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Reclassification of eleven corticioid basidiomycetes with nine typifications

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Abstract: Several species of wood-inhabiting resupinate basidiomycetes are reclassified following examination of type material and sequencing of recent collections. *Grandinia ocellata* is considered the correct name for *Phlebia livida* subsp. *tuberculata* and transferred to *Mycoacia*. *Peniophora avellanea* is an older name for *Phlebia margaritae* and the species moved into *Lopharia*. *Radulum pendulum* is identified as the oldest name for the species most commonly called *Phlebia albida*. *Grandinia tuberculata*, type species for *Stereophlebia*, is accepted as a synonym to *Radulum pendulum* and the combination *Stereophlebia pendula* introduced. *Phlebia canadensis* is accepted as an older name for *Quasiphlebia densa* and the combination *Quasiphlebia canadensis* proposed. Other new combinations proposed are *Cytidiella pallidolivens*, *Hydnophlebia flavicans*, *Hyphodermella pallidovirens*, *Meruliopsis rubicunda*, *Parvodontia gloeocystidiata*, *Phaeophlebiopsis roumeguerei*, and *Rhizochaete galactites*. *Hyphodermella albostraminea* is considered to be a synonym of *Hyphodermella pallidovirens*. *Ceriporia pseudocystidiata* is considered to be a synonym of *Meruliopsis rubicunda*. *Meruliopsis faginea* is considered to be a synonym of *Meruliopsis albostraminea*. Typifications are suggested for *Corticium seriale* subsp. *pallidolivens*, *Kneiffia avellanea*, *Corticium roumeguerei*, *Peniophora moelleriana*, *Grandinia ocellata*, *Corticium lividum*, *Thelephora viscosa* var. *uvida*, and *Radulum pendulum*.

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INTRODUCTION

Corticioid basidiomycetes develop morphologically simple, effused basidiomata that usually extend over a substrate, normally decaying wood, without defined borders (Fig. 1). Before fungal taxonomy got access to molecular methods, the classification of corticioid fungi into natural entities was considered challenging and most species were lumped into the admittedly artificial family *Corticiaceae* (Donk 1964). Radical changes followed from the molecular revolution and corticioid fungi have so far been distributed over more than 10 orders and many more families. This reorganization is very much an ongoing process, mainly driven by access to sequences from species not earlier examined. During the preparation of an identification handbook for European corticioid basidiomycetes (Larsson & Ryvarden 2021) several misplaced species were encountered and new combinations therefore deemed necessary. Most suggested transfers are based on evidence from both morphology and molecular data.

MATERIALS AND METHODS

Specimens were studied in a Zeiss Axioskop 2 equipped with phase contrast lenses. Preparations were placed in 2 % KOH, Melzer's solution, and Cotton Blue (0.3 %) in lactic acid (80 %). Measurements were made digitally with a Zeiss Er5c video camera and Zen Blue software (Zeiss Inc.). When possible, 20 basidiospores each from at least two specimens were measured. For spore measurements 5 % extreme values from both ends of variation are given in parentheses. If an extreme value consists of more than 5 % of the measurements, the parenthesis is omitted. The following abbreviations are used; L = mean length, W = mean width, Q = mean length / width ratio.

DNA was extracted from herbarium specimens using DNeasy plant mini kit (Qiagen, Hilden), following manufacturer's recommendations. The PCR amplifications were carried out using Ready-To-Go™ PCR beads (Amersham Pharmacia Biotech, Uppsala). Primers used to amplify the complete ITS region and the 5´end of the nuclear LSU region were ITS1F and ITS4B (Gardes & Bruns 1993), and LR0R and LR7 (Hopple & Vilgalys 1999), respectively. Amplified products were purified using Qiaquick spin columns (Qiagen, Hilden). Primers used for sequencing were ITS1, ITS4 (White *et al*. 1990), LR5, LR3R (Hopple & Vilgalys 1999), and CTB6 (Garbelotto *et al*. 1997). Sequencing was done by a commercial service provider (Macrogen Europe, Amsterdam), Sequences were assembled using Sequencher v. 5.2.4 (Gene Codes, Ann Arbor).

Through this study 43 ITS sequences and 28 LSU sequences are made public. For the phylogenetic analyses our new

Fig. 1. A. *Hyphodermella pallidovirens* (Photo E. Martini). **B.** *Lopharia avellanea* (Photo V. Spirin). **C.** *Meruliopsis rubicundus* (Photo A. Singer). **D.** *Mycoacia ocellata* (Photo L. Zibarová). **E.** *Mycoacia livida* (Photo B.E. Andersen). **F.** *Phaeophlebiopsis roumeguerei* (Photo L. Goodwin). **G.** *Rhizochaete galactites* (Photo V. Spirin). **H.** *Stereophlebia pendula* (Photo M. Kulju).

Table 1. Sequences from specimens used for morphological studies, phylogenetic analyses, and for typification. GenBank accession numbers in bold-face refer to sequences generated for this study. n/a means no sequence was available. Em-dash means that the gene was not used in any analyses.

Species	Voucher	ITS	LSU	Origin	Reference
Allophlebia ludoviciana	O:110341	MT974603	MT982120	Brazil	Lira *et al.* (2022)
	O:110340	MT974604	MT982121	Ecuador	Lira *et al.* (2022)
Bjerkandera adusta	CFMR:HHB-12826	KP134983	KP135198	USA	Floudas & Hibbett (2015)
Ceriporia pseudocystidiata	KUC:20131001-47	KJ668566	—	South Korea	Jang *et al.* (2015)
Ceriporia tarda	BJFC:Dai 10226	JX623945	—	China	Jia *et al.* (2014)
Ceriporia viridans	H:VS 3843	KX236480	—	Russia	Spirin *et al.* (2016)
	H:OM 11701	KX752600	—	Netherlands	Miettinen et al. (2016)
	H:VS 5909	KX236481	—	Finland	Spirin *et al.* (2016)
Ceriporiopsis fimbriata	BJFC:Dai 11672	KJ698633	KJ698637	China	Zhao *et al.* (2015)
Ceriporiopsis gilvescens	O: A Bernicchia	**OR822132**	**OR822132**	Italy	This study
Ceriporiopsis guidella	O:262837	FJ496687	FJ496722	Italy	Tomsovsky *et al.* (2010)
Ceriporiopsis lagerheimii	BJFC:Dai 12304	KX161647	KX161651	China	Zhao *et al.* (2017)
Cremeoderma unicum	GB:KHL 11786	EU118657	EU118657	Sweden	Larsson (2007)
Crustodontia chrysocreas	CFMR:HHB-6333	KP135358	KP135263	USA	Floudas & Hibbett (2015)
Dentocorticium portoricense	CFMR:HHB-19632	**OR822100**	**OR822100**	USA	This study
	CFMR:He 2161	MF626356	MF626380	USA	Liu *et al.* (2018)
	CFMR:He 2202	MF626357	MF626381	USA	Liu *et al.* (2018)
Dentocorticium sulphurellum	CFMR:FP-11801	JN165018	AF261539	USA	Justo & Hibbett (2011); Moncalvo *et al.* (2002)
	CFMR:T 609	JN165015	JN164815	Canada	Justo & Hibbett (2011); Moncalvo *et al.* (2002)
Dentocorticium taiwanianum	BJFC:He 4615	MF626362	MF626386	China	Liu *et al.* (2018)
	BJFC:He 3383	MF626361	MF626385	China	Liu *et al.* (2018)
	TNM:Wu 9907-1	MF626363	MF626387	China	Liu *et al.* (2018)
Dentocorticium ussuricum	BJFC:He 3278	MF626358	MF626382	China	Liu *et al.* (2018)
	BJFC:He 3322	MF626360	MF626384	China	Liu *et al.* (2018)
	BJFC:He 3294	MF626359	MF626383	China	Liu *et al.* (2018)
Donkia pulcherrima	O:Hausknecht & Kovac	KX752591	KX752591	Austria	Miettinen *et al.* (2016)
Geesterania carneola	SP:446234	KY175000	KY175000	Brazil	Westphalen *et al.* (2018)
Geesterania davidiae	SP:446193	KY174998	KY174998	Brazil	Westphalen *et al.* (2018)
Gelatinofungus brunneus	TNM:GC 1703-31	LC387339	LC387344	Taiwan	Chen *et al.* (2021)
Gelatoporia subvermispora	H:HK 20823	FN907911	FN907911	Russia	Miettinen & Larsson (2010)

Table 1. (Continued)

Species	Voucher	ITS	LSU	Origin	Reference
Gloeoporus guerreroanus	ICN:139059	MG572754	—	Brazil	Jung *et al.* (2018)
Hapalopilus rutilans	JV 0206/2 (Vlasak herb.)	KX752623	KX752623	Sweden	Miettinen *et al.* (2016)
Hydnophanerochaete odontoidea	TNM:GC 1308-45	LC363486	LC363492	China	Chen *et al.* (2018)
Hydnophlebia alachuana	CFMR:FP-103881-Sp	KP135341	KP135201	USA	Floudas & Hibbett (2015)
Hydnophlebia aurantia	TNM:F33329	MZ636982	MZ637143	Taiwan	Chen *et al.* (2021)
	TNM:F33330	MZ636983	MZ637144	Taiwan	Chen *et al.* (2021)
Hydnophlebia canariensis	MA:MA-Fungi 86622	KF483012	KF528103	Canary Isl.	Telleria *et al.* (2017)
	MA:MA-Fungi 86623	KF483013	KF528104	Canary Isl.	Telleria *et al.* (2017)
Hydnophlebia chrysorhiza	CFMR:FD-282	KP135338	KP135217	USA	Floudas & Hibbett (2015)
Hydnophlebia crocata	TNM:F33298	MZ636985	MZ637146	China	Chen *et al.* (2021)
	TNM:F33297	MZ636984	MZ637145	China	Chen *et al.* (2021)
Hydnophlebia flavicans	GB:Moreno & Illana 12690	**OR822101**	**OR822101**	Spain	This study
Hydnophlebia gorgonea	MA:MA Fungi 86659	KF483049	KF528140	Cape Verde	Telleria *et al.* (2017)
	MA:MA Fungi 86658	KF483048	KF528139	Cape Verde	Telleria *et al.* (2017)
Hydnophlebia meloi	MA:MA Fungi 86654	KF483044	KF528135	Cape Verde	Telleria *et al.* (2017)
Hydnophlebia omnivora	CFMR:ME-497	KP135332	KP135218	USA	Floudas & Hibbett (2015)
	CFMR:KKN-112	KP135334	KP136216	USA	Floudas & Hibbett (2015)
Hydnophlebia sp.	BJFC:He 4003	MK860725	MK860738	China	Liu *et al.* (2020)
Hydnophlebia subchrysorhiza	BJFC:Cui 16185	MK860722	MK860739	China	Liu *et al.* (2020)
Hyhodermella corrugata	MA:MA-Fungi 61395	FN600380	JN939584	France	Telleria *et al.* (2010)
Hyphodermella pallidostraminea	LE:286968	OK138912	OK138911	Russia	Crous *et al.* (2021)
Hyphodermella pallidovirens	GB:KHL 15122	**OR822115**	**OR822115**	Norway	This study
	GB:EM 12656	**OR822116**	n/a	Switzerland	This study
	H:VS15797	**PQ066114**	n/a	Austria	This study
Hyphodermella rosae	CFMR:FP-150552	KP134978	KP135223	USA	Floudas & Hibbett (2015)
Hyphodermella sp.	GB:KHL 12623	**OR822117**	**OR822117**	Costa Rica	This study
Lopharia avellanea	GB:EL19-10	**OR822098**	**OR822098**	Spain	This study
	H:VS15422	**OR822099**	n/a	France	This study
Lopharia ayresii	GB:KHL 12549	**OR822097**	**OR822097**	Costa Rica	This study
	BJFC:He 20120724-4	MF626352	MF626375	China	Liu *et al.* (2018)
	BJFC:He 2778	MF626353	MF626376	China	Liu *et al.* (2018)

Table 1. (Continued)

Species	Voucher	ITS	LSU	Origin	Reference
Lopharia cinerascens	CFMR:He 2188	MF626350	MF626373	USA	Liu *et al.* (2018)
	CFMR:He 2228	MF626351	MF626374	USA	Liu *et al.* (2018)
	CBS:485.62	MH858220	MH869821	USA	Vu *et al.* (2019)
	CBS:125884	MH864085	MH875543	New Zealand	Vu *et al.* (2019)
	PDD:95857	JQ694103	n/a	New Zealand	Unpublished
	?:A42	KC414245	n/a	n/a	Unpublished
	CFMR:FP-105043-sp	JN165019	JN165019	USA	Justo & Hibbett (2011)
	H:OM 16670.2	KY948709	n/a	USA	Justo *et al.* (2017)
	O:D276	**OR822096**	**OR822096**	Brazil	This study
Lopharia erubescens	URM:93246	MK993641	MK993636	Brazil	Xavier de Lima *et al.* (2020)
Lopharia mirabilis	BJFC:Dai 5147	MF626342	MF626365	China	Liu *et al.* (2018)
	BJFC:Dai 14978	MF626345	MF626368	China	Liu *et al.* (2018)
	BJFC:Yuan 2532	MF626343	MF626366	China	Liu *et al.* (2018)
	O:Parihar & Tiwari 121	**OR822095**	**OR822095**	India	This study
	BJFC:Dai 5598	MF626341	MF626364	China	Liu *et al.* (2018)
	BJFC:Dai13722	MF626346	MF626369	China	Liu *et al.* (2018)
	BJFC:He 4558	MF626344	MF626367	China	Liu *et al.* (2018)
Lopharia resupinata	BJFC:He 4401	n/a	MF626377	China	Liu *et al.* (2018)
Lopharia sinensis	BJFC:He 2510	MF626348	MF626371	China	Liu *et al.* (2018)
	BJFC:He 2428	MF626347	MF626370	China	Liu *et al.* (2018)
	BJFC:He 2424	MF626349	MF626372	China	Liu *et al.* (2018)
Luteochaete subglobosa	TNM:F30796	MZ636995	MZ637156	Taiwan	Chen *et al.* (2021)
Luteoporia albomarginata	BJFC:Dai 15229	KU598873	KU598879	China	Wu *et al.* (2016)
	BJFC:Dai 15240	KU598874	KU598879	China	Wu *et al.* (2016)
Luteoporia lutea	TNM:F28925	MZ636998	MZ637158	Taiwan	Chen *et al.* (2021)
Luteoporia straminea	SWFC:CLZhao 18947	MW732407	MW724799	China	Zhao *et al.* (2023)
Meruliopsis albomellea	BJFC:Dai 15205	KX494574	—	China	Yuan *et al.* (2017)
	BJFC:Dai 15223	KX494575	—	China	Yuan *et al.* (2017)
Meruliopsis albostraminea	GB:KHL 13798	**OR822130**	**OR822130**	France	This study
Meruliopsis crassitunicata	BJFC:Dai 10833	JX623935	—	n/a	Jia *et al.* (2014)
	TNM:CHWC 1506-46	LC427010	—	Taiwan	Chen *et al.* (2020)

Table 1. (Continued)

Species	Voucher	ITS	LSU	Origin	Reference
Meruliopsis cystidiata	NYBG:776308	MG572749	—	Brazil	Jung *et al.* (2018)
Meruliopsis faginea	LE:F-334408	MW673659	—	Russia	Crous *et al.* (2021)
Meruliopsis hirtella	CFMR:FD-497	KP135054	—	USA	Floudas & Hibbett (2015)
	CFMR:DLL 2009-033	JQ673110	—	USA	Brazee *et al.* (2012)
	CFMR:HHB-4788	KP135053	—	USA	Floudas & Hibbett (2015)
Meruliopsis leptocystidiata	TNM:Wu 1708-15	LC427012	—	China	Chen *et al.* (2020)
	TNM:Wu 1708-43	LC427013	—	China	Chen *et al.* (2020)
Meruliopsis marginata	BJFC:Cui 6878	JX623943	—	China	Jia *et al.* (2014)
Meruliopsis nanlingensis	SWFC:CLZhao 6889	OM955801	—	China	Unpublished
	BJFC:Li 1568	JX623937	—	China	Jia *et al.* (2014)
	BJFC:Dai 8173	JX623942	—	China	Jia *et al.* (2014)
Meruliopsis parvispora	TNM:Wu 1209-58	LC427017	—	Taiwan	Chen *et al.* (2020)
	TNM:Wu 1207-3	LC427016	—	Taiwan	Chen *et al.* (2020)
	TNM:CHWC 1505-129	LC427015	—	Taiwan	Chen *et al.* (2020)
Meruliopsis pseudocystidiata	BJFC:Li 1704	JX623944	—	China	Jia *et al.* (2014)
	TNM:WEI 17-078	LC427019	—	Taiwan	Chen *et al.* (2020)
Meruliopsis rubicunda	GB:VS 4951	**OR822128**	—	Russia	This study
	SWFC:CLZhao 7682	OM955808	—	China	Unpublished
	GB:G Norstedt 081011	**OR822129**	—	Sweden	This study
Meruliopsis sp.	PERTH:8690804	MT537012	—	Australia	Unpublished
	PERTH:08944830	MT537109	—	Australia	Unpublished
	PERTH:8945039	MT537118	—	Australia	Unpublished
	CFMR:HHB-9594	KP135056	—	USA	Floudas & Hibbett (2015)
	CFMR:FD-278	KP135057	—	USA	Floudas & Hibbett (2015)
	CFMR:HHB-10729	KP135051	—	USA	Floudas & Hibbett (2015)
	CFMR:L-9778-sp	KP135052	—	USA	Floudas & Hibbett (2015)
	UC:2023018	KP814205	—	USA	Rosenthal *et al.* (2017)
Meruliopsis taxicola	GB:GB-0237349	EU118648	—	Sweden	Larsson (2007)
	DAOM:16560	MH856432	—	Canada	Vu *et al.* (2019)
	K(M):167914	MZ159419	—	England	Unpublished
Meruliopsis variegata	BJFC:Li 1780	JX623936	—	China	Jia *et al.* (2014)

Table 1. (Continued)

Species	Voucher	ITS	LSU	Origin	Reference
Meruliopsis violacea	LE:247365	KF856503	—	Russia	Zmitrovich & Malysheva (2014)
Mycoacia livida	GB:KHL11705	**PQ636985**	—	Finland	This study
	GB:GB-0069572	HQ153414	—	Sweden	Ghobad-Nejhad & Hallenberg (2012)
Mycoacia ocellata	GB:KHL13967	**PQ066115**	n/a	Sweden	This study
	O:PM 354-11	**PQ636983**	**PQ636983**	Norway	This study
	O:PM 311-12	**PQ636984**	**PQ636984**	Norway	This study
	GB:VS 5285	**PQ636982**	—	Russia	This study
Mycoaciella bispora	GB:EL 13-99	**OR822104**	**OR822104**	Estonia	This study
Odoria alborubescens	BRNU:627479	JQ821319	JQ821318	Czech Rep.	Dvorak *et al.* (2014)
Oxychaete cervinogilva	H:Schigel 5216	KX752596	KX752596	Australia	Miettinen *et al.* (2016)
Phaeophlebiopsis caribbeana	CFMR:HHB-6990	KP135415	KP135243	USA	Floudas & Hibbett (2015)
Phaeophlebiopsis himalayensis	TNM:F29973	MZ637013	MZ637174	Taiwan	Chen *et al.* (2021)
Phaeophlebiopsis peniophoroides	CFMR:FP-150577	KP135417	KP135273	Hawaii	Floudas & Hibbett (2015)
Phaeophlebiopsis ravenelii	GB:GB-0161379	MZ637015	GQ470675	Canary Isl.	Chen *et al.* (2021); Wu *et al.* (2010)
Phaeophlebiopsis roumeguerei	GB:KHL 13759	**OR822122**	**OR822122**	France	This study
Phanerina mellea	H:OM 11393	KX752602	KX752602	Indonesia	Miettinen *et al.* (2016)
Phanerochaete alnea	GB:KHL 12054	**OR822121**	**OR822121**	Norway	This study
Phanerochaete arizonica	CFMR:RLG-10248	KP135170	KP135239	USA	Floudas & Hibbett (2015)
Phanerochaete australis	CFMR:HHB-7105	KP135081	KP135240	USA	Floudas & Hibbett (2015)
Phanerochaete burtii	CFMR:HHB-4618-Sp	KP135117	KP135241	USA	Floudas & Hibbett (2015)
Phanerochaete chrysosporium	CFMR:HHB-6251	KP135094	KP135246	USA	Floudas & Hibbett (2015)
Phanerochaete cumulodentata	GB:KHL 13765	**OR822119**	**OR822119**	France	This study
Phanerochaete laevis	GB:KHL 11839	**OR822118**	**OR822118**	Sweden	This study
Phanerochaete magnoliae	CFMR:HHB-9829	KP135089	KP135237	USA	Floudas & Hibbett (2015)
Phanerochaete sordida	LE:209918	KP994377	KP994383	Finland	Volobuev *et al.* (2015)
Phanerochaete velutina	GB:KHL 11926	**OR822120**	**OR822120**	Sweden	This study
Phlebia albida	GB:GB-0181539	AF141616	AF141616	Greenland	Parmasto & Hallenberg (2000)
Phlebia caspica	GB:EM 13525	**OR822134**	n/a	France	This study
Phlebia cf. bresadolae	CFMR:RLG-10795sp	KY948785	KY948857	USA	Justo *et al.* (2017)
Phlebia chrysocreas	not known	LN611115	LN611115	not known	Kuuskeri *et al.* (2015)
	not known	LN611114	LN611114	not known	Kuuskeri *et al.* (2015)

Table 1. (Continued)

Species	Voucher	ITS	LSU	Origin	Reference
Phlebia formosana	TNM:F30406	MZ637033	MZ637237	Taiwan	Chen *et al.* (2021)
Phlebia margaritae	TUF:124409	KX826788	n/a	Italy	Saitta *et al.* (2017)
Phlebia sp.	TNM:F31277	MZ637038	MZ637241	Taiwan	Chen *et al.* (2021)
	CFMR:HHB-12357	MZ637065	MZ637264	USA	Chen *et al.* (2021)
	not known	LN611130	LN611130	Sweden	Kuuskeri *et al.* (2015)
Phlebia subochracea	GB:KGN 162-95	EU118656	EU118656	Sweden	Larsson (2007)
Phlebia uda	GB:KHL 13157	**OR822103**	**OR822103**	Estonia	This study
Phlebiodontia acanthocystis	CFMR:FP-150571	KY948767	KY948844	Hawaii	Justo *et al.* (2017)
Phlebiodontia fissurata	SWFC:CLZhao 2900	MW732402	MW724794	China	Zhao *et al.* (2023)
	GB:EM 13468	**OR822135**	n/a	Switzerland	This study
Phlebiodontia rajchenbergii	SP:MCW 636-18	OP265192	OP265190	Brazil	Motato-Vasquez *et al.* (2022)
Phlebiodontia sp.	O:LR 46383	**OR822136**	**OR822136**	Brazil	This study
Phlebiodontia subochracea	GB:RGC 160804A1	**OR822102**	**OR822102**	Sweden	This study
Phlebiopsis castanea	H:VS 5295	KX752610	KX752610	Russia	Miettinen *et al.* (2016)
Phlebiopsis crassa	CFMR:KKN-86	KP135394	KP135215	USA	Floudas & Hibbett (2015)
Phlebiopsis flavidoalba	CFMR:FD-263	KP135402	KP135271	USA	Floudas & Hibbett (2015)
Phlebiopsis gigantea	CFMR:FP-70857	KP135390	KP135272	USA	Floudas & Hibbett (2015)
Phlebiopsis sp.	CFMR:FP-102937	KP135391	KP135270	Puerto Rico	Floudas & Hibbett (2015)
Phlebiporia bubalina	BJFC:Dai 13168	KC782526	KC782528	China	Jia *et al.* (2014)
Pirex concentricus	OSC:41587-sp	KP134984	KP135275	USA	Floudas & Hibbett (2015)
Porostereum spadiceum	GB:KHL 13438	**OR822131**	**OR822131**	Germany	This study
Quasiphlebia densa	TNM:F14971	MZ637067	MZ637266	Taiwan	Chen *et al.* (2021)
	TNM:F31834	MZ637066	MZ637265	Taiwan	Chen *et al.* (2021)
Quasiphlebia canadensis	O:PM 343-11	**PQ013065**	**PQ013065**	Norway	This study
	GB:GB-0095231	**PQ013064**	**PQ013064**	Sweden	This study
Rhizochaete americana	CFMR:FP-102188	KP135409	KP135277	USA	Floudas & Hibbett (2015)
Rhizochaete belizensis	CFMR:FP-150712	KP135408	KP135280	Belize	Floudas & Hibbett (2015)
Rhizochaete borneensis	TNM:F31080	MZ637070	MZ637270	Taiwan	Chen *et al.* (2021)
Rhizochaete brunnea	BAFC:34528	AY219389	AY219389	Argentina	Greslebin *et al.* (2004)
Rhizochaete chinensis	TNM:Wu 0910-45	LC387335	MF110294	China	Chen *et al.* (2018); Wu *et al.* (2018)
Rhizochaete filamentosa	CFMR:HHB-3169	KP135410	KP135278	USA	Floudas & Hibbett (2015)

Table 1. (Continued)

Species	Voucher	ITS	LSU	Origin	Reference
Rhizochaete flava	CFMR:PR-1141	KY273030	KY273033	Puerto Rico	Nakasone *et al.* (2017)
Rhizochaete fouquieriae	CFMR:KKN-121	AY219390	AV219390	USA	Greslebin *et al.* (2004)
Rhizochaete galactites	GB:Hjm 18924	**OR822124**	**OR822124**	Sweden	This study
	H:VS 11261	**OR822125**	n/a	Russia	This study
	H:VS 12070	**OR822126**	n/a	Russia	This study
Rhizochaete lutea	TNM:F21760	MZ637072	GQ470651	Taiwan	Chen *et al.* (2021); Wu *et al.* (2010)
Rhizochaete radicata	CFMR:FD-123	KP135407	KP135279	USA	Floudas & Hibbett (2015)
Rhizochaete sulphurina	GB:SPG 745	**OR822127**	**OR822127**	Spain	This study
Rhizochaete sulphurosa	URM:87190	KT003522	KT003519	Brazil	Chikowski *et al.* (2016)
Rhizochaete violascens	GB:GB-0161553	**OR822123**	**OR822123**	Sweden	This study
Riopa metamorphosa	H:VS 2395	KX752601	KX752601	Russia	Miettinen *et al.* (2016)
Scopuloides hydnoides	GB:KHL 11916	EU118665	EU118665	Sweden	Larsson (2007)
Scopuloides sp.	GB:KHL 12320	**OR822105**	**OR822105**	USA	This study
Stereophlebia pendula	GB:KHL 15159	**PQ013066**	**PQ013066**	Spain	This study
	GB:EL 29-11	**PQ013067**	**PQ013067**	Spain	This study
	H:6200339	**PQ013069**	n/a	Finland	This study
	H:6200089	**PQ013071**	n/a	Finland	This study
	H:7047608	**PQ013072**	n/a	USA	This study
	H:7068342	**PQ013070**	n/a	Russia	This study
	OULU:Kulju 78/21	**PQ013068**	n/a	Finland	This study
Terana caerulea	CFMR:FP-104073	KP134980	KP135276	USA	Floudas & Hibbett (2015)

sequences were complemented by sequences downloaded from GenBank (Table 1). Four sequence datasets were compiled using the AliView editor (Larsson 2014). Sampling for the *Hydnophlebia* dataset was guided by the phylogenetic analyses in Chen *et al*. (2021) and Lira *et al*. (2022) and includes a subset of species from *Meruliaceae*. Two *Scopuloides* species were selected as outgroup. Sampling for the *Lopharia* dataset follows Liu *et al*. (2018) with *Gelatoporia subvermispora* added as outgroup (Justo *et al*. 2017). The *Phanerochaetaceae* dataset is modelled after Chen *et al*. (2021) and has *Bjerkandera adusta* and *Porostereum spadiceum* included as outgroup. The *Meruliopsis* ITS dataset has *Ceriporia viridans* as outgroup (Chen *et al*. 2020).

Sequences were aligned through MAFFT (Katoh & Standley 2013) as implemented on the EMBL-EBI server (Madeira *et al*. 2022) with default settings. Ambiguously aligned regions were removed using GBlocks v. 0.91b with relaxed settings (Talavera & Castresana 2007), available on the phylogeny.fr server (Dereeper *et al*. 2008).

The Maximum Likelihood (ML) analysis were conducted with IQ-TREE (Nguyen *et al*. 2015) using the online server at http://iqtree.cibiv.univie.ac.at/ (Trifinopoulos *et al*. 2016). ITS1, 5.8S, ITS2 and 28S were treated as separate partitions (Chernomor *et al*. 2016). The best-fitting substitution model was estimated automatically using ModelFinder implemented on the IQ-TREE server (Kalyaanamoorthy *et al*. 2017). Branch support was estimated through the SH-aLRT test (Guindon *et al*. 2010) and through ultrafast bootstrap (UB) (Hoang *et al*. 2018), both of which are available on the IQ-TREE server.

Bayesian Inference (BI) was calculated using MrBayes v. 3.2 (Ronquist *et al*. 2012) implemented on the CIPRES Science Gateway server v. 3.3 (Miller *et al*. 2010) and utilizing the BEAGLE library (Ayres *et al*. 2012). The same partitions as in the ML analyses were used. Substitution models were selected with MrModeltest2 (Nylander 2004). Analyses were run for 5 M generations, sampling trees every 1000th generation. Other program settings were the default ones.
The original and Gblocks-curated alignments for the phylogenetic trees are uploaded to Figshare (https://doi.org/10.6084/m9.figshare.28560074).

RESULTS

The aligned and end-trimmed *Hydnophlebia* dataset had 1720 nucleotide sites. After curation with GBlocks, 1495 sites remained for the analyses. MrModeltest suggested the K80 model for the ITS region and GTR+I+G for the LSU region. Maximum Likelihood and BI analyses produced essentially the same topology. Figure 2 shows the ML tree with branch support from SH-aLRT (≥ 80 %), UB (≥ 95 %), and BI pp values (≥ 0.95), respectively. The analyses recovered *Hydnophlebia* with strong support and the clade includes an *Odonticium flavicans* sequence in a sister taxon position to *Hydnophlebia alachuana*.

The aligned and end-trimmed *Phanerochaetaceae* dataset consisted of 2078 nucleotide sites. After curation with GBlocks, 1429 sites remained for the analyses. MrModeltest selected SYM+G for ITS1 and GTR + G for 5.8S, ITS2, and LSU. Maximum Likelihood and BI analyses produced essentially the same topology. Figure 3 shows the ML tree with branch support as indicated above. The *Hyphodermella* clade is strongly supported and includes three sequences of *Corticium pallidovirens* that are identical to the type sequence for *Hyphodermella pallidostraminea*. The *Quasiphlebia* clade is also strongly supported and includes three sequences from Norway and Sweden that are identified as *Phlebia canadensis*. These three sequences differ from the type of *Quasiphlebia densa* at two nucleotide positions in ITS2 and one position in LSU. The *Stereophlebia* clade received strong support and is recovered as a sister group to *Gelatinofungus brunneus*. The *Rhizochaete* clade is strongly supported by SH-aLRT but unsupported by UB and BI. The clade includes *Phanerochaete galactites* but its relation to other species remains unclear. The *Phaeophlebiopsis* clade is strongly supported and includes *Peniophora roumeguerei*.

The aligned and end-trimmed *Lopharia* dataset had 1482 nucleotide sites. After curation with GBlocks, 1370 sites remained. MrModeltest suggested SYM+G for ITS1, K80 for 5.8S, GTR+G for ITS2, and GTR+I+G for LSU. The ML and BI analyses produced essentially the same topology. Figure 4 shows the ML tree with branch support threshold values as indicated above. *Lopharia* was recovered as strongly supported by SH-aLRT and BI analyses and weakly supported by UB (87%). The clade included *Peniophora avellanea*, which occurred as a sister taxon to *Lopharia erubescens*.

The aligned and end-trimmed *Meruliopsis* ITS dataset consisted of 670 character sites. After curation with GBlocks, 479 sites remained for the analyses. MrModeltest selected HKY+G for ITS1, K80 for 5.8S, and GTR+G for ITS2. The ML and BI analyses produced essentially the same topology. Figure 5 shows the ML tree with branch support as indicated above. One sequence of *Meruliopsis albostraminea* proved to be identical to the type specimen of *Meruliopsis faginea*. They were recovered well separated from three American sequences of *Meruliopsis hirtella*. Three sequences of *Meruliopsis rubicunda* were found identical to the type of *Ceriporia pseudocystidiata*. The four formed a strongly supported sister clade relationship with *Meruliopsis* sp. from North America.

Taxonomy

Cytidiella pallidolivens (Bourdot & Galzin) K.H. Larss. & Ryvarden, ***comb. nov.*** MycoBank MB 857615. Fig. 6.
Basionym: *Corticium seriale* subsp. *pallidolivens* Bourdot & Galzin, *Bull. Soc. Mycol. Fr*. **27**: 254. 1911.
Synonyms: *Corticium pallidolivens* (Bourdot & Galzin) Bourdot & Galzin, *Hyménomyc. de France* (Sceaux): 222. 1928.
Phlebia pallidolivens (Bourdot & Galzin) Parmasto, *Eesti NSV Tead. Akad. Toim., Biol. seer* **16**: 391. 1967.

Typus: **France**, Aveyron, Millau, Le Causse Noir, on *Pinus sylvestris*, 23 Mar. 1907, *A. Galzin* (**lectotype** of *Corticium seriale* subsp. *pallidolivens*, designated here, PC Bourdot 5508, MBT 10024806; **isolectotype** GB, studied).

Additional material studied: **Spain**, Catalonia, Lerida, N. of Lles, on still attached *Pinus* branch, 18 Nov. 1986, *N. Hallenberg* 10123, GB-0181215.

Description: *Basidiomata* resupinate, effused, closely adnate, at first orbicular, then confluent, soft ceraceous when fresh, firm after drying, membranous, hymenium smooth or with blunt warts, dirty yellow to brick-red, liver-coloured or even chestnut brown, margin paler than hymenium, byssoid to finely fimbriate, subiculum whitish. *Hyphal system* monomitic, hyphae with clamps, in the subiculum parallel, densely arranged, 2.5–6 µm wide, thin-walled to slightly thick-walled, sometimes somewhat gelatinized, in the subhymenium thin-walled, 2–3 µm, frequently branched and with a fine-grained incrustation. Crush preparations in Melzer receive golden yellow oil-drops, probably from dissolution of the incrustation seen in the subhymenium. *Basidia* narrowly clavate 25–40 × 4.5–6 µm, with four sterigmata and a basal clamp. *Basidiospores* narrowly elliptical to almost cylindrical, (6.2–)6.3–7.8(–8.2) × (2.8–)2.9–3.6(–3.7) µm, L = 7.0 µm, W = 3.2 µm, L/W = 2.2, adaxially sometimes slightly concave, some spores weakly sigmoid, thin-walled, smooth, without reaction in Melzer's or Cotton Blue.

Ecology and distribution: On decaying coniferous wood, especially *Pinus* sp. but also *Abies* sp. Frequently on dead but still attached branches. With certainty known from France and Spain. It is reported from pine wood in Austria, Russia, and Canada but we have not studied any specimens. Other reports (see gbif.org) seem to derive from angiosperm wood and are most likely not this species.

Notes: In an early attempt to place *Phlebia albida* in a phylogenetic context, Nakasone (1996) used a culture derived from a Spanish specimen collected on a still attached branch of *Pinus* sp. (host erroneously given as *Populus* by Nakasone). The sequence was recovered in the vicinity of *Phlebia albomellea* and this position has been retained in subsequent studies that used the same culture (e.g. Justo *et al*. 2017). Following the resurrection of *Cytidiella* as the correct place for *Phlebia albomellea* (Larsson 2007), also *Phlebia nitidula* and *Phlebia albida* have been moved to that genus (Zmitrovich 2018, Chen *et al*. 2021).

Phlebia albida is a species growing on a variety of angiosperm trees. This casts doubts on the identity of the pine-dwelling Spanish specimen. A restudy showed that it has been misidentified. The material consists of an effused basidioma having a smooth to slightly tuberculate hymenium with a reddish colour. A search in the literature brought up the name *Corticium pallidolivens* and comparison with authentic material revealed that the Spanish specimen belongs to this species. *Corticium pallidolivens* was collected frequently by Galzin in pine forest in southern France but has rarely been reported during the last hundred years. As indicated by published phylogenetic analyses where sequences from the misidentified specimen have been included, the species should be moved to *Cytidiella* (Chen *et al*. 2021). The identity and correct classification of *Phlebia albida* are discussed below under *Stereophlebia pendula*.

Hydnophlebia flavicans (Bres.) K.H. Larss. & Ryvarden, ***comb. nov.*** MycoBank MB 857616.
Basionym: *Hydnum flavicans* Bres., *Atti Acad. Agiato Rovereto* **3**(1): 95. 1897.
Synonyms: *Odonticium flavicans* (Bres.) Nakasone, *Cryptog. Mycol.* **29**(3): 245. 2008.
Odonticium monfraguense M.N. Blanco, G. Moreno & Manjón, *Cryptog. Mycol.* **10**(2): 137. 1989.

Typus: **Slovakia**, Prencow, na háj, on *Quercus*, 2 Dec. 1890, *A. Kmet* (**lectotype** of *Hydnum flavicans*, S F15525). **Hungary**, on *Quercus*, 12 Feb. 1912, *A. Kmet* (**epitype** S F15531, studied).

Additional materials examined: **Italy**, Sicily, Palermo, Altopiano Batia, St. Mauro Castelverde, on *Quercus suber*, 29 Jan. 2000, *A. Saitta* (A. Bernicchia 7201), O. **Spain**, Cáceres, Monfragüe Nat. Park, Las Cansinas, La Bazagona, on *Quercus suber*, 26 Apr. 1990, *G. Moreno & C. Illana*, GB, dupl. ex. HAH 12690.

Illustration: Michel & Duhem (2003; as *Odonticium monfraguense*).

Description: *Basidiomata* resupinate, closely adnate, effused, ceraceous when fresh, compact and rather hard when dried, hymenium densely hydnoid, pale yellow to pale orange, becoming brownish orange or pale cinnamon, spines cylindrical or slightly flattened, up to 10 mm long, 3–4 per mm, single or fused, margin narrow and pale yellow. *Hyphal system* monomitic, septa without clamps, hyphae in the thin subiculum 3–5 µm wide, irregular, much branched, thick-walled, partly pale brownish, hyphae in aculeal trama 3.5–5 µm, straight, parallel, thick-walled, apically thin-walled and with obtuse apices, subhymenium very thin, composed of thin-walled, 2–3 µm wide, richly branched, densely united hyphae. *Cystidia* scattered to rare, fusiform, 25–30 × 4–5(–7) µm, apically obtuse, thin-walled, projecting for about half their length. *Basidia* clavate, 14–18 × 4–4.5 µm, with four sterigmata. *Basidiospores* elliptical, (3.3–)3.4–4.5(–4.9) × 2.1–2.8(–2.9) µm, L = 3.9 µm, W = 2.35 µm, Q = 1.64 thin-walled, smooth, without reaction in Melzer's or Cotton Blue.

Ecology and distribution: On bark and wood of *Quercus*, especially *Q. suber*. Apparently, a rare species. The lectotype was collected in Slovakia and the epitype in Hungary. All recent collections are from Portugal, Spain, France, and Italy.

Notes: This species has usually been placed in *Odonticium* because of its hydnoid hymenium and the simple-septate hyphae (Manjón *et al*. 1989, Nakasone 2008). However, the type of *Odonticium*, *O. romellii*, belongs in *Hymenochaetales* while *Hydnum flavicans* belongs in *Polyporales*. Molecular data (Fig. 2) confirm that its proper place is in *Hydnophlebia*.

Hyphodermella pallidovirens (Bourdot & Galzin) K.H. Larss. & Spirin, ***comb. nov.*** MycoBank MB 857617. Figs 1A, 7.
Basionym: *Corticium pallidovirens* Bourdot & Galzin, *Hyménomyc. de France*: 215. 1928.
Synonyms: *Corticium pallidovirens* Bourdot & Litsch., *Öst. bot. Z.* **77**(2): 123. 1928, nom. illeg., a homonym of *C. pallidovirens* Bourdot & Galzin. *Typus*: **Austria**, Tirol, "Wäldchen bei Stams in Oberinntal", on branches of *Corylus avellana* and *Alnus incana*, 6 Jun. 1926, *V. Litschauer* (**lectotype** W 16376)
Phlebia viridesalebrosa J. Erikss. & Hjortstam, *Cortic. N. Eur.* **6**: 1127. 1981. *Typus*: **Austria**, Tirol, "Wäldchen bei Stams in Oberinntal", on branches of *Corylus avellana* and *Alnus incana*, 6 Jun. 1926, *V. Litschauer* (**lectotype** W 16376)
Hyphodermella pallidostraminea Bukharova & Volobuev, *Persoonia* **47**: 323. 2021.

Typus: **Austria**, Tirol, “Wäldchen bei Stams in Oberinntal”, on branches of *Corylus avellana* and *Alnus incana*, 6 Jun. 1926, *V. Litschauer* (**lectotype** of *Corticium pallidovirens* PC Bourdot 34284, studied).

Additional materials examined: **Austria**, Niederösterreich, Perchtoldsdorf, Naturpark Föhrenberge, on *Corylus avellana*, 10 Sep. 2022, *V. Spirin* 15797, H. **France**, Aveyron, Castelnau-Pégayrols, Le Trou d’Enfer, on rotten branches of *Buxus sempervirens*, May 1923, *A. Galzin* 27295 (Bourdot 33957), PC. **Norway**, Oslo, Hovedøya, on frondose wood, 22 Sep. 2011, *K.H. Larsson* 15122, GB. **Switzerland**, Ticino, Cevio, Conzorzio, on deciduous wood, 25 Aug. 2015, *E. Martini* 12656, GB.

Description: *Basidiomata* resupinate, effused, closely adnate, thin, crustaceous, hymenium smooth, mostly continuous or slightly cracked when dry, a bit shiny, greyish white with a glaucous or yellowish cast, margin not differentiated, thinning out or pruinose. *Hyphal system* monomitic, hyphae without clamps, in the thin subiculum 3–6(–8) µm wide, mostly thin-walled but some hyphae next to the substrate with thickened walls, partly irregular, partly parallel, closely united into a dense structure, in the subhymenium thin-walled, 3–4 µm wide, crystals common throughout the hyphal structure. *Cystidia* absent. *Basidia* clavate, usually with a slight median constriction and then subutriform, 18–27 × 5–7 µm, with four sterigmata. *Basidiospores* elliptical, (4.9–)5.0–5.7(–5.9) × (3.0–)3.1–3.6 µm, L = 5.35 µm, W = 3.4 µm, Q = 1.59 smooth, thin-walled, with homogenous contents, without reaction in Melzer’s or Cotton Blue.

Ecology and distribution: On decaying branches and stems of angiosperm trees and bushes, on both bark and wood. Very rare and in Europe recorded only from Austria, Switzerland, Italy, France, and Norway. Recently collected in the Russian Far East (as *Hyphodermella pallidostraminea*).

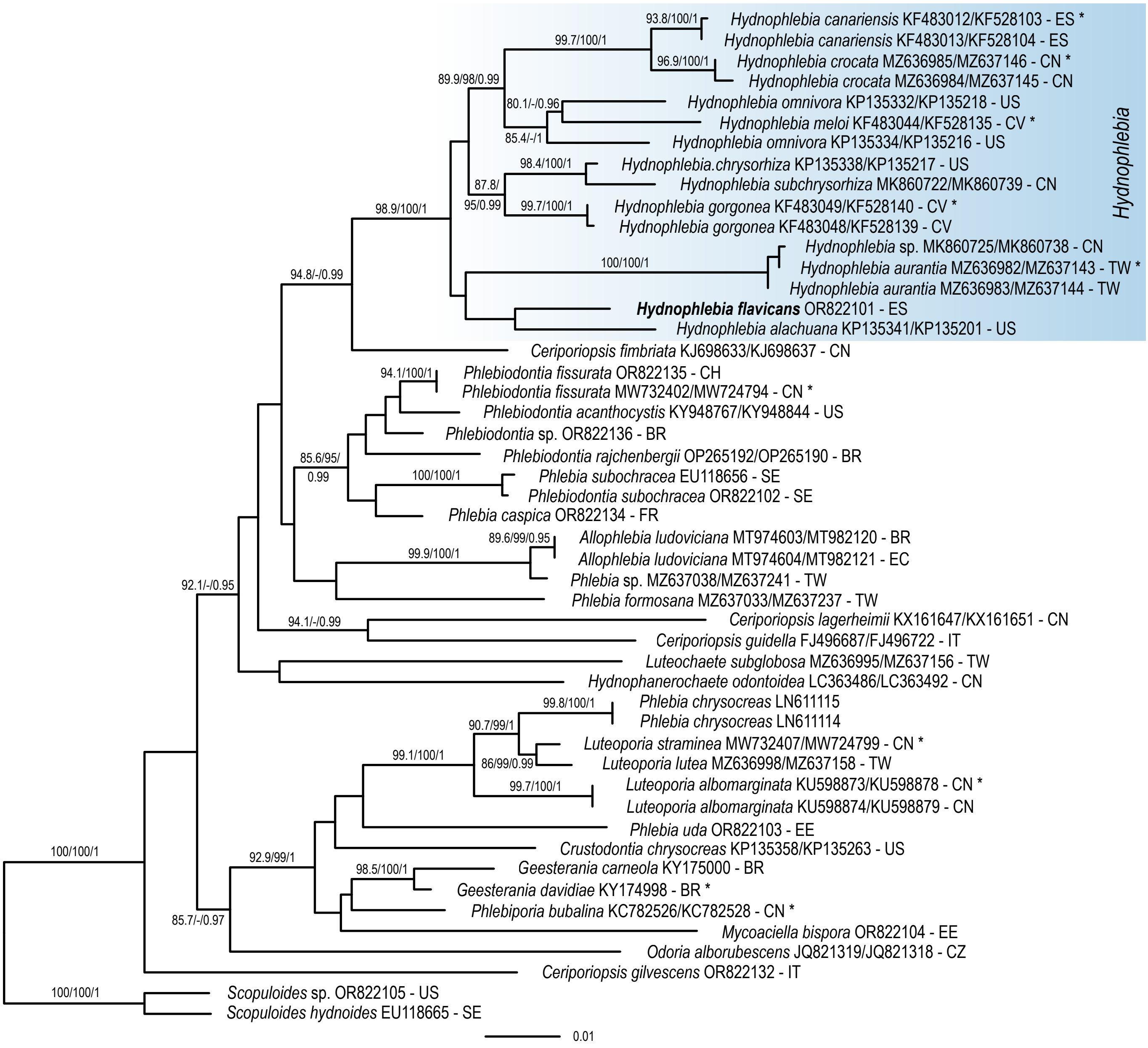

Fig. 2. Maximum likelihood tree for a part of *Meruliaceae* using ITS and LSU sequences. Focal taxa are highlighted. Support values from SH-aLRT (≥ 80), ultrafast boostrap (≥ 95) and Bayesian inference (≥ 0.95) are indicated on branches. Type sequences are marked with *.

Notes: Eriksson *et al*. (1981) treated this species in remarks to *Phlebia lilascens* and concluded that *Corticium pallidovirens* Bourdot & Galzin and *Corticium pallidovirens* Bourdot & Litsch. were different species. Hence, they introduced *Phlebia viridesalebrosa* in order to validate the latter homonym. Hjortstam (1987) later changed his mind and regarded the two species as synonyms. Wu (1990) came to the same conclusion and we concur.

Molecular phylogenetic analyses recover *Corticium pallidovirens* in *Hyphodermella* with strong support (Fig. 3). *Hyphodermella* was originally described as a genus with odontioid hymenium with the hymenial spines consisting

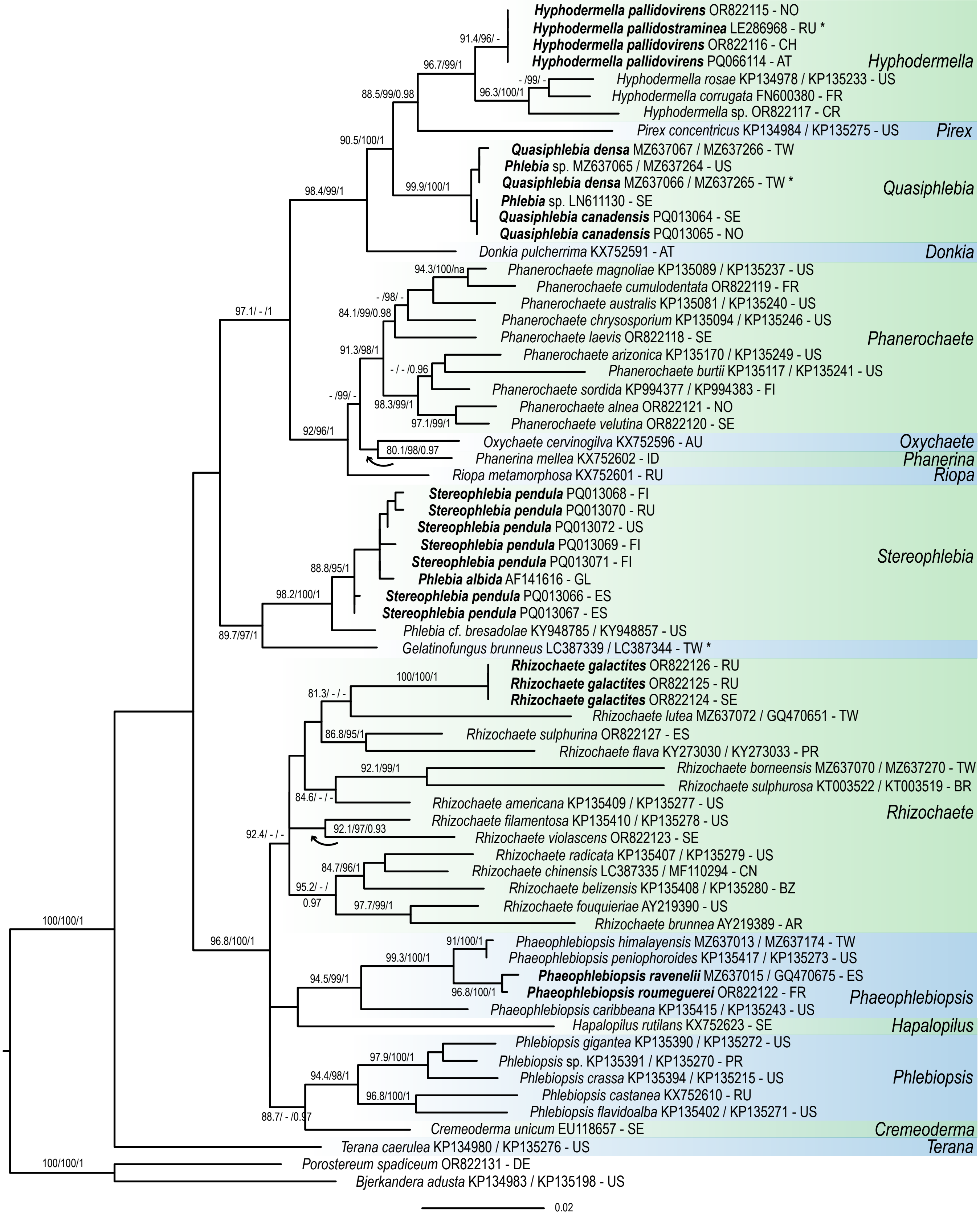

Fig. 3. Maximum likelihood tree for *Phanerochaetaceae* using ITS and LSU sequences. Focal taxa are highlighted. Support values from SH-aLRT (≥ 80), ultrafast boostrap (≥ 95) and Bayesian inference (≥ 0.95) are indicated on branches. Type sequences are marked with *.

of bundles of encrusted hyphae. The genus was initially monotypic. Later additions have introduced species with smooth to tuberculate and poroid hymenial configurations (Zhao *et al*. 2017, Wang & Zhao 2020, Wang *et al*. 2021). However, recent phylogenetic analyses indicate that not all of these additions belong in the genus (Chen *et al*. 2021). *Hyphodermella pallidovirens* has a strictly smooth hymenium with no tendencies to form encrusted bundles of hyphae like the type species.

Lopharia avellanea (Bres.) K.H. Larss. & E. Larss., ***comb. nov.*** MycoBank MB857618. Fig. 1B.
Basionym: *Kneiffia avellanea* Bres., *Ann. Mycol.* **1**: 102. 1903.
Synonym: *Phlebia margaritae* Duhem & H. Michel, *Cryptog. Mycol*. **28**: 30. 2007.

Typus: **Poland**, on branches of *Ulmus*, leg. *Eichler* (**lectotype** of *Kneiffia avellanea*, designated here, S F15745, MBT 10024814, studied).

Additional materials examined: **France**, Aveyron, Millau, Dourbie, on *Quercus pubescens*, 10 May 2022, *V. Spirin* 15422, H. **Poland**, on branches of Ulmus, Jul.-Aug. 1900, *B. Eichler*, S F15745, **lectotype** of *Kneiffia avellanea*, GB **isolectotype**. **Spain**, Huesca, Caspe, 14 km N of Caspe on road A2410 Caspe – Peñalba, on *Quercus ilex*, 7 Apr. 2010, *E. Larsson* EL19-10, GB.

Illustration: Duhem & Michel (2007; as *Phlebia margaritae*).

Description: *Basidiomata* resupinate, effused, closely adnate, thin to moderately thick, rather soft, ceraceous, by age becoming more and more rimose, hymenium smooth, when dried minutely porose, velutinous from emerging cystidia, pale chamois to greyish pink or violaceous, margin thinning out or developed as white, byssoid mycelium. *Hyphal system* monomitic, septa with clamps, subiculum rather compact, composed of 2–4(–5) µm wide, frequently branched and somewhat irregular generative hyphae and 0.5–2 µm wide, somewhat thick-walled micro-binding hyphae with short narrow side-branches, mainly visible along the margin or in cracks in the hymenium. Some hyphae are minutely encrusted. Subhymenial hyphae thin-walled, richly branched, 2–3 µm wide, forming a vertically arranged dense tissue where individual hyphae are difficult to observe. *Cystidia* abundant, conical, thick-walled, densely encrusted, mostly 50–80 × 10–

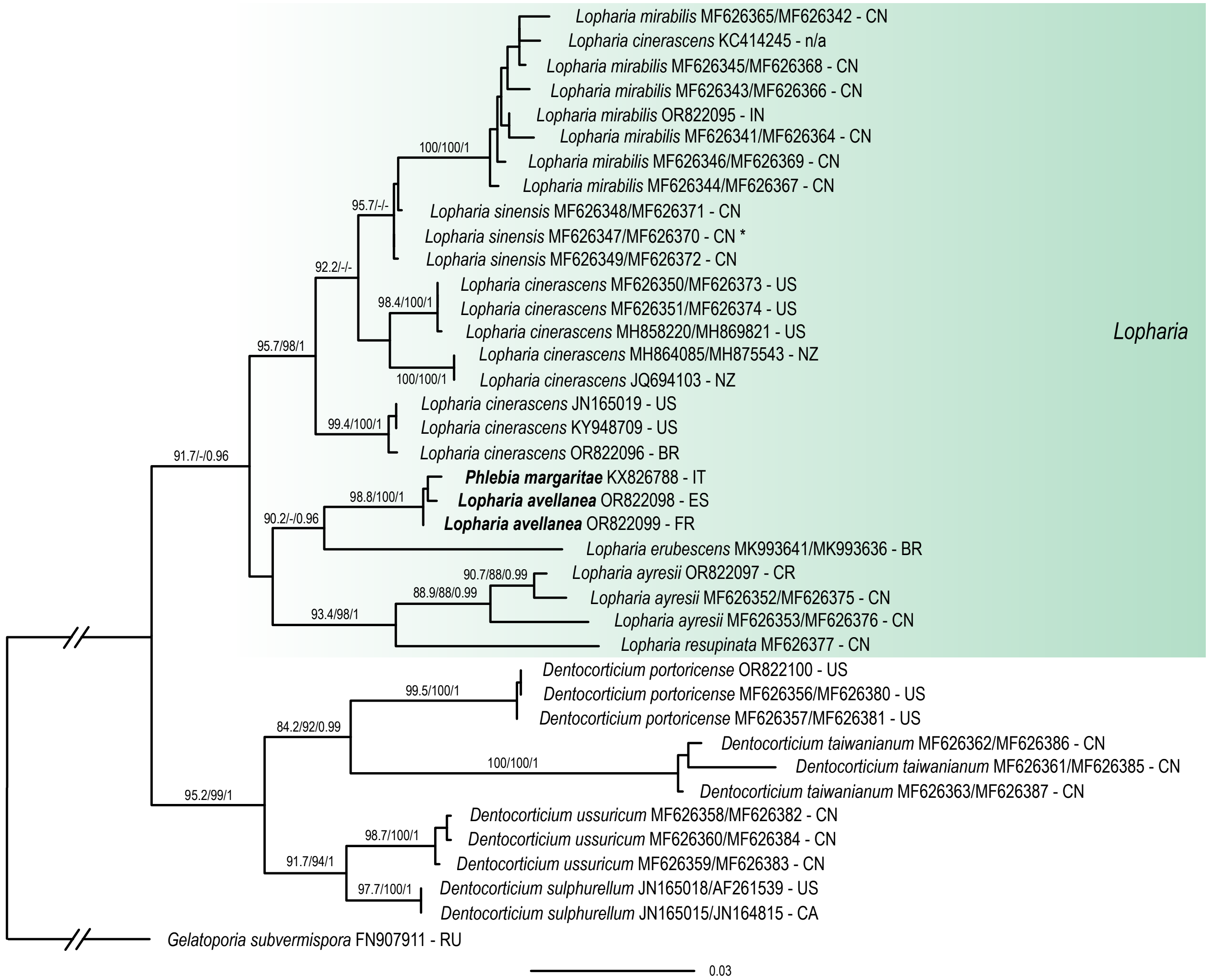

Fig. 4. Maximum likelihood tree for *Lopharia* using ITS and LSU sequences. Focal taxa are highlighted. Support values from SH-aLRT (≥ 80), ultrafast boostrap (≥ 95) and Bayesian inference (> 0.95) are indicated on branches. Type sequences are marked with *.

15 µm, older ones slightly yellowish, initially broadly club-shaped and thin-walled, developing in the hymenium from generative hyphae, in the beginning strongly projecting, becoming embedded when the basidioma thickens. *Basidia* narrowly clavate to subcylindrical, 25–40 × 3–5 µm, distinctly widened at apex when sterigmata develop, with four rather straight sterigmata. *Basidiospores* cylindrical, more or less allantoid, (5.9–)6.0–7.3(–7.9) × (2.1–)2.3–3.4(–3.9) µm, L = 6.85 µm, W = 2.8 µm, Q = 2.29, thin-walled, with one-to-many oil-drops, without reaction in Melzer's or Cotton Blue.

Ecology and distribution: On trunks and branches of angiosperm wood. A rare species, so far found in France, Italy, Iran, Poland and Spain.

Notes: Bresadola (1903) compared his new species to *Peniophora cinerea* and Höhnel & Litschauer (1908) moved it to *Peniophora*. Both Höhnel & Litschauer (1908) and Eriksson *et al*. (1978: 985) suggested that it could be related to *Peniophora* (*Hyphoderma*, *Peniophorella*) *pubera*. According to notes in the type envelope, Burdsall studied the material and concurred with Bresadola about its place in *Peniophora* sensu stricto.

Phylogenetic analyses firmly place the species in *Lopharia* (Fig. 4). This genus was originally regarded as dimitic (Hjortstam & Ryvarden 1990) but the concept was changed when the monomitic species *Peniophora ayresii* was added to the genus (Hjortstam 1995). Recently, more monomitic species have been included and the genus definition emended (Liu *et al.* 2018). *Phlebia margaritae* was described as dimitic because the subiculum contains skeleto-binding hyphae (here called micro-binding hyphae) (Duhem & Michel 2007). However, in our opinion a presence of micro-binding hyphae should not qualify for a classification as dimitic.

The Spanish specimen is paler and with less violaceous tints than the types of *Phlebia margaritae* and *Kneiffia avellanea*. It is also older, which is seen by the thicker, strongly cracked basidioma. The Polish specimen is thin and probably young. In all other respects the studied material is homogenous.

There are three specimens in the Bresadola herbarium in Stockholm (herb S, F15744, F15745, F78491). They all bear the same label data and are apparently pieces of a single specimen from Poland seen by Bresadola. One of them (F15745) also has annotations on microscopic details and pencil drawings of cystidia and spores and is here selected as lectotype.

Meruliopsis rubicunda (Litsch.) Spirin & K.H. Larss. ***comb. nov.*** MycoBank MB 857619. Fig. 1C.

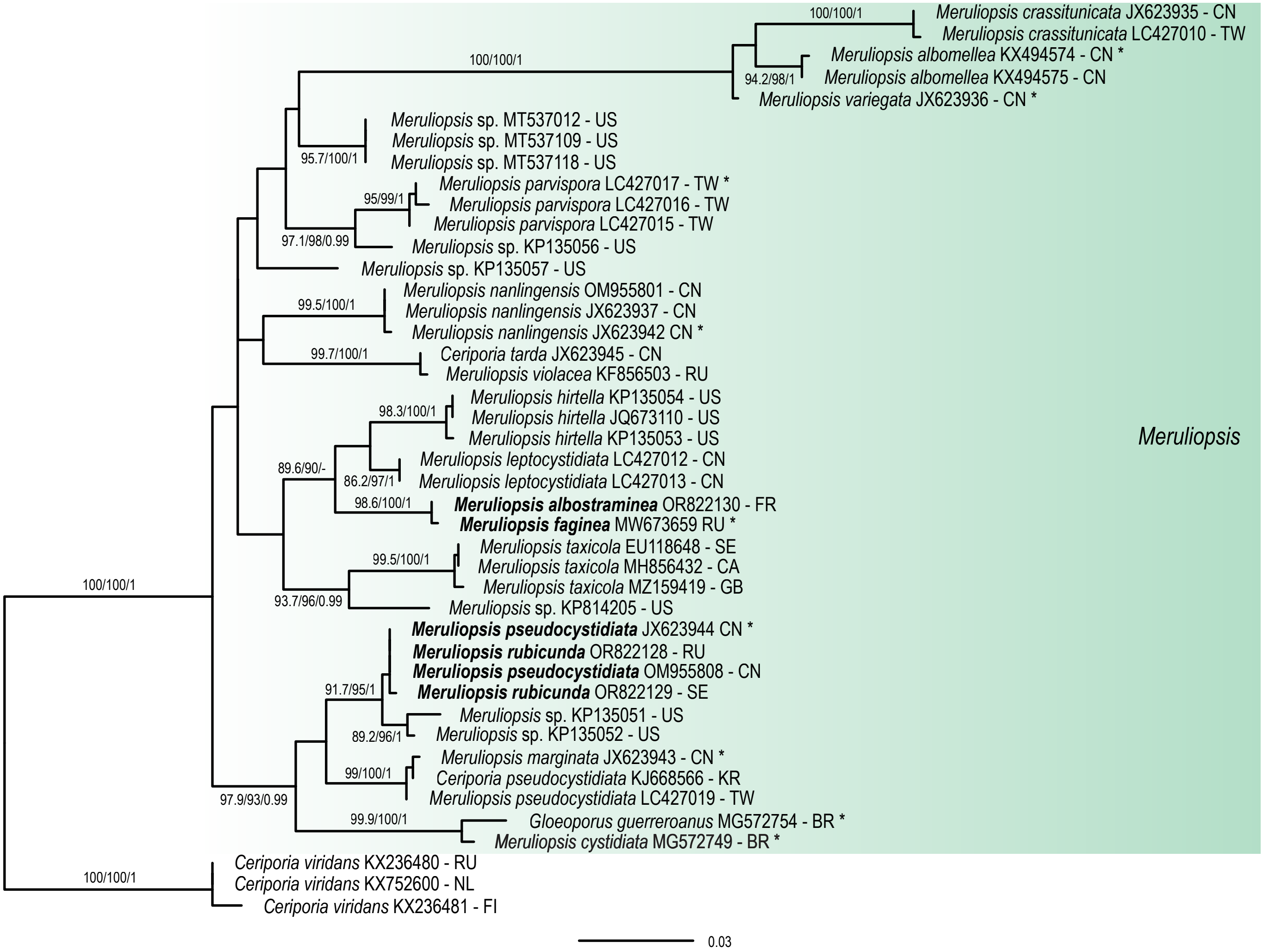

Fig. 5. Maximum likelihood tree for *Meruliopsis* using ITS sequences. Focal taxa are highlighted. Support values from SH-aLRT (≥ 80), ultrafast boostrap (≥ 95) and Bayesian inference (≥ 0.95) are indicated on branches. Type sequences are marked with *.

Basionym: *Merulius rubicundus* Litsch., *Bull. Trimest. Soc. Mycol. Fr.* **49**: 293. 1934.
Synonyms: *Ceraceomerulius rubicundus* (Litsch.) J. Eriksson & Ryvarden, *Cortic. N. Eur*. **2**: 197. 1973.
Ceriporia pseudocystidiata B.S. Jia & Y.C. Dai, *Mycol. Prog.* **13**: 86. 2013.
Meruliopsis pseudocystidiata (B.S. Jia & Y.C. Dai) C.C. Chen & Sheng H. Wu, *Mycologia* **112**: 78. 2020.

Typus: **Russia**, Khakassia, Sayan Mts., on *Alnus* (?), 15 Jul. 1932, *Krawtzew* (**holotype** of *Merulius rubicundus* PRM 618737, studied).

Additional materials examined: *Meruliopsis albostraminea*. **Armenia**, Kaphan, Tsav, on *Sambucus ebulus*, 2 Oct. 1962, *E. Parmasto*, TAAM 16280, **holotype** of *Byssomerulius armeniacus*. **France**, Pyrenées-Orientales, Sorède, E of Lavaill, on *Erica arborea*, 5 Nov. 2008, *H. Michel*, (KHL13798), GB. **Portugal**, Bemfica, on *Eucalyptus globulus*, *C. Torrend* 344, S F15976, BPI, **isolectotype** of *Merulius albostramineus* — *Meruliopsis rubicunda*. **Russia**, Khabarovsk Reg., Khabarovsk Dist., Malyi Niran, on fallen decorticated hard log of *Pinus koraiensis*, 6 Aug. 2012, *V. Spirin* 4951, H, GB. **Sweden**, Norrbotten, Överkalix, Lansjärv, Storberget, on conifer wood, 11 Oct. 2008, *G. Norstedt*, GB — *Merulius armeniacus*. **USA**, Idaho, *Abies grandis*, *J.R. Weir* 15306, BPI, **holotype**.

Illustration: Eriksson & Ryvarden (1973; as *Ceraceomerulius rubicundus*).

Description: *Basidiomata* effused, resupinate, membranous, rather soft, ab. 0.5 mm thick, hymenium reticulately wrinkled to folded or semiporoid, whitish to pale pinkish orange or pale reddish, margin fibrillose, white, subiculum white. *Hyphal system* monomitic, hyphae without clamps, in the subiculum loosely interwoven, 3–5 µm wide, partly encrusted, in the subhymenium densely united, frequently branched, 2.5–4 µm wide. *Cystidia* cylindrical to narrowly clavate, obtuse, 30–40 × 5–6 µm, thin-walled, apically sparsely encrusted, developing in the hymenium and slightly projecting. *Basidia* narrowly clavate, 18–25 × 4–5 µm, with four sterigmata. *Basidiospores* subcylindrical to allantoid, (4.4–)4.8–6.3(–6.6) × (1.7–)1.8–2.3(–2.7) µm, L = 5.4 µm, W = 2.0 µm, Q = 2.72 smooth, thin-walled, without reaction in Melzer's or Cotton Blue.

Ecology and distribution: On decaying wood of conifers. The host tree on the label of *Merulius rubicundus* type is indicated as *'Alnus* (?)', which is likely a misidentification. Belonging to the boreal forest region throughout Eurasia and conifer forests in the Central European mountains.

Notes: Ginns (1971) studied original material of *Merulius albostramineus* (in BPI and S) and *Merulius rubicundus* (PRM) and concluded that they were conspecific. His interpretation has gained wide acceptance. We restudied the same specimens and noticed clear differences in spore morphology; thus, we must reject the synonymy suggested by Ginns (1971).

Ginns (1976) suggested that *Merulius armeniacus*, *M. atropurpureus*, and *M. purpurascens* are synonyms of *Meruliopsis rubicunda* (by Ginns called *Ceraceomerulius albostramineus*). Since *Merulius armeniacus* is older than *M. rubicundus* we studied the type (BPI). The material is heavily grazed by insects and rather collapsed. The hymenium is subporoid and vinaceous brown. Subicular hyphae are rather

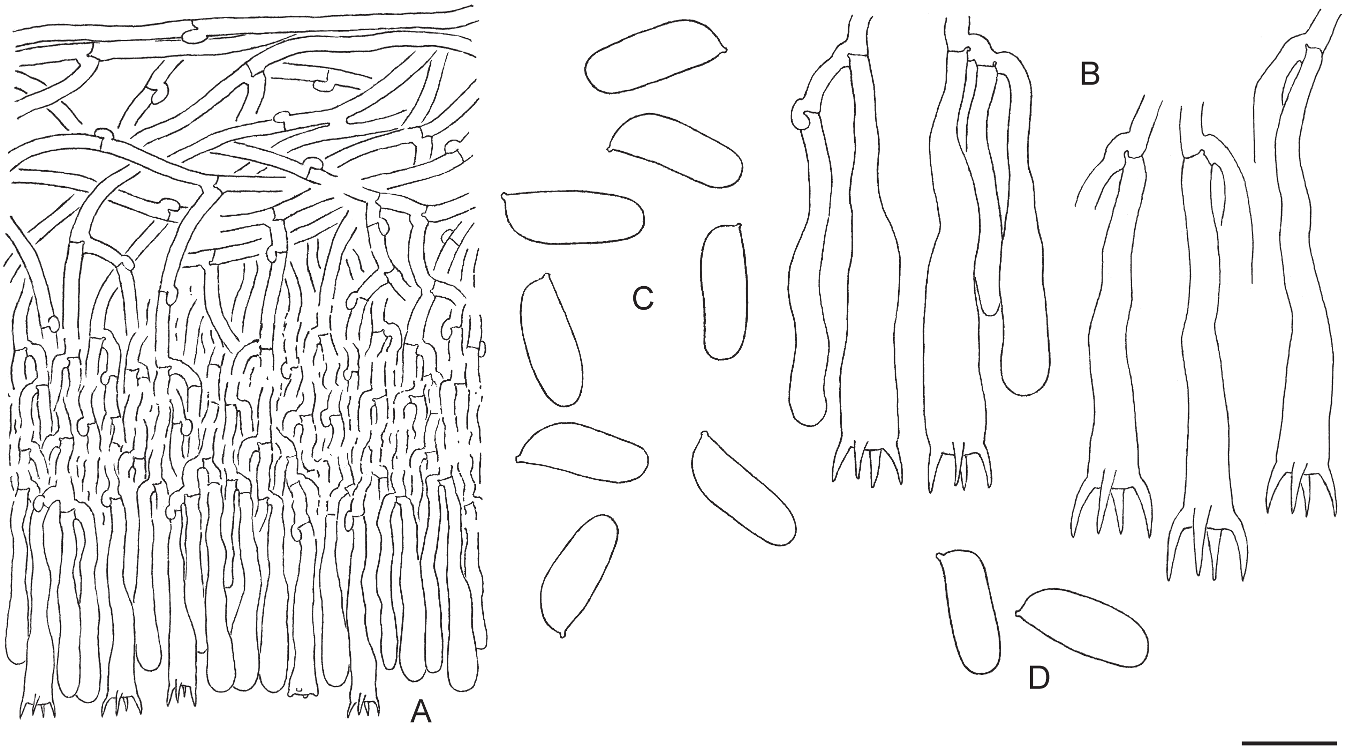

Fig. 6. *Cytidiella pallidolivens*. **A.** Section through basidioma. **B.** Basidia and basidioles. **C, D.** Basidiospores. A–C from N. Hallenberg 10123 (GB); D from Bourdot 5508 (GB).

straight and 3–4 µm wide, while subhymenial elements are not discernible. The whole tissue is filled with a golden yellow encrustation. No rehydrated basidiospores were observed. We find these characters incompatible with *Meruliopsis rubicunda* and reject the synonymy. *Merulius atropurpureus* could be the same as *M. armeniacus*, which is also suggested by Ginns (1971). Hjortstam (1995) studied the type of *M. purpurascens* and compared it with *Meruliopsis taxicola*. He found that both cystidia and basidiospores differed from those of *M. rubicunda*.

Meruliopsis albostraminea is typified with material collected by Torrend in Portugal. This species differs from *M. rubicunda* through a cream-coloured hymenium without the orange pinkish cast typical for the latter species. Moreover, basidiospores are elliptical and never allantoid. Its distribution in Europe is throughout the Mediterranean region and eastwards to the lowlands at the Caspian Sea. Since the publications by Ginns (1971, 1976), the true *M. albostraminea* has been called *M. hirtella* (Burt) Ginns. Burt's species is morphologically similar to *M. albostraminea*. However, ITS sequences of North American specimens identified as *M. albostraminea* sensu Ginns or *Meruliopsis* sp. all differ from sequences from *M. albostraminea* s.s. as well as from *M. rubicunda*. Therefore, we conclude that *M. hirtella* and *M. albostraminea* are different species and that *M. hirtella* likely is absent from Europe. The recently published *Meruliopsis faginea* from the Caucasus is a synonym of *M. albostraminea* as confirmed through DNA sequences. Another, much older synonym of *M. albostraminea* from the Caucasian area, is *Byssomerulius armeniacus*.

Meruliopsis pseudocystidiata is a synonym of *M. rubicunda*. The published ITS sequence of the type specimen is identical to European sequences from material identified as *Meruliopsis rubicunda*. We have not studied the type but both description and illustration from the protologue leave no doubt about the synonymy.

Mycoacia ocellata (Fr.) K.H. Larss. & Spirin, ***comb. nov***. MycoBank MB 857620. Figs 1D, 8.

Basionym: *Grandinia ocellata* Fr., *Epicrisis Systematis Mycologici*: 527. 1838.
Synonyms: *Phlebia livida* subsp. *tuberculata* Hallenb. & E. Larss., *Mycol. Res.* **97**: 353. 1993.
Phlebia tuberculata (Hallenb. & E. Larss.) Ghob.-Nejh., *Mycol. Progr.* **11**: 32. 2012, nom. illeg., not *Phlebia tuberculata* (Berk. & M.A. Curtis) Ţura *et al*., *Biodiversity of the Heterobasidiomycetes and non-gilled Hymenomycetes (former Aphyllophorales) of Israel*: 446. 2011.
Mycoacia neotuberculata S.H. He *et al*., *Mycology*, in press. https://doi.org/10.1080/21501203.2024.2443216

Typus: **Sweden**, Halland, Kvibille parish, Biskopstorp Nature Reserve, on decaying wood of *Fagus sylvatica*, 17 Sep. 2009, *K.H. Larsson* 13967 (**neotype** of *Grandinia ocellata*, designated here, GB GB-0207712, MBT 10024820). ITS GenBank accession PQ066115.

Additional materials examined: **France**, Essonne, Soisy-sur-Seine, Forêt de Sénart, on *Tilia cordata*, 11 Nov. 2021, *V. Spirin* 15277, H. **Norway**, Vestfold, Tønsberg, Askehaug, on *Fagus sylvatica* log, 17 Dec. 2011, *P. Marstad* 354-11, O; Vestfold, Sandefjord, Kile, on *Fagus sylvatica*, 25 Nov. 2012, *P. Marstad* 311-12, O. **Romania**, Arad Co., Bârzava, Runcu Groşi, on *Fagus sylvatica*, 15 Sep. 2021, *V. Spirin* 15054, H; Brasov, Padurea Bogatii, deciduous wood, 22 Oct. 1985, *N. Hallenberg* 9350, GB-0069567. **Russia**, Khabarovsk Reg., Khabarovsk Dist., Ulika, on *Tilia amurensis*, 15 Aug. 2012, *V. Spirin* 5285, GB, H. **Spain**, Lerida. S. of Las Bordas, *Fagus* log, 13 Nov. 1986, *N. Hallenberg* 9958, GB-0069561.

Description: *Basidiomata* effused, resupinate, closely adnate, corneous, hymenium smooth to grandinioid or irregularly tuberculate, hymenial spines usually pointed, when fresh mostly bluish to violaceous, when dried more brownish, hymenial spines often with a whitish tip, margin thinning out, sterile margin lacking. *Hyphal system* monomitic, septa with clamps, subiculum clearly differentiated, composed of parallel, agglutinated, thick-walled, 3–4 µm wide hyphae

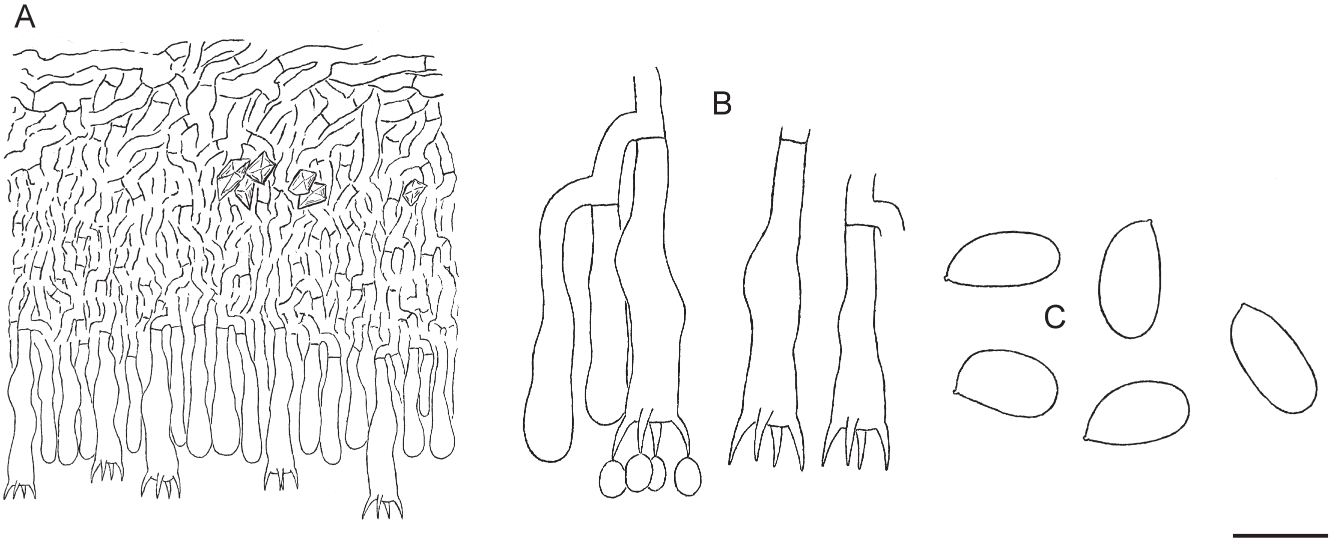

Fig. 7. *Hyphodermella pallidovirens* [E. Martini 12656 (GB)]. **A.** Section through basidioma. **B.** Basidia and basidioles. **C.** Basidiospores. Scale bars: A = 20 µm; B = 10 µm; C = 5 µm.

growing horizontally, subhymenium formed by thin-walled, ab. 2 µm wide, rather short-celled and strongly tortuous hyphae in a dense tissue where individual hyphae and hyphal direction is difficult to observe. *Cystidia* few or sometimes lacking, narrowly fusoid with a long, thin apex, 40–50 × 3–4 µm, thin-walled, developing from subhymenial hyphae and projecting up to half the length. Simple, hypha-like hyphidia common among the basidia. *Basidia* narrowly clavate 20–30 × 3.5–4.5 µm, with four sterigmata. *Basidiospores* cylindrical, (3.7–)3.8–5.4(–5.6) × (1.5–)1.6–2.0(–2.1) µm, L = 4.3, W = 1.8, Q = 2.4, adaxial side often slightly concave with a bend close to apiculus, thin-walled, without reaction in Melzer's or Cotton Blue.

Ecology and distribution: On angiosperm trees, in Northern Europe mostly on *Fagus* (see also notes below). With a nemoral to South boreal distribution in Europe. It is known through sequences from several Asian countries and also from Australia. Not yet reported from North America.

Notes: Hallenberg and co-workers studied the taxonomy of *Phlebia livida* (Hallenberg 1988, 1991, Hallenberg & Larsson 1991, 1993, Ghobad-Nejhad & Hallenberg 2012). They concluded that the species in Europe consists of two well-separated populations, one preferably growing on conifers, and the other mainly found on angiosperm trees. Since *Phlebia livida* by typification is connected to the conifer-dwelling taxon, the angiosperm taxon was described as new, first as a subspecies, *Phlebia livida* subsp. *tuberculata* (Hallenberg & Larsson 1993), then, after a re-evaluation using DNA sequences, raised to species level as *Phlebia tuberculata* (Ghobad-Nejhad & Hallenberg 2012). Unfortunately, *Phlebia tuberculata* (Hallenb. & E. Larss.) Ghob.-Nejh. is a later homonym of *Phlebia tuberculata* (Berk. & M.A. Curtis) Tura *et al.* (Tura *et al*. 2011). This has left *P. livida* subsp. *tuberculata* without a name when treated as a species. Recently, Li *et al*. (2025) introduced *Mycoacia neotuberculata* as a *nomen novum* to replace the illegitimate name *Phlebia tuberculata*. As we show below, there is an old name available that should have been used instead; thus, *Mycoacia neotuberculata* is superfluous.

Name databases (Index Fungorum, MycoBank) suggest several names as synonyms of *Phlebia livida*, i.e. *Corticium viscosum* Pers. (1800), nom. sanct., *Grandinia ocellata* Fr. (1838), *Corticium uvidum* (Fr.) Fr. (1838), *Xerocarpus cacao* P. Karst. (1890), and *Sebacina peritricha* Bourdot & Galzin (1909). Below, the availability of each of these names is discussed.

No original material of *Corticium viscosum* is known. Persoon (1800) underlines that the fungus is sticky, especially when touched. It is effused and smooth with but a few papillae and Persoon discusses if they just reflect irregularities in the substrate. When dried, the fungus becomes strongly cracked (*diminuiter*) and sordid blackish (*sordide fuscescit*). When moving the species to *Thelephora* (Persoon 1801), Persoon slightly changed the description and adds that it is subgelatinous and that the colour of the (fresh?) fungus is greyish whitish or pale (lavender) blue.

In the sanctioning works *Thelephora viscosa* is treated twice. First Fries (1821) merely repeated the text by Persoon, giving the remark that the species is very similar to *Thelephora livida*. However, when Fries returned to the subject in Elenchus Fungorum (Fries 1828), he expressed a different opinion. He now wrote that *T. viscosa* is completely different (*omnino diversa*) from *T. livida*, although easily confused. We conclude that neither the original description nor the descriptions in the sanctioning works provide strong evidence for a synonymy with *Thelephora livida*. Thus, the identity of *Corticium viscosum* remains unknown, and we suggest it is best treated as a nomen dubium.

Grandinia ocellata is a species Fries found on *Fagus*. He described the colour as *lividus* and the hymenium as covered with granules whose white tips resemble pearls (*granulis confertis, subconicis obtusis … Granula terminata apiculo subtilissimo albido, … quasi ocellata*). Lundell & Nannfeldt (1941) regarded *Grandinia ocellata* as a synonym of *Corticium lividum* and we agree. The details of the protologue clearly connect the species to *Phlebia livida* subsp. *tuberculata*.

Fries (1828) introduced *Corticium uvidum* in Elenchus Fungorum as a variety to *Thelephora viscosa* (as β *uvida*). Thus, it is only sanctioned at variety level. In 1838, Fries placed the species next to *Corticium comedens* (=*Vuilleminia comedens*). He remarked that the fungus grows on both sides

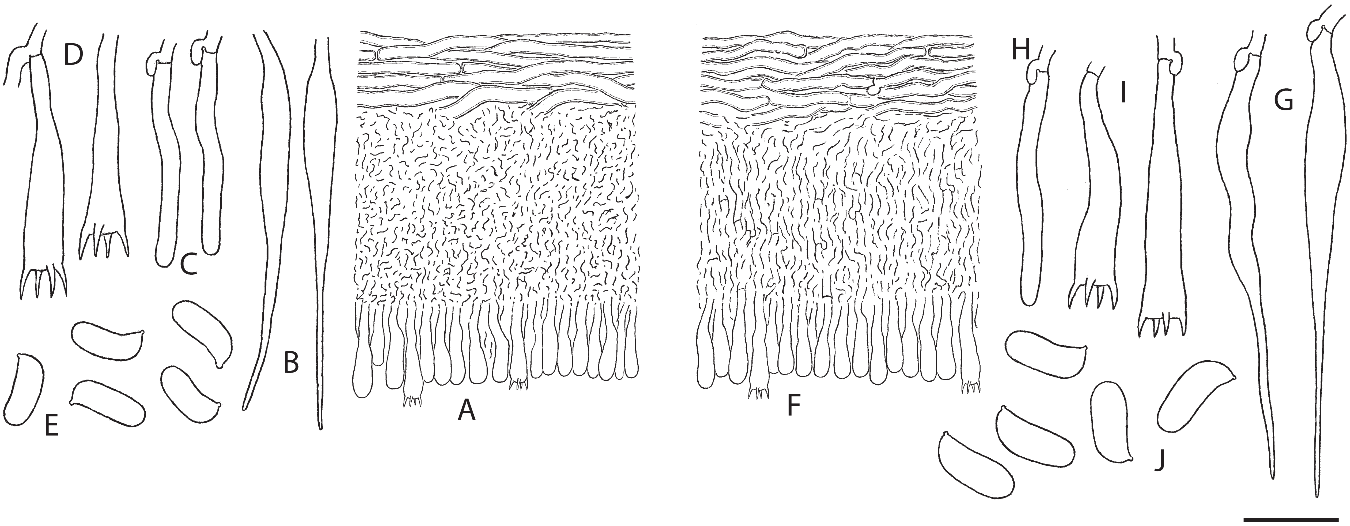

Fig. 8. *Mycoacia ocellata* (A–E) and *M. livida* (F–J). **A, F.** Section through basidioma. **B, G.** Cystidia. **C, H.** Hymenial hyphidia. **D, I.** Basidia. **E, J.** Basidiospores. A–E from neotype; F–J from K. Hjortstam 4371 (GB). Scale bars: A, F = 20 µm; B–D, G–I = 10 µm; E, J = 5 µm.

of *Fagus* branches, and is rosy-lilac but fading. The basidiocarp is described as widely effused, very thin, tremellaceous, very smooth, moist, and when old disappearing (*tritum fugax*). These characters do not immediately recall *Phlebia livida* subsp. *tuberculata*. However, the UPS herbarium preserves a specimen with the name *Corticium uvidum* in Fries' handwriting that was collected in Femsjö, SW Sweden. The basidioma is rather dark and completely smooth. Microscopy reveals that the species belongs to *Phlebia livida* sensu lato, as already pointed out by Lundell & Nannfeldt (1947). Furthermore, as discussed below, a subhymenial structure with thin-walled, mainly ascending hyphae and plenty of resinous exudates when mounted in Cotton Blue makes it possible to identify the specimen as *Phlebia livida* subsp. *livida*. The specimen is here selected as neotype for *Thelephora viscosa* var. *uvida* (see below).

The type of *Xerocarpus cacao* is well preserved and differs clearly from *Phlebia livida* by a less agglutinated context, presence of irregular, short-celled, rather wide subicular hyphae, and by somewhat wider and less pointed cystidia. These characters place *X. cacao* in the vicinity of *Phlebia subserialis*.

Finally, our study of type material of *Sebacina peritricha* (PC) shows that the species belongs in *Auriculariales*. This leaves us with *Grandinia ocellata* as the best alternative when naming *Phlebia livida* subsp. *tuberculata* at species level.

Phlebia livida is not closely related to the type of *Phlebia*, *P. radiata*, and has therefore twice been placed in other genera. First *Phlebia livida* was made the type of the new genus *Lilaceophlebia* (Spirin & Zmitrovich 2004). Later *Phlebia livida* was instead moved to *Mycoacia* (Zmitrovich 2018). Both arrangements are supported in phylogenetic analyses based on nuclear ribosomal sequences (Justo *et al*. 2017, Chen *et al*. 2021). If the wider concept for *Mycoacia* suggested by Zmitrovich (2018) is accepted, an unfortunate result is that *Ceriporiopsis*, typified by *C. gilvescens*, becomes a synonym of *Mycoacia*. However, currently we prefer this solution since most necessary combinations in *Mycoacia* are already in place. Consequently, we here introduce *Mycoacia ocellata* to replace the invalid name *Phlebia tuberculata* (Hallenb. & E. Larss.) Ghob.-Nejh.

Ghobad-Nejhad & Hallenberg (2012) stated that *Mycoacia livida* and *Mycoacia ocellata* can only be separated macroscopically. They point to differences in colour and in the hymenial ornamentation that is pointed in *M. ocellata*, never so in *M. livida*. They also mention that old basidiomata of *M. livida* may become detached from the substrate. We can only partly agree with these observations. Hymenial ornamentation is not always pointed in *M. ocellata*, and juvenile and senescent specimens can be almost smooth, without any sign of pointed emergences; in addition, some older specimens of the species (especially dried ones) are as dark as those of *M. livida*. This makes it often impossible to separate the two taxa macroscopically, but there are several microscopical features that could aid in identification. First, the basidiospores of *M. ocellata* are on average slightly narrower and often shorter than in subsp. *livida*, on average 4.3 × 1.8 µm vs 4.4 × 2.0 µm, respectively. The differences are tiny, however, and it is necessary to measure several specimens and at least twenty spores per specimen. Second, when mounted in Cotton Blue an amorphous resinous exudate is present among hymenial cells and subhymenial hyphae in *M. livida*, usually observable as large, yellowish, grainy bodies. The same substance is present in *M. ocellata*, but to a much lesser extent and only as small droplets. Third, subhymenial hyphae of *M. livida* are normally thin-walled, rather long-celled and as a rule with a clear tendency for vertical orientation (Fig. 8). In *M. ocellata*, subhymenial hyphae have a variable wall thickness, are short-celled and strongly tortuous, making the tissue look almost pseudoparenchymatic (Fig. 8). The detaching margin in old basidiomata of subsp. *livida* is an additional useful character for identification.

Basidioma substrate is the most important information for separating *Mycoacia livida* and *M. ocellata*. Ghobad-Nejhad & Hallenberg (2012) report one case where *M. livida* was collected on hardwood. Unfortunately, we were not able to locate this specimen. They also report one case of *M. ocellata* collected on *Abies*. We studied this specimen and found the substrate to be *Fagus*. We conclude that even if not clearly demonstrated, rare cases of host jumping cannot be excluded.

We have seen specimens of *Mycoacia ocellata* misidentified as *Phlebiodontia caspica*. When fully developed, *P. caspica* is regularly hydnoid, but young basidiomata may appear strongly tuberculate as in specimens of *M. ocellata*. Microscopically *P. caspica* develops numerous cystidia whereas in *M. ocellata* cystidia are typically few or even absent. Above all, the two species differ in spore morphology, being suballantoid in *M. ocellata* and narrowly elliptical in *P. caspica*.

Mycoacia livida (Pers.) Zmitr., *Folia Cryptog. Petropolitana* **6**: 101. 2018. Figs 1E, 8.
Basionym: *Corticium lividum* Pers., *Observ. Mycol.* **1**: 38 (1796), nom. sanct. [Fries, *Syst. Mycol*. **1**: 447. 1821, as *Thelephora*].
Synonyms: *Thelephora viscosa* var. *uvida* Fr., nom. sanct. [Fries, *Elench. Fung.* **1**: 218. 1828]. *Typus*: **Sweden**, Småland, Femsjö, leg. E. Fries (**neotype**, designated here, UPS F-003107, MBT 10024861, studied).
Phlebia livida (Pers.) Bres., *Atti Acad. Agiato Rovereto* **3**: 105. 1897.
Lilaceophlebia livida (Pers.) Spirin & Zmitr., *Nov. sist. Niz. Rast.* **37**: 179. 2004.

Typus: **Sweden**, Småland, Femsjö, *E. Fries* (**neotype** of *Corticium lividum* UPS F-002613, designated by Eriksson *et al*. 1981, as **lectotype**, studied). **Sweden**, Småland, Femsjö, on *Picea abies* log, 3 Oct. 1984, *N. Hallenberg* 8658 (**epitype**, designated here, GB-0069572, MBT 10024815). ITS GenBank accession HQ153414.

Additional materials examined: **Finland**, Pohjois-Häme, Pyhä-Häkki Nat. Park, on *Picea abies* trunk, 21 Aug. 1986, *N. Hallenberg* 9543, GB-0069566. **Russia**, Khabarovsk Reg., Verkhnebureinskii Dist., Dublikan Nat. Res., on *Picea ajanensis*, 21 Aug. 2015, *V. Spirin* 7717, H; Nizhny Novgorod Reg., Sharanga Dist., Kilemary Nat. Res., on *Picea abies*, 25 Aug. 2019, *V. Spirin* 13055, H. **Sweden**, Dalsland, Ör, W of lake Örsjön, on *Pinus sylvestris*, 3 Nov. 1972, *K.H. Larsson & K. Hjortstam* 6029, GB-0115280; Ångermanland, Junsele, Kortinghöjden, on *Picea abies*, 22 Sep. 1970, *K. Hjortstam* 4371, GB-0115291.

Parvodontia gloeocystidiata (Gorjón & Saitta) K.H. Larss., ***comb. nov***. MycoBank MB 857621. Fig. 9.
Basionym: *Leptocorticium gloeocystidiatum* Gorjón & Saitta, *Mycosphere* **5**(3): 407. 2014.

Typus: **Italy**, Sicily, Messina, Portella Scarno, on dead wood of *Fagus sylvatica*, 14 Apr. 2012, *A. Saitta* 483 (**holotype** SALA; **isotype** GB, studied).

Description: *Basidiomata* resupinate, effused, adnate, soft ceraceous, hymenium smooth to sparingly grandinioid, ochraceous, margin not differentiated. *Hyphal system* dimitic, generative hyphae with clamps, subiculum dominated by branching, 1–1.5 µm wide skeletal hyphae, generative hyphae 2–3 µm, thin-walled, subhymenium dense with ab. 2 µm wide, thin-walled hyphae, difficult to observe. *Cystidia* none, but a few, slightly branching hyphidia present in the hymenium. *Gloeocystidia* numerous, present throughout the basidioma, irregular to cylindrical, frequently with constrictions and often apically moniliform, 15–35 × 5–8.5 µm, some gloeocystidia with weakly yellowish and refractive contents. *Basidia* clavate 15–20 × 3–4 µm, with four sterigmata and a basal clamp. *Basidiospores* elliptical, 4–5 × 2.5–3 µm (few spores measured), smooth, thin-walled, without reaction in Melzer's or Cotton Blue.

Ecology and distribution: The type was collected on decaying wood of *Fagus*. Only known from the type locality in Italy.

Notes: *Parvodontia* was introduced with *P. luteocystidia* as the only species (Hjortstam & Ryvarden 2004). Later, three more species were added, viz. *P. albocrustacea* from Brazil (Baltazar *et al*. 2016), *P. austrosinensis* from China (Li *et al*. 2022), and *P. relampaga* from Southeast USA (Paez *et al*. 2024). All species have gloeocystidia with more or less yellowish contents and small elliptical basidiospores. The type species and *P. albocrustacea* are monomitic while the other two species have skeletal hyphae that are branched in *P. austrosinensis* and unbranched in *P. relampaga*. *Parvodontia gloeocystidiata* shares with *P. austrosinensis* the presence of skeletal hyphae but gloeocystidia are thin-walled in the former and thick-walled in the latter. As indicated by Gorjón & Saitta (2014), the placement in *Leptocorticium* was provisional in absence of molecular data.

Phaeophlebiopsis roumeguerei (Bres.) K.H. Larss. & Ryvarden, ***comb. nov***. MycoBank MB 857622. Fig. 1F.
Basionym: *Corticium roumeguerei* Bres., *Fung. Trident*. **2**(8–10): 36. 1892.
Synonyms: *Peniophora moelleriana* Bres. ex Sacc., *Bol. Soc. Broteriana*, sér. **1**(11): 13. 1893. *Typus*: **Portugal**, Coimbra, Coimbra, Choupal National Forest, on *Eucalyptus globulus*, Feb. 1891, *A. Möller* (**holotype**, designated here, S F15831, MBT 10024921, studied).
Kneiffia subascondita Bres., *Ann. Mycol.* **1**: 102. 1903.

Typus: **France**, Haute-Garonne, Toulouse, winter 1878, *C. Roumeguère* Fungi Selecti Gallici 506 (**lectotype** of *Corticium roumeguerei*, designated here, S F204886, MBT 10024908, studied).

Additional materials examined: **France**, Pyrenées orientales, Argèles-sur-Mer, Forêt dominicile des Albères, La Vallée Heureuse, along track to Ribera del Tallot d'en Bac, on frondose wood, 3 Nov. 2008, *K.H. Larsson* 13759, GB. **Italy**, Tuscany, Florence, Boboli Gardens, on frondose wood, Sep. 1890, *U. Martelli*, paratype of *Corticium roumeguerei*, S F204885. **Portugal**, Minho, Parque Nacional de Peneda-Geres, Terras de Bouro, Camp de Geres, via Romana, on deciduous wood, 1 May 1989, *K. Hjortstam* 17087, GB. **Spain**, Canary Islands, Tenerife, Anaga Mountains, along road Las Mercedes – Bailadero, on *Erica*, 7 Mar. 1989, *N. Hallenberg* 10963, GB-0161379.

Illustration: Eriksson *et al*. (1981; as *Phlebiopsis roumeguerei*).

Description: *Basidiomata* resupinate, closely adnate, effused and sometimes large, varying in thickness, up to 1 mm or even more, hymenium pale whitish to dark ochraceous or with a reddish tint, in old basidiomata densely cracked, margin abrupt. *Hyphal system* monomitic, hyphae 2–4 µm, with thin walls in the hymenial part, otherwise somewhat thick-walled, densely interwoven but the hyphal direction is mainly vertical, subhymenium stratified, subiculum hardly

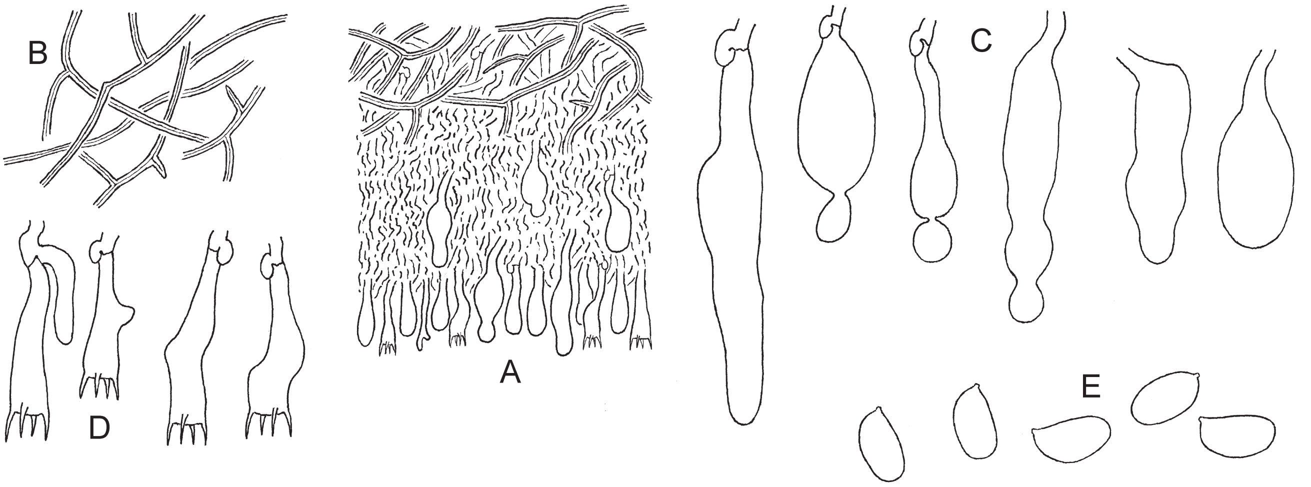

Fig. 9. *Parvodontia gloeocystidiata* [isotype (GB)]. **A.** Skeletal hyphae from subiculum. **B.** Section through basidioma. **C.** Gloeocystidia. **D.** Basidia. **E.** Basidiospores. Scale bars A, B = 20 µm; C, D = 10 µm; E = 5 µm.

discernible. *Cystidia* numerous, conical, (50–)70–100 × 10–15 µm, apically encrusted, projecting to half the length, thick-walled with a central capillary lumen, basally smooth, with somewhat thickened walls. *Basidia* narrowly clavate, 18–22(–30) × 4–5 µm, apically widened, with four sterigmata. *Basidiospores* oblong to narrowly elliptical, (4.2–)4.3–5.6(–5.8) × (2.0–)2.4–3.4(–3.8) µm, L = 5.0 µm, W = 2.9 µm, Q = 1.75, adaxial side straight or slightly concave, smooth, thin-walled, without reaction in Melzer's or Cotton Blue.

Ecology and distribution: On decayed wood of broadleaved trees, on twigs, branches as well as on trunks. Known with certainty from South and West Europe and from Canary Islands.

Notes: This species is often treated as a younger synonym of *Peniophora ravenelii*, described from South Carolina, United States. According to the original description, *P. ravenelii* has decidedly shorter cystidia. Cooke (1879) reported the cystidium length as 30–35 µm; similarly, Burt (1925) gives measurements as 30–40 µm. In contrast, *P. roumeguerei* has cystidia that measure (50–)70–100 µm. DNA sequences from American specimens identified as *P. ravenelii* do not match any sequences from European material. Chen *et al*. (2021) and Zhao *et al.* (2021) showed that *P. ravenelii* clusters in the *Phaeophlebiopsis* clade. They used two sequences generated from specimens collected from Canary Islands and France, respectively. We studied the specimen from Canary Islands and found that it has the long cystidia typical for *P. roumeguerei*. As pointed out by Floudas & Hibbett (2015), the identity of *Peniophora ravenelii* remains unclear.

Quasiphlebia canadensis (W.B. Cooke) K.H. Larss., ***comb. nov.*** MycoBank MB 857623. Fig. 10.
Basionym: *Phlebia canadensis* W.B. Cooke, *Mycologia* **48**(3): 398. 1956.
Synonym: *Quasiphlebia densa* C.C. Chen & Sheng H. Wu, *Fungal Diversity* **111**: 391. 2021.

Typus: **Canada**, Ontario, Lake Timagami, Long Point, on *Acer spicatum*, 16 Aug. 1939, *H.S. Jackson* (**holotype** TRTC 18156, studied).

Additional materials examined: **Norway**, Akershus, Oslo, Sørkedalen, Kjellertjern, on angiosperm wood, 30 Sep. 1983, *K.H. Larsson* 4460, GB; Sogn og Fjordane, Luster, Mørkris, on *Corylus avellana*, 29 May 1979, *J-H. Støverud* 791/99, O-F-120446; Vestfold, Sandefjord, Råstad, on *Salix* sp., 10 Dec.

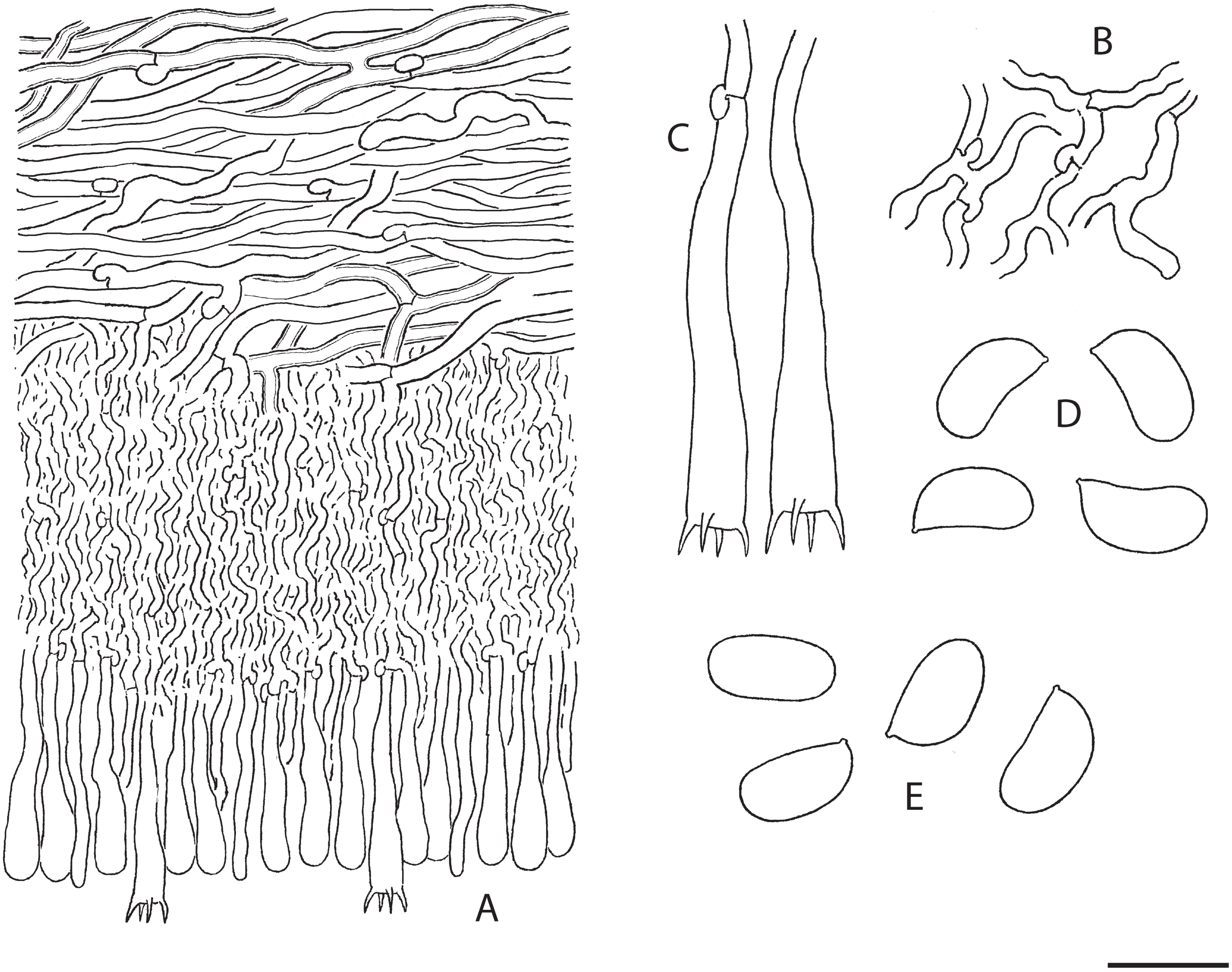

Fig. 10. *Quasiphlebia canadensis*. **A.** Section through basidioma. **B.** Subicular hyphae. **C.** Basidia. **D, E.** Basidiospores. A–D from P. Marstad 343-11 (O); E from isotype of *Phlebia canadensis* (GB). Scale bars: A, B = 20 µm; C = 10 µm; D, E = 5 µm.

2011, *P. Marstad* 343-11, O. **Sweden**, Dalarna, Garpenberg, Hässlen, on *Corylus avellana*, 8 Sep. 1968, *I. Nordin* 4572, GB-0087227; Lappland, Torne Lappmark, Jukkasjärvi, Abisko, at Nissanjokk, on *Salix* sp., 3 Aug. 1928, *J.A. Nannfeldt* 1547, GB-0114826; ibid., Tornehamn, E of Ruonajaurats, on *Betula tortuosa*, 22 Aug. 1960, *J. Eriksson* 4430, GB-0206024; Norrbotten, Nedertorneå, Kurkisviken, on *Alnus incana*, 26 Aug. 1960, *J. Eriksson* 9330, GB-0095232; Skåne, Sturup, close to Ekholmssjön, on *Ulmus glabra*, 3 Apr. 2004, *S. Svensson* SSE04004, GB-0095231.

Description: *Basidiomata* resupinate, effused, closely adnate, firm ceraceous, hymenium smooth to tuberculate, often with radiating ridges, especially in marginal areas, orange reddish to violaceous or pale brown to brown, margin fimbriate, sometimes somewhat elevated. *Hyphal system* monomitic, all septa with clamps, subicular hyphae firm-walled, distinct, winding and somewhat irregular, 3–5(–6) µm wide, extending horizontally over the substrate, forming a dense but not agglutinated, white tissue, often with coarse crystals present, subhymenium composed of densely united, thin-walled, richly branched 2–2.5 µm wide hyphae, individual hyphae difficult to observe. *Hyphidia*, or rather hyphal ends, common in the hymenium, 30–40 × 2–2.5 µm, thin-walled, apically sometimes hooked or even branched. *Basidia* narrowly clavate, 30–40 × 5–6 µm, with four sterigmata and a basal clamp, soon collapsing after spore discharge. *Basidiospores* elliptical, often with a slightly concave adaxial side and then almost reniform, (4.0–)4.3–5.1(–5.4) × (2.2–)2.5–2.8(–3.2) µm, L = 4.5 µm, W = 2.6 µm, Q = 1.75, smooth, thin-walled, without reaction in Melzer's or Cotton Blue.

Ecology and distribution: On decaying wood of a variety of broadleaved trees. Reported from *Acer*, *Alnus*, *Betula*, *Corylus*, *Quercus*, *Salix*, *Ulmus*, and unidentified angiosperms. Described from Canada and reported from USA, Taiwan, Norway and Sweden. Probably widespread but often misidentified as *Phlebia albida* (see *Stereophlebia pendula* below).

Notes: *Phlebia canadensis* has mostly been treated as a synonym to *Phlebia albida* (Eriksson *et al*. 1981, Ginns & Lefebvre 1993), although the smaller basidiospores were noticed. However, Nakasone (1996) did not accept this synonymy. Despite the striking morphological similarity of *P. albida* (= *Stereophlebia pendula*, see below) and *Quasiphlebia canadensis* these two species are not closely related. *Quasiphlebia canadensis* is firmly placed within the *Donkia* subclade in *Phanerochaetaceae* whereas *Phlebia albida* belongs to a different subclade together with *Gelatinofungus brunneus*.

European specimens of *Quasiphlebia canadensis* differ by one substitution and one deletion in ITS2 region from Asian and American specimens. We consider these differences to be a geographically structured infraspecific variation.

Rhizochaete galactites (Bourdot & Galzin) K.H. Larss. & Spirin, ***comb. nov.*** MycoBank MB 857624. Fig. 1G.
Basionym: *Corticium rhodoleucum* subsp. *galactites* Bourdot & Galzin, *Hyménomyc. de France*: 189. 1928.
Synonym: *Phanerochaete galactites* (Bourdot & Galzin) J. Erikss. & Ryvarden, *Cort. N. Europe* **5**: 1005. 1978.

Materials examined. **France**, Allier, Château-Charles, on *Pinus* sp., 23 Aug. 1905, *H. Bourdot* 5107, PC; Aveyron, Vinnac, on *Pinus* sp., 29 Nov. 1912, *A. Galzin* (Bourdot 9210, UPS F-1033348); *ibid*., Bourdot 9211, UPS F-1033413. **Russia**, Nizhny Novgorod Reg., Lukoyanov Dist., Razino, on *Pinus sylvestris*, 30 Jul. 2017, *V. Spirin* 11261, H; *ibid*. 27 Jul. 2018, *V. Spirin* 12070, H. **Sweden**, Öland, N. Möckleby par., S of Dörby, close to the shooting range, on *Pinus sylvestris*, 20 Sep. 2005, *K. Hjortstam* 18924, GB-0112026.

Illustration: Eriksson *et al*. (1978; as *Phanerochaete galactites*).

Description: *Basidiomata* resupinate, effused, loosely attached to the substrate and more or less detachable, membranous, 0.1–0.4 mm thick, hymenium smooth, soft and tender when alive, when dried brittle and cracking,

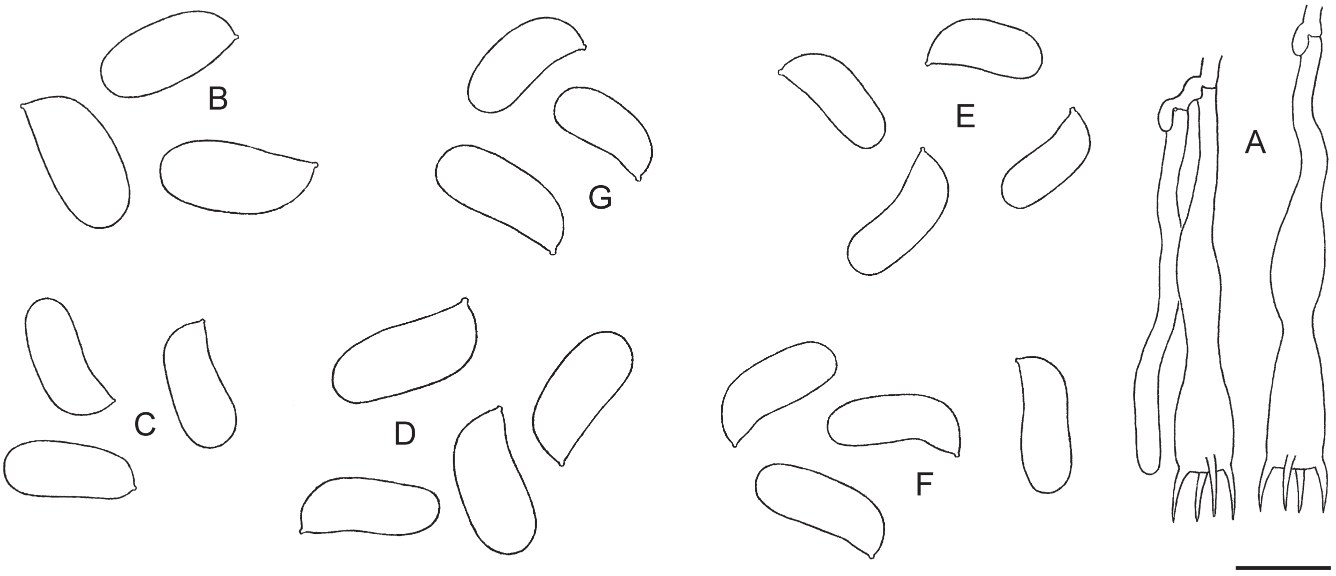

Fig. 11. *Stereophlebia pendula*. **A.** Basidia and hyphidium. **B–G.** Basidiospores. A from O. Miettinen 24536 (H); B from K.H. Larsson 15159 (GB); C from *Grandinia tuberculata*, type (K); D from *Radulum pallidum*, type (K); E from *Stereum subcostatum*, isolectotype (GB); F from *Stereophlebia pendula*, epitype (H); G from O. Miettinen 24536 (H). Scale bars: A = 10 µm; B–G = 5 µm.

showing the white subiculum, hymenium at first white then turning cream-coloured or finally more or less ochraceous to isabelline, margin variable but usually more or less fibrillose, hyphal cords present in subiculum and extending beyond the basidioma margin, also emerging from the margin itself. *Hyphal system* monomitic, subicular hyphae mostly 3–5(–7) µm wide, narrower ones thin-walled, wider hyphae somewhat thick-walled, wider hyphae with occasional clamps, but no clamp whorls, hyphal cords up to 0.5 mm wide, with 3–15(–20) µm wide hyphae, sometimes embedded in an oily matter, subhymenial hyphae 2–3 µm, thin-walled, richly branched, crystals often present in old specimens, hyphal cords extending from the basidioma margin do not contain clamped or very wide hyphae. *Cystidia* few, or seemingly absent, cylindrical, blunt, mostly 30–45 × 6–10 µm, covered by fine-grained crystals, encrusted part 15–40 µm, thin-walled, embedded or projecting, easily crushed in microscope preparations and then only visible as lumps of crystals. *Basidia* subclavate, 25–30 × 4–5 µm, with four sterigmata. *Basidiospores* narrowly elliptical to subcylindrical, (4.2–)4.3–5.3 × (2.0–)2.1–2.5(–2.7) µm, L = 4.6 µm, W = 2.3 µm, Q = 2.01, adaxial side slightly convex, straight or somewhat concave, smooth, thin-walled, without reaction in Melzer's or Cotton Blue.

Ecology and distribution: On decaying wood on the ground. Most specimens have been collected on *Pinus* spp. but it is also reported from *Juniperus*, *Abies*, *Populus*, and *Quercus*. Scattered throughout Europe and always rare. Originally described from France and perhaps more common in West Europe.

Notes: Eriksson *et al*. (1978) observed that it was not always possible to find cystidia. In the original material they studied, for example in the selected lectotype (Bourdot 5108, herb PC), no cystidia were found, whereas in Scandinavian specimens cystidia could usually be demonstrated. Burdsall (1985) accepted only acystidiate specimens in *Phanerochaete galactites* and placed specimens with cystidia in *P. subiculosa*. Burdsall (1985) cited Bourdot 9211 among the collections of *P. subiculosa* he had examined, while Bourdot 9210 from the same date and place was cited as *P. galactites*. We studied both collections and conclude that they are conspecific and belong to *P. galactites*. Most likely, *P. subiculosa* is not a member of the European funga.

Stereophlebia pendula (Fr.) K.H. Larss., ***comb. nov.*** MycoBank MB 857629. Figs 1H, 11.
Basionym: *Radulum pendulum* Fr., *Elench. Fung*. **1**: 149. 1828. nom. sanct. [Fries, op. cit.].
Synonyms: *Grandinia tuberculata* Berk. & M.A. Curtis, *Hooker's J. Bot. Kew Gard. Misc*. **1**: 237. 1849. *Typus*: **USA**, South Carolina, on *Carya*, *Curtis* 1111 (**holotype** K, studied).
Phlebia albida H. Post, in Fries, *Monogr. Hymenomyc. Suec.* (Upsaliae) **2**(2): 280. 1863. *Typus*: **Sweden**, Östergötland, Skedevi, Rejmyra, on wood, 5 Nov. 1862, *H. von Post* (**lectotype** S F15542, selected by Eriksson *et al.* 1981).
Radulum pallidum Berk. & M.A. Curtis, *Grevillea* **1**(no. 10): 145. 1873. *Typus*: **USA**, South Carolina, on bark of *Carya*, No. 2599 (**holotype** K, studied).
Stereum subcostatum P. Karst., *Hedwigia* **20**: 178. 1881. *Typus*: **Finland**, Mustiala, in ramos dejectos arbor. frond., 10 Oct. 1881, *P.A. Karsten* (**lectotype** H; **isolectotype** GB, studied).

Typus: **Sweden**. Östergötland, Skedevi par., Rejmyra, 30 Oct. 1862, drawn by von Post and P. Åkerlund, "*direxit et approbavit* E. Fries" (**neotype** of *Radulum pendulum*, designated here, S S1142, https://herbarium.nrm.se/specimens/S1142, MBT 10024833). **Finland**, Inari Lappin, Inari, Muotkatunturin erämaa, Soavveljávrecopma, on *Betula pubescens*, 27 Aug. 2020, *O. Miettinen* 23860.2 (**epitype** designated here, H 6200339, MBT 10024834). ITS GenBank accession PQ013071.

Additional materials examined: **Denmark**, Greenland, Narssarssuaq valley, on branch of *Betula*, Aug. 1991, *V. Mukhin*, GB-0181519. **Finland**, Oulun Pohjanmaa, Oulu, Metsokangas, on *Betula* sp., 30 Oct. 2021, *M. Kulju* 78/21, OULU; Uusimaa, Helsinki, Haltiala, on fallen *Betula* branch, 2 Jan. 2021, *O. Miettinen* 24536, H 6200089. **Russia**. Nizhny Novgorod Reg., Lukoyanov Dist., Razino, on *Tilia cordata*, 30 Jul. 2019, *V. Spirin* 12778, H 7068342. **Spain**, Madrid, Ontigola, SE of Aranjues, on *Salsola vermicularis*, 4 Mar. 2011, *E. Larsson* 29-11, GB; Madrid, Pioz, on angiosperm wood, 31 Oct. 2011, *K.H. Larsson* 15159. **USA**, Washington, Pend Oreille County, Slate Creek, on *Corylus cornuta*, 15 Oct. 2014, *V. Spirin* 8566, H 7047608.

Description: *Basidiomata* resupinate, effused to effused-reflexed, membranous, hymenium smooth to tuberculate, sometimes with radiating ridges near the margin, cream to ochraceous to pale orange reddish, pileus surface smooth with adpressed hyphae, white, margin white, finely fimbriate. *Hyphal system* monomitic, septa with clamps, subicular hyphae firm-walled to thick-walled, distinct, 3–5.5 µm, rather straight, uniform, often with a grainy incrustation, subhymenial hyphae thin-walled, richly branched, 2–3.5(–5) µm, rather densely united. *Hyphidia* or hyphal ends common in hymenium, of hyphal width, mostly tapering towards apex, 20–40 × 2.5–3.5 µm. *Basidia* narrowly clavate, 35–40 × 5–6 µm, with four sturdy sterigmata up to 7 µm long, with a basal clamp. *Basidiospores* narrowly elliptical to cylindrical, often slightly bent near apiculus, (5.6–)5.7–7.1(–7.4) × (2.5–)2.7–3.3(–3.5) µm, L = 6.3 µm, W = 3,0 µm, Q = 2.15. smooth, thin-walled, without reaction in Melzer's or Cotton Blue.

Ecology and distribution: On angiosperm wood, often on thin branches and twigs, observed on many different tree species, also on bushes like *Salsola vermicularis*. Found from Mediterranean steppe-vegetation to alpine *Betula* forest and *Salix* thickets. Recorded in many regions of the Northern Hemisphere but seemingly with an uneven presence.

Notes: A surprisingly variable species and therefore often misidentified. *Phlebia albida* was introduced by Fries (1863), who attributed the species to Hampus von Post, a Swedish botanist, chemist and geologist that contributed many fungal specimens to Fries. A specimen collected by von Post in 1862 is selected as lectotype (Eriksson *et al*. 1981, Nakasone 1996). Several names have been suggested as synonyms of *P. albida* (Nakasone 1996). Of these synonyms, for which type specimens are preserved, the oldest is *Grandinia tuberculata*. Using this epithet the species has recently been referred to a separate genus as *Stereophlebia tuberculata*, however, without discussing the suggested synonomy with *Phlebia albida* (Zmitrovich 2018).

Basidiomata of *Phlebia albida* have a variable configuration and a variable colour and also show variation in spore morphology. They can be completely effused but also develop more or less distinct pilei. The hymenium can be smooth, radially veined or more or less strongly tuberculate. Hymenium colour varies from cream to ochraceous or orange-red. The micromorphology is fairly simple with a monomitic hyphal system, clamped hyphae, narrowly clavate basidia, and cylindrical, thin-walled, smooth basidiospores. Spores are mostly cylindrical with a more or less distinct bend close to apiculus. However, two Spanish specimens have elliptical spores (Fig. 11). Their ITS sequence differs slightly, why it is possible that further studies of other markers will reveal them as a separate species.

In his sanctioning work Fries (1828) described *Radulum pendulum*, a name that was interpreted as a synonym of *Phlebia albida* (Bresadola 1903, Bourdot & Galzin 1928, Boidin 1958). There is no authentic material of *R. pendulum* and for this reason the name was treated as a nomen dubium (Nakasone 1996). However, the lack of type material has not prevented Friesian names from being given a modern interpretation, especially when it is possible to follow a tradition.

Fries (1828) describes a fungus that breaks through the bark on *Alnus* twigs and develops narrow, azonate, pubescent pilei. The species has a soft coriaceous consistency and a tuberculate hymenium with a milk-white colour, eventually becoming rimose. The context is soft and white and tubercles sometimes grow to the size of a teeth. Fries compares his new species with *Thelephora hirsuta* (≡ *Stereum hirsutum*) but points to the erumpent growth as a difference.

Because his species concept is based primarily on macroscopic characters, Fries (1863) introduced the new species *Phlebia albida* for a collection by von Post (the lectotype) that was entirely resupinate without a pileus.

According to the nomenclatural rules a type should first of all be selected among original materials. In the case of *Phlebia albida*, the protologue refers to an icon preserved in the Stockholm herbarium that was drawn from a specimen collected in November 1861 from Rejmyra where von Post lived. Although the specimen selected as lectotype was not mentioned in the protologue, it was collected and annotated by von Post in 1862 before the publication of the species in 1863. It can reasonably be regarded as original material and is preferrable as type compared to the icon.

In the case of *Radulum pendulum* we choose the icon in herb. S as neotype since it is the only material that is connected to Fries. We supplement this neotype with an epitype based on a recently collected and sequenced specimen from Finland.

Conflict of interest: The authors declare that they have no conflict of interest.

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