembles *D. submodesta* by having annual and imbricate basidiomata, similar-colored pileal surface and similar-sized basidiospores, but *D. allantoidea* differs by having light clay-buff to fawn pore surface, larger and round to angular or elongated pores (1–3 per mm; Han et al. 2016). *Daedalea americana* M.L. Han, Vlasák & B.K. Cui and *D. stereoides* Fr. share similar-sized basidiospores as *D. submodesta*, but *D. americana* has larger pores (4–5 per mm) and smaller cystidia (11–15 × 4–5 µm; Han et al. 2015); *D. stereoides* differs by its white to ochraceous buff pileal surface with a pink tint and larger pores (1–3 per mm; Ryvarden & Johansen 1980).

Additional specimens (paratypes) examined – AUSTRALIA. Queensland, Cairns, Crater Lakes National Park, on fallen angiosperm trunk, 17 May 2018, Cui 16748 (BJFC 030047), Cui 16786 (BJFC 030085); on rotten angiosperm wood, 17 May 2018, Dai 18807 (BJFC 027275).

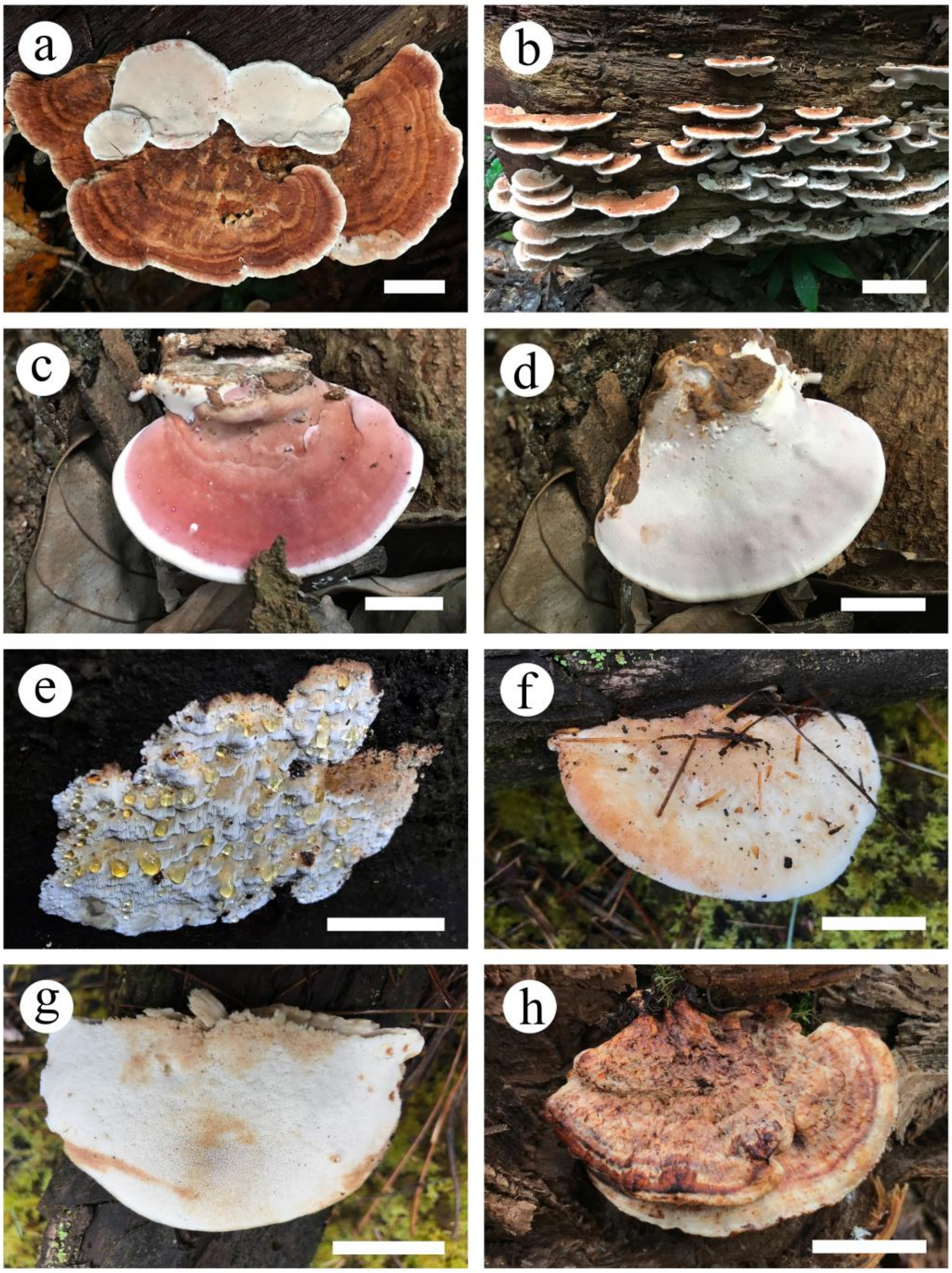

Figure 3 – Basidiomata of new species. a, b *Daedalea submodesta* (Cui 16773). c, d *D. vinacea* (Dai 18551). e *Eucalyptoporia tasmanica* (Cui 16677). f, g *Fuscopostia avellanea* (Cui 16266). h *F. persicina* (Cui 17086). Scale bars: c, d = 1.5 cm, f, g, h = 2 cm, a, e = 2.5 cm, b = 5.5 cm.

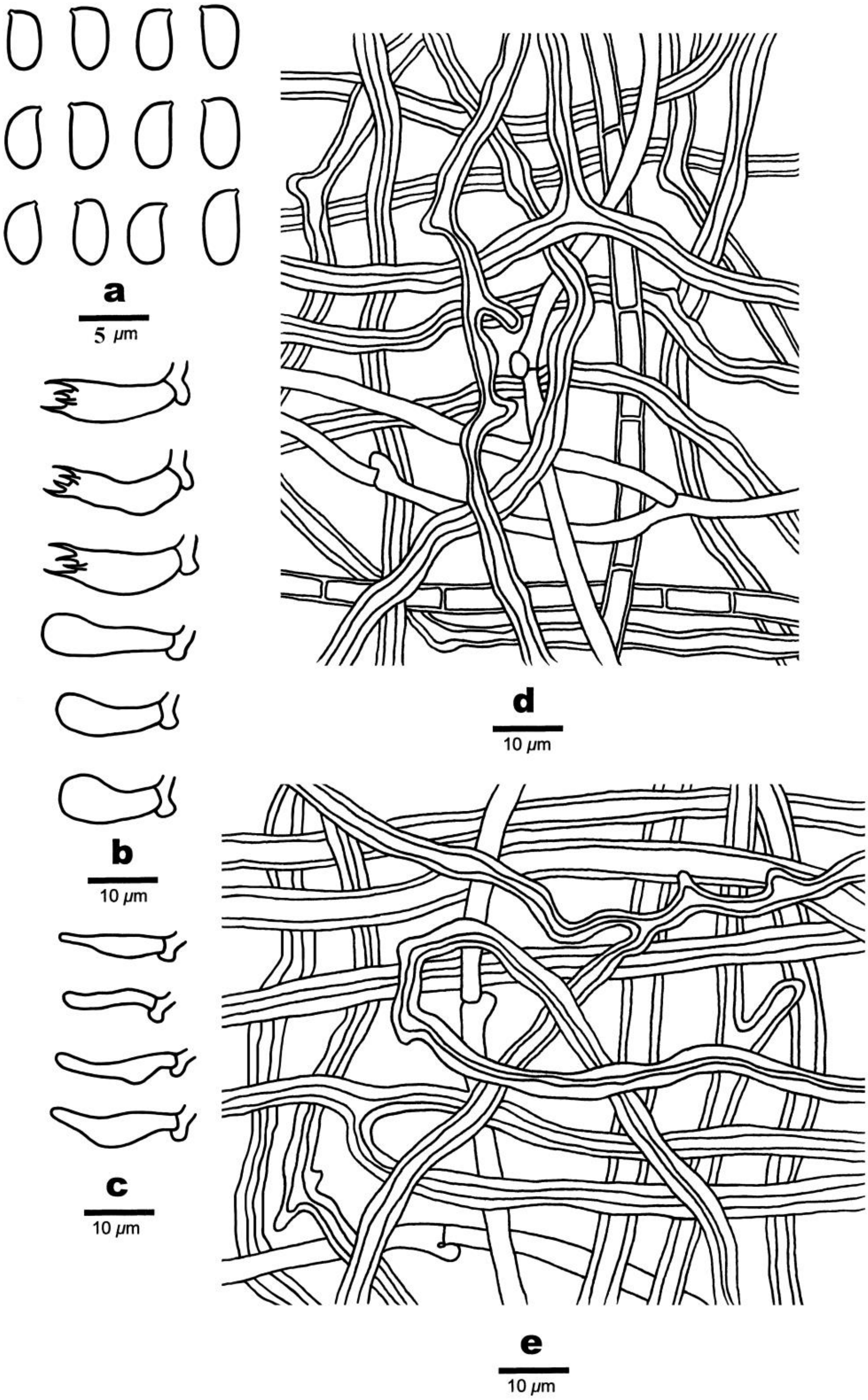

Figure 4 – Microscopic structures of *Daedalea submodesta* (drawn from the holotype). a Basidiospores. b Basidia and basidioles. c Cystidioles. d Hyphae from trama. e Hyphae from context. Scale bars: a = 5 µm, b–e = 10 µm.

Daedalea vinacea B.K. Cui & Shun Liu, sp. nov. Figs 3c–d, 5

Index Fungorum number: IF900935; Facesoffungi number: FoF 14702

Differs from other *Daedalea* spp. by its flesh pink to vinaceous pileal surface when fresh, buff, brownish vinaceous to clay-pink upon drying, round and small pores (7–10 per mm), cylindrical to ellipsoid and small basidiospores (3.4–4.2 × 2–2.3 µm).

Type – MALAYSIA. Kuala Lumpur, Forest Eco-Park, on rotten angiosperm wood, 14 April 2018, Dai 18551 (BJFC 026840, holotype).

Etymology – *Vinacea* (Lat.): refers to its vinaceous pileal surface.

Fruiting body – Basidiomata annual, pileate, solitary, soft corky, without odor or taste when fresh, corky and light in weight upon drying. Pileus applanate to slightly concave, semicircular to flabelliform, projecting up to 3.5 cm, 6.5 cm wide and 1.5 cm thick at base. Pileal surface flesh pink to vinaceous when fresh, becoming buff, brownish vinaceous to clay-pink upon drying, glabrous; margin white to pinkish buff, obtuse to acute. Pore surface cream to pinkish buff when fresh, becoming flesh pink to brownish vinaceous upon drying; sterile margin distinct, cream to buff, up to 3 mm wide; pores round, 7–10 per mm; dissepiments thick, entire. Context cream to clay-buff, corky, up to 8 mm thick, Tubes concolorous with pore surface, corky, up to 6 mm long.

Hyphal structure — Hyphal system dimitic; generative hyphae with clamp connections; skeletal hyphae IKI–, CB–; tissues unchanged in KOH.

Context – Generative hyphae infrequent, hyaline, slightly thick-walled, unbranched, 1.9–3.5 µm in diam; skeletal hyphae dominant, yellowish brown to cinnamon brown, thick-walled with a wide to narrow lumen, occasionally branched, straight to flexuous, interwoven, 2.4–5.2 µm in diam.

Tubes – Generative hyphae infrequent, hyaline, thin- to slightly thick-walled, unbranched, 1.9–2.5 µm in diam; skeletal hyphae dominant, hyaline to pale yellowish, thick-walled with a wide to narrow lumen, occasionally branched, straight to flexuous, interwoven, 2–4 µm in diam. Cystidia and cystidioles absent. Basidia clavate, with four sterigmata and a basal clamp connection, 13–16.5 × 5–6.5 µm; basidioles dominant, in shape similar to basidia, but smaller.

Spores – Basidiospores cylindrical to ellipsoid, hyaline, thin-walled, smooth, IKI–, CB–, (3–)3.5–4.2(–4.3) × (1.5–)2–2.5 µm, L = 3.84 µm, W = 2.02 µm, Q = 1.88–1.92 (n = 90/3).

Type of rot – Brown rot.

Notes – Phylogenetically, *Daedalea vinacea* grouped with *D. modesta* and *D. submodesta* and formed a highly supported lineage (100% MP, 100% ML, 1.00 BPP; Fig. 1). Morphologically, *D. modesta* has brownish pileal surface and cream to clay-pink pore surface, and longer basidiospores (4.5–6 × 1.5–2 µm; Ryvarden & Johansen 1980); *D. submodesta* has pinkish buff to brownish vinaceous pileal surface and faint yellow to light pink pore surface when dry, and larger ellipsoid basidiospores (3.9–5.3 × 2.6–3 µm). *Daedalea fulvirubida* (Corner) T. Hatt., *D. pseudodochmia* (Corner) T. Hatt. and *D. stevensonii* Petr. share the same type locality with *D. vinacea*. However, they all possess larger pores and basidiospores, *D. fulvirubida* (1–3 per mm, 4.5–6.5 × 2–2.8 µm; Hattori 2005), *D. pseudodochmia* (1–2 per mm, 5.5–6 × 3–3.5 µm; Lindner et al. 2011), *D. stevensonii* (1–1.5 per mm, 4–5 × 2–3.5 µm; Petrak 1959).

Additional specimens (paratypes) examined – MALAYSIA. Petaling Jaya, Kota Damansara, Community Forest Reserve, on fallen angiosperm trunk, 6 July 2019, Cui 18260 (BJFC 035119), Cui 18272 (BJFC 035131); Kuala Lumpur Eco-Forest Park, on fallen angiosperm trunk, 8 July 2019, Cui 18323 (BJFC 035182); Selangor, Forest Research Institute of Malaysia, on Construction wood, 15 April 2018, Dai 18562 (BJFC 026851). SINGAPORE. Bukit Timah National Reserve, on fallen angiosperm trunk, 19 July 2017, Dai 17823 (BJFC 025355).

Eucalyptoporia B.K. Cui & Shun Liu, gen. nov.

Index Fungorum number: IF900936; Facesoffungi number: FoF 14703

Etymology – *Eucalyptoporia* (Lat.): refers to the type species of this genus growing on *Eucalyptus* sp. and producing resupinate polyporoid basidiomata.

Type species – *Eucalyptoporia tasmanica* B.K. Cui & Shun Liu.

Basidiomata annual, resupinate to effused-reflexed, corky to fragile. Pore surface white, pinkish buff to clay-buff. Subiculum buff. Tubes concolorous with pore surface. Hyphal system dimitic; generative hyphae with clamp connections; skeletal hyphae IKI–, CB–; tissues unchanged in KOH. Cystidia absent, cystidioles occasionally present. Basidia clavate. Basidiospores cylindrical to oblong-ellipsoid, hyaline, thin-walled, smooth, IKI–, CB–. Causing a brown rot.

Notes – In the phylogenetic analysis, *Eucalyptoporia* is closely related to *Melanoporia* and *Rhodofomes* (Fig. 1). Morphologically, they share dimitic hyphal system with clamped generative hyphae; however, *Melanoporia* differs in having salmon pink, brownish vinaceous to fuscous pileal surface, dark chocolate brown to dark purplish brown pore surface and ellipsoid basidiospores (Liu et al. 2023a); *Rhodofomes* differs by possessing mostly pileate basidiomata with rose pink, brown or black pileal surface, pinkish, vinaceous to brownish vinaceous pore surface (Han et al. 2016).

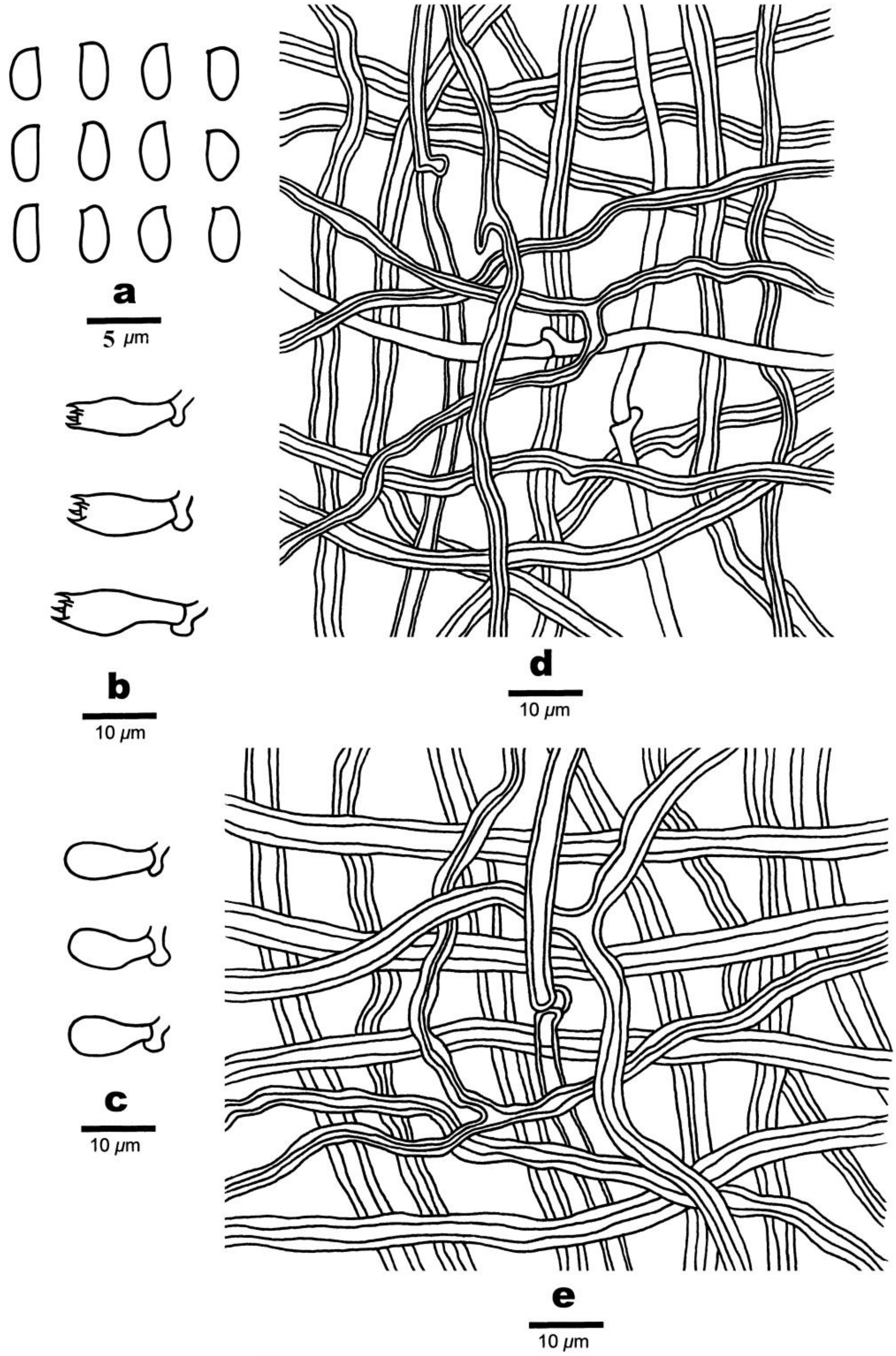

Figure 5 – Microscopic structures of *Daedalea vinacea* (drawn from the holotype). a Basidiospores. b Basidia. c basidioles. d Hyphae from trama. e Hyphae from context. Scale bars: a = 5 μm, b–e = 10 μm.

Eucalyptoporia tasmanica B.K. Cui & Shun Liu, sp. nov. Figs 3e, 6

Index Fungorum number: IF900937; Facesoffungi number: FoF 14704

Type – AUSTRALIA. Tasmania, Mount Field National Park, on fallen trunk of *Eucalyptus* sp., 14 May 2018, Cui 16677 (BJFC 029976, holotype).

Etymology – *Tasmanica* (Lat.): refers to the species collected from Tasmania in Australia.

Fruitbody – Basidiomata annual, resupinate to effused-reflexed, not easily separated from substrate, corky, without odor or taste when fresh, corky to fragile upon drying, up to 5 cm long, 10 cm wide, 5 mm thick at center. Pore surface white to pinkish buff when fresh, becoming buff yellow to clay-buff upon drying; pores angular to round, 4–6 per mm; dissepiments slightly thick, entire to lacerate. Subiculum buff, corky, thin, up to 2 mm thick. Tubes concolorous with pore surface, corky, up to 3 mm long.

Hyphal structure – Hyphal system dimitic; generative hyphae with clamp connections; skeletal hyphae IKI–, CB–; tissues unchanged in KOH.

Subiculum – Generative hyphae frequent, hyaline, thin- to slightly thick-walled, frequently branched, 3.3–5.8 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen to subsolid, rarely branched, interwoven, 3.2–6.3 µm in diam.

Tubes – Generative hyphae abundant in trama, hyaline, thin-walled, frequently branched, 1.9–3.2 µm in diam; skeletal hyphae frequent, hyaline, thick-walled with a wide to narrow lumen, 2.8–3.4 µm in diam. Cystidia absent, but fusoid cystidioles occasionally present, hyaline, thin-walled, 13–26 × 3.2–4.8 µm. Basidia clavate, with four sterigmata and a basal clamp connection, 17.8–30 × 4.2–6.3 µm; basidioles dominant, in shape similar to basidia, but slightly smaller.

Spores – Basidiospores cylindrical to oblong-ellipsoid, hyaline, thin-walled, smooth, IKI–, CB–, (3.8–)4–5(–5.2) × (1.9–)2–2.8(–3) µm, L = 4.58 µm, W = 2.35 µm, Q = 1.66–2.13 (n = 50/1).

Type of rot – Brown rot.

Notes – One ITS sequence (HM583823) originated from Hopkins et al. (2011) is consistent with the sequence of *Eucalyptoporia tasmanica*. Furthermore, this specimen has the same geographical distribution and host tree as *E. tasmanica* (Hopkins et al. 2011). Thus, this sample is identified as *E. tasmanica* in this study.

Fuscopostia B.K. Cui, L.L. Shen & Y.C. Dai, Persoonia 42: 118, 2018.

Type species – *Fuscopostia fragilis* (Fr.) B.K. Cui, L.L. Shen & Y.C. Dai.

Basidiomata annual, pileate to effused-reflexed, soft corky, fragile to corky. Pileal surface white, cream to brownish. Pore surface white, buff to rusty brown; pores round to angular. Hyphal system monomitic; generative hyphae with clamp connections, IKI–, CB–. Gloeocystidia present or not, cystidioles frequently present. Basidiospores cylindrical to allantoid, hyaline, thin-walled, smooth, IKI–, CB–. Causing a brown rot.

Notes – *Fuscopostia* is a brown-rot fungal genus, recognizable by brownish basidiomata when bruised or drying. Shen et al. (2019) carried out the phylogenetic and taxonomic studies on *Postia* and related genera and transferred *P. duplicata* L.L. Shen, B.K. Cui & Y.C. Dai, *P. fragilis* (Fr.) Jülich, *P. lateritia* Renvall and *P. leucomallella* (Murrill) Jülich to the new genus *Fuscopostia*. Then, Liu et al. (2023a) described *F. subfragilis* B.K. Cui & Shun Liu from Southwest China. Phylogenetically, *Fuscopostia* was grouped together with *Amaropostia* B.K. Cui, L.L. Shen & Y.C. Dai, *Cystidiopostia* B.K. Cui, L.L. Shen & Y.C. Dai and *Spongiporus* Murrill within Postiaceae (Fig. 1), which was consistent with previous studies (Shen et al. 2019, Liu et al. 2023a).

Although the brownish basidiomata when bruised or drying makes *Fuscopostia* easy to distinguish from other genera, identification to species level is difficult as morphological features are quite similar among the species. Based on morphological characters and phylogenetic analyses, seven species are accepted in *Fuscopostia* around the world, of which six species can be distributed in China, viz., *F. avellanea* B.K. Cui & Shun Liu, *F. duplicata* (L.L. Shen, B.K. Cui & Y.C. Dai) B.K. Cui, L.L. Shen & Y.C. Dai, *F. leucomallella* (Murrill) B.K. Cui, L.L. Shen & Y.C. Dai, *F. persicina* B.K. Cui & Shun Liu, *F. subfragilis*, and *F. tomentosa* B.K. Cui & Shun Liu. Through field trip investigations, we concluded that *Fuscopostia* spp. distributed in China mainly occur in temperate to alpine plateau climate of Southwest and Northeast regions. Moreover, most of the *Fuscopostia* species are annual and cold-loving saprotrophic wood-decay fungi, mainly saprotrophs on dead wood of conifers, especially on *Pinus* sp., *Picea* sp. and *Abies* sp.

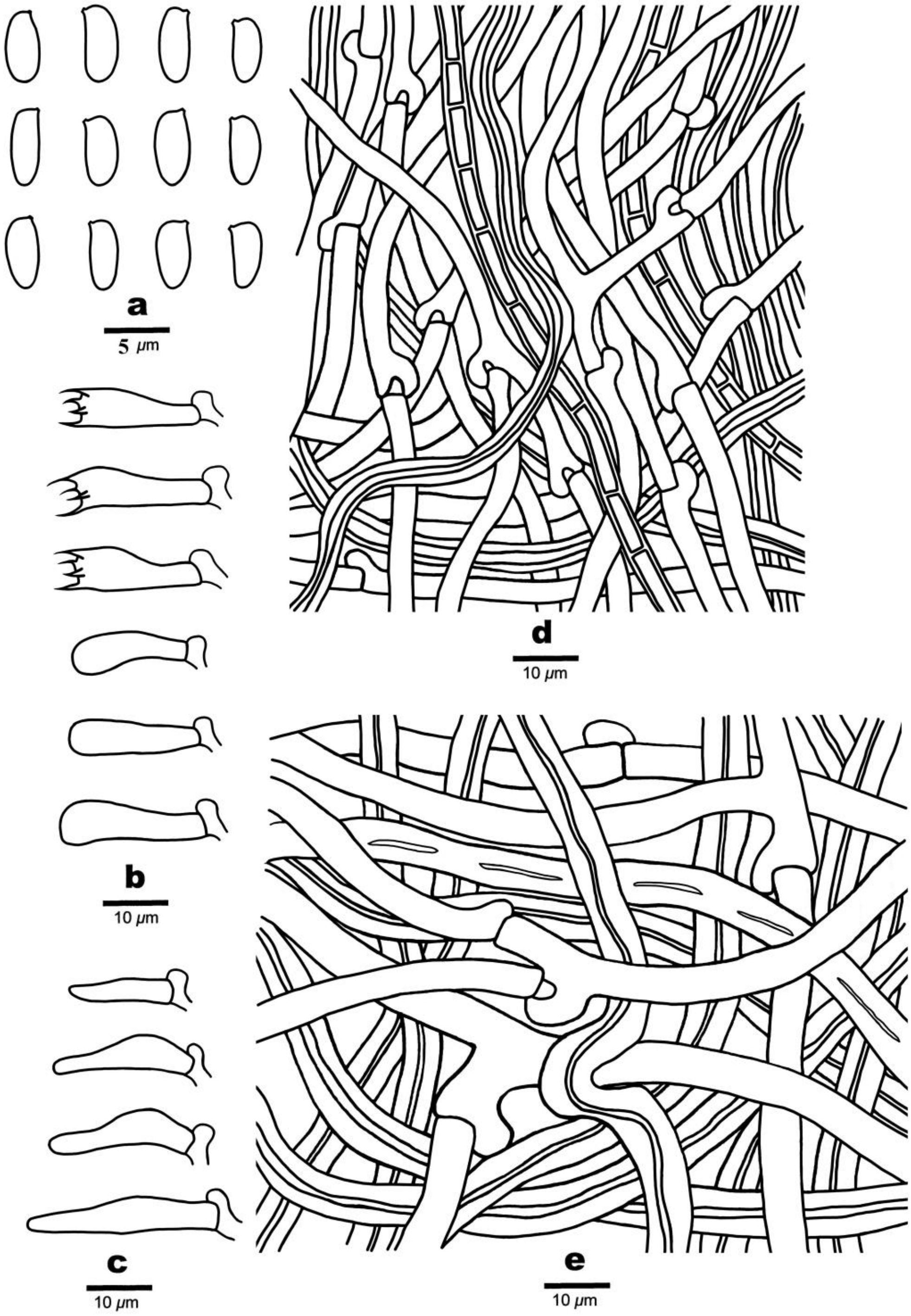

Figure 6 – Microscopic structures of *Eucalyptoporia tasmanica* (drawn from the holotype). a Basidiospores. b Basidia and basidioles. c Cystidioles. d Hyphae from trama. e Hyphae from context. Scale bars: a = 5 µm, b–e = 10 µm.

Fuscopostia avellanea B.K. Cui & Shun Liu, sp. nov. Figs 3f–g, 7

Index Fungorum number: IF900938; Facesoffungi number: FoF 14705

Differs from other *Fuscopostia* spp. by its cream to salmon pileal surface with clay-pink tint when fresh, becoming clay-buff to buff yellow when bruised or drying, allantoid to cylindrical basidiospores (3.8–5.2 × 0.9–1.5 µm) and grows on *Pinus* sp.

Type – CHINA. Yunnan Province, Lanping County, Tongdian Town, Luoguqing, on fallen trunk of *Pinus* sp., 19 September 2017, Cui 16266 (BJFC 029565).

Etymology – *Avellanea* (Lat.): refers to the clay-buff pileal surface when bruised or drying.

Fruiting body – Basidiomata annual, pileate to effused-reflexed, solitary, soft corky to corky, without odor or taste when fresh, becoming corky to fragile and light in weight upon drying. Pileus semicircular to ungulate, projecting up to 4 cm, 7.5 cm wide and 1.5 cm thick at base. Pileal surface cream to salmon, with clay-pink tint when fresh, becoming buff yellow to clay-buff when bruised or drying, glabrous to velutinate, azonate; margin sharp to obtuse, straight when fresh and straight to incurved upon drying. Pore surface white to cream when fresh, becoming pinkish buff to rusty brown when bruised or drying; sterile margin indistinct; pores round to angular, 4–7 per mm; dissepiments thin to slightly thick, entire to lacerate. Context cream to buff, corky, up to 9 mm thick. Tubes pinkish buff to rusty brown, corky to fragile, up to 5 mm long.

Hyphal structure – Hyphal system monomitic; generative hyphae with clamp connections, IKI–, CB–; tissues unchanged in KOH.

Context – Generative hyphae hyaline, thin- to slightly thick-walled with a wide lumen, occasionally branched, interwoven, 2.5–7 µm in diam.

Tubes – Generative hyphae hyaline, thin- to slightly thick-walled with a wide lumen, occasionally branched, interwoven, 2–4 µm in diam. Cystidia absent; cystidioles present, narrowly clavate, hyaline, thin-walled, 13–19 × 1.8–3 µm. Basidia clavate, with four sterigmata and a basal clamp connection, 13.5–20 × 3.5–5 µm; basidioles dominant, in shape similar to basidia, but smaller.

Spores – Basidiospores allantoid to cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, (3.7–)3.8–5.2(–5.3) × 0.9–1.5(–1.6) µm, L = 4.26 µm, W = 1.24 µm, Q = 3.27–3.69 (n = 120/4).

Type of rot – Brown rot.

Additional specimens (paratypes) examined – CHINA. Yunnan Province, Ninglang County, Luguhu Nature Reserve, on rotten wood of *Pinus* sp., 9 September 2021, Dai 23018 (BJFC 037591), Dai 23019 (BJFC 037592); Yunlong County, Tianchi Nature Reserve, on fallen branch of *Pinus* sp., 6 November 2019, Cui 18064 (BJFC 034923).

Notes – Phylogenetically, *Fuscopostia avellanea* is closely related to *F. fragilis*, *F. subfragilis* and *F. tomentosa* (Fig. 1). However, *F. fragilis* differs in having white to buff pileal surface when fresh, buff yellow, rusty brown to dark brown when bruised or drying, larger pores (2–4 per mm) and phaseoliform to broadly allantoid basidiospores (3.9–5 × 1.7–2.1 µm; Renvall 1992); *F. subfragilis* differs in its buff to flesh pink pore surface when fresh, becoming olivaceous buff to honey yellow when dry, and wider basidiospores (4.3–5.2 × 1.7–2.5 µm; Liu et al. 2023a); *F. tomentosa* differs by its clay-buff, fawn to snuff brown pileal surface when bruised or drying, longer cystidioles (18.3–42.5 × 1.9–3.2 µm) and larger basidiospores (3.9–6.2 × 1.8–2.5 µm).

Fuscopostia persicina B.K. Cui & Shun Liu, sp. nov. Figs 3h, 8a, 9

Index Fungorum number: IF900939; Facesoffungi number: FoF 14706

Differs from other *Fuscopostia* spp. by its solitary or imbricate basidiomata with peach to cinnamon pileal surface when fresh, becoming fawn to snuff brown when bruised or drying, round pores (6–8 per mm) and allantoid to cylindrical basidiospores (4.4–5.3 × 1.5–2.3 µm).

Type – CHINA. Yunnan Province, Lijiang, Yulong Xueshan Park, on fallen trunk of *Picea* sp., 16 September 2018, Cui 17086 (BJFC 030385).

Etymology – *Persicina* (Lat.): refers to the peach pileal surface when fresh.

Fruiting body – Basidiomata annual, pileate, solitary or imbricate, soft corky to corky, without odor or taste when fresh, becoming corky to fragile and light in weight upon drying. Pileus flabelliform, projecting up to 4.5 cm, 7 cm wide and 1 cm thick at base. Pileal surface peach to cinnamon when fresh, becoming fawn to snuff brown when bruised or drying, glabrous, azonate and sulcate; margin sharp, straight when fresh and straight to incurved upon drying. Pore surface cream to buff when fresh, becoming milky coffee to snuff brown when bruised or drying; sterile margin indistinct; pores round, 6–8 per mm; dissepiments slightly thick, entire. Context cream to buff, corky, up to 5 mm thick. Tubes pinkish buff to olivaceous buff, corky to fragile, up to 3 mm long.

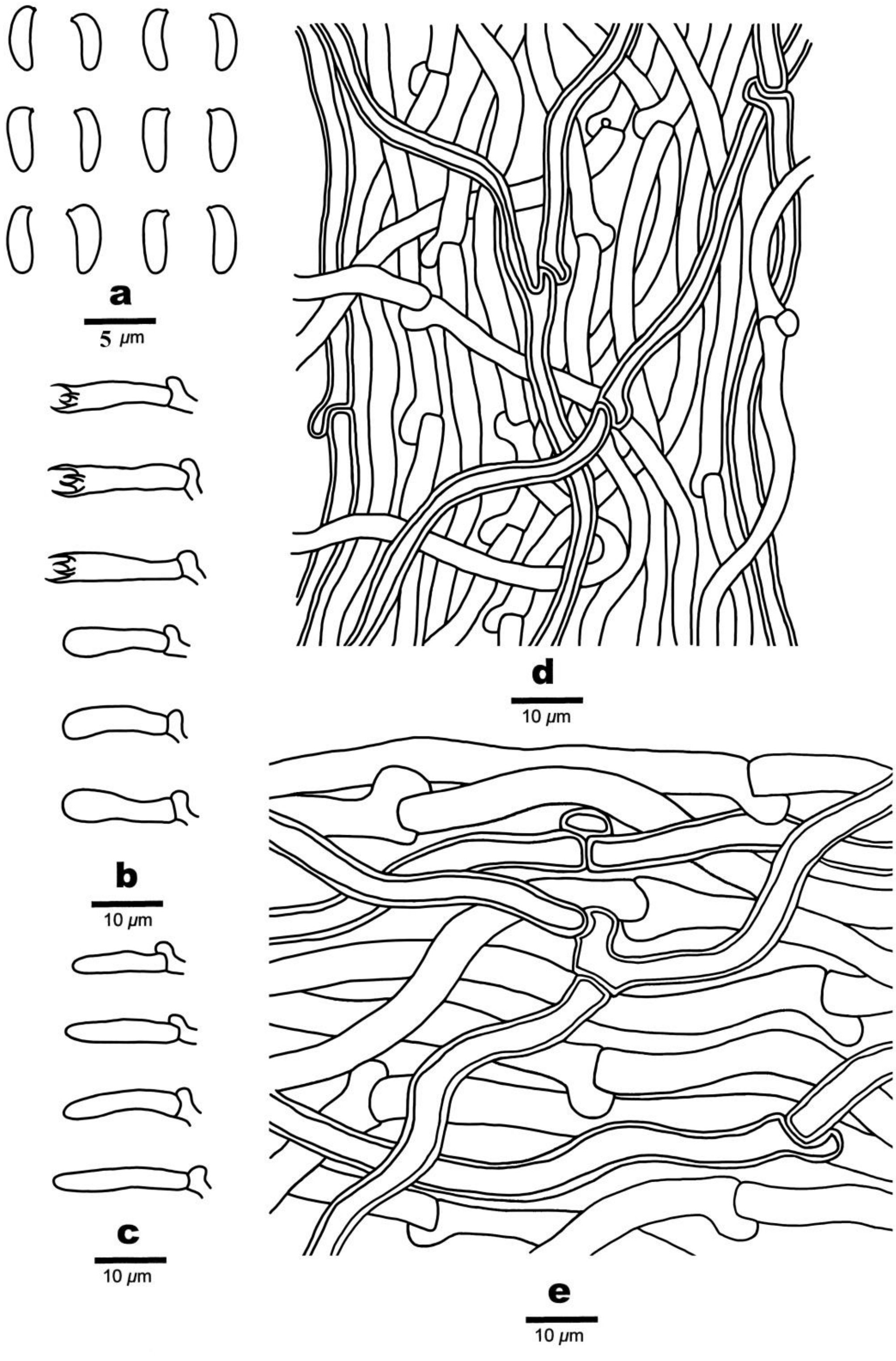

Figure 7 – Microscopic structures of *Fuscopostia avellanea* (drawn from the holotype). a Basidiospores. b Basidia and basidioles. c Cystidioles. d Hyphae from trama. e Hyphae from context. Scale bars: a = 5 μm, b–e = 10 μm.

Hyphal structure – Hyphal system monomitic; generative hyphae with clamp connections, IKI–, CB–; tissues unchanged in KOH.

Context – Generative hyphae hyaline, slightly thick-walled with a wide lumen, occasionally branched, interwoven, 2.5–7 µm in diam.

Tubes – Generative hyphae hyaline, thin- to slightly thick-walled with a wide lumen, occasionally branched, interwoven, 2–5 µm in diam. Gloeocystidia present in the hymenium, narrowly clavate to fusoid, hyaline, thin-walled, 16–27.5 × 2–4.5 µm; cystidioles present, narrowly clavate to fusoid, hyaline, thin-walled, 14.5–22 × 3–5 µm. Basidia clavate, with four sterigmata and a basal clamp connection, 15.5–20 × 3–5.5 µm; basidioles dominant, in shape similar to basidia, but smaller.

Spores – Basidiospores allantoid to cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, (4.2–)4.4–5.3(–5.4) × (1.3–)1.5–2.3 µm, L = 4.82 µm, W = 1.83 µm, Q = 2.65–2.69 (n = 60/2).

Type of rot – Brown rot.

Additional specimen (paratype) examined – CHINA. Xizang (Tibet), Linzhi County, Sejila Mountain, on stump of *Abies* sp., 23 October 2021, Dai 23341 (BJFC 037912).

Notes – *Fuscopostia persicina* is closely related to *F. duplicate*, *F. leucomallella* and *F. subfragilis* in the phylogenetic analyses (Fig. 1). They share pileate basidiomata with flabelliform pileus, and similar sized basidiospores, but *F. duplicate* differs in its white to cream pileal surface when fresh, cinnamon to reddish brown when bruised or upon drying, larger pores (3–4 per mm), gloeocystidia (26–34 × 2–3 µm) and basidia (20–28 × 4–5 µm; Shen et al. 2014); *F. leucomallella* differs by having larger pores (3–4 per mm), cystidia (19–42 × 4–9 µm) and longer basidiospores (4.6–6.3 × 1.3–1.8 µm; Renvall 1992); *F. subfragilis* differs by having buff to honey yellow pileal surface and olivaceous buff to honey yellow pore surface when dry, and larger pores (3–4 per mm; Liu et al. 2023a).

Fuscopostia tomentosa B.K. Cui & Shun Liu, sp. nov. Figs 8b–c, 10

Index Fungorum number: IF900940; Facesoffungi number: FoF 14707

Differs from other *Fuscopostia* spp. by its tomentose, white to cream pileal surface in juvenile specimens and light brown to reddish brown at center in mature fresh specimens, becoming clay-buff, fawn to snuff brown when bruised or drying, cylindrical basidiospores (3.9–6.2 × 1.8–2.5 µm) and grows on Abietoideae sp.

Type – CHINA. Sichuan Province, Jiulong County, Wuxuhai Park, on stump of *Picea* sp., 13 September 2019, Cui 17718 (BJFC 034577).

Etymology – *Tomentosa* (Lat.): refers to the tomentose pileal surface.

Fruiting body – Basidiomata annual, pileate, solitary, soft corky, without odor or taste when fresh, becoming corky to fragile and light in weight upon drying. Pileus semicircular to flabelliform, projecting up to 3 cm, 6.5 cm wide and 1.5 cm thick at base. Pileal surface white to cream in juvenile specimens, light brown to reddish brown at center and cream to buff yellow towards the margin in mature fresh specimens, becoming clay-buff, fawn to snuff brown when bruised or drying, tomentose, concentrically zonate or azonate and sulcate; margin sharp to obtuse, straight when fresh and straight to incurved upon drying. Pore surface white to cream when fresh, becoming greyish brown, snuff brown to rusty brown when bruised or drying; sterile margin indistinct; pores round to angular, 3–5 per mm; dissepiments thin to slightly thick, entire to lacerate. Context honey yellow to greyish brown, corky, up to 8 mm thick. Tubes pinkish buff to clay-buff, corky to fragile, up to 4 mm long.

Hyphal structure – Hyphal system monomitic; generative hyphae with clamp connections, IKI–, CB–; tissues unchanged in KOH.

Context – Generative hyphae hyaline, thin- to slightly thick-walled with a wide lumen, occasionally branched, interwoven, 2.5–6.5 µm in diam.

Tubes – Generative hyphae hyaline, thin- to slightly thick-walled with a wide lumen, occasionally branched, interwoven, 2–4 µm in diam. Cystidia absent; cystidioles present, hyphoid to narrowly clavate, hyaline, thin-walled, 18–42.5 × 2–3.5 µm. Basidia clavate, with four sterigmata and a basal clamp connection, 17.5–24.5 × 3–5.5 µm; basidioles dominant, in shape similar to basidia, but smaller.

Spores – Basidiospores cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, 3.9–6.2(–6.3) × 1.8–2.5(–2.7) µm, L = 5.21 µm, W = 2.16 µm, Q = 2.25–2.66 (n = 120/4).

Type of rot – Brown rot.

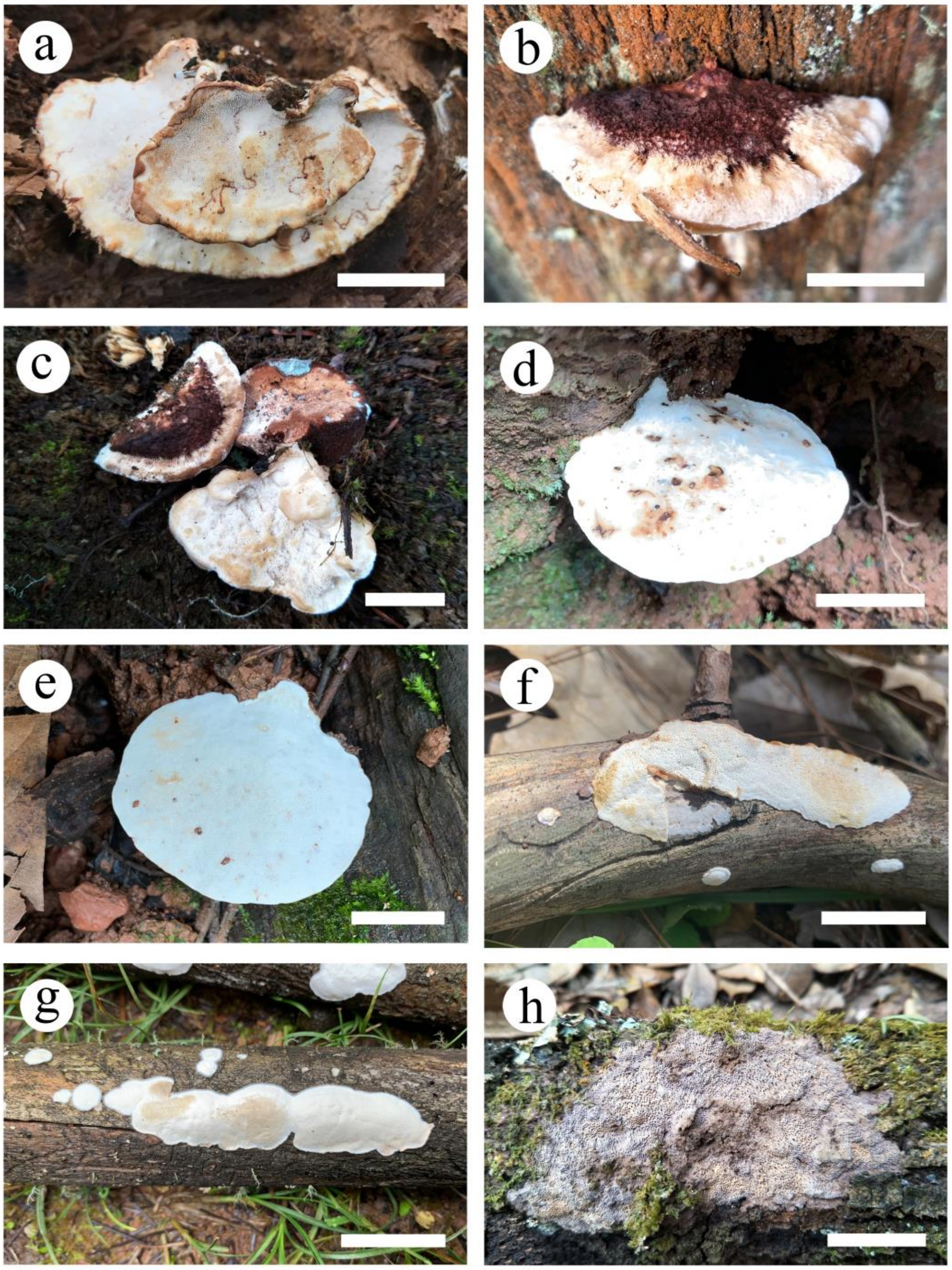

Figure 8 – Basidiomata of new species. a *F. persicina* (Cui 17086). b, c *F. tomentosa* (Cui 17718). d, e *Niveoporofomes orientalis* (Dai 20440). f, g *Resupinopostia sublateritia* (Dai 22655, Dai 22760). h *Rhodoantrodia subtropica* (Cui 18021). Scale bars: a, b, d, e, f, g = 2 cm, h = 2.5 cm, c = 3 cm.

Additional specimens examined – ***Fuscopostia duplicata***. CHINA. Xizang (Tibet), Linzhi, Bomi County, Yigong Tea Plantation, on rotten wood of *Pinus armandii*, 24 October 2021, Dai 23429 (BJFC 038001), Dai 23430 (BJFC 038002). Zhejiang Province, Qingyuan County, Baishanzu Nature Reserve, on rotten angiosperm wood, 14 August 2013, Dai 13411 (BJFC 014872, holotype). ***Fuscopostia fragilis***. BELARUS. Brestskaya Voblasts, Belavezhskaya Pushcha National Park, on rotten wood of *Picea* sp., 18 October 2019, Dai 21040 (BJFC 032699); Mahilyowskaya, Svislach-Byarezina projecting National Park, on fallen trunk of *Pinus* sp., 15 October 2019, Dai 20956 (BJFC 032615). ***Fuscopostia lateritia***. CHINA. Jilin Province, Antu County, Changbaishan Nature Reserve, on rotten wood of *Picea* sp., 25 August 2005, Dai 6946 (IFP 011823).

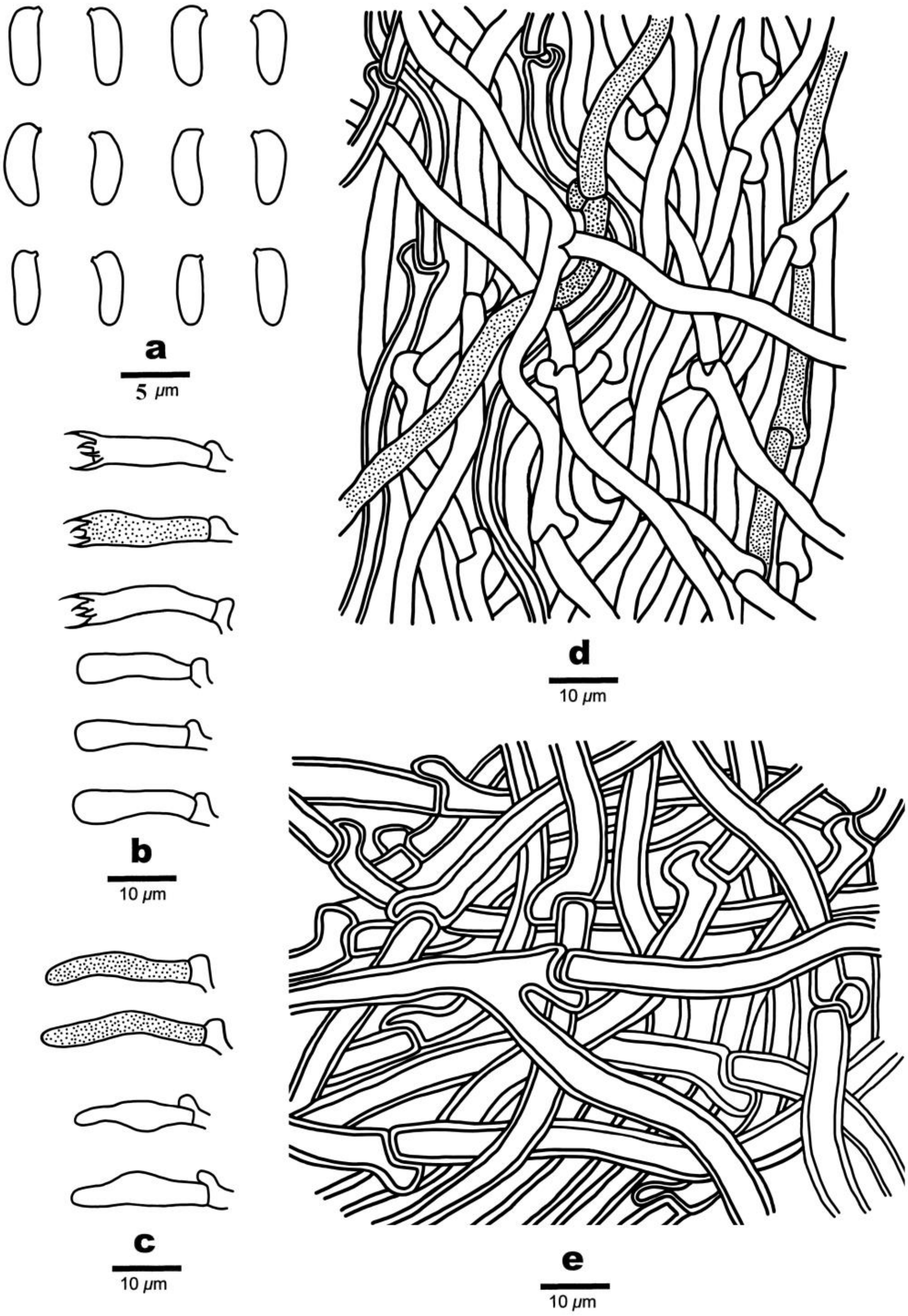

Figure 9 – Microscopic structures of *Fuscopostia persicina* (drawn from the holotype). a Basidiospores. b Basidia and basidioles. c Gloeocystidia and cystidioles. d Hyphae from trama. e Hyphae from context. Scale bars: a = 5 µm, b–e = 10 µm.

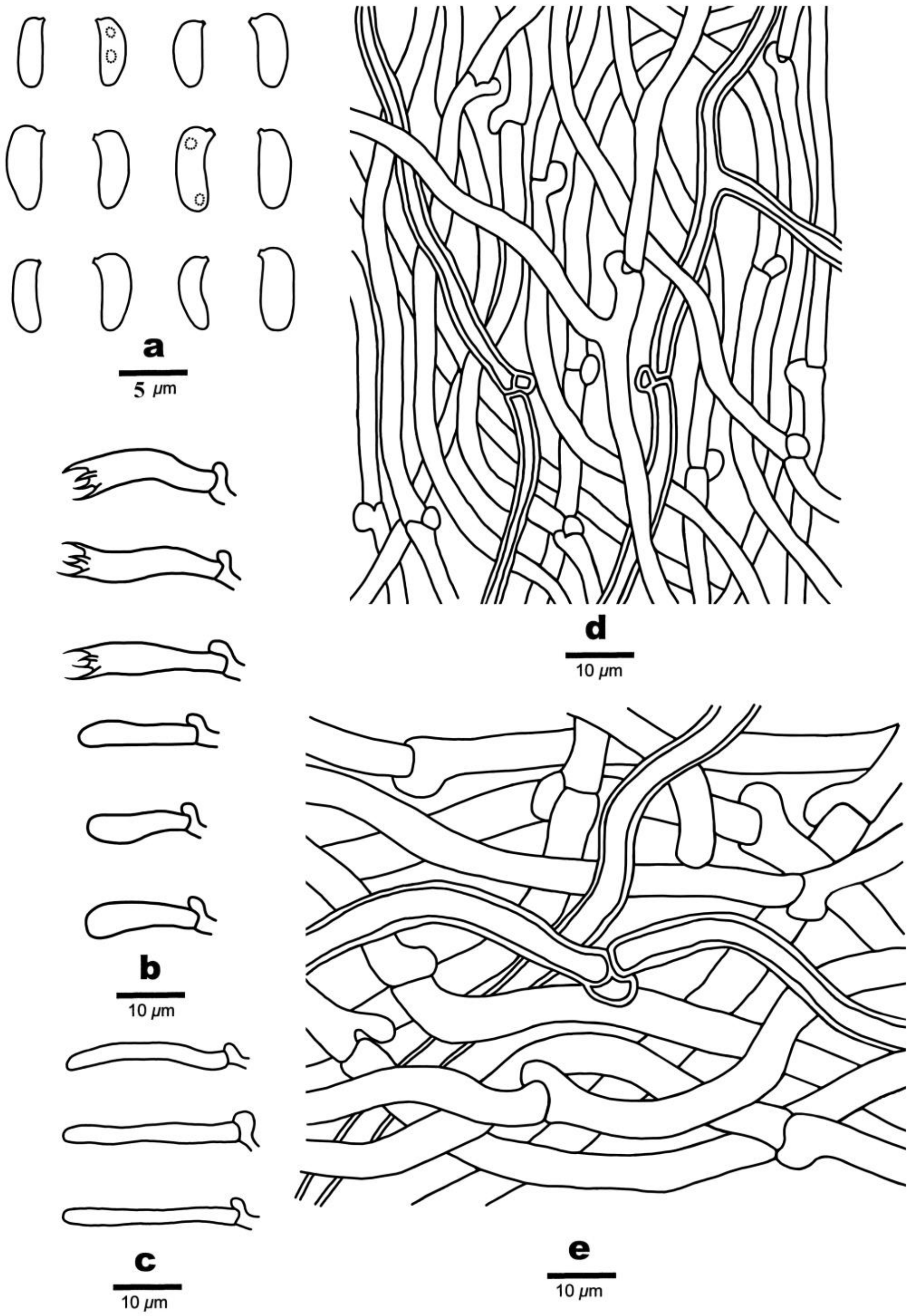

Figure 10 – Microscopic structures of *Fuscopostia tomentosa* (drawn from the holotype). a Basidiospores. b Basidia and basidioles. c Cystidioles. d Hyphae from trama. e Hyphae from context. Scale bars: a = 5 µm, b–e = 10 µm.

FINLAND. Perä-Pohjanmaa, South Pisavaara National Park, on fallen trunk of *Pinus* sp., 15 September 1997, Dai 2662 (BJFC 002083). ***Fuscopostia leucomallella***. CHINA. Xizang (Tibet), Linzhi, Bomi County, on fallen trunk of *Pinus yunnanensis*, 25 October 2021, Dai 23505 (BJFC 038077); Bomi County, Gang Picea Forest Scenic Spot, on rotten wood of *Pinus yunnanensis*, 27 October 2021, Dai 23644 (BJFC 038216); Bomi County, Gang Picea Forest Scenic Spot, on stump of *Pinus yunnanensis*, 27 October 2021, Dai 23655 (BJFC 038227); Bomi County, Yigong Tea Plantation, on rotten wood of *Pinus armandii*, 24 October 2021, Dai 23462 (BJFC 038034). ***Fuscopostia subfragilis***. CHINA. Sichuan Province, Jiulong County, Wuxuhai Park, on fallen trunk of *Picea* sp., 13 September 2019, Cui 17706 (BJFC 034565). Yunnan Province, Chuxiong, Zixishan Nature Reserve, on fallen angiosperm branch, 20 September 2017, Cui 16302 (BJFC 029601, holotype); Lanping County, Tongdian, Luoguqing, on fallen trunk of *Pinus* sp., 19 September 2017, Cui 16282 (BJFC 029581). ***Fuscopostia tomentosa***. CHINA. Sichuan Province, Jiuzhaigou County, Jiuzhaigou Nature Reserve, on fallen trunk of *Picea* sp., 20 September 2020, Cui 18564 (BJFC 035425); Meigu County, Dafengding Nature Reserve, on dead tree of *Picea* sp., 18 September 2019, Cui 17860 (BJFC 034719); on stump of *Picea* sp., 18 September 2019, Cui 17865 (BJFC 034724); Yajiang County, Kangbahanzi Village, on stump of *Abies* sp., 7 September 2020, Cui 18364 (BJFC 035223). Yunnan Province, Shangri-La, Pudacuo National Park, on fallen trunk of *Picea* sp., 17 September 2018, Cui 17114 (BJFC 030414); on stump of *Picea* sp., 13 August 2019, Cui 17478 (BJFC 034337); on rotten stump of *Abies* sp., 7 September 2021, Dai 22977 (BJFC 037550); Deqin County, Baimaxueshan Nature Reserve, on stump of *Abies* sp., 14 September 2020, Cui 18515 (BJFC 035376).

Notes – In the phylogenetic analyses, *Fuscopostia tomentosa* is closely related to *F. avellanea* and *F. fragilis* (Fig. 1). *Fuscopostia avellanea* and *F. fragilis* resembles *F. tomentosa* by having white to cream pore surface when fresh, pinkish buff to rusty brown when bruised or drying, but *F. avellanea* differs by having cream to salmon pileal surface with clay-pink tint when fresh, clay-buff to buff yellow when bruised or drying, smaller pores (4–7 per mm), cystidioles (12.8–19.2 × 1.8–3.3 µm) and basidiospores (3.8–5.2 × 0.9–1.5 µm); *F. fragilis* differs by having white to buff pileal surface when fresh and smaller basidiospores (3.9–5 × 1.7–2.1 µm; Renvall 1992). Morphologically, *F. duplicate*, *F. leucomallella* and *F. tomentosa* share white to cream pore surface when fresh and similar sized pores; however, *F. duplicate* differs in having white to cream pileal surface when fresh, the presence of gloeocystidia (26–34 × 2–3 µm; Shen et al. 2014); *F. leucomallella* differs in the presence of gloeocystidia (19–42 × 4–9 µm) and narrow basidiospores (4.6–6.3 × 1.3–1.8 µm; Renvall 1992).

Niveoporofomes B.K. Cui, M.L. Han & Y.C. Dai, Fungal Diversity 80: 360, 2016.

Type species – *Niveoporofomes spraguei* (Berk. & M.A. Curtis) B.K. Cui, M.L. Han & Y.C. Dai.

Basidiomata annual, pileate, tough to hard corky. Pileal surface ivory white to ochraceous or black-brown. Pore surface white, cream to pale buff brown; pores round to angular. Hyphal system dimitic; generative hyphae clamped; skeletal hyphae IKI−, CB−. Cystidia absent, cystidioles present. Basidiospores ovoid to broadly ellipsoid, hyaline, thin-walled, smooth, IKI−, CB−. Causing a brown rot.

Notes – *Niveoporofomes* was established by Han et al. (2016) and typified by *N. spraguei*. Decock et al. (2022) studied *Niveoporofomes* and presented one new species, *N. oboensis* Decock, Amalfi & Ryvarden, and the two new combinations, *N. globosporus* (Ryvarden & Aime) Decock, Amalfi & Ryvarden and *N. widdringtoniae* (Masuka & Ryvarden) Decock & Ryvarden. They concluded that the North American/European clade should correspond to *N. spraguei*, while the East Asian clade could represent a distinct taxon (Decock et al. 2022).

Niveoporofomes orientalis B.K. Cui & Shun Liu, sp. nov. Figs 8d–e, 11

Index Fungorum number: IF900941; Facesoffungi number: FoF 14708

Differs from other *Niveoporofomes* spp. by its cream to pinkish buff pileal surface when dry, round pores (5–7 per mm), ovoid to subglobose basidiospores (4.8–5.8 × 4–4.6 µm) and distribution in the Eastern world.

Type – CHINA. Yunnan Province, Puer, Puer Forest Park, Xiniuping Scenic Spot, on rotten angiosperm wood, 17 August 2019, Dai 20440 (BJFC 032108, holotype).

Etymology – *Orientalis* (Lat.): refers to the new species distributed in the Eastern world.

Fruiting body – Basidiomata annual, pileate, solitary or imbricate, corky, without odor or taste when fresh, hard corky and light in weight upon drying. Pileus applanate, semicircular, projecting up to 4.5 cm long, 6 cm wide, 1.5 cm thick at base. Pileal surface white to cream when fresh, becoming cream to pinkish buff; margin cream, slightly obtuse to acute. Pore surface white to pinkish buff when fresh, becoming buff to cinnamon-buff when dry; pores round, 5–7 per mm; dissepiments thick, entire. Context white to cream, hard corky, up to 8 mm thick. Tubes paler than or concolorous with pore surface, hard corky, up to 6 mm long.

Hyphal structure – Hyphal system dimitic; generative hyphae with clamp connections; skeletal hyphae IKI–, CB–; tissues unchanged in KOH.

Context – Generative hyphae frequent, hyaline, thin- to slightly thick-walled, rarely branched, 2–5 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, occasionally branched, straight to flexuous, interwoven, 3.2–7.2 µm in diam.

Tubes – Generative hyphae frequent, hyaline, thin-walled, rarely branched, 1.8–3.2 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, occasionally branched, straight to flexuous, interwoven, 2.3–4.2 µm in diam. Cystidia absent; fusoid cystidioles occasionally present, hyaline, thin-walled, 17.5–27.5 × 2.5–5.5 µm. Basidia clavate, bearing four sterigmata and a basal clamp connection, 18.6–21.2 × 4.6–8 µm; basidioles dominant, in shape similar to basidia, but smaller.

Spores – Basidiospores ovoid to subglobose, hyaline, thin-walled, smooth, IKI–, CB–, 4.8–5.8(–6) × 4–4.6(–4.7) µm, L = 5.26 µm, W = 4.31 µm, Q = 1.07–1.40 (n = 90/3).

Type of rot – Brown rot.

Additional specimens examined – ***Niveoporofomes orientalis***. CHINA. Guangdong Province, Zhaoqing, Dinghushan Nature Reserve, on fallen angiosperm trunk, 30 June 2010, Cui 8969 (BJFC 007907, paratype). Guangxi Province, Shiwandashan Forest Park, on angiosperm stump, 6 July 2016, Cui 14031 (BJFC 028899, paratype); on dead tree of angiosperm, 6 July 2016, Cui 14013 (BJFC 028881, paratype). Hunan Province, Zhangjiajie Forest Park, on dead tree of *Castanea* sp., 17 August 2010, Dai 11676 (BJFC 008800, paratype). Yunnan Province, Pingbian County, Daweishan Forest Park, on fallen angiosperm branch, 26 June 2019, Dai 19905 (BJFC 031579, paratype); Honghe, Lvchun County, Huanglianshan Forest Park, on dead angiosperm tree, 13 August 2019, Dai 20717 (BJFC 032384, paratype). ***Niveoporofomes spraguei***. CANADA. Ontario, Hamilton, McMaster University, Botanical Garden, on angiosperm wood, 18–20 July 2017, Dai 19169 (BJFC 027637); on living angiosperm tree, 18–20 July 2017, Dai 19177 (BJFC 027645).

Notes – In our current phylogenetic analyses, samples of *N. orientalis* from China formed a highly supported subgroup (100% ML, 100% MP, 1.00 BPP; Fig. 1) and then clustered with but different from other *Niveoporofomes* species. Morphologically, *N. globosporus*, *N. oboensis*, *N. spraguei*, *N. widdringtoniae* and *N. orientalis* share pileate, corky to hard corky basidiomata, dimitic hyphal system with clamped generative hyphae, thin-walled and ovoid to globose basidiospores; but *N. globosporus* differs from *N. orientalis* by having larger pores (4–5 per mm), globose basidiospores (4.5–6 × 4.5–6 µm) and distributing in North America (Ryvarden et al. 2009, Decock et al. 2022); *N. oboensis* differs from *N. orientalis* in having larger pores (3.5–4 per mm), and distributing in tropical Africa (Decock et al. 2022); *N. spraguei* can be distinguished from *N. orientalis* by its larger basidia (24–28 × 6–7 µm) and basidiospores (5.5–7 × 4–5 µm; Ryvarden & Melo 2014); *N. widdringtoniae* differs from *N. orientalis* in having globose basidiospores (4.5–5 × 4.5–5 µm), growing on *Widdringtonia nodiflora* and distributing in tropical Africa (Decock et al. 2022).

Resupinopostia B.K. Cui & Shun Liu, gen. nov.

Index Fungorum number: IF900942; Facesoffungi number: FoF 14709

Type species – *Resupinopostia lateritia* (Renvall) B.K. Cui & Shun Liu.

Etymology – *Resupinopostia* (Lat.): refers to this genus resembling *Postia* and with the resupinate basidiomata.

Diagnosis – Basidiomata annual, resupinate to effused-reflexed, soft corky when fresh, fragile to corky when bruised or drying. Pore surface white, cream to pinkish buff when fresh, pinkish buff to buff yellow when dry, reddish-brown when bruised; pores round to angular. Context white to cream, corky. Tubes pinkish buff to brownish, fragile. Hyphal system monomitic;

generative hyphae with clamp connections, IKI–, CB–. Cystidia absent, cystidioles present or absent. Basidiospores allantoid to cylindrical, hyaline, thin-walled, smooth, IKI–, CB–. Causing a brown rot.

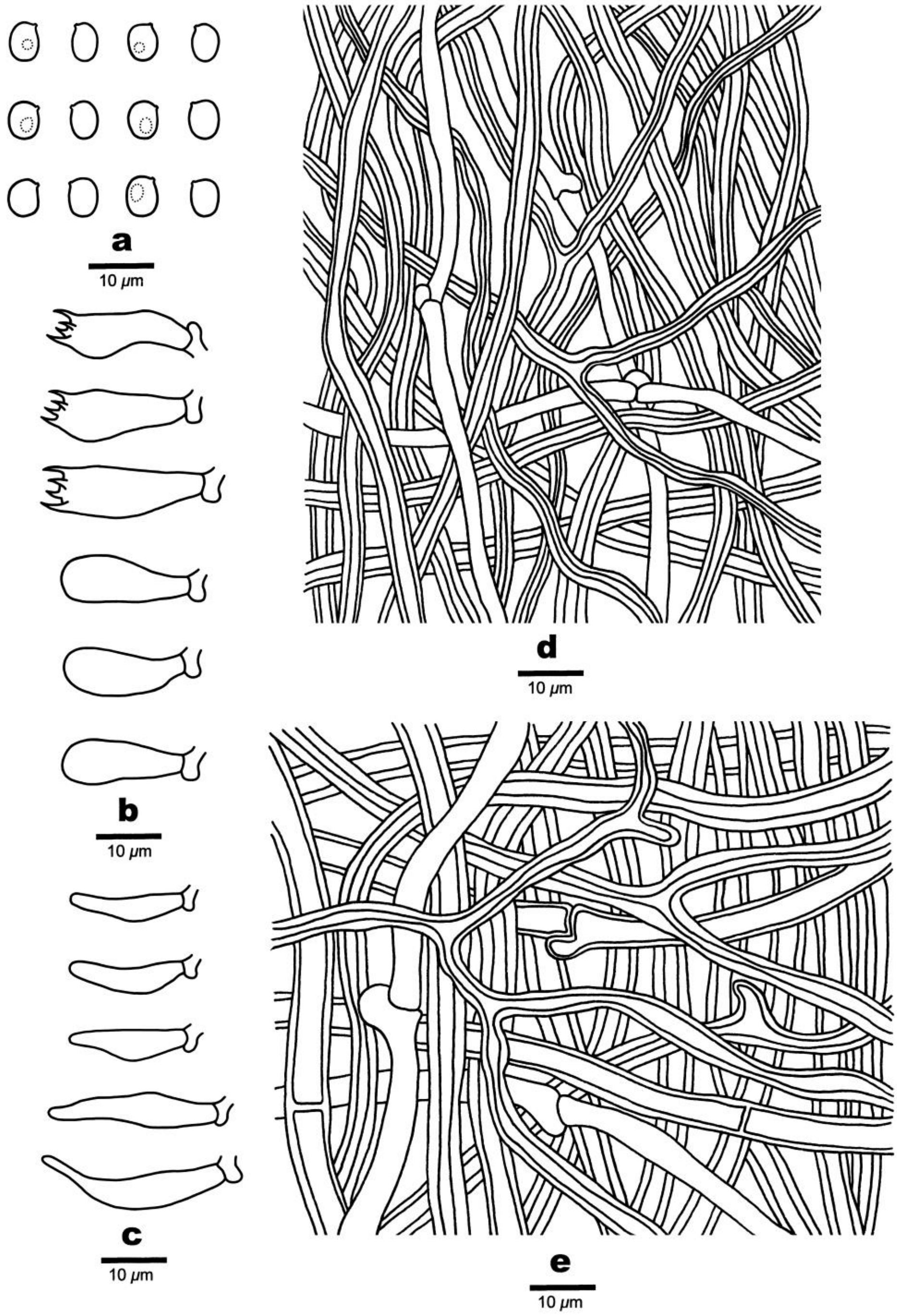

Figure 11 – Microscopic structures of *Niveoporofomes orientalis* (drawn from the holotype). a Basidiospores; b. Basidia and basidioles; c. Cystidioles; d. Hyphae from trama; e. Hyphae from context. Scale bars: a–e = 10 μm.

Notes – In our multi-gene phylogenetic analyses, *Fuscopostia duplicata*, *F. fragilis*, *F. leucomallella*, *F. subfragilis* and three new species groups with high statistical support (98% MP, 99% ML, 1.00 BPP, Fig. 1) and is consistently resolved as *Fuscopostia*. *Fuscopostia lateritia* groups with the new species and forms a separated lineage with strong support (95% MP, 92% ML, 1.00 BPP, Fig. 1), rather than gathering with *Fuscopostia* spp. (Fig. 1). Previous phylogenetic reconstructions including these species (*Postia duplicata*, *P. fragilis*, *P. lateritia* and *P. leucomallella*) also placed them into different clades (Shen & Cui 2014, Shen et al. 2014, 2015). Therefore, it was already apparent that only one generic name attributed to these species is incorrect.

The phylogenies inferred from the combined datasets of 7-gene sequences (Fig. 1) showed that the lineage has phylogenetic affinity to the genera *Amaropostia*, *Calcipostia*, *Fuscopostia* and *Spongiporus*. Morphologically, they share annual growth habit, monomitic hyphal system with clamped generative hyphae, allantoid to cylindrical and thin-walled basidiospores. However, *Amaropostia* differs by its woody hard basidiomata when dry, and bitter taste (Shen et al. 2019); *Calcipostia* differs in its calcareous basidiomata and circular guttulate depressions attached to the pileal surface (Shen et al. 2019); *Fuscopostia* unique by its pileate to effused-reflexed basidiomata with brownish pileal surface and pore surface when bruised or drying (Shen et al. 2019); *Spongiporus* is distinguished by its pileate or effused-reflexed basidiomata usually with imbricate pileus (Shen et al. 2019). Based on morphological characters and phylogenetic analyses, we transferred *Fuscopostia lateritia* and the new species to the new genus *Resupinopostia*, with *R. lateritia* as generic type.

Resupinopostia sublateritia B.K. Cui & Shun Liu, sp. nov. Figs 8f–g, 12

Index Fungorum number: IF900943; Facesoffungi number: FoF 14710

Differs from *Resupinopostia lateritia* by its white, cream to pinkish buff pore surface when fresh, pinkish buff to buff yellow when drying, smaller and round pores (6–8 per mm).

Type – CHINA. Yunnan Province, Mouding County, Huafoshan Nature Reserve, on rotten wood of *Pinus* sp., 31 August 2021, Dai 22655 (BJFC 037229).

Etymology – *Sublateritia* (Lat.): refers to the new species resembling *Resupinopostia lateritia* in morphology and phylogeny.

Fruiting body – Basidiomata annual, resupinate, adnate, not easily separated from the substrate, soft corky to corky, without odor or taste when fresh, becoming corky to fragile and light in weight upon drying; up to 6 cm long, 1.3 cm wide, and 3 mm thick at center. Pore surface white, cream to pinkish buff when fresh, becoming pinkish buff to buff yellow when drying, reddish-brown when bruised; sterile margin indistinct; pores round, 6–8 per mm; dissepiments slightly thick, entire. Subiculum cream to buff, corky, up to 1 mm thick. Tubes pinkish buff to olivaceous buff, corky to fragile, up to 2 mm long.

Hyphal structure – Hyphal system monomitic; generative hyphae with clamp connections, IKI–, CB–; tissues unchanged in KOH.

Subiculum – Generative hyphae hyaline, slightly thick-walled with a wide lumen, occasionally branched, interwoven, 2.3–5 µm in diam.

Tubes – Generative hyphae hyaline, thin- to slightly thick-walled with a wide lumen, occasionally branched, interwoven, 2.2–4.3 µm in diam. Cystidia absent; cystidioles present, narrowly clavate to fusoid, hyaline, thin-walled, 15.5–21.5 × 2.2–4.2 µm. Basidia clavate, with four sterigmata and a basal clamp connection, 13–20.5 × 3.5–5.5 µm; basidioles dominant, in shape similar to basidia, but smaller.

Spores – Basidiospores allantoid to cylindrical, hyaline, thin-walled, smooth, IKI–, CB–, 4.3–5 × 1.3–2(–2.1) µm, L = 4.65 µm, W = 1.64 µm, Q = 2.25–3.33 (n = 120/4).

Type of rot – Brown rot.

Additional specimens (paratypes) examined – CHINA. Sichuan Province, Xichang, Yiwanshui Village, on fallen branch of *Pinus* sp., 16 September 2019, Cui 17825 (BJFC 034684); Yanyuan County, Lugughu, on fallen trunk of *Pinus yunnanensis*, 15 August 2019, Cui 17519 (BJFC 034378). Yunnan Province, Lanping County, Tongdian, Luoguqing, on rotten wood of *Pinus* sp., 3 September 2021, Dai 22760 (BJFC 037333), Dai 22761 (BJFC 037334).

Notes – Phylogenetically, *Resupinopostia sublateritia* is closely related to *R. lateritia* (Fig. 1). Morphologically, *R. lateritia* may be confused with *R. sublateritia* in having resupinate to effused-reflexed basidiomata and the absence of gloeocystidia in the hymenium. However, *R. lateritia* differs from *R. sublateritia* in its larger pores (3–4 per mm) and narrower basidiospores (4.5–6 × 1.2–1.6 µm; Renvall 1992). Two sequences obtained from GenBank are clustered together in *Resupinopostia*, which is different from *R. lateritia* and *R. sublateritia* in molecular sequence. These two specimens are treated as unknown species in *Resupinopostia* since we have no specimen.

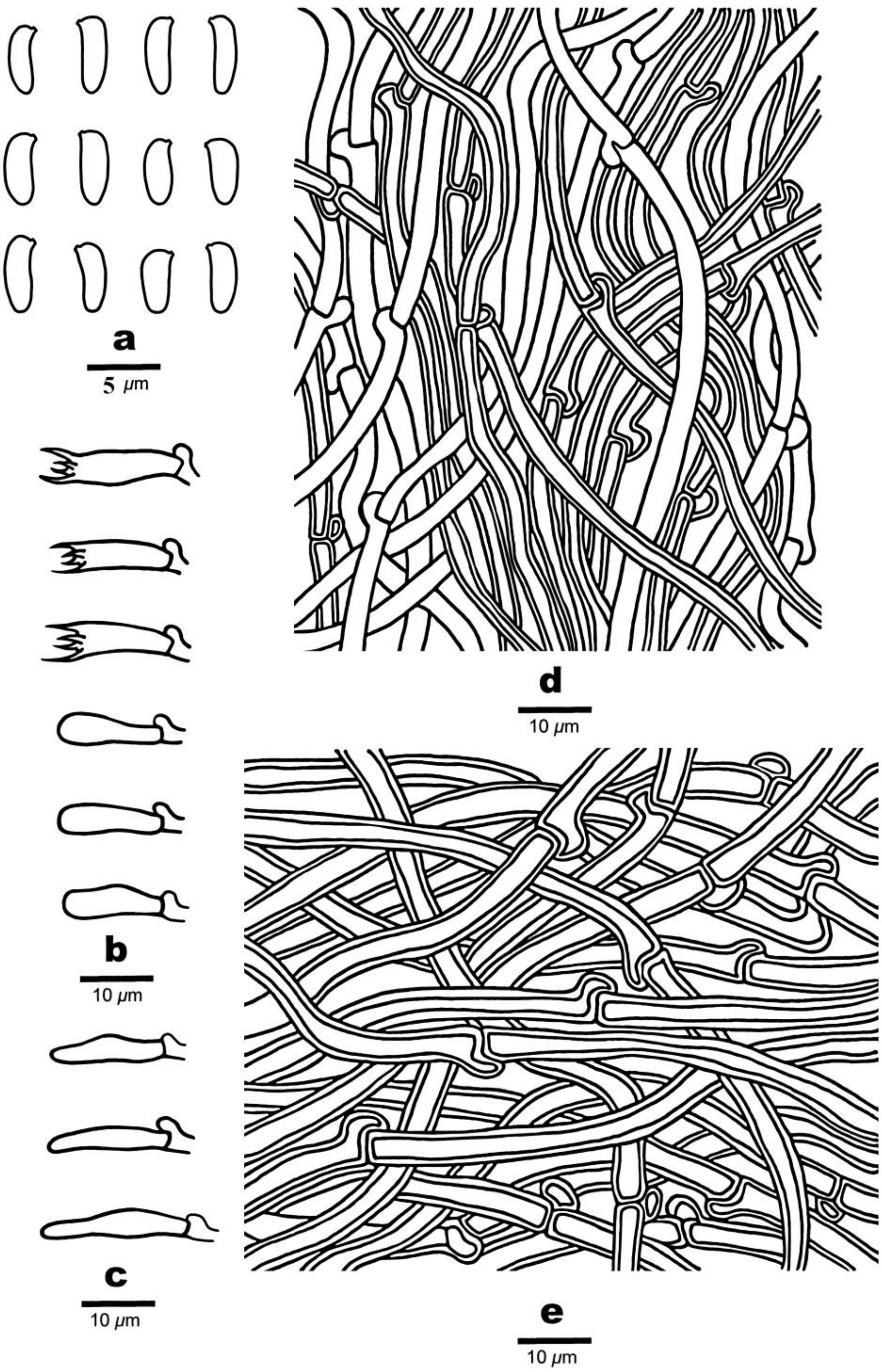

Figure 12 – Microscopic structures of *Resupinopostia sublateritia* (drawn from the holotype). a Basidiospores. b Basidia and basidioles. c Cystidioles. d Hyphae from trama. e Hyphae from context. Scale bars: a = 5 µm, b–e = 10 µm.

Rhodoantrodia B.K. Cui, Y.Y. Chen & Shun Liu, Fungal Diversity 118: 59, 2023.

Type species – *Rhodoantrodia tropica* (B.K. Cui) B.K. Cui, Y.Y. Chen & Shun Liu.

Basidiomata annual, resupinate, soft corky to corky. Pore surface light purple, violaceous to pinkish buff; pores angular. Hyphal system dimitic; generative hyphae with clamp connections; skeletal hyphae IKI−, CB−. Cystidia and cystidioles absent. Basidiospores cylindrical to subfusiform, hyaline, thin-walled, smooth, IKI−, CB−. Causing a brown rot.

Notes – *Rhodoantrodia* was proposed to accommodate *Antrodia tropica* B.K. Cui and *A. yunnanensis* M.L. Han & Q. An by Liu et al. (2023a). It is characterized by its resupinate basidiomata, light purple, violaceous to pinkish buff pore surface, dimitic hyphal system with clamped generative hyphae, and cylindrical to subfusiform basidiospores (Liu et al. 2023a). Currently, the genus is only distributed in the tropical to subtropical regions of China.

Rhodoantrodia subtropica B.K. Cui & Shun Liu, sp. nov. Figs 8h, 13

Index Fungorum number: IF900944; Facesoffungi number: FoF 14711

Differs from other *Rhodoantrodia* spp. by its greyish violet to livid vinceous pore surface when fresh, becoming greyish violet to vinceous buff when dry, angular pores (3–4 per mm) and cylindrical to subfusiform basidiospores (7–8.4 × 2.6–3.3 µm).

Type – CHINA. Yunnan Province, Jianchuan County, Shibaoshan Park, on fallen angiosperm branch, 5 November 2019, Cui 18021 (BJFC 034880, holotype).

Etymology – *Subtropica* (Lat.): refers to the species similar to *Rhodoantrodia tropica*.

Fruitbody – Basidiomata annual, resupinate, not easily separated from substrate, soft corky, without odor or taste when fresh, corky upon drying, up to 5 cm long, 10 cm wide, 5 mm thick at center. Pore surface greyish violet to livid vinceous when fresh, becoming greyish violet to vinceous buff upon drying; pores angular, 3–4 per mm; dissepiments thick, entire to lacerate. Subiculum buff, thin, up to 2 mm thick. Tubes concolorous with pore surface, corky, up to 3 mm long.

Hyphal structure – Hyphal system dimitic; generative hyphae with clamp connections; skeletal hyphae IKI–, CB–; tissues unchanged in KOH.

Subiculum – Generative hyphae frequent, hyaline, thin- to slightly thick-walled, rarely branched, 2–4.2 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a narrow lumen to subsolid, rarely branched, interwoven, 2.8–6.2 µm in diam.

Tubes – Generative hyphae abundant in trama, hyaline, thin- to slightly thick-walled, frequently branched, 1.8–4 µm in diam; skeletal hyphae dominant, hyaline, thick-walled with a wide to narrow lumen, 2.8–5.4 µm in diam. Cystidia and cystidioles absent; basidia clavate, with four sterigmata and a basal clamp connection, 18.3–26.5 × 4.6–8.8 µm; basidioles dominant, in shape similar to basidia, but slightly smaller.

Spores – Basidiospores cylindrical to subfusiform with tapering apex, hyaline, thin-walled, smooth, IKI–, CB–, 7–8.4 × 2.6–3.3 µm, L = 7.78 µm, W = 2.92 µm, Q = 2.33–2.96 (n = 60/2).

Type of rot – Brown rot.

Notes – In our phylogenetic analyses, *R. subtropica* grouped with *R. tropica* and *R. yunnanensis* and formed a highly supported lineage (100% ML, 100% MP, 1.00 BPP; Fig. 1). Morphologically, these species share similar colored basidiomata when fresh; however, *R. yunnanensis* separates by having a greyish blue to dark greyish blue pore surface when dry, presence of cystidioles and larger basidiospores (7–9.9 × 2.5–3.1 µm; Han et al. 2020); *R. tropica* is distinguished in having a greyish to pinkish buff pore surface when dry and its generative hyphae dominated in the hymenophoral trama (Cui 2013).

Additional specimen (paratype) examined – CHINA. Yunnan Province, Pingbian County, Daweishan Forest Park, on fallen angiosperm branch, 26 June 2019, Dai 19798 (BJFC 031473).

New combinations

Cystidiopostia simanii (Pilát) B.K. Cui, Shun Liu & L.L. Shen, comb, nov.

Index Fungorum number: IF900945; Facesoffungi number: FoF 14712

Basionym – *Leptoporus simanii* Pilát ex Pilát, Acta Musei Nationalis Pragae 9B (2): 100, 1953.

= *Postia simanii* (Pilát ex Pilát) Jülich, Persoonia 11 (4): 423, 1982.

Notes – *Leptoporus simanii* was proposed by Pilát (1953) and later transferred to *Postia* by Jülich (1982). This species has resupinate basidiomata, white, cream to yellowish pore surface, apically encrusted cystidia and allantoid basidiospores, all of which conform to *Cystidiopostia* species. Based on morphological characters, we transferred *Postia simanii* to *Cystidiopostia* as a new combination.

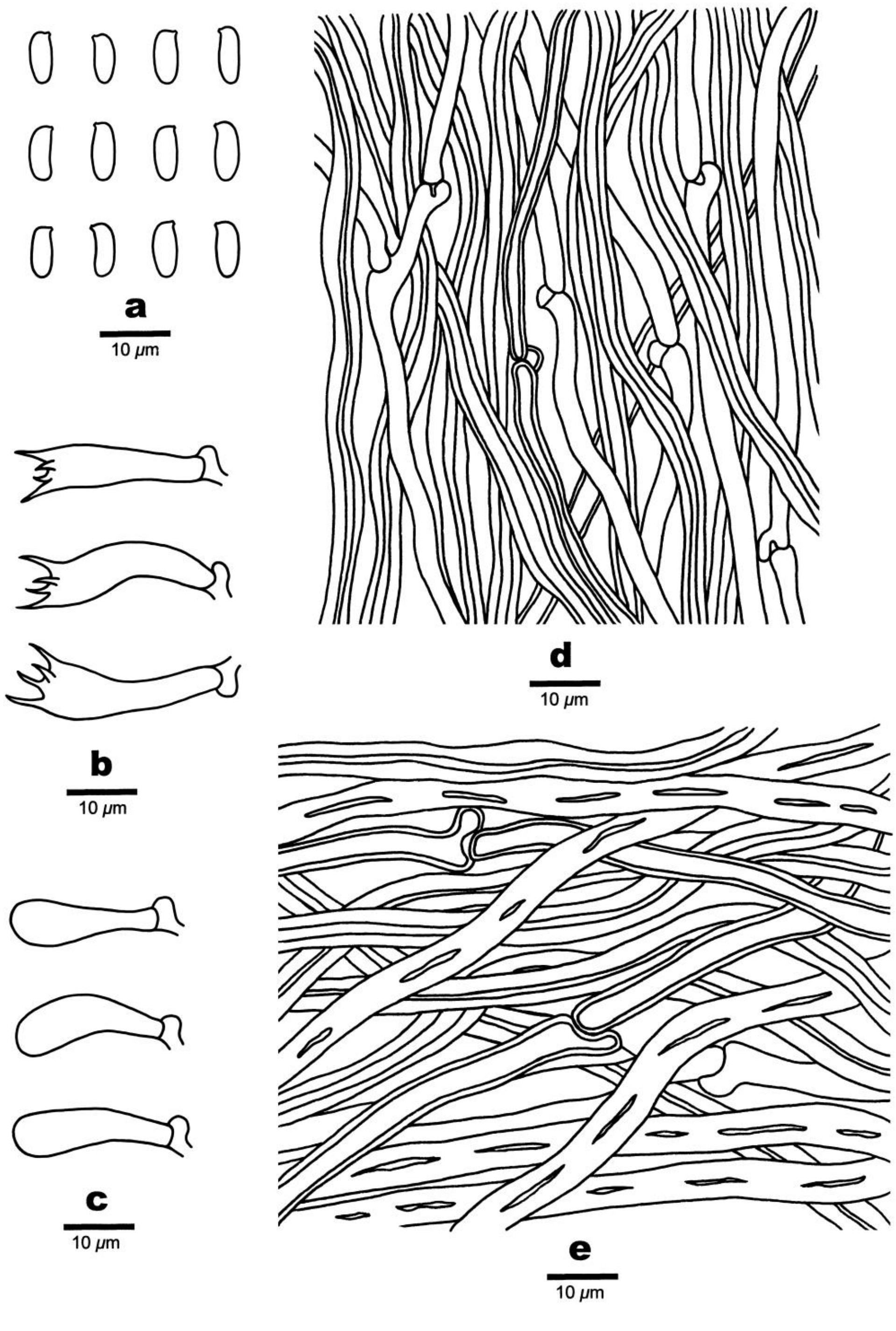

Figure 13 – Microscopic structures of *Rhodoantrodia subtropica* (drawn from the holotype). a Basidiospores. b Basidia and basidioles. c Cystidioles. d Hyphae from trama. e Hyphae from context. Scale bars: a–e = 10 µm.

Specimens examined – CHINA. Anhui Porvince, Huangshan, Huangshan Mountain, on fallen angiosperm trunk, 13 October 2004, Dai 6157 (IFP 005451); Jinlin Province, Antu County, Changbaishan Nature Reserve, Huangsongpu, on fallen branch of *Abies* sp., 28 August 2005, Dai 7074 (IFP 011834); Zhejiang Province, Lin'an County, Tianmushan Nature Reserve, 11 October 2005, Cui 2702 (IFP 005450).

Osteina subundosa (Peck) B.K. Cui, Shun Liu & L.L. Shen, comb, nov.

Index Fungorum number: IF900946; Facesoffungi number: FoF 14713

Basionym – *Postia subundosa* Y.L. Wei & Y.C. Dai, Fungal Diversity 23: 400, 2006.

Notes – *Postia subundosa* was discovered by Wei & Dai (2006) in Heilongjiang Province of China. This species is characterized by the pileate basidiomata sometimes with laterally stipitate, semi-circular to circular pileus with undulate pileal margin, cylindrical to allantoid and thin-walled basidiospores, all of these features are consistent with those of *Osteina*.

Specimens examined – CHINA. Heilongjiang, Yichun, Fenglin Nature Reserve, on fallen trunk of *Picea* sp., 7 September 2002, Dai 3608 (BJFC 002101), Dai 3628 (IFP 015762, holotype); Tangyuan County, Daliangzihe Forest Park, on fallen trunk of *Picea* sp, 27 August 2008, Yuan 4990 (BJFC 013478).

Resupinopostia lateritia (Renvall) B.K. Cui & Shun Liu, comb. nov.

Index Fungorum number: IF900947; Facesoffungi number: FoF 14714

Basionym – *Postia lateritia* Renvall, Karstenia 32: 44, 1992.

= *Oligoporus lateritius* (Renvall) Ryvarden & Gilb., Synopsis Fungorum 7: 417, 1993.

Notes – *Postia lateritia* was described and illustrated from Finland, Sweden and Canada. It is associated with a brown rot and has been found on *Pinus sylvestris* in the old coniferous forest (Renvall 1992). We have examined the specimens from Finland and China. These specimens possess effused-reflexed basidiomata, white pore surface when fresh, reddish-brown when bruised, cream to yellowish when dry, allantoid and thin-walled basidiospores. Phylogenetic analysis shows that *Fuscopostia lateritia* and species of *Resupinopostia* cluster together and form a high supported clade (Fig. 1). Based on morphological characters and phylogenetic analyses, we transferred *Fuscopostia lateritia* to *Resupinopostia* as a new combination. For a detailed description of *Postia lateritia*, see Renvall (1992).

Specimens examined – CHINA. Jilin Province, Antu County, Changbaishan Nature Reserve, on rotten wood of *Picea* sp., 25 August 2005, Dai 6946 (IFP 011823); 29 August 2005, Dai 7139 (IFP 011844). FINLAND. Perä-Pohjanmaa, South Pisavaara National Park, on fallen trunk of *Pinus* sp., 15 September 1997, Dai 2652 (IFP 005405), Dai 2662 (BJFC 002083).

Spongiporus japonica (Y.C. Dai & T. Hatt.) B.K. Cui, Shun Liu & L.L. Shen, comb, nov.

Index Fungorum number: IF900948; Facesoffungi number: FoF 14715

Basionym – *Postia japonica* Y.C. Dai & T. Hatt., Mycotaxon 102: 114, 2007.

Notes – *Postia japonica* was described and illustrated from Japan (Dai & Hattori 2007). We have examined the type specimen and one specimen from China. This species possesses imbricate basidiomata always forming cluster, ellipsoid and thin-walled basidiospores. Based on morphological characters, we transferred *P. japonica* to *Spongiporus* as a new combination. For a detailed description of *S. japonica*, see *P. japonica* by Dai & Hattori (2007).

Specimens examined – CHINA. Yunnan Province, Yongping County, Baotaishan Forest Park, on dead angiosperm tree, 27 November 2015, Dai 16380 (BJFC 020468). JAPAN. Ibaraki Pref, Kasama Sashiro Forest Reserve, on living tree base of *Castanopsis* sp., 25 November 2006, Dai & Hattori 8046 (BJFC 013450, holotype).

Spongiporus persicinus (Niemelä & Y.C. Dai) B.K. Cui, Shun Liu & L.L. Shen, comb, nov.

Index Fungorum number: IF900949; Facesoffungi number: FoF 14716

Basionym – *Postia persicina* Niemelä & Y.C. Dai, Karstenia 44 (1-2): 74, 2004.

Notes – *Postia persicina* was described from Finland and Russia, and grows on *Picea abies* (Niemelä et al. 2004). It possesses fleshy but fairly sturdy or somewhat tough basidiomata when fresh, shrinking a little when drying, soft, uniform or chalky context and cylindrical basidiospores, which conform to the morphological characteristics of *Spongiporus*, so we transferred *Postia persicina* to *Spongiporus*.

Specimens examined – FINLAND. Lappi, Kolari, Äkäslompolo, Varkaankuru, on fallen trunk of *Picea* sp., 17 August 1999, Niemelä & Dai 6453 (IFP 015760, isotype). CHINA. Xinjiang, Huocheng County, Guozigou Nature Reserve, on fallen trunk of *Larix* sp., 18 August 2004, Wei 1456a (BJFC 013506).

Discussion

The vast majority of brown-rot fungi gather in the antrodia clade within the Polyporales, but the clade cannot receive high support or form monophyletic clade (Hibbett & Donoghue 2001, Binder et al. 2005, 2013, Garcia-Sandoval et al. 2011, Justo et al. 2017, Liu et al. 2023a). In current phylogenetic analysis, most of the brown-rot fungi within the Polyporales grouped together with no significant support and formed 14 family-level lineages (Fig. 1), which basically consistent with previous studies. Based on field trips, publications, and databases queries, 383 species belonging to 69 genera and 14 families are accepted in the brown-rot fungi within the Polyporales, including two new genera, nine new species and five new combinations. The families with the highest number of species are Fomitopsidaceae (147 species), Postiaceae (97 species), Adustoporiaceae (28 species), and Laetiporaceae (28 species); the genera with the highest number of species are *Cyanosporus* (35 species), *Fomitopsis* (30 species), and *Daedalea* (21 species).

Molecular clock analysis showed that the ancestor of Agaricales, Boletales, Hymenochaetales, Polyporales and Russulales split at about 144.94 Mya, 131.33 Mya, 177.32 Mya, 141.55 Mya and 169.09 Mya (Fig. 2), respectively, which generally consistent with the previous studies (Zhao et al. 2017, He et al. 2019, Ji et al. 2022, Liu et al. 2023c). Families in the Polyporales diverged between 57.87–119.88 Mya, which is a relatively consistent time range compared to other studies, the divergence times in a range of 62–106 Mya in He et al. (2019) and in a range of 66.02–119.22 Mya in Liu et al. (2023c). The differentiation of brown-rot fungi and white-rot fungi within Polyporales occurred in the early Cretaceous (about 119.25 Mya), at this time, angiosperm trees spread rapidly and were about to replace gymnosperm trees as the dominant species. The brown-rot families of Polyporales were centralized differentiation in the middle Cretaceous (about 81.48–99.54 Mya), among them, Sparassidaceae was the first to appear (about 99.54 Mya) and the earliest established. Binder et al. (2013) suggested that if the antrodia clade is treated as monophyletic, Sparassidaceae can be used as the family name for this clade, which is reasonable. The next were Taiwanofungaceae (about 96.37 Mya), Sarcoporiaceae (about 94.22 Mya), Postiaceae (about 93.59 Mya), Laetiporaceae (about 90.72 Mya), Laricifomitaceae (about 88.78 Mya), Auriporiaceae and Dacryobolaceae (about 84.26 Mya), Phaeolaceae and Pycnoporellaceae (about 83.32 Mya), Fomitopsidaceae and Piptoporellaceae (about 83.23 Mya), the latest were Adustoporiaceae and Fibroporiaceae (about 81.48 Mya). Zhao et al. (2016) suggested using stem ages of 20 Mya and 30 Mya as one of criteria for setting section and subgenera ranks respectively. In this study, genera of the brown-rot fungi within the Polyporales diverged with a mean stem age between 30.15 to 99.54 Mya (Fig. 2), of which, the *Eucalyptoporia* occurs in a mean stem age of 35.68 Mya and *Resupinopostia* occurs in a mean stem age of 34.41 Mya. This study confirmed the rationality of the establishment of each genus of the brown-rot fungi within the Polyporales at the level of divergence time.

The natural distribution of plant-associated fungi across broad geographic ranges depends to a certain extent on host distribution and environmental conditions (Lodge 1997, Gilbert et al. 2007, 2008, Wang et al. 2021b, Yuan et al. 2021, Mao et al. 2023). In terms of geographical distribution, brown-rot fungi within the Polyporales are widely distributed around the world, and mostly saprophytic or parasitic on wood. They can be distributed in Asia, Europe, North America, South America, Africa, and Oceania. Among them, Asia has the highest number of species, followed by

Europe, North America, Oceania and South America, and Africa has the least. Some species have a wide distribution range, such as *Amylocystis lapponica* (Romell) Bondartsev & Singer, *Daedalea modesta* (Kunze ex Fr.) Aoshima, *Fibroporia vaillantii* (DC.) Parmasto, *Rhodofomitopsis oleracea* (R.W. Davidson & Lombard) B.K. Cui, Yuan Y. Chen & Shun Liu and *Sarcoporia polyspora* P. Karst., etc. It is worth noting that there are 178 brown-rot fungi within the Polyporales distributed in China, of which 87 are currently endemic to China. This may be due to the diverse and unique ecological environment and host trees in China, which provides a rich substrate for the growth of brown rot-fungi within the Polyporales, thus possessing rich and unique species resources. In China, some species distributed in China can be only distributed in specific areas, such as *Antrodia subheteromorpha* B.K. Cui, Y.Y. Chen & Shun Liu, *Cyanosporus hirsutus* B.K. Cui & Shun Liu and *Laetiporus medogensis* J. Song & B.K. Cui are only distributed in plateau and mountain region; *Buglossoporus eucalypticola* M.L. Han, B.K. Cui & Y.C. Dai, *Fomitopsis bambusae* Y.C. Dai, Meng Zhou & Yuan Yuan and *Oligoporus podocarpi* Y.C. Dai, Chao G. Wang & Yuan Yuan are only distributed in tropical region; *Rhodoantrodia yunnanensis* (M.L. Han & Q. An) B.K. Cui & Shun Liu, *R. subtropica* B.K. Cui & Shun Liu and *Wolfiporiopsis castanopsidis* (Y.C. Dai) B.K. Cui & Shun Liu are only distributed in subtropical region; *Fomitopsis bondartsevae* (Spirin) A.M.S. Soares & Gibertoni, *Laricifomes officinalis* (Vill.) Kotl. & Pouzar and *Fragifomes niveomarginatus* (L.W. Zhou & Y.L. Wei) B.K. Cui, M.L. Han & Y.C. Dai are only distributed in temperate monsoon region; *Antrodia aridula* Y.C. Dai, H.M. Zhou, Y.D. Wu & Shun Liu and *Cyanosporus auricomus* (Spirin & Niemelä) B.K. Cui & Shun Liu are only distributed in temperate continental region. As for host trees, the host genus of brown-rot fungi within the Polyporales are significantly higher in angiosperm trees than in gymnosperm trees (Table 2). Statistical analysis shows that 242 species can grow on angiosperm trees, *Quercus*, *Poplus*, and *Eucalyptus* are the most suitable angiosperm host genera for the growth of this group; 205 species can grow on gymnosperm trees, *Pinus*, *Picea* and *Abies* are the most suitable gymnosperm host genera for the growth of this group. Some brown-rot fungi within the Polyporales can grow simultaneously on angiosperm trees and gymnosperm trees, but some species have strict selectivity towards the growth substrates and grow on specific host trees, such as *Buglossoporus eucalypticola* M.L. Han, B.K. Cui & Y.C. Dai, *Eucalyptoporia tasmanica* and *Fomitopsis eucalypticola* B.K. Cui & Shun Liu only growth on *Eucalyptus* sp.; *Antrodia bambusicola* Y.C. Dai & B.K. Cui, *Fibroporia bambusae* Yuan Y. Chen & B.K. Cui and *Fomitopsis bambusae* Y.C. Dai, Meng Zhou & Yuan Yuan only growth on bamboo; *Amyloporia nothofaginea* Rajchenb. & Gorjón, *Cyanosporus nothofagicola* B.K. Cui, Shun Liu & Y.C. Dai and *Nothofagiporus venata* (Rajchenb. & Wright) B.K. Cui & Shun Liu only growth on *Nothofagus* sp.

This study and recent studies have focused on the classification and phylogenetic studies of brown-rot fungi within the Polyporales, but there are still some problems need to be further addressed. Firstly, the phylogenetic results of present and other studies show that brown-rot fungi within the Polyporales sometimes cluster together but do not receive high support or do not cluster together, it is suggested that the phylogenetic relationship of this group is not stable, and further research is needed to find out the stable phylogenetic relationship of this group by using more gene fragments or whole genome sequences. Secondly, some taxa of brown-rot fungi within the Polyporales are only recorded in the authentic mycological databases (Index Fungorum and Mycobank), and they lack sequences or difficult to find original descriptions, such as *Buglossoporus* spp., *Crustoderma* spp. and *Sparassis* spp., the rationality of these taxa need further determined. Thirdly, some species have available sequences, but we don't have specimens, and their genus level status needs further confirmation, such as *Amyloporia nothofaginea* Rajchenb. & Gorjón, *Postia carbophila* Rajchenb. and *Postia folliculocystidiata* (Kotl. & Vampola) Niemelä & Vampola. In addition, species of brown-rot fungi within the Polyporales are abundant and constantly updating, so the large-scale and comprehensive field investigations are still needed, especially the areas and groups with weak research, but the cost is high. Subsequent investigations should obtain detailed geographical location data of the species in order to use maximum entropy (Maxent) spatial distribution modeling for distribution area prediction. To improve the accuracy of prediction, multiple factors such as climate factors, host trees, altitude, human interference, and soil physicochemical properties can be comprehensively considered.

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