

doi.org/10.3114/fuse.2025.16.1

## Reclassification of eleven corticioid basidiomycetes with nine typifications

K.-H. Larsson<sup>1,2\*</sup>, V. Spirin<sup>3,4</sup>, L. Ryvarden<sup>1</sup>, E. Larsson<sup>2,4</sup>

<sup>1</sup>Natural History Museum, University of Oslo, P.O. Box 1172, Blindern, 0318 Oslo, Norway

<sup>2</sup>Gothenburg Global Biodiversity Centre, P.O. Box 463, 40530 Göteborg, Sweden

<sup>3</sup>Botany Unit (Mycology), Finnish Museum of Natural History, P.O. Box 7 FI-00014 University of Helsinki, Finland

<sup>4</sup>University of Gothenburg, Dep. of Biological and Environmental Sciences, P.O. Box 463, 40530 Göteborg, Sweden

\*Corresponding author: k.h.larsson@nhm.uio.no

### Key words:

ITS  
new taxa  
phylogeny  
taxonomy  
typifications  
28S

**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 *Cytdiella pallidolivens*, *Hydnophlebia flavicans*, *Hyphodermella pallidovirens*, *Meruliopsis rubicunda*, *Parvodontia gloeocystidiata*, *Phaeophlebiopsis roumegueri*, 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 roumegueri*, *Peniophora moelleriana*, *Grandinia ocellata*, *Corticium lividum*, *Thelephora viscosa* var. *uvida*, and *Radulum pendulum*.

**Citation:** Larsson K-H, Spirin V, Ryvarden L, Larsson E (2025). Reclassification of eleven corticioid basidiomycetes with nine typifications. *Fungal Systematics and Evolution* 16: 1–27. doi: 10.3114/fuse.2025.16.1

**Received:** 24 November 2024; **Accepted:** 5 March 2025; **Effectively published online:** 28 March 2025

**Corresponding editor:** P.W. Crous

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

Table 1. (Continued)

Species	Voucher	ITS	LSU	Origin	Reference
<i>Gloeoporus guerreroanus</i>	ICN:139059	MG572754	—	Brazil	Jung et al. (2018)
<i>Haplopilus rutilans</i>	JV 0206/2 (Vlasak herb.)	KX752623	KX752623	Sweden	Miettinen et al. (2016)
<i>Hydnophanerochaete odontoidea</i>	TNM:GC 1308-45	LC363486	LC363492	China	Chen et al. (2018)
<i>Hydnophlebia alachuana</i>	CFMR:FP-103881-Sp	KP135341	KP135201	USA	Floudas & Hibbett (2015)
<i>Hydnophlebia aurantia</i>	TNM:F33329	MZ636982	MZ637143	Taiwan	Chen et al. (2021)
	TNM:F33330	MZ636983	MZ637144	Taiwan	Chen et al. (2021)
<i>Hydnophlebia canariensis</i>	MA:MA-Fungi 86622	KF483012	KF528103	Canary Isl.	Telleria et al. (2017)
	MA:MA-Fungi 86623	KF483013	KF528104	Canary Isl.	Telleria et al. (2017)
<i>Hydnophlebia chrysothiza</i>	CFMR:FD-282	KP135338	KP135217	USA	Floudas & Hibbett (2015)
<i>Hydnophlebia crocata</i>	TNM:F33298	MZ636985	MZ637146	China	Chen et al. (2021)
	TNM:F33297	MZ636984	MZ637145	China	Chen et al. (2021)
<i>Hydnophlebia flavicans</i>	GB:Moreno & Illana 12690	<b>OR822101</b>	<b>OR822101</b>	Spain	This study
<i>Hydnophlebia gorgonea</i>	MA:MA Fungi 86659	KF483049	KF528140	Cape Verde	Telleria et al. (2017)
	MA:MA Fungi 86658	KF483048	KF528139	Cape Verde	Telleria et al. (2017)
<i>Hydnophlebia meloi</i>	MA:MA Fungi 86654	KF483044	KF528135	Cape Verde	Telleria et al. (2017)
<i>Hydnophlebia omnivora</i>	CFMR:ME-497	KP135332	KP135218	USA	Floudas & Hibbett (2015)
	CFMR:KKN-112	KP135334	KP136216	USA	Floudas & Hibbett (2015)
<i>Hydnophlebia</i> sp.	BJFC:He 4003	MK860725	MK860738	China	Liu et al. (2020)
<i>Hydnophlebia subchrysothiza</i>	BJFC:Cui 16185	MK860722	MK860739	China	Liu et al. (2020)
<i>Hyphodermella corrugata</i>	MA:MA-Fungi 61395	FN600380	JN939584	France	Telleria et al. (2010)
<i>Hyphodermella pallidostraminea</i>	LE:286968	OK138912	OK138911	Russia	Crous et al. (2021)
<i>Hyphodermella pallidovirens</i>	GB:KHL 15122	<b>OR822115</b>	<b>OR822115</b>	Norway	This study
	GB:EM 12656	<b>OR822116</b>	n/a	Switzerland	This study
	H:VS15797	<b>PQ066114</b>	n/a	Austria	This study
<i>Hyphodermella rosae</i>	CFMR:FP-150552	KP134978	KP135223	USA	Floudas & Hibbett (2015)
<i>Hyphodermella</i> sp.	GB:KHL 12623	<b>OR822117</b>	<b>OR822117</b>	Costa Rica	This study
<i>Lopharia avellanea</i>	GB:EL19-10	<b>OR822098</b>	<b>OR822098</b>	Spain	This study
	H:VS15422	<b>OR822099</b>	n/a	France	This study
<i>Lopharia ayresii</i>	GB:KHL 12549	<b>OR822097</b>	<b>OR822097</b>	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																									
<i>Lopharia cinerascens</i>	CFMR:He 2188	MF626350	MF626373	USA	Liu <i>et al.</i> (2018)																									
	CFMR:He 2228	MF626351	MF626374	USA	Liu <i>et al.</i> (2018)																									
	CBS:485.62	MH858220	MH869821	USA	Vu <i>et al.</i> (2019)																									
	CBS:125884	MH864085	MH875543	New Zealand	Vu <i>et al.</i> (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 <i>et al.</i> (2017)																									
	O:D276	<b>OR822096</b>	<b>OR822096</b>	Brazil	This study																									
	URM:93246	MK993641	MK993636	Brazil	Xavier de Lima <i>et al.</i> (2020)																									
<i>Lopharia mirabilis</i>	BJFC:Dai 5147	MF626342	MF626365	China	Liu <i>et al.</i> (2018)																									
	BJFC:Dai 14978	MF626345	MF626368	China	Liu <i>et al.</i> (2018)																									
	BJFC:Yuan 2532	MF626343	MF626366	China	Liu <i>et al.</i> (2018)																									
	O:Parihar & Tiwari 12.1	<b>OR822095</b>	<b>OR822095</b>	India	This study																									
	BJFC:Dai 5598	MF626341	MF626364	China	Liu <i>et al.</i> (2018)																									
	BJFC:Dai13722	MF626346	MF626369	China	Liu <i>et al.</i> (2018)																									
	BJFC:He 4558	MF626344	MF626367	China	Liu <i>et al.</i> (2018)																									
	BJFC:He 4401	n/a	MF626377	China	Liu <i>et al.</i> (2018)																									
	BJFC:He 2510	MF626348	MF626371	China	Liu <i>et al.</i> (2018)																									
	BJFC:He 2428	MF626347	MF626370	China	Liu <i>et al.</i> (2018)																									
<i>Lopharia resupinata</i>	BJFC:He 2424	MF626349	MF626372	China	Liu <i>et al.</i> (2018)																									
	TNM:F30796	MZ636995	MZ637156	Taiwan	Chen <i>et al.</i> (2021)																									
	BJFC:Dai 15229	KU598873	KU598879	China	Wu <i>et al.</i> (2016)																									
	BJFC:Dai 15240	KU598874	KU598879	China	Wu <i>et al.</i> (2016)																									
	TNM:F28925	MZ636998	MZ637158	Taiwan	Chen <i>et al.</i> (2021)																									
	SWFC:CLZhao 18947	MW732407	MW724799	China	Zhao <i>et al.</i> (2023)																									
	BJFC:Dai 15205	KX494574	—	China	Yuan <i>et al.</i> (2017)																									
	BJFC:Dai 15223	KX494575	—	China	Yuan <i>et al.</i> (2017)																									
	GB:KHL 13798	<b>OR822130</b>	<b>OR822130</b>	France	This study																									
	BJFC:Dai 10833	JX623935	—	n/a	Jia <i>et al.</i> (2014)																									
<i>Luteochaete subglobosa</i>	TNM:CHWC 1506-46	LC427010	—	Taiwan	Chen <i>et al.</i> (2020)																									
	<i>Luteoporia albomarginata</i>																													
						<i>Luteoporia lutea</i>																								
											<i>Luteoporia straminea</i>																			
																<i>Meruliopsis albomellea</i>														
																					<i>Meruliopsis albostraminea</i>									
																										<i>Meruliopsis crassitunicata</i>				

Table 1. (Continued)

Species	Voucher	ITS	LSU	Origin	Reference
<i>Meruliopsis cystidiata</i>	NYBG:776308	MG572749	—	Brazil	Jung et al. (2018)
<i>Meruliopsis faginea</i>	LE-F-334408	MW673659	—	Russia	Crous et al. (2021)
<i>Meruliopsis hirtella</i>	CFMR:FD-497	KP135054	—	USA	Floudas & Hibbett (2015)
	CFMR:DLL 2009-033	JQ673110	—	USA	Brazeo et al. (2012)
<i>Meruliopsis leptocystidiata</i>	CFMR:HHB-4788	KP135053	—	USA	Floudas & Hibbett (2015)
	TNM:Wu 1708-15	LC427012	—	China	Chen et al. (2020)
	TNM:Wu 1708-43	LC427013	—	China	Chen et al. (2020)
<i>Meruliopsis marginata</i>	BJFC:Cui 6878	JX623943	—	China	Jia et al. (2014)
<i>Meruliopsis nanlingensis</i>	SWFC:CLZhao 6889	OM955801	—	China	Unpublished
	BJFC:Li 1568	JX623937	—	China	Jia et al. (2014)
	BJFC:Dai 8173	JX623942	—	China	Jia et al. (2014)
<i>Meruliopsis parvispora</i>	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)
<i>Meruliopsis pseudocystidiata</i>	BJFC:Li 1704	JX623944	—	China	Jia et al. (2014)
	TNM:WEI 17-078	LC427019	—	Taiwan	Chen et al. (2020)
<i>Meruliopsis rubicunda</i>	GB:VS 4951	<b>OR822128</b>	—	Russia	This study
	SWFC:CLZhao 7682	OM955808	—	China	Unpublished
	GB:G Norstedt 081011	<b>OR822129</b>	—	Sweden	This study
<i>Meruliopsis sp.</i>	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)
<i>Meruliopsis toxicola</i>	UC:2023018	KP814205	—	USA	Rosenthal et al. (2017)
	GB:GB-0237349	EU118648	—	Sweden	Larsson (2007)
	DAOM:16560	MH856432	—	Canada	Vu et al. (2019)
	K(M):167914	MZ159419	—	England	Unpublished
<i>Meruliopsis variegata</i>	BJFC:Li 1780	JX623936	—	China	Jia et al. (2014)

Table 1. (Continued)

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

Table 1. (Continued)

Species	Voucher	ITS	LSU	Origin	Reference
<i>Phlebia formosana</i>	TNM:F30406	MZ637033	MZ637237	Taiwan	Chen et al. (2021)
<i>Phlebia margaritae</i>	TUF:124409	KX826788	n/a	Italy	Saitta et al. (2017)
<i>Phlebia</i> 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)
<i>Phlebia subochracea</i>	GB:KGN 162-95	EU118656	EU118656	Sweden	Larsson (2007)
<i>Phlebia uda</i>	GB:KHL 13157	<b>OR822103</b>	<b>OR822103</b>	Estonia	This study
<i>Phlebiodontia acanthocystis</i>	CFMR:FP-150571	KY948767	KY948844	Hawaii	Justo et al. (2017)
<i>Phlebiodontia fissurata</i>	SWFC:CLZhao 2900	MW732402	MW724794	China	Zhao et al. (2023)
	GB:EM 13468	<b>OR822135</b>	n/a	Switzerland	This study
<i>Phlebiodontia rajchenbergii</i>	SP:MCW 636-18	OP265192	OP265190	Brazil	Motato-Vasquez et al. (2022)
<i>Phlebiodontia</i> sp.	O:LR 46383	<b>OR822136</b>	<b>OR822136</b>	Brazil	This study
<i>Phlebiodontia subochracea</i>	GB:RGC 160804A1	<b>OR822102</b>	<b>OR822102</b>	Sweden	This study
<i>Phlebiopsis castanea</i>	H:VS 5295	KX752610	KX752610	Russia	Miettinen et al. (2016)
<i>Phlebiopsis crassa</i>	CFMR:KKN-86	KP135394	KP135215	USA	Floudas & Hibbett (2015)
<i>Phlebiopsis flavidoalba</i>	CFMR:FD-263	KP135402	KP135271	USA	Floudas & Hibbett (2015)
<i>Phlebiopsis gigantea</i>	CFMR:FP-70857	KP135390	KP135272	USA	Floudas & Hibbett (2015)
<i>Phlebiopsis</i> sp.	CFMR:FP-102937	KP135391	KP135270	Puerto Rico	Floudas & Hibbett (2015)
<i>Phlebioporia bubalina</i>	BJFC:Dai 13168	KC782526	KC782528	China	Jia et al. (2014)
<i>Pirex concentricus</i>	OSC:41587-sp	KP134984	KP135275	USA	Floudas & Hibbett (2015)
<i>Porostereum spadiceum</i>	GB:KHL 13438	<b>OR822131</b>	<b>OR822131</b>	Germany	This study
<i>Quasiphlebia densa</i>	TNM:F14971	MZ637067	MZ637266	Taiwan	Chen et al. (2021)
	TNM:F31834	MZ637066	MZ637265	Taiwan	Chen et al. (2021)
<i>Quasiphlebia canadensis</i>	O:PM 343-11	<b>PQ013065</b>	<b>PQ013065</b>	Norway	This study
	GB:GB-0095231	<b>PQ013064</b>	<b>PQ013064</b>	Sweden	This study
<i>Rhizochaete americana</i>	CFMR:FP-102188	KP135409	KP135277	USA	Floudas & Hibbett (2015)
<i>Rhizochaete belizensis</i>	CFMR:FP-150712	KP135408	KP135280	Belize	Floudas & Hibbett (2015)
<i>Rhizochaete borneensis</i>	TNM:F31080	MZ637070	MZ637270	Taiwan	Chen et al. (2021)
<i>Rhizochaete brunnea</i>	BAFC:34528	AY219389	AY219389	Argentina	Greslebin et al. (2004)
<i>Rhizochaete chinensis</i>	TNM:Wu 0910-45	LC387335	MF110294	China	Chen et al. (2018); Wu et al. (2018)
<i>Rhizochaete filamentosa</i>	CFMR:HHB-3169	KP135410	KP135278	USA	Floudas & Hibbett (2015)



Table 1. (Continued)

Species	Voucher	ITS	LSU	Origin	Reference
<i>Rhizochaete flava</i>	CFMR:PR-1141	KY273030	KY273033	Puerto Rico	Nakasone <i>et al.</i> (2017)
<i>Rhizochaete fouquieriae</i>	CFMR:KKN-121	AY219390	AV219390	USA	Greslebin <i>et al.</i> (2004)
<i>Rhizochaete galactites</i>	GB:Hjm 18924	<b>OR822124</b>	<b>OR822124</b>	Sweden	This study
	H:VS 11261	<b>OR822125</b>	n/a	Russia	This study
	H:VS 12070	<b>OR822126</b>	n/a	Russia	This study
<i>Rhizochaete lutea</i>	TNM:F21760	MZ637072	GQ470651	Taiwan	Chen <i>et al.</i> (2021); Wu <i>et al.</i> (2010)
<i>Rhizochaete radicata</i>	CFMR:FD-123	KP135407	KP135279	USA	Floudas & Hibbett (2015)
<i>Rhizochaete sulphurina</i>	GB:SPG 745	<b>OR822127</b>	<b>OR822127</b>	Spain	This study
<i>Rhizochaete sulphurosa</i>	URM:87190	KT003522	KT003519	Brazil	Chikowski <i>et al.</i> (2016)
<i>Rhizochaete violascens</i>	GB:GB-0161553	<b>OR822123</b>	<b>OR822123</b>	Sweden	This study
<i>Riopa metamorphosa</i>	H:VS 2395	KX752601	KX752601	Russia	Miettinen <i>et al.</i> (2016)
<i>Scopuloidea hydnoidea</i>	GB:KHL 11916	EU118665	EU118665	Sweden	Larsson (2007)
<i>Scopuloidea sp.</i>	GB:KHL 12320	<b>OR822105</b>	<b>OR822105</b>	USA	This study
<i>Stereophlebia pendula</i>	GB:KHL 15159	<b>PQ013066</b>	<b>PQ013066</b>	Spain	This study
	GB:EL 29-11	<b>PQ013067</b>	<b>PQ013067</b>	Spain	This study
	H:6200339	<b>PQ013069</b>	n/a	Finland	This study
	H:6200089	<b>PQ013071</b>	n/a	Finland	This study
	H:7047608	<b>PQ013072</b>	n/a	USA	This study
	H:7068342	<b>PQ013070</b>	n/a	Russia	This study
	OULU:Kulju 78/21	<b>PQ013068</b>	n/a	Finland	This study
<i>Terana caerulea</i>	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 ( $\geq 80\%$ ), UB ( $\geq 95\%$ ), and BI pp values ( $\geq 0.95$ ), respectively. The analyses recovered *Hydnophlebia* with strong support and the clade includes an *Odontium 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 roumegueri*.

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

***Cyrtidiella pallidolivens*** (Bourdot & Galzin) K.H. Larss. & Ryvardeen, **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, Llerida, 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 *Cyrtidiella* 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 pallidovirens* and comparison with authentic material revealed that the Spanish specimen belongs to this species. *Corticium pallidovirens* 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 *Cyrtidiella* (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:** *Odonticum flavicans* (Bres.) Nakasone, *Cryptog. Mycol.* **29**(3): 245. 2008.

*Odonticum 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 *Odonticum monfraguense*).

**Description:** *Basidiomata* resupinate, closely adnate, effused, ceraceous when fresh, compact and rather hard when dried, hymenium densely hydroid, 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 *Odonticum* because of its hydroid hymenium and the simple-septate hyphae (Manjón *et al.* 1989, Nakasone 2008). However, the type of *Odonticum*, *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.

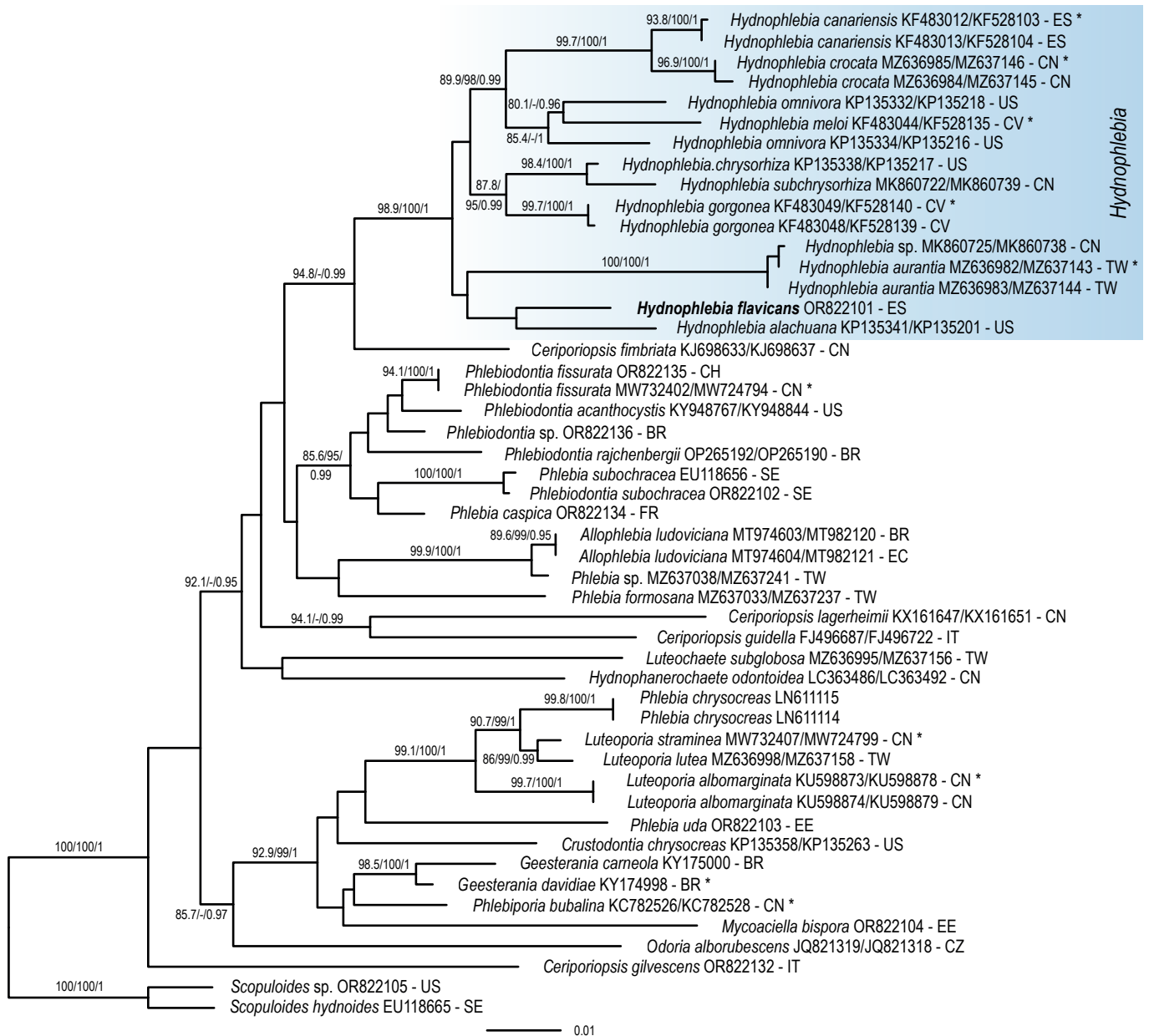
*Typus*: Austria, Tirol, “Wäldchen bei Stams in Oberinntal”, on branches of *Corylus avellana* and *Alnus incana*, 6 Jun. 1926, V. Litschauer (lectotype of *Corticium pallidovirens* PC Bourdot 34284, studied).

*Additional materials examined*: Austria, Niederösterreich, Perchtoldsdorf, Naturpark Föhrenberge, on *Corylus avellana*, 10 Sep. 2022, V. Spirin 15797, H. France, Aveyron, Castelnaud-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 bootstrap (≥ 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 viridalesbrosa* 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 odontoid hymenium with the hymenial spines consisting

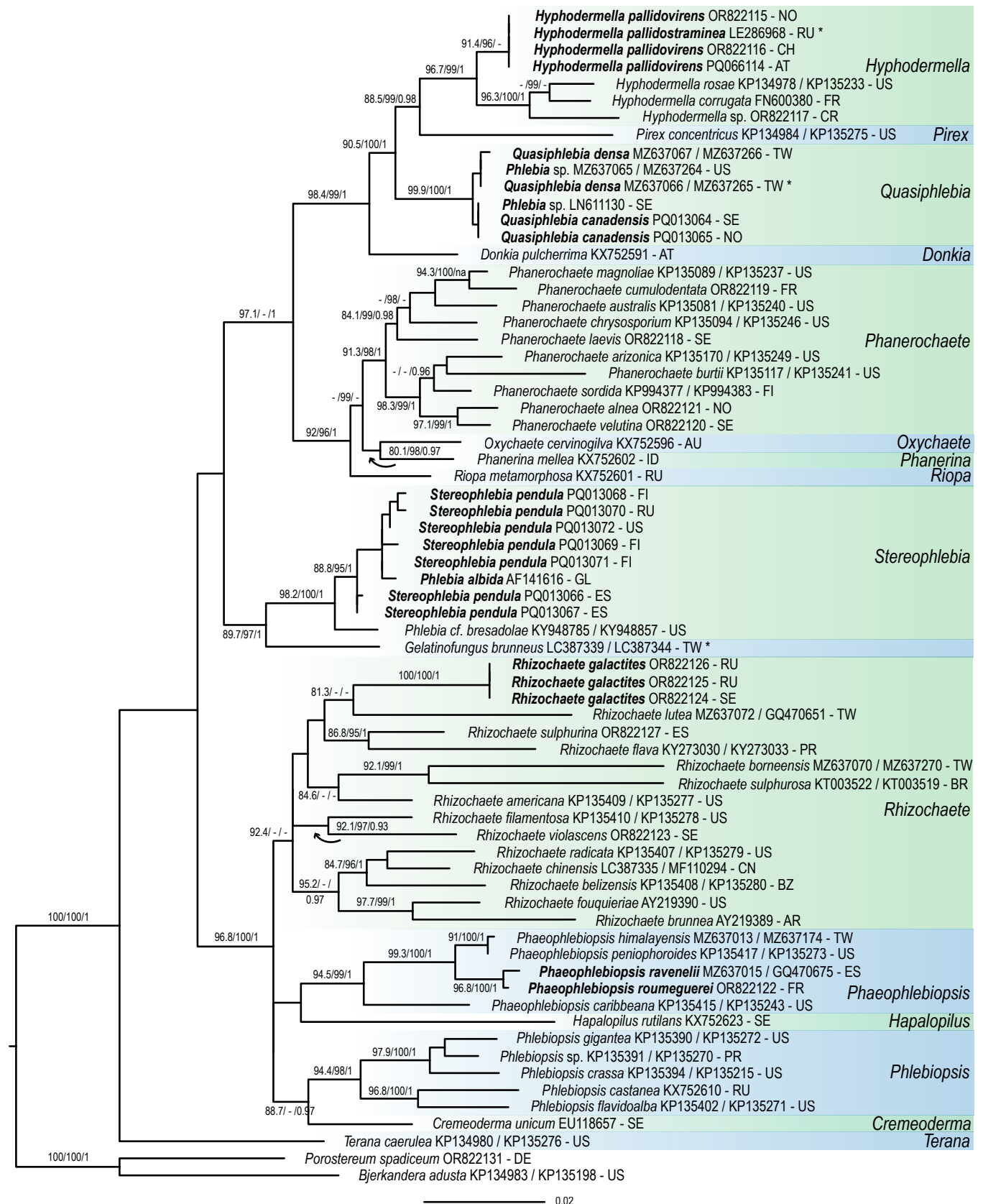


Fig. 3. Maximum likelihood tree for *Phanerochaetaceae* using ITS and LSU sequences. Focal taxa are highlighted. Support values from SH-aLRT ( $\geq 80$ ), ultrafast bootstrap ( $\geq 95$ ) and Bayesian inference ( $\geq 0.95$ ) are indicated on branches. Type sequences are marked with \*.

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.

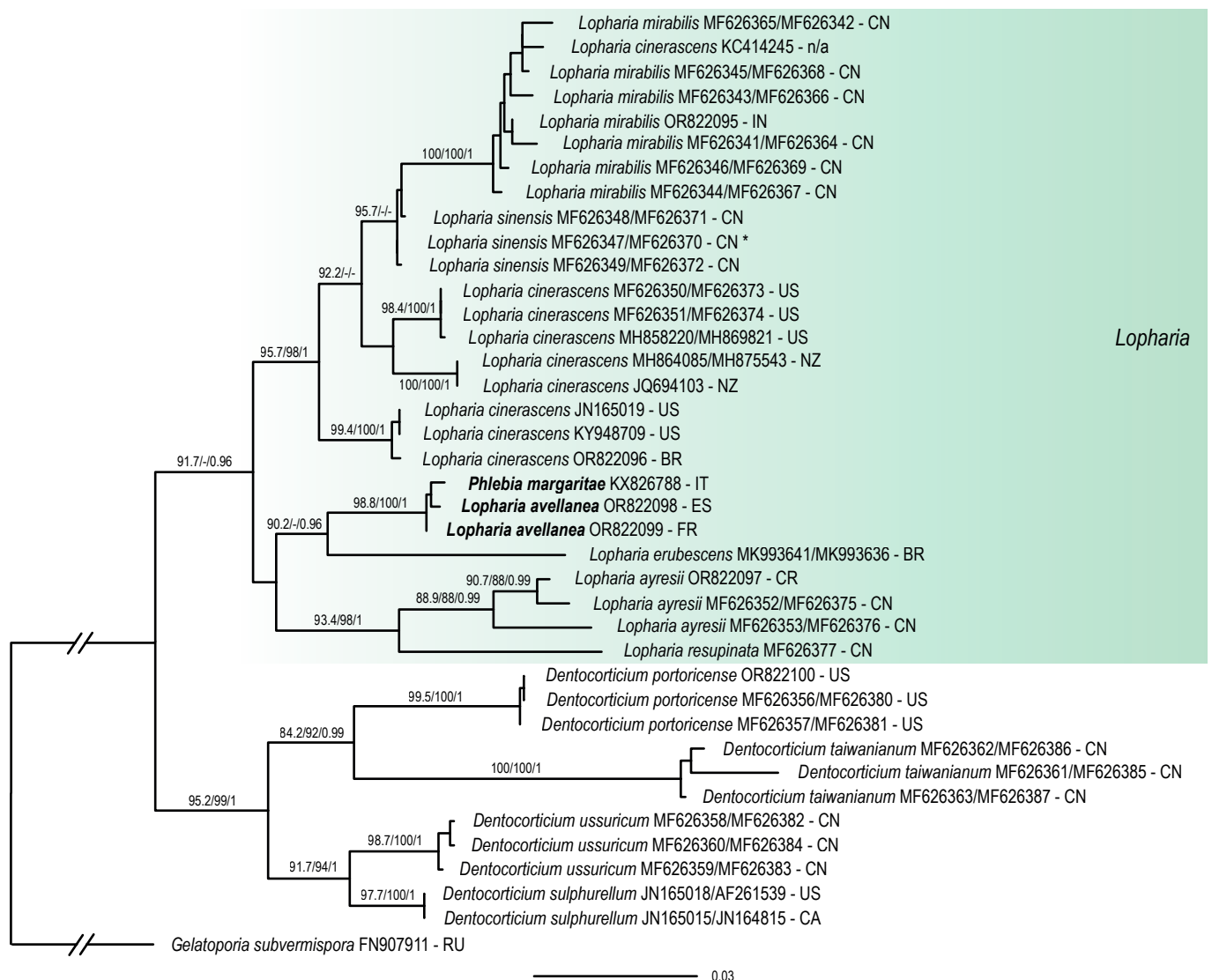
**Typus:** **Poland**, on branches of *Ulmus*, leg. **Eichler** (**lectotype** of *Kneiffia avellanea*, designated here, S F15745, MBT 10024814, studied).

**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)  $\mu\text{m}$  wide, frequently branched and somewhat irregular generative hyphae and 0.5–2  $\mu\text{m}$  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  $\mu\text{m}$  wide, forming a vertically arranged dense tissue where individual hyphae are difficult to observe. *Cystidia* abundant, conical, thick-walled, densely encrusted, mostly 50–80  $\times$  10–



**Fig. 4.** Maximum likelihood tree for *Lopharia* using ITS and LSU sequences. Focal taxa are highlighted. Support values from SH-aLRT ( $\geq 80$ ), ultrafast bootstrap ( $\geq 95$ ) 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*.

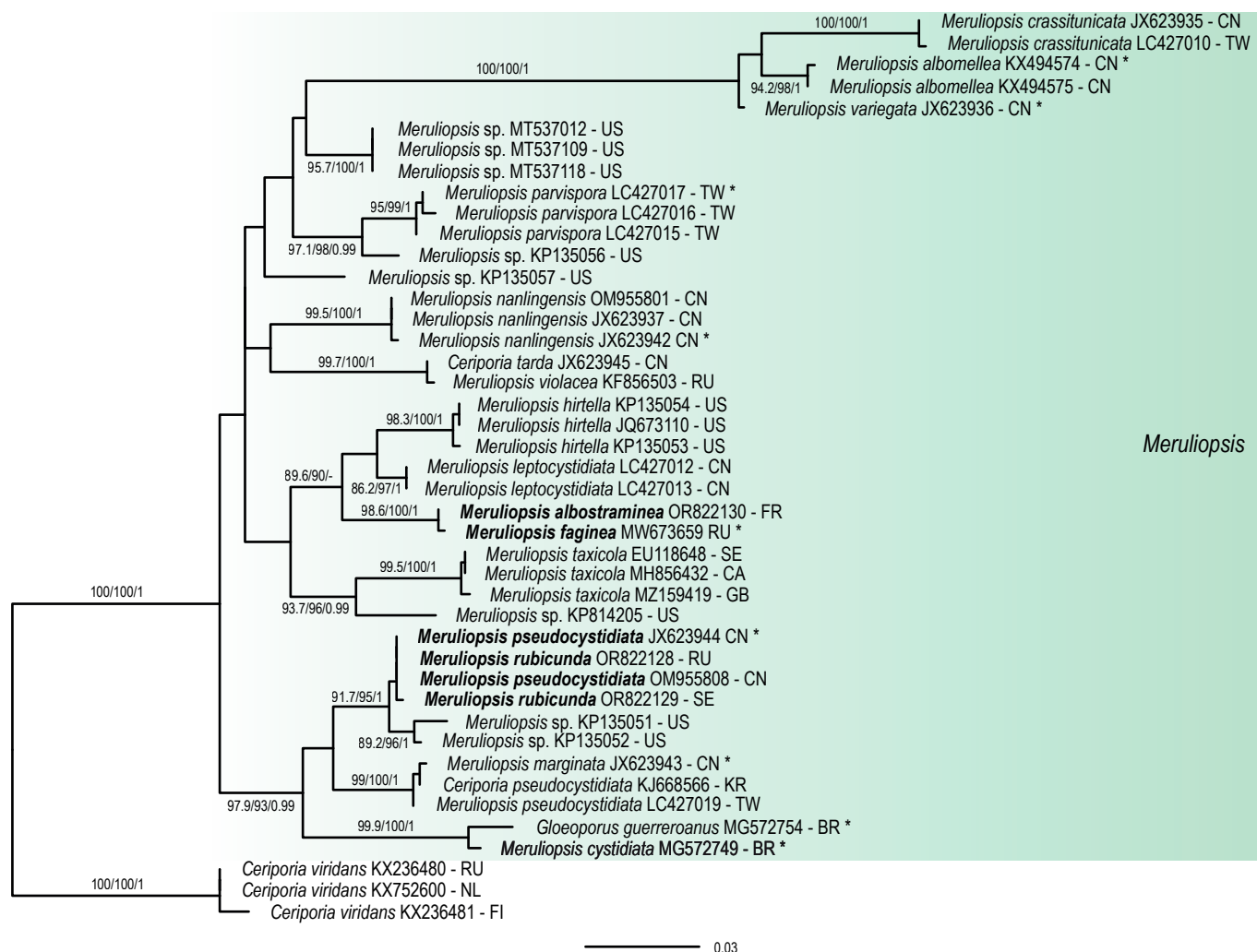
Phylogenetic analyses firmly place the species in *Lopharia* (Fig. 4). This genus was originally regarded as dimitic

(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 ( $\geq 80$ ), ultrafast bootstrap ( $\geq 95$ ) and Bayesian inference ( $\geq 0.95$ ) 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, Krawtzev (**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, **isoelectotype** 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*).

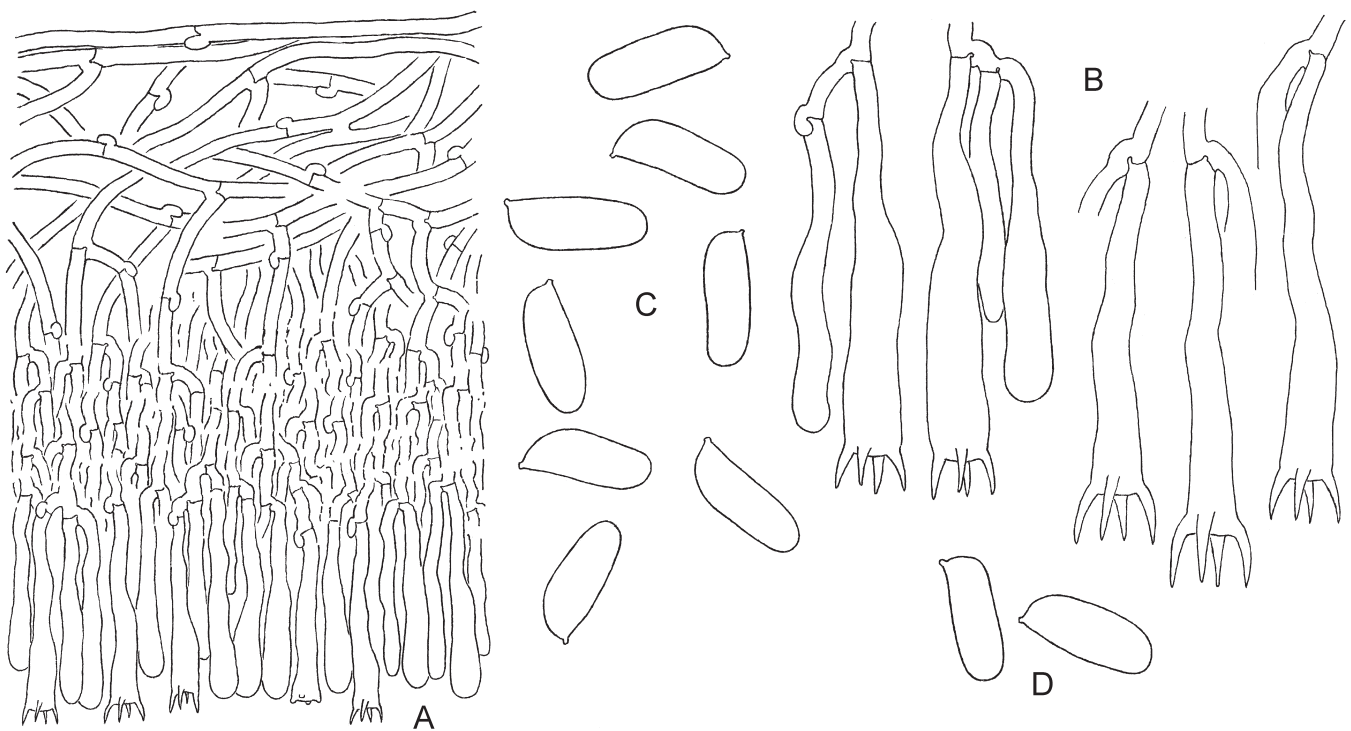
*Description:* *Basidiomata* effused, resupinate, membranous, rather soft, ab. 0.5 mm thick, hymenium reticulately wrinkled to folded or semiporoid, whitish to pale pinkish

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.

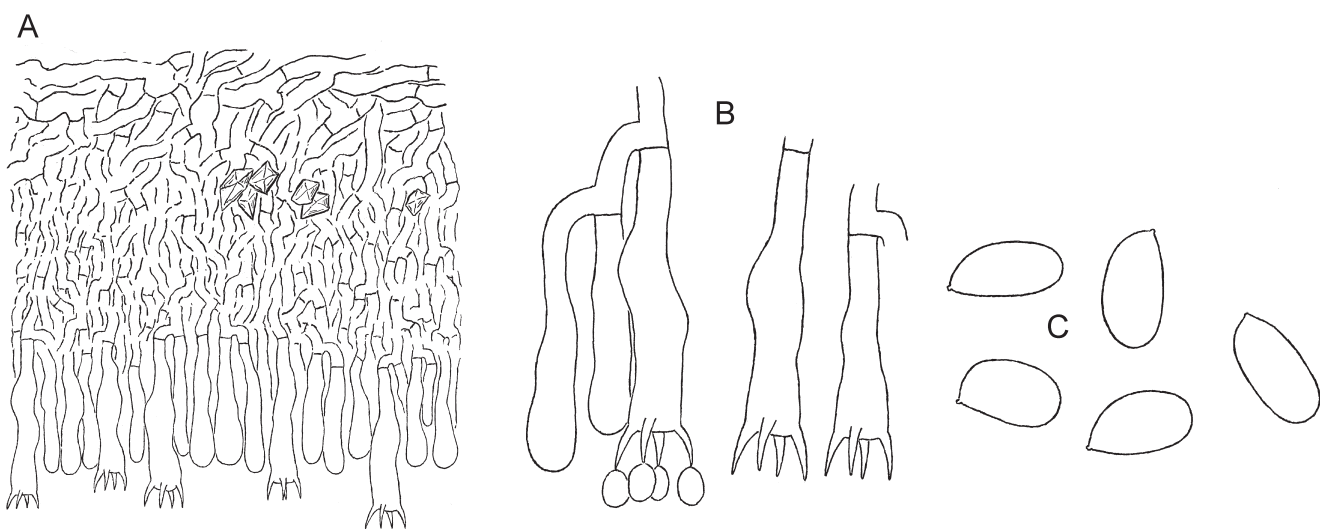
*Phlebia tuberculata* (Hallenb. & E. Larss.) Ghob.-Nehj., *Mycol. Progr.* **11**: 32. 2012, nom. illeg., not *Phlebia tuberculata* (Berk. & M.A. Curtis) Tura et al., *Biodiversity of the Heterobasidiomycetes and non-gilled Hymenomycetes (former Aphyllophorales) of Israel*: 446. 2011.

*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 Groși, 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* (Hallenberg & E. Larsson) Ghobad-Nejhad 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.

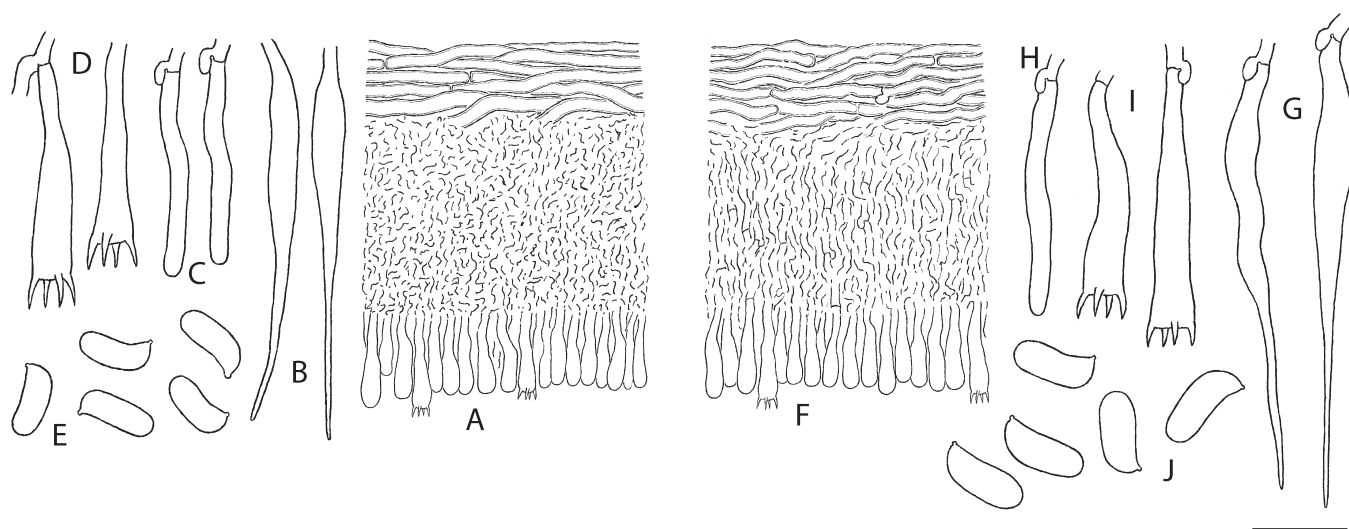
Name databases (Index Fungorum, MycoBank) suggest several names as synonyms of *Phlebia livida*, i.e. *Corticium viscosum* Pers. (1800), nom. sanct., *Grandinia ocellata* Fr. (1838), *Corticium uvidum* (Fr.) Fr. (1838), *Xerocarpus cacao* P. Karst. (1890), and *Sebacina peritricha* Bourdot & Galzin (1909).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

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  $4.3 \times 1.8 \mu\text{m}$  vs  $4.4 \times 2.0 \mu\text{m}$ , 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 hydroid, 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 grandinoid, 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 roumegueri*** (Bres.) K.H. Larss. & Ryvarden, **comb. nov.** MycoBank MB 857622. Fig. 1F.

**Basionym:** *Corticium roumegueri* 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).

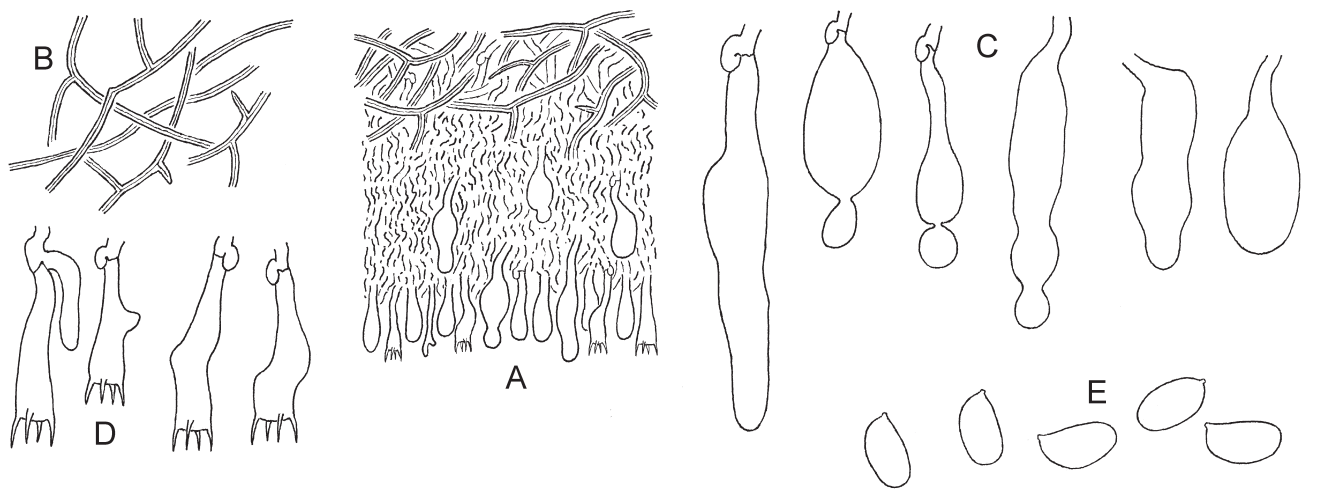
*Kneiffia subascondita* Bres., *Ann. Mycol.* 1: 102. 1903.

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

**Additional materials examined:** **France**, Pyrénées orientales, Argèles-sur-Mer, Forêt domnicile 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 roumegueri*, 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 roumegueri*).

**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. roumegueri* 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. roumegueri*. As pointed out by Floudas & Hibbett (2015), the identity of *Peniophora ravenelii* remains unclear.

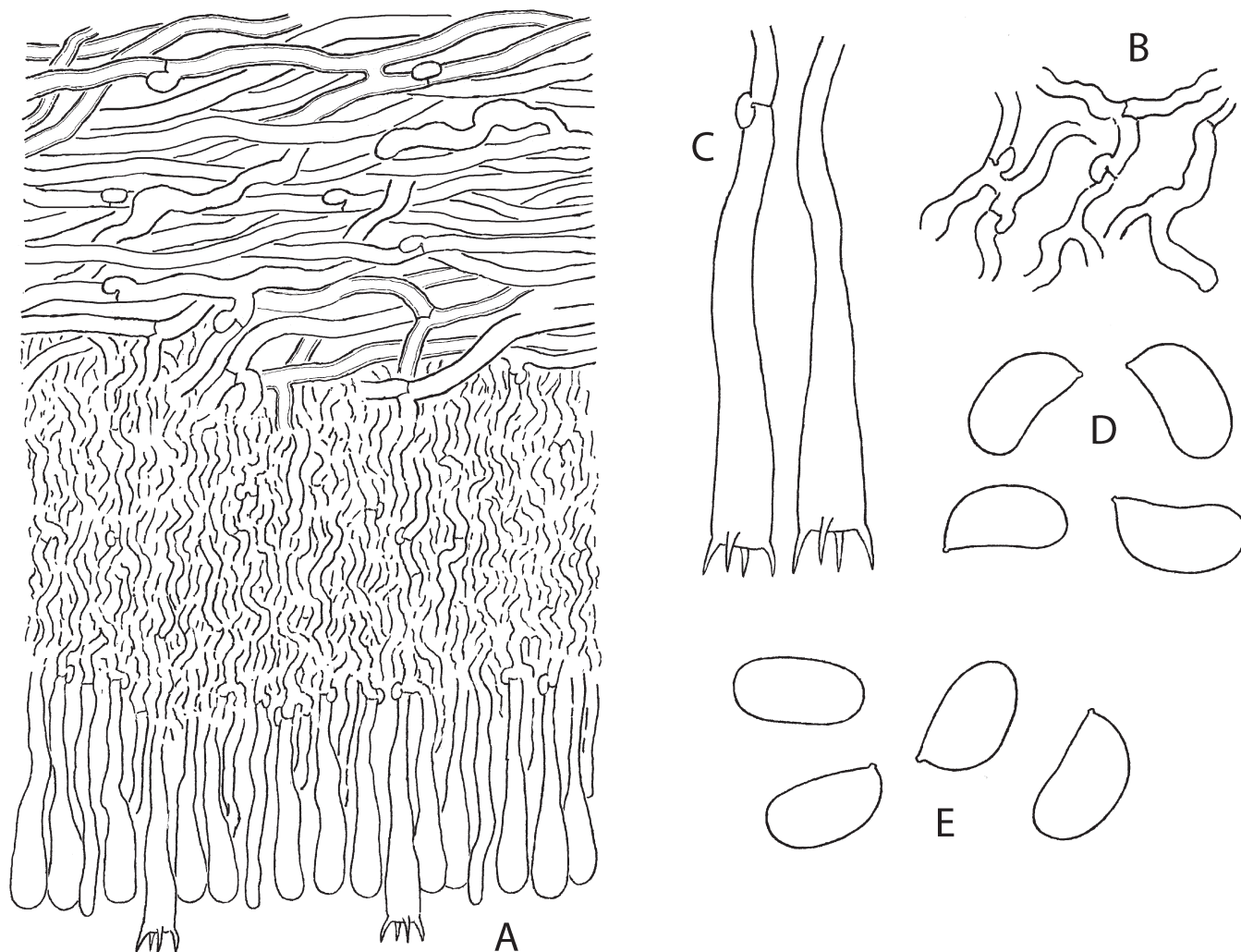
***Quasiphlebia canadensis*** (W.B. Cooke) K.H. Larss., **comb. nov.** MycoBank MB 857623. Fig. 10.

**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)  $\mu\text{m}$  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  $\mu\text{m}$  wide hyphae, individual hyphae difficult to observe. *Hyphidia*, or rather hyphal ends, common in the hymenium, 30–40  $\times$  2–2.5  $\mu\text{m}$ , thin-walled, apically sometimes hooked or even branched. *Basidia* narrowly clavate, 30–40  $\times$  5–6  $\mu\text{m}$ , 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)  $\times$  (2.2–)2.5–2.8(–3.2)  $\mu\text{m}$ , L = 4.5  $\mu\text{m}$ , W = 2.6  $\mu\text{m}$ , 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.

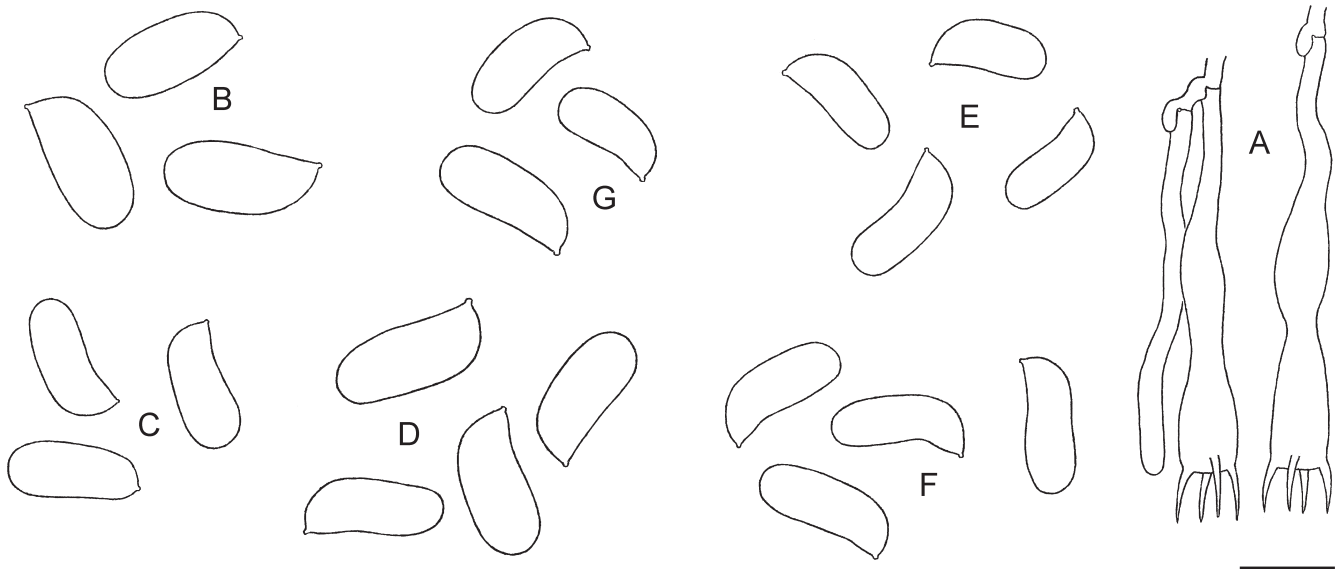
**Basionym:** *Corticium rhodoleucum* subsp. *galactites* Bourdot & Galzin, *Hyménomyc. de France*: 189. 1928.

**Synonym:** *Phanerochaete galactites* (Bourdot & Galzin) J. Erikss. & Ryvarde, *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*, isoelectotype (GB); **F** from *Stereophlebia pendula*, epitype (H); **G** from O. Miettinen 24536 (H). Scale bars: **A** = 10  $\mu\text{m}$ ; **B–G** = 5  $\mu\text{m}$ .

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)  $\mu\text{m}$  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)  $\mu\text{m}$  wide hyphae, sometimes embedded in an oily matter, subhymenial hyphae 2–3  $\mu\text{m}$ , 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  $\times$  6–10  $\mu\text{m}$ , covered by fine-grained crystals, encrusted part 15–40  $\mu\text{m}$ , thin-walled, embedded or projecting, easily crushed in microscope preparations and then only visible as lumps of crystals. *Basidia* subclavate, 25–30  $\times$  4–5  $\mu\text{m}$ , with four sterigmata. *Basidiospores* narrowly elliptical to subcylindrical, (4.2–)4.3–5.3  $\times$  (2.0–)2.1–2.5(–2.7)  $\mu\text{m}$ , L = 4.6  $\mu\text{m}$ , W = 2.3  $\mu\text{m}$ , 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, Soavveljävrecopma, 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, Narssarsuaq 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  $\mu\text{m}$ , rather straight, uniform, often with a grainy incrustation, subhymenial hyphae thin-walled, richly branched, 2–3.5(–5)  $\mu\text{m}$ , rather densely united. *Hyphidia* or hyphal ends common in hymenium, of hyphal width, mostly tapering towards apex, 20–40  $\times$  2.5–3.5  $\mu\text{m}$ . *Basidia* narrowly clavate, 35–40  $\times$  5–6  $\mu\text{m}$ , with four sturdy sterigmata up to 7  $\mu\text{m}$  long, with a basal clamp. *Basidiospores* narrowly elliptical to cylindrical, often slightly bent near apiculus, (5.6–)5.7–7.1(–7.4)  $\times$  (2.5–)2.7–3.3(–3.5)  $\mu\text{m}$ , L = 6.3  $\mu\text{m}$ , W = 3.0  $\mu\text{m}$ , 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 synonymy 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* ( $\equiv$  *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 preferable 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.

## REFERENCES

- Ayres DL, Darling A, Zwickl DJ, et al. (2012). BEAGLE: an application programming interface and high-performance computing library for statistical phylogenetics. *Systematic Biology* **61**: 170–173. <https://doi.org/10.1093/sysbio/syr100>
- Baltazar JM, da Silveira RMB, Rajchenberg M (2016). Type studies of J. Rick's corticioid homobasidiomycetes (*Agaricomycetes*, *Basidiomycota*) housed in the Herbarium Anchieta (PACA). *Phytotaxa* **255**: 101–132. <https://doi.org/10.11646/phytotaxa.255.2.1>
- Boidin J (1958). Essai biotaxonomique sur les hydnés résupinés et les corticiés. *Revue Mycologique. (Paris), Mémoire hors-série* **6**: 1–388.
- Bourdot H, Galzin A (1909). Hyménomycètes de France. (I. Hétérobasidiés). *Bulletin de la Société Mycologique de France* **25**: 15–36.
- Bourdot H, Galzin A (1928). *Hyménomycètes de France*. Sceaux.
- Brazeo NJ, Lindner DL, Fraver S, et al. (2012). Wood-inhabiting, polyporoid fungi in aspen-dominated forests managed for biomass in the US Lake States. *Fungal Ecology* **5**: 600–609. <https://doi.org/10.1016/j.funeco.2012.03.002>
- Bresadola G (1903). Fungi polonici a cl. viro B. Eichler lecti. *Annales Mycologici* **1**: 65–96.
- Burdsall HH (1985). A contribution to the taxonomy of the genus *Phanerochaete* (*Corticaceae*, *Aphyllphorales*). *Mycologia Memoir* **10**: 1–165.
- Burt EA (1925). The *Thelephoraceae* of North America XIV. *Annals of the Missouri Botanical Garden* **12**: 213–357.
- Chen CC, Chen CY, Lim YW, et al. (2020). Phylogeny and taxonomy of *Ceriporia* and other related taxa and description of three new species. *Mycologia* **112**: 64–82. <https://doi.org/10.1080/00275514.2019.1664097>
- Chen CC, Chen CY, Wu SH. (2021). Species diversity, taxonomy and multigene phylogeny of phlebioid clade (*Phanerochaetaceae*, *Irpicaceae*, *Meruliaceae*) of *Polyporales*. *Fungal Diversity* **111**: 337–442. <https://doi.org/10.1007/s13225-021-00490-w>
- Chen CC, Wu SH, Chen CY (2018) *Hydnophanerochaete* and *Odontoefibula*, two new genera of phanerochaetoid fungi (*Polyporales*, *Basidiomycota*) from East Asia. *MycoKeys* **39**: 75–96. <https://doi.org/10.3897/mycokeys.39.28010>
- Chernomor O, von Haeseler A, Minh BQ (2016). Terrace aware data structure for phylogenomic inference from supermatrices. *Systematic Biology* **65**: 997–1008. <https://doi.org/10.1093/sysbio/syw037>
- Chikowski RS, Larsson K-H, Gibertoni TB (2016). Three new combinations in *Rhizochaete* (*Agaricomycetes*, *Fungi*) and a new record to the Brazilian Amazonia. *Nova Hedwigia* **102**: 185–196. [https://doi.org/10.1127/nova\\_hedwigia/2015/0298](https://doi.org/10.1127/nova_hedwigia/2015/0298)
- Cooke MC (1879). On *Peniophora*. *Grevillea* **8**(no 45): 17–21.
- Crous PW, Osieck ER, Jurjevi Ž, et al. (2021). Fungal Planet description sheets: 1284–1382. *Persoonia* **47**: 178–384. <https://doi.org/10.3767/persoonia.2021.47.06>
- Dereeper A, Guignon V, Blanc G, et al. (2008). Phylogeny.fr: robust phylogenetic analysis for the non-specialist. *Nucleic Acids Research* **36**, issue suppl\_2, 1: W465–469. <https://doi.org/10.1093/nar/gkn180>
- Donk MA (1964). A conspectus of the families of *Aphyllphorales*. *Persoonia* **3**: 199–324.



- Duhem B, Michel H (2007). Une espèce nouvelle de *Phlebia* possédant des fibres arboriformes. *Cryptogamie, Mycologie* **28**: 29–38.
- Dvorák D, Beták J, Tomšovský M (2014). *Aurantioporus alborubescens* (Basidiomycota, Polyporales) – first record in the Carpathians and notes on its systematic position. *Czech Mycology* **66**: 71–84.
- Eriksson J, Hjortstam K, Ryvarden L (1978). *Corticiaceae of North Europe*, vol. 5. Fungiflora, Oslo.
- Eriksson J, Hjortstam K, Ryvarden L (1981). *Corticiaceae of North Europe*, vol. 6. Fungiflora, Oslo.
- Eriksson J, Ryvarden L (1973). *Corticiaceae of North Europe*, vol. 2. Fungiflora, Oslo.
- Floudas D, Hibbett DS (2015). Revisiting the taxonomy of *Phanerochaete* (Polyporales, Basidiomycota) using a four gene dataset and extensive ITS sampling. *Fungal Biology* **119**: 679–719. <https://doi.org/10.1016/j.funbio.2015.04.003>
- Fries E (1821). *Systema Mycologicum*, vol. 1. Lund (Lundae).
- Fries E (1828). *Elenchus Fungorum*, vol. 1. Greifswald (Gryphiswaldiae).
- Fries E (1838). *Epicrasis Systematis Mycologici*. Lund (Lundae).
- Fries E (1863) *Monographia Hymenomycetum Sueciae* **2**: 1–355. Uppsala (Upsaliae).
- Garbelotto MM, Lee HK, Slaughter G, et al. (1997). Heterokaryosis is not required for virulence of *Heterobasidion annosum*. *Mycologia* **89**: 92–102. <https://doi.org/10.1080/00275514.1997.12026759>
- Gardes M, Bruns TD (1993). ITS primers with enhanced specificity for basidiomycetes - application to the identification of mycorrhizae and rusts. *Molecular Ecology* **2**: 113–118. <https://doi.org/10.1111/j.1365-294X.1993.tb00005.x>
- Ghobad-Nejhad M, Hallenberg N (2012). Multiple evidence for recognition of *Phlebia tuberculata*, a more widespread segregate of *Phlebia livida* (Polyporales, Basidiomycota). *Mycological Progress* **11**: 27–35. <https://doi.org/10.1007/s11557-010-0722-1>
- Ginns JH (1971). The genus *Merulius* V. Taxa proposed by Bresadola, Bourdot & Galzin, Hennings, Rick, and others. *Mycologia* **63**: 800–818.
- Ginns JH (1976). *Merulius*: s.s. and s.l., taxonomic disposition and identification of species. *Canadian Journal of Botany* **54**: 100–167.
- Greslebin AG, Nakasone KK, Rajchenberg M. (2004). *Rhizochaete*, a new genus of phanerochaetoid fungi. *Mycologia* **96**: 260–271. <https://doi.org/10.1080/15572536.2005.11832976>
- Guindon S, Dufayard J-F, Lefort V, et al. (2010). New algorithms and methods to estimate maximum-likelihood phylogenies: Assessing the performance of PhyML 3.0. *Systematic Biology* **59**: 307–321. <https://doi.org/10.1093/sysbio/syq010>
- Hallenberg N (1988). Species delimitation in *Corticiaceae* (Basidiomycetes). *Mycotaxon* **31**: 445–465.
- Hallenberg N (1991). Pairing tests with species of *Aphylllophorales* (Basidiomycetes) from two phytogeographically isolated areas. *Mycotaxon* **42**: 355–386.
- Hallenberg N, Larsson E (1991). Differences in cultural characters and electrophoretic patterns among sibling species in four different species complexes (*Corticiaceae*, Basidiomycetes). *Mycologia* **83**: 131–141. <https://doi.org/10.1080/00275514.1991.12025989>
- Hallenberg N, Larsson E (1993). On taxonomy of *Phlebia livida*. *Mycological Research* **97**: 351–354. [https://doi.org/10.1016/S0953-7562\(09\)81135-0](https://doi.org/10.1016/S0953-7562(09)81135-0)
- Hjortstam K (1987). A check-list to genera and species of corticioid fungi (*Hymenomycetes*). *Windahlia* **17**: 55–85.
- Hjortstam K (1995). Two new genera and some new combinations of corticioid fungi (*Basidiomycotina*, *Aphylllophorales*) from tropical and subtropical areas. *Mycotaxon* **54**: 183–193.
- Hjortstam K, Ryvarden L (1990). *Lopharia* and *Porostereum* (*Corticiaceae*). *Synopsis Fungorum* **4**: 1–68.
- Hjortstam K, Ryvarden L (2004). Some new tropical genera and species of corticioid fungi (*Basidiomycotina*, *Aphylllophorales*). *Synopsis Fungorum* **18**: 20–32.
- Hoang DT, Chernomor O, von Haeseler A, et al. (2018). UFBoot2: Improving the ultrafast bootstrap approximation. *Molecular Biology and Evolution* **35**: 518–522. <https://doi.org/10.1093/molbev/msx281>
- Hopple Jr JS, Vilgalys R (1999). Phylogenetic relationships in the mushroom genus *Coprinus* and dark-spored allies based on sequence data from the nuclear gene coding for the large ribosomal subunit RNA: divergent domains, outgroups, and monophyly. *Molecular Phylogenetics and Evolution* **13**: 1–19. <https://doi.org/10.1006/mpev.1999.0634>
- Höhnelt F von, Litschauer V (1908). Beiträge zur Kenntnis der Corticieen III. *Sitzungsberichten der kaiserliche Akademie der Wissenschaften in Wien, Mathem.-Naturw. Klasse* **117**(1): 1082–1124.
- Jang Y, Jang S, Min M, et al. (2015). Comparison of the diversity of Basidiomycetes from dead wood of the manchurian fir (*Abies holophylla*) as evaluated by fruiting body collection, mycelial isolation, and 454 sequencing. *Microbial Ecology* **70**: 634–645. <https://doi.org/10.1007/s00248-015-0616-5>
- Jia BS, Zhou LW, Cui BK, et al. (2014). Taxonomy and phylogeny of *Ceriporia* (Polyporales, Basidiomycota) with an emphasis of Chinese collections. *Mycological Progress* **13**: 81–93. <https://doi.org/10.1007/s11557-013-0895-5>
- Jung PE, Lee H, Wu S-H, et al. (2018). Revision of the taxonomic status of the genus *Gloeoporus* (Polyporales, Basidiomycota) reveals two new species. *Mycological Progress* **17**: 855–863. <https://doi.org/10.1007/s11557-018-1400-y>
- Justo A, Hibbett DS (2011). Phylogenetic classification of *Trametes* (Basidiomycota, Polyporales) based on a five-marker dataset. *Taxon* **60**: 1567–1583. <https://doi.org/10.1002/tax.606003>
- Justo A, Miettinen O, Floudas D, et al. (2017). A revised family-level classification of the Polyporales (Basidiomycota). *Fungal Biology* **121**: 798–824. <https://doi.org/10.1016/j.funbio.2017.05.010>
- Kalyaanamoorthy S, Minh BQ, Wong TKF, et al. (2017). ModelFinder: Fast model selection for accurate phylogenetic estimates. *Nature Methods* **14**: 587–589. <https://doi.org/10.1038/nmeth.4285>
- Katoh K, Standley DM (2013). MAFFT multiple sequence alignment software version 7: improvements in performance and usability. *Molecular Biology and Evolution* **30**(4): 772–780. <https://doi.org/10.1093/molbev/mst010>
- Kuuskeri J, Mäkelä MR, Isotalo J, et al. (2015). Lignocellulose-converting enzyme activity profiles correlate with molecular systematics and phylogeny grouping in the incoherent genus *Phlebia* (Polyporales, Basidiomycota). *BMC Microbiology* **15**: 217. <https://doi.org/10.1186/s12866-015-0538-x>
- Larsson A (2014). AliView: a fast and lightweight alignment viewer and editor for large datasets. *Bioinformatics* **30**: 3276–3278. <https://doi.org/10.1093/bioinformatics/btu531>
- Larsson K-H (2007). Re-thinking the classification of corticioid fungi. *Mycological Research* **111**: 1040–1063. <https://doi.org/10.1016/j.mycres.2007.08.001>

- Larsson K-H, Ryvarden L (2021). Corticioid fungi of Europe vol 1. *Synopsis Fungorum* **43**: 1–266.
- Li Y, Cao Y, Nakasone KK, et al. (2025). Species diversity, taxonomy, multi-gene phylogeny and divergence times of *Meruliaceae* (*Polyporales*, *Basidiomycota*). *Mycology*, <https://doi.org/10.1080/21501203.2024.2443216>.
- Li Y, Nakasone KK, Chen CC, et al. (2022) Taxonomy and phylogeny of *Cystostereaceae* (*Agaricales*, *Basidiomycota*): A new genus, five new species, and three new combinations. *Journal of Fungi* **8**(11): 1229. <https://doi.org/10.3390/jof8111229>
- Lira CS, Chikowski RS, de Lima VX, et al. (2022). *Allophlebia*, a new genus to accommodate *Phlebia ludoviciana* (*Agaricomycetes*, *Polyporales*). *Mycological Progress* **21**(4): 47–58. <https://doi.org/10.1007/s11557-022-01781-5>
- Liu DM, Xu YL, Li Y, et al. (2020). Two new species of *Hydnophlebia* (*Meruliaceae*, *Polyporales*) from China based on morphological and molecular evidence. *Phytotaxa* **477**: 35–46. <https://doi.org/10.11646/phytotaxa.477.1.2>
- Liu S-L, Nakasone KK, Wu S-H, et al. (2018). Taxonomy and phylogeny of *Lopharia* s.s., *Dendrodontia*, *Dentocorticium* and *Fuscocerreana* (*Basidiomycota*, *Polyporales*). *MycoKeys* **32**: 25–48. <https://doi.org/10.3897/mycokeys.32.23641>
- Lundell S, Nannfeldt JA (1941). *Fungi exsiccati suecici, praestertim upsaliensis*, Fasc. XX1–XX11: 1–51. Uppsala.
- Lundell S, Nannfeldt JA (1947). *Fungi exsiccati suecici, praestertim upsaliensis*, Fasc. XX1X–XXX: 1–61. Uppsala.
- Madeira F, Pearce M, Tivey ARN, et al. (2022). Search and sequence analysis tools services from EMBL-EBI in 2022. *Nucleic Acids Research* **50**(W1): W276–W279. <https://doi.org/10.1093/nar/gkac240>
- Manjón JL, Blanco MN, Moreno G (1989). *Odonticium monfraguense* sp. nov. *Corticaceae*. *Cryptogamie, Mycologie* **10**: 135–140.
- Michel H, Duhem B (2003). Qu'est-ce que l'*Acia squalina* Fr. sensu Bourdot? *Cryptogamie, Mycologie* **24**: 327–338.
- Miettinen O, Larsson K-H (2010). *Sidera*, a new genus in *Hymenochaetales* with poroid and hydroid species. *Mycological Progress* **10**: 131–141. <https://doi.org/10.1007/s11557-010-0682-5>
- Miettinen O, Spirin V, Vlasák J et al. (2016). Polypores and genus concepts in *Phanerochaetaceae* (*Polyporales*, *Basidiomycota*). *MycoKeys* **17**: 1–46. <https://doi.org/10.3897/mycokeys.17.10153>
- Miller MA, Pfeiffer W, Schwartz T (2010). Creating the CIPRES Science Gateway for inference of large phylogenetic trees. 2010 Gateway Computing Environments Workshop (GCE), New Orleans, LA: 1–8. <https://doi.org/10.1109/GCE.2010.5676129>
- Moncalvo JM, Vilgalys R, Redhead SA, et al. (2002). One hundred seventeen clades of euagarics. *Molecular Phylogenetics and Evolution* **23**: 357–400. [https://doi.org/10.1016/S1055-7903\(02\)00027-1](https://doi.org/10.1016/S1055-7903(02)00027-1)
- Motato-Vásquez V, Westphalen M, Gugliotta A (2022). *Phlebiodontia rajchenbergii* gen. et sp. nov. (*Polyporales*, *Meruliaceae*) from the Brazilian Atlantic Forest based on morphological and molecular evidence. *Lilloa* **59**(suppl.): 305–330. <https://doi.org/10.30550/j.lil/2022.59.S/2022.09.26>
- Nakasone KK (1996). Morphological and molecular studies on *Auriculariopsis albomellea* and *Phlebia albida* and a reassessment of *A. ampla*. *Mycologia* **88**: 762–775. <https://doi.org/10.1080/00275514.1996.12026714>
- Nakasone KK (2008). Type studies of corticioid Hymenomycetes described by Bresadola. *Cryptogamie, Mycologie* **29**: 231–257.
- Nakasone KK, Draeger KR, Ortiz-Santana B (2017). A contribution to the taxonomy of *Rhizochaete* (*Polyporales*, *Basidiomycota*). *Cryptogamie, Mycologie* **38**: 81–99. <https://doi.org/10.7872/crym/v38.iss1.2017.81>
- Nguyen L-T, Schmidt HA, von Haeseler A, et al. (2015). IQ-TREE: A fast and effective stochastic algorithm for estimating maximum-likelihood phylogenies. *Molecular Biology and Evolution* **32**: 268–274. <https://doi.org/10.1093/molbev/msu300>
- Nylander JAA (2004). *MrModeltest* v2. Program distributed by the author. Evolutionary Biology Centre, Uppsala University, Sweden.
- Paez CA, Smith JA, Nakasone KK, et al. (2024). *Parvodontia relampaga* sp. nov.: A *Cystostereaceae* fungal pathogen that is the causal agent of relampago blight of woody plants in Florida, USA. *Fungal Biology* **128**: 1758–1770. <https://doi.org/10.1016/j.funbio.2024.03.002>
- Parmasto E, Hallenberg N (2000). A taxonomic study of phlebioid fungi (*Basidiomycota*). *Nordic Journal of Botany* **20**: 105–118. <https://doi.org/10.1111/j.1756-1051.2000.tb00740.x>
- Persoon CH (1800). *Observationes Mycologicae*, vol. 2. Leipzig and Luzern (Lipsiae et Lucernae).
- Persoon CH (1801). *Synopsis Methodica Fungorum*, vol. 2. Göttingen (Gottingae).
- Ronquist F, Teslenko M, van der Mark P, et al. (2012). MrBayes 3.2: Efficient Bayesian phylogenetic inference and model choice across a large model space. *Systematic Biology* **61**: 539–542. <https://doi.org/10.1093/sysbio/sys029>
- Rosenthal LM, Larsson KH, Branco S, et al. (2017). Survey of corticioid fungi in North American pinaceous forests reveals hyperdiversity, underpopulated sequence databases, and species that are potentially ectomycorrhizal. *Mycologia* **109**: 115–127. <https://doi.org/10.1080/00275514.2017.1281677>
- Saitta A, Losi C, Ambrosio E (2017). First record of *Phlebia margaritae* (*Polyporales*, *Basidiomycota*) in Italy. *Nova Hedwigia* **105**: 37–41. [https://doi.org/10.1127/nova\\_hedwigia/2017/0398](https://doi.org/10.1127/nova_hedwigia/2017/0398)
- Spirin V, Vlasák J, Rivoire B, et al. (2016). Studies in the *Ceriporia purpurea* group (*Polyporales*, *Basidiomycota*), with notes on similar *Ceriporia* species. *Cryptogamie, Mycologie* **37**: 421–435. <https://doi.org/10.7872/crym/v37.iss4.2016.421>
- Spirin VA, Zmitrovich IV (2004). A contribution to the taxonomy of corticioid fungi. *Merulius* Fr., *Phlebia* Fr., and related genera (in Russian). *Novosti Sistematiki Nizshikh Rastenii* **37**: 166–188.
- Talavera G, Castresana J. (2007). Improvement of phylogenies after removing divergent and ambiguously aligned blocks from protein sequence alignments. *Systematic Biology* **56**: 564–577. <https://doi.org/10.1080/10635150701472164>
- Telleria MT, Dueñas M, Melo I, et al. (2010). Morphological and molecular studies of *Hyphodermella* in the Western Mediterranean area. *Mycological Progress* **9**: 585–596. <https://doi.org/10.1007/s11557-010-0666-5>
- Telleria MT, Dueñas M, Martín MP (2017). Three new species of *Hydnophlebia* (*Polyporales*, *Basidiomycota*) from the Macaronesian Islands. *MycoKeys* **27**: 39–64. <https://doi.org/10.3897/mycokeys.27.14866>
- Tomšovský M, Menkis A, Vasaitis R (2010). Phylogenetic relationships in European *Ceriporiopsis* species inferred from nuclear and mitochondrial ribosomal DNA sequences. *Fungal Biology* **114**: 350–358. <https://doi.org/10.1016/j.funbio.2010.02.004>

- Trifinopoulos J, Nguyen L-T, von Haeseler A, *et al.* (2016). W-IQ-TREE: a fast online phylogenetic tool for maximum likelihood analysis. *Nucleic Acids Research* **44**: W232–W235. <https://doi.org/10.1093/nar/gkw256>
- Tura D, Zmitrovich IV, Wasser SP, *et al.* (2011). *Biodiversity of the Heterobasidiomycetes and non-gilled Hymenomycetes (former Aphyllophorales) of Israel*. Gantner Verlag, Ruggell.
- Volobuev S, Okun M, Ordynets A, *et al.* (2015). The *Phanerochaete sordida* group (*Polyporales*, *Basidiomycota*) in temperate Eurasia, with a note on *Phanerochaete pallida*. *Mycological Progress* **14**: 80. <https://doi.org/10.1007/s11557-015-1097-0>
- Vu D, Groenewald M, de Vries M, *et al.* (2019). Large-scale generation and analysis of filamentous fungal DNA barcodes boosts coverage for kingdom fungi and reveals thresholds for fungal species and higher taxon delimitation. *Studies in Mycology* **92**: 135–154. <https://doi.org/10.1016/j.simyco.2018.05.001>
- Wang H, Zhao C-L (2020). *Hyphodermella aurantiaca sp. nova* (*Polyporales*, *Basidiomycota*) as evidenced by morphological characters and phylogenetic analyses. *Annales Botanici Fennici* **58**: 61–68. <https://doi.org/10.5735/085.058.0110>
- Wang H, Gu Z-R, Zhao C-L (2021). *Hyphodermella zixishanensis* (*Polyporales*, *Basidiomycota*), a new species with reddish hymenial surface. *Nordic Journal of Botany* **39**(8): 03329. <https://doi.org/10.1111/njb.03329>
- Westphalen MC, Rajchenberg M, Tomšovský M, *et al.* (2018). A re-evaluation of Neotropical *Junghuhnia* s.lat. (*Polyporales*, *Basidiomycota*) based on morphological and multigene analyses. *Persoonia* **41**: 130–141. <https://doi.org/10.3767/persoonia.2018.41.07>
- White TJ, Bruns TD, Lee S, *et al.* (1990). Amplification and direct sequencing of fungal ribosomal RNA genes for phylogenetics. In: *PCR protocols: A guide to methods and applications* (Innis MA, Gelfand DH, Sinisky JJ, *et al.*, eds). Academic Press, USA: 315–322.
- Wu F, Yuan Y, Chen JJ, *et al.* (2016). *Luteoporia albomarginata gen. et sp. nov.* (*Meruliaceae*, *Basidiomycota*) from tropical China. *Phytotaxa* **263**: 31–41. <https://doi.org/10.11646/phytotaxa.263.1.3>
- Wu SH (1990). The *Corticiaceae* (*Basidiomycetes*) subfamilies *Phlebioideae*, *Phanerochaetoideae* and *Hyphodermoideae* in Taiwan. *Acta Botanica Fennica* **142**: 1–123.
- Wu SH, Nilsson HR, Chen CT, *et al.* (2010). The white-rotting genus *Phanerochaete* is polyphyletic and distributed throughout the phlebioid clade of the *Polyporales* (*Basidiomycota*). *Fungal Diversity* **42**: 107–118. <https://doi.org/10.1007/s13225-010-0031-7>
- Wu SH, Wang DM, Chen YP (2018). *Purpureocorticium microsporum* (*Basidiomycota*) *gen. et sp. nov.* from East Asia. *Mycological Progress* **17**: 357–364. <https://doi.org/10.1007/s11557-017-1362-5>
- Xavier de Lima V, Lira CS, Chikowski RS, *et al.* (2020). Additions to neotropical stereoid fungi (*Polyporales*, *Basidiomycota*): one new species of *Lopharia* and one new combination in *Phlebiopsis*. *Mycological Progress* **19**: 31–40. <https://doi.org/10.1007/s11557-019-01538-7>
- Yuan Y, Ji XH, Wu F, *et al.* (2017). *Ceriporia albomellea* (*Phanerochaetaceae*, *Basidiomycota*), a new species from tropical China based on morphological and molecular evidences. *Phytotaxa* **298**: 20–28. <https://doi.org/10.11646/phytotaxa.298.1.2>
- Zhao C-L, Liu S-L, Ren G-J, *et al.* (2017). Three species of wood-decaying fungi in *Polyporales* new to China. *Mycotaxon* **132**: 29–42. <https://doi.org/10.5248/132.29>
- Zhao C-L, Qu MH, Huang RX, *et al.* (2023). Multi-gene phylogeny and taxonomy of the wood-rotting fungal genus *Phlebia* sensu lato (*Polyporales*, *Basidiomycota*). *Journal of Fungi* **9**: 320. <https://doi.org/10.3390/jof9030320>
- Zhao C-L, Ren GJ, Wu F (2017). A new species of *Hyphodermella* (*Polyporales*, *Basidiomycota*) with a poroid hymenophore. *Mycoscience* **58**: 452–456. <https://doi.org/10.1016/j.myc.2017.06.007>
- Zhao C-L, Wu F, Liu H-X, *et al.* (2015). A phylogenetic and taxonomic study on *Ceriporiopsis* s. str. (*Polyporales*) in China. *Nova Hedwigia* **101**: 403–417. [https://doi.org/10.1127/nova\\_hedwigia/2015/0282](https://doi.org/10.1127/nova_hedwigia/2015/0282)
- Zhao Y-N, He S-H, Nakasone KK, *et al.* (2021). Global phylogeny and taxonomy of the wood-decaying fungal genus *Phlebiopsis* (*Polyporales*, *Basidiomycota*). *Frontiers in Microbiology* **12**: 622460. <https://doi.org/10.3389/fmicb.2021.622460>
- Zhu XT, Li YC, Wu G, *et al.* (2014). The genus *Imleria* (*Boletaceae*) in East Asia. *Phytotaxa* **191**: 81–98. <https://doi.org/10.11646/phytotaxa.191.1.5>
- Zmitrovich IV (2018). *Conspectus systematis Polyporacearum v. 1.0. Folia Cryptogamica Petropolitana* **6**: 3–145.
- Zmitrovich, IV, Malysheva VF (2014). Studies on *Oxyporus*. I. Segregation of *Emmia* and general topology of phylogenetic tree. *Mikologiya i Fitopatologiya* **48**(3): 161–171.

